



# The Interaction Society:—

Practice, Theories and Supportive Technologies

Mikael Wiberg

# **The Interaction Society:**

## **Practices, Theories and Supportive Technologies**

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Umeå University, Sweden



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# Preface

## Introduction

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*The Interaction Society* is evolving literally as we speak. New information and communication technologies (ICTs) are developed every day to enable us to communicate and interact in new ways never imagined just a few years ago.

This book about the *Interaction Society* builds upon, and around, one single observation of today's IT use. The observation is that there is an ongoing broadening of the use of information technology (IT) that traditionally has been applied for calculations, transactions, storage of data, etc., into new areas more closely related to human communication and interaction needs. So, while the computer of yesterday was occupied with crunching numbers, today and tomorrow's technology will be occupied with maintaining our social contacts with one another. It is sometimes said that a loved baby has many names. That is also true for this new technology that has already been commonly labeled as, e.g., ICT (information and communication technology), social belonging technologies, awareness technologies, groupware, and community support.

Twenty-two researchers from around the world have contributed with thirteen interesting chapters to this new book about this evolving technology-enabled Interaction Society. The chapters are grouped into three different areas covering various aspects of this phenomenon ranging from: 1) empirical case studies that illustrate how people uses this technology in novel ways to interact, 2) theories and models that help us analyze and better understand the impact this technology has on us as individuals, as well as the impact it has on an organizational as well as a societal level of analysis. Finally, the last section of this book lets us look around the corner to see what the researchers are up to when it comes to supporting future every day human interaction one to ten years from now.

## How To Read This Book

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This new book is a book about a new technology-enabled society in the making. It is emerging literally as we speak, because this book is about the Interaction Society, i.e., a society where modern information technology plays a central role in supporting all various kinds of human interaction including, e.g., human-to-human voice communication, human-machine interaction, mass communication, long-distance synchronous and asynchronous communication, etc. In particular, this book is about information technology (IT) or information and communication technologies (ICTs) that enable us as humans to communicate or interact with one another in ways not possible just a few years ago.

The book consists of three parts. These three parts can be read independent of each other, but also of course as a single book from the first page to the last. The first part, or segment of the book, is labeled “*Practice.*” This first part introduces the reader to this emerging Interaction Society by providing a set of illustrative case studies that specifically, and from an empirical standpoint, provides valuable examples of how modern information technology can support new ways of interaction. The second part of the book is labeled “*Theories.*” This second part of the book takes on a more conceptual, analytical, and theoretical perspective in an attempt to bring out and provide some answers to questions like, e.g., what characterizes the Interaction Society? How does it differ from the “information society” typically, and commonly, discussed in the literature? And, how might the very concept of “interaction” be defined and how does it relate to concepts like “communication?” Further on, this second part of this book provides some analytical frameworks and analytical tools for going about analyzing how modern information technology enables the Interaction Society and which issues it puts in the foreground. Finally, the third part of the book is labeled “*Supportive Technologies.*” This part is devoted to the advancing of and research into designing new IT support to enable us to, in the near future, be able to communicate in even more sophisticated and novel ways than ever imagined before. In contrast to the first part of the book, which provides some good examples of already available technologies and how these implemented and adopted technologies enables us to communicate and interact in new ways, this third part of the book lets us take a look around the corner to see what the future holds for us. Shortly speaking, it is about the cutting edge of the emerging Interaction Society in the making.

Each of these three parts of the book is first introduced with a short preface that introduces the scope and perspective taken by the contributing authors of the part before each individual chapter is introduced.



## **The Audience of the Book**

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This textbook is for undergraduate and master's students from a range of backgrounds studying classes in Human-Computer Interaction (HCI), Computer-Supported Cooperative Work (CSCW), interaction design, Computer-Mediated Communication (CMC), etc. A broad range of professionals, hardware and software developers, and technology users will also find this book useful, and so will graduate students who are moving into this area from related disciplines.

## **The Value of This Book and Its Main Contributions**

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The uniqueness of this book is twofold. First, it is the first book published with an explicit focus on the *Interaction Society* rather than focusing on the *Information Society*. Second, its main contributions are that it provides both technical and social aspects of the Interaction Society, as well as critical analysis of the obstacles for work in the Interaction Society together with theories and models of how all these aspects might be understood, explained, and even predicted. This is a book about how new interaction technologies enables this society, and how the use of this technology affects the individuals, groups and organizations within our modern society. Yet another uniqueness of this book is that it highlights the importance of *mobility* in relation to interaction and technology. Finally, what makes the book unique is that it manages to combine technological and social details with theoretical and analytical deepness and strengths. With this broad approach taken to the subject it is hopefully an interesting book both for the academic world as well as for system developers of new interaction technologies, and ordinary users of these new services, technologies and gadgets.

While there has been some related books published that touches upon, e.g., how this technology enables new ways of working (i.e., “networking work” or “the work in the network”) they have in some cases at the same time “black boxed” the technology part of it. Contrary to this, the attempt in this book is to take a close look both at the enabling technology *per se* and also on how the role of IT has changed from being, e.g., a tool for advanced calculations, a word processing device, an efficient method for storage and processing of data, and an effective machine for transactions, to being an enabler and augments of human-to-human-interaction and human-computer interaction.

## **The Structure of This Book**

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The book consists of a collection of chapters that relate to three overall aspects of the Interaction Society. The three parts are labeled (1) “*Practice*,” covering empirical case studies that illustrates the use, impact and consequences of interaction technologies on collaboration, individuals, and organization of work (2) “*Theories*” and models that aim at describe and analyze how these new technologies challenges our assumptions made about human communication in general, and (3) “*Supportive Technologies*” that illustrate novel ways of enabling good technical support for communication and collaboration in the area of interaction, together with careful analysis of user requirements on such systems.

For each part in the book four chapters are included to cover that specific aspect of the Interaction Society. The chapters provide not only analytical deepness, but also valuable contributions to current research in the field. Further on, the different chapters provide a somewhat rich overview of the problems and challenges identified in relation to the Interaction Society. According to this the structure of the book is as follows:

The first part of this book, entitled “Practice,” takes on an empirical approach to the Interaction Society. In this section various empirical studies and cases are presented that help us understand what is going on out there, i.e., how this new technology to support interaction is, in many different areas, already widely adopted and put into everyday use. The section is first introduced with a short preface entitled “*Stepping Out into the Fluidity of Interaction*” by the author of this book that aims at setting the scene for the chapters included in this first part of the book.

The second part of this book, entitled “Theories,” takes on a more theoretical perspective on the Interaction Society. In this section, various discussions concerning the basic concepts like “interaction,” “communication,” “collaboration,” and “coordination” are presented. The contributing chapters in this second section also contain models and theories developed to help us to better understand, analyze and even predict the role and impact of modern information and communication technologies on us as individuals, social groups, organizations and on our society. Overall, the purpose of this section is thus to provide some analytical tools for helping us to better understand computer-supported, and mediated, interaction. The second section of this book is thus first introduced by the author of this book with a short preface entitled “*Making Sense of Technology-Enabled Interaction.*”

Finally, the third part of this book, entitled “Supportive Technologies,” is devoted to the future of interaction technologies. Here, research efforts made to realize novel applications and gadgets designed to support interaction are pre-

sented as well as research that aims at identifying new requirements for interaction technology design. This final section of this book is first introduced by the author of this book with a short preface entitled “*Let’s Head for the Future of Interaction Technologies.*”

Next follows a brief introduction of the contributing chapters. As the following short descriptions of each chapter will show, the chapters in this book cover many different empirical cases where information technology is used to support interaction, various approaches to, or methods for, conducting studies of technology-enabled interaction, a wide range of ways of interpreting and understanding computer supported interaction, and several possible directions for future development of technology in this area. Clearly, the Interaction Society is a new society in the making, literally as we speak.

## Practice

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In **Chapter 1**, “*The Emerging Interaction Society*,” **Mikael Wiberg** (ed.) sets the scene for the book by introducing the book’s focal scope, i.e., the evolving Interaction Society. In this introductory chapter, the editor of this book first provides a definition of the concept of interaction and how it relates to the concepts of communication and collaboration. He then introduces a number of components that enables the Interaction society. Having outlined the basic building blocks of this he then points at some challenges for future research within this area before concluding the chapter by presenting the structure for the rest of the book followed by a brief introduction of each and every other chapter in this book.

In **Chapter 2**, “*Email: Message Transmission and Social Ritual*,” **Eileen Day** considers the implications of what it means to be moving towards an Interaction Society. In her research into intra-organisational email illuminates some of the inherent social complexity and the subtle nuances of its use within organisational life. According to her research a range of significant insights emerged through a deep hermeneutic understanding of the ways that people within the study were constructing email as an everyday part of their workplace. As a consequence, Eileen Day presents us with a new concept, *message web* to encapsulate the social interaction and human sense-making activities around email in association with its technical capabilities as daily life is being played out within organisational cultures today. In this chapter, Eileen Day tells an ethnographic story concerning just one strand of the case study organisation’s message web: the copying function of email. And being an ethnographic story, she has also embedded reflective glimpses of her research processes.

In **Chapter 3**, “*Social Exile and Virtual Hrig: Computer-Mediated Interaction and Cybercafé Culture in Morocco*,” **Said Graiouid** explores ways in

which computer-mediated interaction and cybercafé culture are appropriated by individuals and groups in Morocco. In this chapter it is argued that computer-mediated communication mediates the construction of cybernetic identities and promotes the rehearsal of invented social and gender relations. This inventive accommodation of the Internet (known among young Moroccan Net communicants as ‘virtual *hrig*’) makes computer-mediated interaction, especially through the discursive forum of chatrooms and e-mail discussion groups, act as a backtalk to dominant patriarchal and conservative power structures. By using a qualitative ethnographic approach while sounding the depth of the “cultural noises” and incrustations, which are accompanying the expansion of cyber culture, the author also hopes to foreground the prospective implications of New Media and Information Technologies in a non-Western environment. While it is too early to draw conclusions on the extent of the impact of new media technologies on individual subjectivities and group identities, the point is made that cyber interaction is contributing to the expansion of the public sphere in Morocco.

In **Chapter 4**, “*Keeping Track of Notes – Implications for Mobile Information and Communication Technology in Homecare Practice*,” **Carljohan Orre** provides a case and an investigation of how a particular mobile ICT support has been used within an established practice of homecare work. The discussion in this chapter shows a perspective of how technology and practice co-evolves and gets enmeshed together. The importance of seeing the interface of either the mobile devices or the stationary computer as common information spaces is stressed, since the single-user interface the current system offers is not enough support for the collaborative activities the mobile workforce of homecare work is engaged in. The problem resides in this case in the relations to predecessors of the system, found in diaries and coordination tools. A modest suggestion posed by the author is that an understanding of the work maintaining the role of these predecessors can provide beneficial information for the future design of these technological supports.

In **Chapter 5**, “*Learning While Playing: Design Implications for Edutainment Games*,” **Kalle Jegers & Charlotte Wiberg** argue that currently, both research and practice show a great interest in studying and developing ways to use computers in various forms to support and enhance interaction between humans. The authors further argue that although the issue of human-to-human interaction by use of computers is of great relevance and importance, it is important not to forget about the interaction between humans and computers. New factors and aspects, not previously grasped by the Human-Computer Interaction (HCI) discipline, are becoming recognized as important in the interaction between users and technology. Aspects such as emotions, experiences and entertainment are more and more frequently considered when designing and developing new computer applications in many different areas. In this chapter, the authors report on the initial results of a study conducted in the project FunTain.

The main purpose with the project reported from was to identify general guidelines and implications for edutainment games, in order to guide designers of such games as they, according to the authors, often lack in design guidelines. In the project reported from in this chapter usability evaluations were conducted on an edutainment game in order to identify usability problems. These findings were analyzed and used as input in focus group meetings, held with joint teams of game designers and HCI experts. The outcome of the focus groups was a proposal of a list of ten general design guidelines. Findings indicate that users had problems in understanding the underlying model for the game as well as identifying the knowledge-related content. Experts, further, gave comments about feedback problems and different types of consistencies. Some of the implications from the findings are guidelines for earning and losing points, scoring and performance feedback and game object characteristics.

## Theories

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In **Chapter 6**, “*Informational and Communicational Explanations of Corporations as Interaction Systems*,” **Richard J. Varey** argues that whilst many proponents of “interactive communication” and “social interaction” do not see the concept as problematic, they focus attention on practices. In this chapter, Richard Varey chose to re-examine both “interaction” and “communication,” and to relate these concepts to the concepts of society and organization/corporation. In this chapter, the concept of “interaction” is examined and social interaction is considered as exchange. The patterning of social interaction in markets, bureaucracies, solidarity groupings, and co-operative collectives, and their respective core values are considered. The “organization” is explained as a complex dynamic interaction system. An alternative sociological analysis of the social is then compared with that of the social psychology tradition. Communication is discussed as a mode of interaction, to reveal monologic and dialogic conceptions of communication. In the end of the chapter conclusions are raised around the themes of “interactive communication,” IT, and dialogue and appreciation in a society constituted by interaction. Interaction, it is concluded, requires presence, whereas ICT allows absence.

In **Chapter 7**, “*Fluid Interaction in Mobile Work Practices*,” **Masao Kakihara, Carsten Sørensen & Mikael Wiberg** discuss the increasing fluidity of interaction that workers perform in contemporary work settings. According to the authors, everyday working life is increasingly constituted of a heterogeneous *mélange* where people, work objects and symbols as well as their interactions are distributed in time, space and across contexts. When considering interaction where participants, work, and interactional objects are mobile, the challenges of supporting the fluidity of interaction in collocated settings are immense. This chapter outline *mobile interaction* in terms of the fluid

topological metaphor and analyses the dimensions of struggling with fluid mobile interaction based on a framework characterising interactional asymmetries.

In **Chapter 8**, “*Mobile IT as Immutable Mobiles? Exploring the Enabling Qualities of a Mobile IT Application*,” **Jonny Holmström** explores the social consequences of mobile IT. In this chapter it is argued that even though the need for better theorizing on the topic has been highlighted recently, most attempts to date have failed not only to properly explore the social consequences of mobile IT, but also in being specific about the technology itself in any detail. Further on, the author argues that a promising approach with which to explore mobile IT and its social consequences may be found in actor network theory (ANT). ANT’s rich methodology embraces scientific realism in its central concept of hybrids that are simultaneously technological and social. The advantages of conceiving mobile IT applications immersed in and a part of a network of hybrids are explored by drawing from a project concerned with mobile IT use in the context of the mobile bank terminal (MBT). In the project reported from in this chapter it was found that the users were less than enthusiastic over the MBT, and two key problems were identified: First, the poor design of MBT hampered the possibilities for ad-hoc activities. Second, the users felt that ad-hoc activities could be seen as somewhat irresponsible in the context of banking business. To this end, the problems related to the MBT use were both social and technical. The author concludes this chapter by identifying and elaborating on some aspects of the social consequences of mobile IT use in order to shed new light on the possibilities and challenges that mobile IT use conveys.

In **Chapter 9**, “*Supporting Proximate Communities with P3-Systems: Technology for Connecting People-to-People-to-Geographical-Places*,” **Quentin Jones & Sukeshini A. Grandhi** examine systems that link **People-to-People-to-geographical-Places**, which the authors label P3-Systems. In this chapter four major P3-Systems design approaches have been identified by an analysis of systems prototyped to date: (1) People Centric P3-System design that use absolute user location, based on awareness of where somebody is located (e.g., *Active Badge*); (2) People Centric P3-System design based on user co-location/proximity (e.g., *RoamWare*, *FolkMusic* and *Hocman*); (3) Place Centric P3-System design based on the use of virtual spaces that contain representations of user’s use of physical spaces (e.g., *ActiveMap*); and (4) Place Centric P3-System design based on the use of virtual spaces that contain online interactions related to physical location (e.g., *Geonotes*). This chapter explores how proximate community member interactions can potentially be well supported by P3-Systems through the improved geographical contextualization and coordination of interactions and the identification of previously unidentified location-based affinities between community members.

## **Supportive Technologies**

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In **Chapter 10**, “*The Mobile Workplace: Collaboration in a Vast Setting*,” **Daniel Normark & Mattias Esbjörnsson** discuss how truly mobile occupational groups relate to locations in a vast working area when collaborating with each other. It brings forth two ethnographic studies on mobile professionals working on the roads. According to the authors of this chapter, their work setting has predominantly been described from a perspective where they are isolated in the drivers’ seat. However, seeing that the environment in which they drive through constitutes their workplace, the chapter examines their relation to the surroundings when performing their tasks. The empirical data illustrates the importance of mutual understanding of locations to successfully perform collaborative tasks. For example, coordinates supplied by a GPS-receiver are not sufficient in the performance of their tasks. It is rather the mutual understanding of locations, being in proximity, or other visual clues, which are of importance. The authors argue the need for a detailed understanding regarding the use of locations, to succeed in the development of future mobile position-based services.

In **Chapter 11**, “*Spectator Information Support: Exploring the Context of Distributed Events*,” **Andreas Nilsson, Urban Nuldén & Daniel Olsson** argue that, in the context of temporary, distributed events such as music festivals and sports, the event is divided in several parts held at different geographical locations at the same time or in a sequence. Thus, the conventional technology used can only provide limited support at portions of the event. This research as reported in this chapter focuses on the challenges for design concerning information support in the context of distributed events. The chapter reports from three empirical studies and applies two perspectives on context as a background to the fieldwork findings. Within the results, three main contextual requirements are presented that need to be considered when designing information support for spectators *in situ*. The chapter contributes to existing research in terms of providing descriptions of the interplay between actors, context and the event itself. Among the conclusions regarding design, the authors of this chapter claim that technology should be shaped to behave and act according to how, where and with whom spectators are situated.

In **Chapter 12**, “*SeamlessTalk: User-Controlled Session Management for Sustained Car Conversations*,” **Ola Henfridsson, Mikael Wiberg, Rikard Lindgren & Fredrik Ljungberg** report from a research project focused on designing a new innovative ICT application to support mobile interaction. More specifically, the authors of this chapter approach the problem of how to realize sustained car conversations across mobile phones and in-car phone resources and, in doing so, they frame it as a session management problem. Addressing this problem, the chapter outlines a session management model for user-con-

trolled media switches during ongoing phone conversations. The model makes a distinction between the user and the infrastructure levels of session management. To illustrate and validate the rationale of the model, the chapter presents an in-car mobile phone hands-free system, SeamlessTalk, developed to support sustained car conversations. The authors argue that their developed user-controlled session management model contributes to current research on session management by addressing the explicit/implicit session management dichotomy in multiple media situations.

In **Chapter 13**, “*Guiding Design for Waiting*,” **Johan Lundin & Lina Larsson** propose a number of suggestions for design of information technology (IT) to be used in public places. The design implications given are based on an exploratory field study conducted in public places where people wait to travel. The study shows that the use of technology must be negotiable and adaptable to support use in different ways, in different contexts and to produce a possibility for others to understand this use. The findings are arranged in three areas: *creating privacy* (how people act to establish privacy in the public place), *adapting to change* (how people adapt to social, spatial and temporal changes in the environment), and *appearance and activity* (how people make efforts to communicate activities to others present in the public place). Each of these areas has aspects that affect the use of IT. Thus they should also influence the design of IT. Based on these findings, they derive implications for design of IT to be used in public places.

This book ends with a few **concluding remarks** by the editor of this book. Overall, the editor concludes that interaction *per se* is something fundamental to us as humans and therefore a natural and sometimes necessary part of many of our everyday activities. Due to this it is not a surprise that the different chapters in this book span across so many seemingly disparate settings. Rather, interaction is ubiquitous and a core aspect of us as humans and, as such, it is easy to understand why so many current attempts on supporting interaction rely on the two most widespread and established technological infrastructures of the modern society as mentioned in the introduction to this book, i.e., the Internet and the mobile phone network because, as of today, a lot of social interaction takes place on the Internet in different online forums, chat rooms, bulletin boards, communities, news groups, discussion lists, via email discussions or maybe as instant messaging conversations, and on the other hand, one of the most widely adopted technologies to support human interaction in the wild is the mobile phone, which makes sense since another core aspects of us as humans besides our needs and willingness to interact is that we are mobile, sometimes in motion and some other times just located at some place waiting to catch a bus, or standing maybe in a line to a rock concert. Finally, the editor of this book highlights the importance of understanding the temporal aspects of



the interaction landscape that these new technologies enable. Conversations with others do not exist in a vacuum having a clear starting and stopping point. Rather, conversations are ongoing and have both a history and a future. This continuity of interaction should therefore always be a focal issue when designing new technologies for the interaction society.

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**March 2004**



## Chapter I

# Introduction – The Emerging Interaction Society

Mikael Wiberg  
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## Introduction

---

Recently it has been argued that there is a need for computer science, and related fields of research, to shift its focus from user tasks, their requirements, applications or computing, to issues concerning interaction, mutual awareness, and ubiquity (e.g., Dourish, 2001). Overall, it is a shift from the *Information Society*, with its focus on information, storage and processing of data and transactions, to the *Interaction Society*, with related issues including, e.g., work as *ongoing and fluid networks of connections* (Sroull & Keisler, 1998) interaction overload (Ljungberg & Sørensen, 2000), interaction management (Whittaker et al., 1997), contact management (Whittaker et al., 2002), session management (Edwards, 1994), time management, etc. This general shift has also highlighted the need to acknowledge issues such as attention management in relation to the fluidity of work (e.g., Hudson et al., 2002; Davenport & Beck, 2001).

As acknowledged by Boden (1994), interaction is really the glue that builds up the modern organisation:

*“The structuring properties of the interaction order in real-time settings such as meetings have enormous (and as yet largely ignored) consequences for the overall structuring of organizations. Caught in a meeting and connected through a series of interactions across time and space are the people, ideas, decisions, and outcomes that make the organization” (Boden, 1994, p.106).*

With *interaction* and its related issues in mind, several empirical studies have been conducted with a specific focus on the characteristics of informal, lightweight, and opportunistic interaction and its implications for design of technology to support interaction (e.g., Whittaker et al., 1994; Wiberg, 2001a; Dahlberg et al., 2000). Together with the issue of *interaction* there is also the issue of *interruptions* and inappropriate times for interaction. Recent empirical work place studies (e.g., Hudson et al., 2002) have, for example, shown that people spend a lot of their time in settings where their ability to respond to incoming interaction requests are very limited.

The overall objective of this book is to provide its audience with a rich overview of this emerging *Interaction Society* enabled by new information and communication technologies (ICTs), such as mobile phones, PDAs, and pagers, and applications such as email and chat clients, instant messaging systems, video conferencing systems, and different kinds of alert- and notification systems.

## **A New Computer Supported Society is Emerging**

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A digital layer on top of our traditional society is emerging, i.e., a digital layer to the extent that modern information technology is used almost everywhere in today's society to support all various kinds of new technology-enabled human activities not possible to perform without the technology. Some researchers in the field have characterized the relation between these human activities and the enabling technologies in terms of IT dependencies where new human actions couldn't have been realized without the new technology (e.g., Nordstrom, 2003). One simple example of technology that has fast become widespread and adopted broadly over the whole human population is the mobile phone. With this small device a person can interact with somebody else independent of the geographic distance between them, and independent of their respective

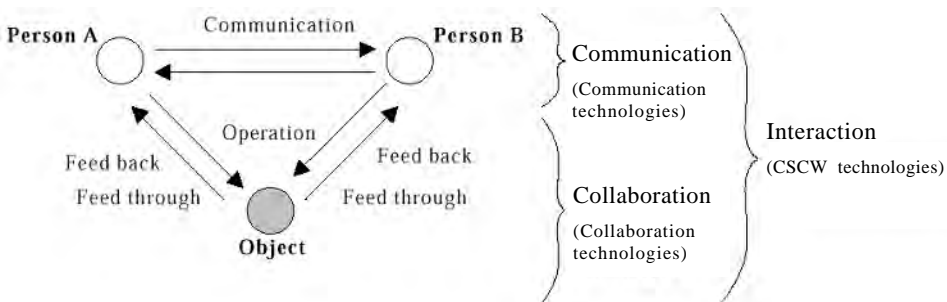
locations. Clearly this kind of new interaction device enables us to interact in new ways, and we would have some difficulties living without them today.

Before moving forward any farther, the very concept of “*interaction*” might need some clarification. Below I will therefore try to define this term in relation to the concepts of communication and collaboration.

The concepts of interaction and interaction support can be defined in relation to the concepts of communication and collaboration (Ljungberg, 1999). According to Dix & Beale (1996), communication is the exchange of information between people, e.g., video conferencing. Collaboration is when two or more people are operating a common object (or artifact), e.g., co-operative authoring where the shared document is the common object. In collaboration, operations produce “feedback” to the operator, but also “feed through” to co-workers. Support for collaboration is sometimes combined with support for communication, e.g., a collaborative authoring system (collaboration) equipped with a chat feature (communication). In the context of this model, communication and collaboration can be conceived as subsets of “interaction.” As suggested by Ljungberg (1999) we can use “CSCW technologies” to frame the technological support for interaction, i.e., communication technologies and collaboration technologies (see Figure 1).

According to Figure 1, mobile interaction, which is a major component of the Interaction Society, can thus be defined as communication and collaboration around a shared object in a mobile use context, e.g., talking with somebody over a mobile phone while walking around on the deck on a big ship.

*Figure 1. Definition of interaction and interaction support and how it relates to the concepts of communication and collaboration (Ljungberg, 1999; based on Dix & Beale, 1996)*



## New IT Use: From Calculation to Communication

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While the computer of yesterday was occupied with crunching numbers, today and tomorrow's technology will be occupied with maintaining our social contacts with one another. The computers of yesterday were commonly labeled as "information technologies," "IT" or "IS" (i.e., Information Systems). Now it might be a good idea to reinterpret this "IT" acronym. Due to the more social focus of modern IT use it might be more appropriate to talk about IT in terms of "Interaction Technologies" as a general label for what this technology does for us on a social level.

To be social is something very fundamental to us as humans and therefore it is quite easy to understand why these new technologies and devices to support human communication have so rapidly become adopted on a widespread basis. It is sometimes claimed that a loved baby has many names. That is also true for this new technology that has already been commonly labeled as, e.g., ICT (information and communication technology), social belonging technologies, awareness technologies, groupware, and virtual community support. These technologies appear nowadays everywhere and are used by a broad population ranging from adults to teenagers to children.

One important aspect of this new kind of IT use is the difference in the purpose of the technology, i.e., to support various kinds of social activities instead of supporting, e.g., advanced calculations. Another difference is in its use patterns. While computing in the 1970s was about several persons working together around *one* single machine to make *it* produce an *exact* result, today's computing is about *several* persons interacting with *each other* via *several* computers and, as such, *it* enables them to maintain and develop their social networks. Here, it becomes clear that also the *role* of the technology has changed from being in the frontline of our attention to now becoming a more pervasive technology that enable us to do new things without directing our attention to the technology *per se*. How many people think about how the phone operates "under the shell" while they are having a phone conversation?

There are several factors that together enable the *Interaction Society* including not only the new technical devices such as pagers, mobile phones and BlackBerries (i.e., mobile email devices, see Figure 2), but also, e.g., the underlying infrastructures (e.g., the Internet and the mobile phone network), new interaction modalities, new applications and services, and maybe fore-

Figure 2. Two different BlackBerry mobile email devices



most, new use patterns and new emerging behaviors due to the adoption of these technologies.

In the next section we go through these different enabling factors and take a closer look at a few of the new behaviors that have started to arise around these interaction technologies.

## **Enabling Components for the Interaction Society**

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As stated in the previous section, the *Interaction Society* is enabled by several factors including, e.g., mobile devices, new applications, technical infrastructures, etc. These are all important factors that enable this new society to become a reality. Then, on top of these technologies, new use patterns and behaviors are emerging around these technologies. In this section the enabling technologies are first presented followed by a brief introduction of some new human behaviors that have already started to grow out of this new kind of IT use.

## **Interaction Infrastructures for the Interaction Society**

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From a technical viewpoint, the Interaction Society is mainly enabled on top of two major and global technical platforms, i.e., 1) *the telephone network*,



(including mobile networks for voice and data communication), and 2) *the Internet*. These two platforms enable people who are geographically dispersed to communicate across the globe independent of the distance in between them. The telephone network enabled people to synchronously talk to one another. On the other hand, Internet enabled for more sustained interaction and enabled people to more or less asynchronously communicate via email, chat rooms, virtual communities, discussion forums, bulletin boards, etc. Today, these two platforms are now melting together into one global communication network where people can communicate with each other across these two previously separated infrastructures. A good example of the melting of these two platforms is the now growing market for IP telephony where the Internet is used to enable Internet users to make voice calls to other persons on the telephone network.

So, clearly these two platforms enable computerized interaction support. But, in order to reach the user and enable him or her to start to interact there are several additional components needed. Below some of these components are presented.

## **Interaction Devices**

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On top of the telephone network and the Internet infrastructure several new interaction devices have been developed to enable us to communicate at anytime, and from almost any location. Today, these technologies no longer tie us to the desktop or the office environment. Rather, the modern interaction devices are *mobile*, thus enabling us to take advantage of them in any preferable place and whenever we want to. From that perspective the technology has finally become ubiquitous and an integrated part of our lives (and not just an integrated part of our office environment). From a perceptual perspective, one of the most visible sign of today's Interaction Society might be the widespread adoption of mobile phones<sup>1</sup>, and the second most visible sign of how computers are entering our everyday lives might be the widespread adoption of laptop computers and the everyday increasing numbers of Internet accounts<sup>2</sup>.

However, it is not only laptop computers and mobile phones that count as interaction devices, and it has not only been efforts made on bridging *long distances* between geographically dispersed persons (like enabling communication over the Internet between different countries, or via the telegraph or the modern mobile phone), but there has also been efforts made on developing

mobile devices to bridge *quite short distances* (i.e., the walkie-talkie supports one-to-one voice communication over two to three kilometers).

There have also been some efforts made on supporting human interaction across *really short distances*. One such example is the Japanese LoveGety (see Figure 3). The LoveGety is a matchmaking device that communicates with co-located devices in the near proximity of its user, i.e., around 10 meters. Owners can set the device to show display lights according to whatever mood they are in (there are only three): “let’s just chat,” “let’s go sing some karaoke,” or the “Get together” mode. The idea is to bring the device to, e.g., a night club or other social situation where others are equipped with similar devices and then do a virtual hide and seek until you find somebody that matches your distributed profile. When one LoveGety detects another of the opposite sex within range, it beeps and flashes green if both are in the same harmonious mode, and red if the opposite user is sending out a different mode.

In fact, there is a lot of research going on today that focuses on interaction support for co-located communities similar to the basic idea behind the commercial LoveGety device (e.g., supporting social gatherings and groups at fairs, conferences, rock concerts, etc.). During recent years several research prototype devices have been developed to support, e.g., mobile group awareness [i.e., the Hummingbird device (Holmqvist et al., 1999)], *ongoing mobile interaction* [i.e., the RoamWare system (Wiberg, 2001b), see Figure 4], *mobile meetings* [i.e., the ProxyLady system (Dahlberg et al., 2000)],

*Figure 3. A picture of two LoveGetties (to the left a female device and to the right a male device)*



*Figure 4. Two pictures of the RoamWare system (The first picture (left) shows the RoamWare device with a connection cable to allow for synchronization of data between the RoamWare device and a PDA or a PC. The second picture (right) shows a use situation where two persons are wearing the devices on their belts in a mobile meeting.)*



*mobile co-located communities* [i.e., the Memetags system (Borovoy et al., 1998)], or even *mobile folklore* [i.e., “iBalls” (Borovoy et al., 2000)].

Figure 4 shows two pictures of the RoamWare system. The RoamWare system allows its users to keep a dynamic contact list that is automatically generated depending on who they meet during the day. This contact history can then be used to, e.g., send group emails, send meeting invitations or initiate a teleconference session with a group of persons that the user has just met, e.g., during a business lunch, a seminar or any other social activity where people gather together at the same physical place. As seen in the pictures in Figure 4, the RoamWare device does not have a graphic display, nor does it have any tiny keyboard or any other input modality. Rather, this is a “background technology” or a *calm technology* (Weiser & Brown, 1996) that is designed to only operate in the background of its user and let the user focus his or her attention the social context rather than on the mobile device *per se*.

Recently there have also been some commercial interaction devices developed with the same focus on supporting co-located groups and social gatherings. One such example is the Spot-me device (<http://www.spotme.ch/spotmeinfo.html>). As shown in Figure 5, the Spot-me device is a small mobile device that communicates over radio with other co-located Spot-me devices in the close vicinity of its user. This device is intended to function as an “ice-breaker technology” at conferences or other social gatherings. Using this

Figure 5. The Spot-me device (left) and a screenshot of the social radar (right)



device, the user can, amongst other things, search for other Spot-me users or use the “social radar” function (Figure 5, right).

The radar function displays the photos and details of all people standing up to 30 meters away (and the range can be altered between one to three meters, seven-20 meters, and 20-30 meters). This functionality provides a completely new way to discretely decide whom to meet during coffee, to personally identify the people sitting nearby at lunch, or to look up forgotten names according to the manufacturer.

Besides these more or less “extreme” interaction devices developed, there has also been a lot of effort made today on developing all various kinds of additional hardware and add-ons to mobile phones to enable us to communicate more easily and in totally new ways using, e.g., our mobile phone digital cameras and video recorders, chat boards, (i.e., tiny SMS/MMS keyboards that can be attached to a mobile phone), digital pens, ringer notification pens, etc.

## **Interaction in the Wild: Wireless Networking & Mobile Computing**

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As the previous section has illustrated, mobile computing and wireless networking are two components that enable the Interaction Society. These two technologies make us more or less independent of the current location. With wireless and mobile technologies we can bring the technology along and communicate with anyone, from any desired location, no matter if you are sitting in your office or gone hiking “in the wild.”

Although wireless networking and mobile computing are often related, they are not identical as Table 1 illustrates. In this  $2 \times 2$  matrix we see a distinction

*Table 1. Mobile vs. wireless diagram (based on Tanenbaum, 2002)*

		Mobile	
		No	Yes
Wireless	No	Desktop computers in offices	A notebook computer used in a hotel room
	Yes	Networks in older, unwired buildings	Portable office; PDA for store inventory

between fixed wireless and mobile wireless. Even notebooks computers, or laptops, are sometimes wired. For example, if a traveler plugs a notebook computer into the telephone jack in a hotel room, he or she has mobility without a wireless network (Tanenbaum, 2002).

On the other hand, some wireless computers are not mobile. An important example is a company that owns an older building lacking network cabling, and which wants to connect its computers without having workmen put in cable ducts to wire the building which also might be a much more expansive solution (Tanenbaum, 2002).

In summary, the wireless technologies make us more independent in that we can now unplug the wires to our machines. Also, the fact that our computers are now quite small, lightweight and movable (i.e., mobile) enable us to bring our computers along wherever we want to go.

A good example of a combination of mobile computing and wireless networking is the mobile phone. The mobile phone is in fact a small mobile computer (i.e., a carry on mobile computational device) with a wireless network connection. Today, the mobile phone has evolved into a quite personal device and, as such, it comes in a lot of different forms with different functionality. However, although the form of the mobile phone and some added functionality might vary a lot from one phone to another (for an example of the difference in

*Figure 6. Three Nokia mobile phones (left) and three Ericsson mobile phones (right)*

the shape of modern mobile phones see Figure 6), they are all built to support one fundamental human activity, i.e., human-to-human interaction.

## **Applications for Interaction or Interaction Software**

It is not solely the wireless networks, the Internet infrastructure, or the mobile interaction devices that enable the Interaction Society. Another important enabling component for the Interaction Society is the wide adoption of various new applications for interaction or “interaction software.”

Already in the early 1990s people started to, on a widespread basis, use computers to support their everyday communication needs. The most common application for Internet communication around 1994-95 was email, which is still the most widespread channel for Internet communication today, 10 years later<sup>3</sup>. Besides email, it was quite common, and still is, to discuss issues and interact over the Internet via Newsgroups, various kinds of discussion forums, as postings on public virtual bulletin boards, or via different kinds of open chat rooms.

A couple of years later, or more precisely in 1996, the first instant messaging system called ICQ (“I Seek You”) was released<sup>4</sup>. With this piece of software installed, people can send short messages to each other in a peer-to-peer fashion.

The ICQ client had, and still has, one big difference from the email systems. The design of ICQ was centered around the *buddy list*, i.e., a dynamic contacts list that continuously and synchronously shows who is currently online, whereas the email system was centered around the list of messages sent and received and ways of storing messages in different folders, etc.

Another central aspect of ICQ was that since it was focused on maintaining social contacts and the focus was set on the persons and the maintaining of the person’s social network rather than on the messages *per se* a typical ICQ session typically includes many short messages (almost like post-it notes) sent back and forth between two persons in a chat-like fashion (i.e., almost synchronous interaction) rather than being like email conversations where people sometimes send several pages long messages. In fact, already in 1994 a research project at AT&T Labs Research conducted some experiments with a system called TeleNotes (Whittaker et al., 1997) that was designed to support brief ICQ-like interactions over a network across any geographical distance.

The original idea behind ICQ was quit simple, but totally in line with the central claim in this book, i.e., that one of the foremost things that people want to do with the technology today is to communicate with one another. As stated on the ICQ website:

*“ICQ Inc., the successor of Mirabilis Ltd. was created when America Online acquired all Mirabilis’ assets on June 1998. Mirabilis was founded in July 1996 when four young Israeli avid computer users established a new Internet company. Yair Goldfinger (26, Chief Technology Officer), Arik Vardi (27, Chief Executive Officer), Sefi Vigiser (25, President), and Amnon Amir (24, currently studying), created the company in order to introduce a new way of communication over the Internet. They observed the fast deployment of the World Wide Web which was propelled by the mounting popularity of surfing and browsing, and watched the growing number of people interacting with web servers. They realized, however, that something more profound was evolving under the surface. Millions of people have been connected to one huge world wide network — the Internet. They noticed that **those people were connected — but not interconnected.** They realized that if one missing component would be added, all these people, in addition to **interacting with web servers, would be able to interact with each other.** The missing link was the technology which would enable the Internet users to locate each other online on the Internet, and to create peer-to-peer communication channels, in a straight forward, easy, and simple manner. They pioneered this technology, that way opening a whole new industry.”*  
(<http://company.icq.com/info/icqstory.html>)

Nowadays, and in line with the development of not only the Internet infrastructure, but also the mobile phone network, people are also provided with mobile access to ICQ and similar instant messaging systems to meet the communication demands from today’s mobile users. Today, ICQ can be run on not only stationary and laptop computers, but also on PDAs and even on mobile phones using WAP (Wireless Application Protocol) or SMS. Figure 7 shows three different ways of accessing ICQ.

Of course, people also still communicate frequently using less sophisticated software than ICQ. Today, several million SMS (Short Message Service) text

*Figure 7. The three pictures illustrate three different ways of accessing ICQ (The first picture (left) shows the PC ICQ Lite client. The screenshot shows the buddylist in the middle of the interface where the user can easily see who is currently online and easily send them short messages by just clicking on a contact in the list. The second picture (middle) shows the mobile phone (WAP) interface to ICQ. Finally, the last picture (right) shows a mobile device (i.e., a Motorola chat phone) where the user can communicate with other ICQ users using simple SMS commands.)*



messages are sent everyday worldwide, and people have also during the recent year started to adopt the new format MMS to send short texts, sound clips, and digital photos to each other using their mobile phones with tiny built-in digital cameras.

Another promising area for online communication is IP telephony over the new Internet protocol IPv6. With IP telephony people can have voice communication across IP telephones, ordinary analog telephones, mobile phones and PCs equipped with IP telephony software and a headset.

A special form of IP telephony has just recently been available in the last year, i.e., IP telephony over the Internet using true P2P (peer-to-peer) technology. With this system persons can communicate in full duplex voice mode with each other independent of any central administration of the system. The system for this new kind of IP telephony is a freeware program called Skype and was released in 2003. Although it has only been around for a year it has already more than 7 million users worldwide. Skype is a free and simple software that



*Figure 8. Three screenshots of the Skype IP telephone PC client (The first screenshot (left) shows a buddy list where the green icons indicating whom else that is currently online. If the user wants to make a phone call to someone else that is currently online (e.g., to call Pamela) he or she can simply click on that person in the buddy list to initiate a call (middle). During the call (right) the user can communicate via voice and when the user wants to end the call he/she can simply push the red hang up icon.)*



will enable its users to make free phone calls from their PC anywhere in the world (see Figure 8). Skype was created by the people who developed KaZaA ([www.kazaa.com](http://www.kazaa.com)) and it uses innovative P2P (peer-to-peer) Internet technology to connect the Skype users worldwide.

Besides this P2P trend there are also a lot of research efforts taken in several new directions to support new forms of human interaction. For instance, there is some interesting research going on to design, e.g., persistent conversation systems (e.g., Erickson et al., 1999; Smith & Fiore, 2001), interaction initiation support (e.g., Wiberg, 2002), stranger interaction support (e.g., Reingold, 2003) and various kinds of awareness systems (e.g., Gutwin & Greenberg, 1996, 1998), and, e.g., ambient displays for informal social events (e.g., Ishii et al., 1998; Mankoff et al., 2003).

## **New Interaction Modalities**

Another component that has played an important role in enabling the Interaction Society is new ways of interacting *with* these new devices and software available, and new ways of putting the technology to use, i.e., new interaction modalities. The most common of these new interaction modalities is the ability to bring the technology along, i.e., the *mobility* of the technology. This has been possible due to development of better batteries, small graphical displays, tiny microprocessors, and small low-power hard disks. Another important factors in relation to these mobile devices including PDAs and mobile phones is the development of new input devices such as the touch sensitive display and the stylus pen for handwritten input.

Also, the possibility to now bring the technology along without occupying our hands is an emerging area under the name “*wearable computing*” where the basic idea is that instead of carry the devices in our hands it should be worn in, e.g., our clothes, on our back, on our shoulders or even on our head.

In line with this recent “wearable computing” trend there has been some interesting research conducted with a specific focus on what philosophical questions that this new technology realm touches upon (see, e.g., Dourish, 2001; Fällman, 2004; Lund, 2003). Amongst the most popular ideas right now is that this trend towards wearable computing, and also efforts made at realizing so-called “tangible interfaces” (e.g., Ishii & Ullmer, 1997; Brave et al., 1998) is something that very actively and directly involves not only our heads and our fingers but our whole human bodies in our interaction with and via computers. Further on this computing paradigm, where our bodies get more involved and where the augmentation of our experiences has been pinpointed as a central aspect of this phenomenon, some researchers (e.g., Dourish, 2001; Fällman, 2004) have argued that this might be best understood and approached from a phenomenological perspective. All these efforts made on involving our whole bodies (and not just our heads) in our interactions with and via computers have recently been labeled by Dourish (2001) as “embodied interaction.”

Another important part of the development of new interaction modalities is all the efforts taken to make our computers visually disappear into the surrounding; disappear and offload our perception and let us focus on the issues and activities we want to focus on instead of forcing us to focus on the technology *per se* whenever we need computer support. Here, important research has recently been conducted on how to design new interaction systems based on embedded technology, the ubiquitous computing ideal and pervasive comput-

ing paradigm, and current ideas about so-called ambient intelligence where, e.g., peripheral displays have been designed to support informal communication (e.g., Mankoff, 2003). One fundamental idea behind this “hide the computer” ideal has so far been to explore how various kinds of sensors (e.g., touch sensors, light sensors, accelerometers, etc), agents, and other context-awareness technologies (e.g., GPS positioning, WLAN triangulation, etc.) can be used in the design of new interaction technologies.

## **New Interaction Networks: Local (Spontaneous) Networks**

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A final component that enables new ways of interacting in our modern society that has just recently started to become widely adopted are various kinds of local open wireless networks of different kinds. These networks have sometimes been labeled “spontaneous” networks since they typically support ad-hoc networking, which is good if somebody wants to quickly establish a network connection for a short while or if the user is at a new location and does not know if there is any network connection available in the ether.

These spontaneous networks that open up new possibilities for people to interact in new ways include, e.g., WLANs (wireless local area networks), ad-hoc networks, Bluetooth networks, and P2P (peer-to-peer) networks.

## **New Behaviors: An Emerging Society on all Different Levels of Computer Supported Human Activities**

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The previous sections above have pointed at some important enabling components for the Interaction Society. One might think that “that’s just technology.” Technology has, however, always had an important influence on the shaping of our society and, on the other hand, our society has had great influence on the shaping of our technology and our technology use<sup>5</sup>.

The general hypothesis put forward in this book is that the current transformation from the *Information Society* as described by, e.g., Webster (2002), enabled by the *Network Society* (Castells, 1996), to the *Interaction Society*,

touches upon, and has some severe impact on several dimension of the modern world, including issues related to individuals, groups, organizations, and the society at large. It also spans across different problem areas of research related to social and cultural issues, technical issues, and theoretical challenges. It also spans across work related interaction, leisure-time interaction, and other forms of social interaction.

To just illustrate the impact of the Interaction Society in how it leads to new behaviours related to the different levels of human activities as mentioned above, we can for example see how new information and communication technologies (ICTs), and interaction applications and interaction devices have implications for *individuals* in their work environments on, e.g., how they should make up their priorities between individual tasks and interaction with others (i.e., a question of interactiveness vs. interpassiveness). In this book, Kakiyama et al. explore exactly this specific issue in more detail and in relation to the fluidity of work in organizations.

On a *group level*, or collaborative level of human activities, this transformation into the Interaction Society relates to questions concerning mutual awareness, coordination, and division of labor. While a lot of experimental research has been conducted since the mid-1980s around CSCW (Computer Supported Cooperative Work) to explore new ways of supporting groups and team collaboration with new information technologies these experimental efforts are now a reality. Today, people around the world communicate frequently over email and mobile phones, they participate in electronic meeting rooms and share documents in virtual work environments on the Web. What was once solely prototype systems have now left the research labs and are now available everywhere. One such example is, as mentioned in the previous section, ICQ and similar instant messaging applications that are now a technology that is available and adopted on a large-scale basis.

On an *organizational level* of analysis, an increase in interactions and use of computerized interaction support relates to questions concerning, e.g., how to organize work effectively according to this new society, and how to make use of interaction to build up and share competence (which is closely related to current research in the area of knowledge management). This issue has been in focus for some while now and several studies have been conducted on, e.g., how the use of email affects the efficiency of work in an organization, or how instant messaging could be used in organizational decision processes on a management level.

Clearly, this new technology has already enabled, and will even further enable, new ways of doing and organizing work. Some researchers in this area have for example pointed at “networking” as a new way of doing business where interpersonal contacts and interaction technologies play important roles to make the network work (Ljungberg, 1997). This networking idea has also been extrapolated to the society as a whole (see, e.g., Castells, 1996) and there are strong reasons to believe that even more new business models will emerge on top of this “networking” trend<sup>6</sup>.

On a *societal level* the transformation towards the Interaction Society is also a shift from computing focused on transactions (e.g., administrative systems, banking systems, datawarehouses), towards computing to support interaction (e.g. mobile phones, ICQ, chat, email, etc.) (Ljungberg & Sørensen, 2000; Dourish, 2001). As mentioned above, it almost makes sense to talk about IT as an *interaction technology*, and not merely an *information technology*. A general vision often put forward here is that interaction in the near future will be seamless, effective, “anytime, anywhere,” and instant (stretching from various application domains such as the use of SMS and MMS among teenagers to interaction among business executives and use of interaction technologies to enable financial services). Some researchers (e.g., Dahlbom, 1996, 1997) have even argued that our society of today might be best described as a “talk society” where we, by just picking up our mobile phone, can get in contact with anyone at anytime to do business, to negotiate, to make deals, and act as knowledge-brokers and service buyers and consumers on an open and free market.

On this societal level of human activities we have also already started to see new mass-behaviors emerge during the most recent years. One such phenomenon is “flash mobs” (Reingold, 2003) where several hundred mobile phone users gather together for a fraction of time to do some collective action. It might be to form a line of a couple of hundred persons in front of a hot dog wagon for a couple of minutes and then just walk away from the place a couple of minutes later as if nothing has happened, or gather together to do something else for a couple of minutes and then split up again a couple of minutes later. Reingold (2003) has described this phenomenon as “stranger interaction” where total strangers use their mobile phones to get together and quickly organize themselves to do some collective action without knowing anything about each other.

These sections above have just exemplified very briefly what this new technology can do for us and what it does to us. The rest of this book will report on a lot of additional behaviors emerging in the use of these interaction technolo-

gies and it will go into detail in describing and analyzing these different behaviors.

## **New Challenges: Research Areas and Design Issues**

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There are a lot of challenges to the Interaction Society; many issues that need to be explored. In this section, I will only briefly touch upon a fraction of those challenges to set the scene for the rest of this book. Each chapter in this book will then add to this list of issues that needs to be dealt with in the near future.

The challenges for the Interaction Society can be found on all of the different levels of human activities as mentioned above, and these new technologies that enable the Interaction Society raise a lot of social and technological questions, as well as raise some interesting theoretical challenges for further research.

Concerning the *social dimensions* of the Interaction Society, one obvious issue is that with an increasing growth in adoption of technologies to support interaction, and with an increase in interpersonal communication enabled by these devices and gadgets, *interruptions* will be a focal issue when the geographical place is no longer a useful filter for interaction (because of new possibilities of interruptions caused by mobile phones, pagers, PDAs, etc that break right into conversations “anytime, anywhere”). Further on, an increase in computer-mediated communication might lead to issues concerning, e.g., interaction overload (Ljungberg & Sørensen, 2000), divided attention problems (Wiberg, 2001a, 2001b), and stress, both in the workplace and during leisure hours. Here, empirical case studies are important to describe successful arrangements of interaction technologies, and work routines to enable effective, and maybe healthy, fluid work. Further on, there is a need for analysis, models, new knowledge, and design guidelines for how to effectively cope with the increasing burden of interaction demands, and the increasing demands for instant interaction and demands for being “always online, always available.”

Concerning the *technical dimensions* of the Interaction Society, some work is needed on how to create integrated environments across stationary and mobile computers, realize service handover, seamless session management, etc., to enable us to focus more on interacting and communicating with other persons and less on the technical aspects like establishing sessions, configuring devices, finding and initiating network connections, etc.

There are also some interesting *theoretical challenges* in relation to the rise of the interaction society. Some examples here might be, e.g., how to organize these seamless/fluid work environments? Here, models that can better inform us about the consequences and impact of interaction technologies on work life and human performance are highly relevant. We also need to develop our theories of basic human communication that take into account ongoing interaction across multiple devices, and across different media channels. Finally, and in relation to the section above, we also need new models on how to balance the question that the fluidity in work for one person (empowered by this new technology) is a potential interruption for another.

This book is a first attempt to start addressing these and several additional issues. Thus, the overall objective and mission of this book is to provide its audience with a rich overview of the emerging *Interaction Society* enabled by new information and communication technologies (ICT), including gadgets such as mobile phones, Love getties, PDAs, and pagers, and applications such as email and chat clients, Internet communities, instant messaging systems, video conferencing systems, and different kinds of alert- and notification systems.

## References

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- Boden, D. (1994). *The business of talk. Organizations in action*. Cambridge: Polity Press.
- Borovoy et al. (1998). Meme tags and community mirrors: Moving from conferences to collaboration. In *Proceedings of the ACM 1998 Conference on Computer Supported Cooperative Work* (p. 159).
- Borovoy, R., Silverman, B., Gorton, T., Notowidigdo, M., Knep, B., Resnick, M., & Klann, J. (2001). Folk computing: Revisiting oral tradition as a scaffold for co-present communities. In *Proceedings of the SIGCHI Conference on Human Factors in Computing systems*.
- Brave, S., Ishii, H., & Dahley, A. (1998). Tangible interfaces for remote collaboration and communication. In *Proceedings of the 1998 ACM Conference on Computer Supported Cooperative Work*.
- Castells, M. (1996). *The rise of the network society*. Oxford: Blackwell.

- Churchman, C.W. (1972). *The design of inquiring systems: Basic concepts of systems and organization*. Basic Books.
- Dahlberg, P., Ljungberg, F., & Sanneblad, J. (2000). Supporting opportunistic communication in mobile settings. In *Proceedings of CHI2000*. ACM Press.
- Dahlbom, B. (1996). Vägen till pratsamhället ("The road to the talk society") IT revolutionen och vetenskapen. *Tvärssnitt*, (4).
- Dahlbom, B. (1997) Välkommen till Pratsamhället! "Welcome to the talk society!" *Tidsskrift för Dokumentation*, 52 (1/2).
- Davenport & Beck. (2001). *The attention economy: Understanding the new currency of business*. Boston, MA: Harvard Business School Press.
- Dix & Beale. (1996). *Remote cooperation: CSCW issues for mobile and teleworkers*. Berlin: Springer.
- Dourish, P. (2001). *Where the action is: The foundations of embodied interaction*. Cambridge, MA: MIT Press.
- Edwards, K. (1994). Session management for collaborative applications. In *Proceedings of the Conference on Computer Supported Cooperative Work* (pp. 323-330).
- Erickson, T., Smith, D., Kellogg, W., Laff, M., Richards, J., & Bradner, E. (1999). Socially translucent systems: Social proxies, persistent conversation, and the design of "babble." In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (CHI 1999)*.
- Fällman, D. (2003). *In romance with the materials of mobile interaction: A phenomenological approach to the design of mobile information technology*. Doctoral Thesis, RR.03-04, Umea University, Sweden.
- Gutwin, C., & Greenberg, S. (1996). Workspace awareness for groupware. In *Conference Companion on Human Factors in Computing Systems (CHI 1996)*.
- Gutwin, C., & Greenberg, S. (1998). Design for individuals, design for groups: Tradeoffs between power and workspace awareness In *Proceedings of the 1998 ACM conference on Computer Supported Cooperative Work (CSCW 98)*.
- Holmquist, L.E., Falk J., & Wigström, J. (1999). Supporting group collaboration with inter-personal awareness devices. *Journal of Personal Technologies*, 3 (1-2).



- Hudson, J., Christensen, J., Kellogg, W., & Erickson, T. (2002). I'd be overwhelmed, but it's just one more thing to do. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems: Changing Our World, Changing Ourselves*.
- Ishii, H., & Ullmer, B. (1997). Tangible bits: Towards seamless interfaces between people, bits and atoms. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems: Changing Our World, Changing Ourselves*.
- Ishii, H., Wisneski, C., Brave, S., Dahley, A., Gorbet, M., Ullmer, B., & Yarin, P. (1998). AmbientROOM: Integrating ambient media with architectural space. In *CHI 98 Conference Summary on Human Factors in Computing Systems*.
- Ljungberg, F. (1999). Exploring CSCW mechanisms to realize constant accessibility without inappropriate interaction. *Scandinavian Journal of Information Systems*, 11, 115-136.
- Ljungberg, F., & Sørensen, C. (2000). Overload: From transaction to interaction. In K. Braa, C. Sørensen, & B. Dahlbom (eds.), *Planet Internet* (pp. 113-136). Lund, Sweden: Studentlitteratur.
- Lund, A. (2003) *Massification of the intangible: An investigation into embodied meaning and information visualization*. Doctoral Thesis, RR.03-01, Umea University, Sweden.
- Mankoff, J., Dey, A., Hsieh, G., Kientz, J., Lederer, S., & Ames, M. (2003). Peripheral and ambient displays: Heuristic evaluation of ambient displays. In *Proceedings of the Conference on Human Factors in Computing Systems (CHI 2003)*.
- Nordström, T. (2003). *Information System Stewardship: Advancing utilization of information technology in organizations* (Report RR – 03.02, 2003). (Doctoral Thesis).
- Reingold, H. (2003). *Smart Mobs: The next social revolution*. Reading, MA: Basic Books.
- Smith, M., & Fiore, A. (2001). Visualization components for persistent conversations. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (CHI 2001)*.
- Sproull, L., & Keisler, S. (1998). *Connections: New ways of working in the networked organization*. Cambridge, MA: MIT Press.
- Tanenbaum, A. (2002). *Computer networks*. NJ: Prentice-Hall.

- Webster, F. (2002). *Theories of the information society*. London: Routledge.
- Weiser, M., & Brown, J. S. (1996). Designing calm technology. *PowerGrid Journal*, v1.01. Retrieved from the World Wide Web: <http://powergrid.electriciti.com/1.01>.
- Whittaker, S., Frohlich, D., & Daly-Jones, O. (1994). Informal workplace communication: What is it like and how might we support it? In *Proceedings of ACM 1994 Conference on Human Factors in Computing Systems*. ACM Press.
- Whittaker, S., Jones, Q., & Terveen, L. (2002). Managing long-term conversations: Conversation and contact management. In *HICCS 2002*.
- Whittaker, S., Swanson, J., Kucan, J., & Sidner, C. (1997). TeleNotes managing lightweight interactions in the desktop. *ACM Transactions on Computer-Human Interaction*, 4 (2), 137-168.
- Wiberg, M. (2001a). In between mobile meetings: Exploring seamless ongoing interaction support for mobile CSCW. PhD-thesis, Department of Informatics, Umeå University, Sweden.
- Wiberg, M. (2001b). RoamWare: An integrated architecture for seamless interaction in between mobile meetings. In *Proceedings of the 2001 International ACM SIGGROUP Conference on Supporting Group Work* (pp. 288-297). Boulder, CO: ACM Press.
- Wiberg, M. (2002) *Interaction, interruptions, and lightweight support for availability management: A pre-study of issues related to the fluidity of work in the Interaction Society* (Working paper 02.03). Department of Informatics, Umeå University, Sweden.

## Endnotes

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- <sup>1</sup> At present (i.e., August 28, 2003), 1.2 billion people worldwide own a mobile phone according to HS Business & Finance (<http://www.helsinki-hs.net/news.asp?id=20030828IE7>) and to just give an example the total number of telephone users in China has now exceeded 287 million, including 167 million fixed phone users and 120.6 million mobile phone users. China now has the second largest telephone network in the world and it ranks third in the world in terms of information industry. China's number of mobile phone users has just narrowly surpassed the United

States, whose mobile phone users number 120.1 million. This according to People's daily ([http://english.peopledaily.com.cn/200109/04/eng20010904\\_79296.html](http://english.peopledaily.com.cn/200109/04/eng20010904_79296.html)).

- 2 Almost 10% of the world's population now has access to the Internet, according to Nua.com, the compiler of Internet statistics. Figures for Internet use had grown to 580.78M people by the end of May 2002, up from 407.1M in December 2000. The Nua study indicates that for the first time ever, Europe has the highest number of Internet users in the world. There are now 185.83M Europeans online, compared to 182.83M in the U.S. and Canada, and 167.86M in the Asia/Pacific region.
- 3 According to a research project at Berkeley university, US that conducts studies of the development of email (<http://www.sims.berkeley.edu/research/projects/how-much-info/internet/emaildetails.html>) the total number of electronic mailboxes in the world had soared 83.5% in the past year (i.e., 2000) to 569,171,660 mailboxes; In the U.S., in the year 2000 the number of mailboxes has jumped 73% to 333.5 million mailboxes since the end of 1998. In the rest of the world, the total number of mailboxes has grown 101% to 235.6 million mailboxes in 2000. In the U.S., the average corporate email user has around 1.5 mailboxes, and the average household using email has about four mailboxes. In the year 2000 there were about 89 million Americans using email at work and roughly 50 million households using email.
- 4 Source: <http://company.icq.com/info/icqstory.html>
- 5 For a more detailed discussion of how technology and society is, and have always been, heavily and complexly intertwined (see, e.g., Castells, 1996).
- 6 Although the very concept of "networks" or "networking" has recently become very popular, the idea of "networks" or even "knowledge networks" is rather old. For a throughout discussion of, e.g., networks for knowledge creation and sharing from the perspectives of Leibniz and Hegel see Churchman (1972).

# **Part I: Practice**

## **Stepping Out into the Fluidity of Interaction**

In this first part of this book, entitled “Practice,” the contributing authors enable us to step out into the world and get a grasp of what is currently going on out there. In this part of the book we are provided with some good examples of how this new Interaction Society is evolving and how we can see signs of this everywhere in our everyday lives. The chapters cover, e.g., empirical studies of email and Internet use, studies of edutainment games as interactive environments, and empirical studies aimed at identifying implications for mobile information and communication technology.

Overall, it is already noticeable how this technology both shapes the ways in which we interact with each other, as well as opens up new ways for us to start to interact. While the telephone is one such old technology that has had influence on our communicative behaviors for several decades now, we can start to see how online Internet communication becomes adopted and how it leads to new communicative behaviors. Finally, what kind of new behaviors will emerge from interacting with edutainment games and interaction with and via mobile ad-hoc networks is still an open question. What we do know is that there is a constant interaction stream out there that is ongoing, highly multithreaded, dynamic and heterogeneous. With this in mind, the following chapters enable us to tap into this fluidity of interactions even further and, in doing so, we can get some new insights about us as human beings and how we function as individuals, social beings and group members in this new kind of computer-supported world.

## Chapter II

# Email: Message Transmission and Social Ritual

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### **Abstract**

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*In considering the implications of what it means to be moving towards an Interaction Society, my research into intraorganisational email illuminates some of the inherent social complexity and the subtle nuances of its use within organisational life. A range of significant insights emerged through a deep hermeneutic understanding of the ways that people within the study were constructing email as an everyday part of their workplace. As a consequence, I have constructed a new concept, message web to encapsulate the social interaction and human sense-making activities around email in association with its technical capabilities as daily life is being played out within organisational cultures today. In this chapter, I tell an ethnographic story concerning just one strand of the case study organisation's message web: the copying function of email. And being an ethnographic story, I've also embedded reflective glimpses of my research processes.*

## Introduction

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Electronic mail (email) has emerged as the key application for Internet-based communication in both contemporary organisations and personal domains. As such, it has the potential to be one of the major determinants in shaping the emergence of an interactive society.

This chapter presents an ethnographic story about intraorganisational email that is grounded in my practice-oriented qualitative research. I undertook a case study to find out more about what is actually going on with email in organisations. In doing so, I delved deeply into the study participants' intertwined layers of meaning of, and experiences with, email through their interpretations and descriptions of such experiences.

And while ethnographies remain an alternative to mainstream approaches of knowledge construction in information systems research, increasingly such methodologies are being drawn upon to construct additional understandings (based on real-life examples) around people as social actors and their interactions with the technologies and systems they use (Schultze & Bolard, 2000; Stahl, 2003). A theme which Lamb & Kling's (2003) recent work directs attention to is the need for information systems research to make more use of this "social actors" metaphor, claiming it "readily expands the scope and scale of the social space of people's interactions" (p.224).

In crafting together the ethnographic data and the theoretical arguments, I discovered a range of interesting and even unexpected interpretations about how the work environment is continually being socially constructed by the social actors present and the multiple significances of email within such constructs. These discoveries provide a vivid and multi-faceted interpretative window on organisational life that indicates some of the fluidity and connectiveness that is happening as we move towards a more interactive society. The spaces visible through such a window can be viewed from different perspectives and so it was with my research.

I adapted Carey's 1989 model: he used the concept that communication could be looked at from two different dimensions, that is, communication as message transmission or communication as social ritual. Although Carey's research concerned mass communication, I applied the two dimensions of his model to my email research. Numerous themes emerged around email as both message transmission and social ritual and at times, it was difficult to maintain such a dichotomy as specific themes could be considered in association with both dimensions of the model.

In making sense of the interactions around organisational email, I have developed a concept I call “a message web”. The term captures the social and technological forces within evolving forms of organisational communication (incorporating both message transmission and social ritual) while it also highlights the connections between emerging communicative practices associated with virtual space and interactions within organisational culture.

The story I tell in this chapter concentrates on just one aspect of the case study’s message web; that is, the ways that the participants constructed their understanding about, and use of, email’s functionality to duplicate and then distribute information. Within this theme, the uses of group distribution lists and the practices associated with copying messages emerged as being a significant element within their interactions.

In addition, I also embed brief personal reflections into the story to draw attention to the taken for granted aspects of the many voices that are present (although not necessarily always acknowledged) in research activities. “In doing so, I challenge the boundaries of what is acceptable [research] writing and also what it is acceptable to write about” (Day, 2002, para. 8). These reflections expose fleeting glimpses of my thinking in facing numerous dilemmas and indicate the paths I took to resolve them, sometimes referred to as a “confessional genre of representation” (see Schultze, 2000).

In making visible some of my meaning-construction processes, I seek to engage you, the reader, with an invitation to also critique my thinking and my decisions. I concur with Bochner (2000) when he says, “I want a story that doesn’t just refer to subjective life, but instead acts it out in ways that show me what life feels like now and what it can mean.” Including these reflections allow me to *act out* some of my experiences while also making the situational and the consequential nature of social research visible.

## **Background and Theoretical Framework**

While email-related research has quite a long history, interest in the social aspects appears on the rise. In the mid-1990s, Fulk, Schmitz & Ryu (1995) claimed that, “[n]ew media such as electronic mail are no longer so new in organizations; they have been established features of everyday work environments. Yet there remains a great need to understand how these media are

perceived and used within social and organizational contexts” (p. 259). By 1999, “[a]lthough e-mail does not have the same effect in every organization, researchers agree that e-mail is significantly changing life in organizations” (Minsky & Marin, p. 195). And by 2003, Tyler, Wilkinson & Huberman were arguing that, “[e]mail has become the predominant means of communication . . . it pervades business, social and technical exchanges and as such it is a highly relevant area for research on communities and social networks” (Introduction Section, para. 1).

Mainstream public commentators provide a more hyped-up view of what is happening, for instance the phenomenon of the Cluetrain Manifesto (Levine, Locke, Searls & Weinberger, 2000) seemed to strike an immediate chord by tapping into a wellspring of excitement about the Internet. Originally created as a document on a website in 1999 and then released as a book in 2000, the Manifesto provides 95 theses which the authors declare to be the key to business success in a digital world. The underlying premise is that markets are conversations: interactive conversations with both customers and staff.

What we are seeing is that over time, a comprehensive and rich picture of email is being constructed. Additional layers of complexity are revealed as email’s varied relationships, interactions and uses unfold as an integral element within organisational life. Ducheneaut & Bellotti (2001) have described email as having become a place where many of us live; “as email captures an increasing share of an organization’s total communication volume, individuals progressively appropriate their email client as a habitat in which they spend most of their work day” (p. 37).

The idea that email is merging into the space where we work (and even live) is the directing framework for the project called *Reinventing Email* at the Collaborative User Experience (CUE) Research Group, IBM Watson Research Centre. Muller & Gruen (Researchers at CUE) contest the simplistic notion that email only “serves as a tool for communication and collaboration within organizations” and instead they argue that email itself can be “the object of the collaboration.” Using examples such as an executive and their assistant sharing access and responsibility for the same mail, they see users “discovering new, unanticipated uses . . . [and] by using the technology to new purposes, they ‘reinvent’ it” (2003).

This perspective that users can (and do) reinvent the technology has some association with Kiesler’s 1997 claim that there are different types of social effects, i.e., mundane and significant. She claimed that technology could amplify or transform social processes resulting in effects that are either:



- Mundane, where the technology simply amplifies or augments what people have done in the past (by doing it more accurately, more quickly or cheaply) *or*
- Significant, in that technology can transform how people think about the world and enact their social roles within it.

This two level perspective had earlier been explored by Sproull & Kiesler (1991) in their research using what they termed “first and second level effects” that flow from the introduction of new information and communication technologies.

First level effects are primarily associated with increased efficiency and a reduction in the costs of sharing information. Second level effects flow from the unforeseen variations which the technology makes possible: new ways of working and doing business, new ways of living and creating a community, and especially new ways of thinking and learning. The consequences of second level effects can dramatically extend beyond those of first level efficiency effects (Sproull & Kiesler, 1991).

People are able to do new things that “leads to thinking in new ways and thereby to fundamental changes in how people work and interact” (Sproull & Kiesler, 1991, p. 35). It is people’s behaviour, not just the attributes of the technology, which determine whether a technology is amplifying or transformative (Kiesler, 1997, p. xii). Gómez (1998) explained that, “second level effects are generally unanticipated, slow in emerging, and are related to changes in social patterns and the interdependence among users” (p. 225).

Phillips & Eisenberg (1993, 1996) studied email use in a not-for-profit research organisation associated with a university. They found that different email strategies, from simple, direct requests to more complex manoeuvres were being used. In conclusion, they suggested “some of the features of email encourage co-workers (but not so much supervisors) to put pressure on their peers and to use the publicness of the information to force accountability” (Phillips & Eisenberg, 1993).

The notion of users “rethinking” how email can be used and a move towards these second level effects was evident in Kersten & Phillips (1992) early work around email being used to manage impressions. They suggested email users could integrate a range of different goal-directed behaviours that could be

considered as impression management strategies, for instance ingratiation, self-promotion and intimidation.

More recently, O'Sullivan (2000) has also studied how the role of impression management impacts of interpersonal communication technology choice. Even though his study concerned personal relationships rather than interactions at work, his findings support the perspective that views the use of mediated communication channels as a way of managing self-relevant information in pursuit of self-presentational goals (p. 403). He concluded that in situations where positive impressions may be threatened, using a mediated communication channel (such as email) means that self-revelation could be more controlled, which could be advantageous to the sender.

In a more general study of email use within four disparate organizations, Ruggeri Stevens & McElhill (2000) have devised "a multi-dimensional 'positioning' model for practical use by managers" to explore their organisation's present use of email. The dimension, labelled People Influences, attempts to measure the degree to which email is being used to serve individual needs compared to group/corporate needs. They include the practice of sending copies of messages to managers to force the main recipient into specific actions and the use of email to safeguard a position (which their study respondents referred to as a "Cover Your Backside" tactic) as examples of weaknesses on this dimension (pp. 276-277).

The practice of duplicating information brings fresh challenges for both managers and staff with increased potential for mismanagement and abuse. Schwartz (2003) recently studied "the effects of mailing list mismanagement from the user's perspective at a research and teaching University." He analysed the impact of an error that resulted in two messages being cross-posted between a voluntary moderated mailing list of 6,100 subscribers in 67 countries and a much smaller mandatory unmoderated list consisting of 352 faculty members. In the 11 days after the error, 31,680 unnecessary email messages passed between the 352 members of the smaller list. Schwartz concluded that if you assume "that each member spent only 45 seconds to download, read, and delete each message, there were a total of 396 work-hours wasted."

The possibilities that email opens up within organisational life appear to be both significant and multifaceted and much remains to be discovered.

## **Study Methodology**

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As a social researcher, I draw upon constructivist/interpretative (sometimes termed naturalistic) traditions and this qualitative research is based on an empirical research methodology: a single case study within a framework of ethnographic and grounded theory principles. It is interdisciplinary in that it transcends several different disciplinary borders; for instance, that of sociology, applied communication, organisational behaviour, and management studies as well as information technology.

The research was undertaken between 1995 and 2000 with the aim of deepening our understanding of the social world of organisational life as interpreted and experienced by people who actually use email daily in their interactive communications at work. The study involved 33 people employed by a large Australian organisation (identified through the pseudonym, Station 99). While a range of significant themes emerged, this story focuses specifically on only one of them, that is, the new insights that arose around the study of participants' construction of the distribution and copying functions of email. Vivid contextual detail quoted from their ethnographic conversations enriches the story. These semi-structured interviews ranged from 30 minutes to over two hours while the demographics of those who participated in the study encompass a diverse mix of ages, gender and occupational roles. I identify the participants whose words are quoted within my story. However, anonymity is preserved through the use of fictitious names. All other information is true to life.

The story itself illustrates many characteristics of qualitative research traditions: the ways that people use email within their daily activities at work are explored through the single case study methodology while rich, detailed and thick descriptions reveal the multiplicity of intertwined understandings of the meanings associated with email.

*At this point, you may be interested in reading my first reflective journal extract in the endnotes for a glimpse of my deliberations about the form of my story's content: deliberations which traditionally remain unspoken and hence, invisible.<sup>1</sup>*

In addition, the story-telling writing style draws on emerging genres of scholarly discourse as an alternative to the structure and expression of traditional

information technology/information systems research. In telling this story, I have deliberately drawn in elements from these newer techniques particularly through the rhetorical strategy of writing in the first person and also by using an atypical structure (compared to the more universally accepted structure and design of traditional research reports).

However in many respects, my story illustrates that email has already become taken for granted in organisations today. Reporting the research results in a non-traditional format similarly encourages an introspective focus on what we take for granted in the knowledge creation process. Research writing that departs from traditional forms can be construed as challenging, provocative and creative, while for others it may be perceived as being distracting; it may simply be misunderstood or even actually dismissed as having little to no intellectual value. However, the presence of my ethnographic story as a contributing chapter to a book exploring what an interactive society might be like indicates spaces are emerging for different ways of looking at, and talking about, technology as a part of such a society.

## **Message Webs**

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As briefly mentioned before, I have constructed the term “message web” to describe an electronic communication network within an organisation but it is also more than that — it captures the coming together of social and technological concepts within evolving forms of organisational communication.

The term itself has tendrils that connect it to several scholarly communities, for instance, psychology, organisational behaviour and computing. Petzinger quoted Abraham Maslow (a psychologist who pioneered the concept of motivation as a hierarchy of needs that culminated in self-actualisation) who, in 1962, described a holistic business as “a business in which everything is related to everything else. Not like a chain of links of causes and effects, but rather a spiderweb, or geodesic dome, in which every part is related to every other part” (McKelvey et al., 1999, p. 75).

The term “message web” also borrows from concepts associated with Gestalt psychology in that the social relationships within a message web can be perceived as the figure, with the technology providing the ground it appears against. The descriptive power of the message web concept is derived from the

notion of fluid, dynamic and complex social interactions in combination with the deterministic nature of computer network environments. It focuses a spotlight (in a holistic sense) on the communicative interactions among people in organisations against a background of the technological machinery that maintains electronic messages in motion.

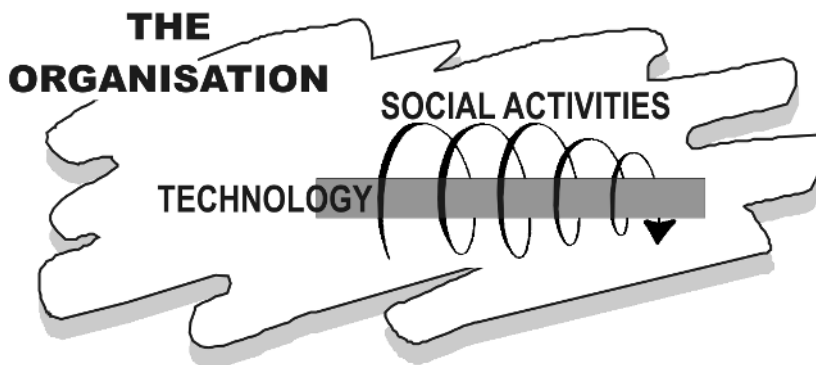
Figure 1 is a visual representation of a message web that can be viewed as comprising technology that progress in a lineal sense (the line) while human and social activities spiral around the technology (the circles). Both the technology and the social activities are situated within the context of an organisation.

Technology (the line) can be seen to be rather straightforward, while people's behaviours (the spirals) tend to be more creative, troublesome, attention demanding, time consuming, vibrant and complex.

This concept of an organisational message web also links into information systems thinking around socio-technical systems design: Kling & Scacchi's 1982 "web of computing" and the more recent ideas of Kling, McKim & King's "socio-technical interaction networks" (2003).

Evolutionary forces driving towards more virtual forms of organisation where the emphasis is on flexibility, trust and open relationships are challenging traditional organisations with multilevel hierarchies that are bound by bureaucratic notions of structure and controlled by rules. Message webs make use of communication technologies to stimulate the diffusion of information, knowledge and understandings throughout the organisation on an organic rather than a mechanistic level.

*Figure 1. An organisational message web*



One way of explaining these changes in organisational forms in relation to computer-mediated communication involves the notion that social activities and ways of thinking associated with email (sometimes defined as email cultures being sub-cultures of the organisation's predominant culture) are diverse, complex and constantly evolving. And as such, these email cultures play a defining role (especially around social norms) within the message web as it is continually being shaped through varying degrees of trust, openness and flexibility of both the organisation and its members.

In my exploration of Station 99's email cultures, Schein's (1985) three-level approach to organisational culture was also relevant to the message web concept. His first level (surface), which concerned the visible artefacts of culture, can be linked to the technology itself, while his second and third levels can be applied to the more abstract notions of applied strategies (second level) and the taken for granted beliefs and values (third and final level) underlying social action. Hence, Schein's work on organisational culture provides another position from which to reflect on the line and the circles of the message web.

However, it is important to note that by bringing this concept of a message web into focus in these ways, other views automatically move out of focus. For while I am using the message web concept to extend and amplify understandings about specific facets of email use in organisations, other dimensions of these experiences are consequently reduced at the same time. For instance, the actual content of the emails in Station 99's message web was considered to be outside the scope of the study as was an in-depth exploration of such things as the frequency and duration of individual email use.

## **Transmission[s] and Transmitting**

Many of the study participants drew together multiple perspectives that centered on email as a message transmission system. The metaphor "email as a tool" seemed to encapsulate many of their overall understandings and descriptions of email with some linkages to knowledge management. The widespread use of a tool metaphor to describe email denotes a certain way of thinking and a way of seeing (Morgan, 1997, p. 4). In this case, it appears as though participants perceived email communication primarily as a transmission process with the emphasis centred on moving messages around.

Electronic mail systems provide a multiple addressability facility that allows a single message to be sent to numerous recipients. This feature is reshaping the accepted notion that business documents are addressed to a single recipient with others receiving a copy for their information via a Cc process.

It has been accepted practice to send duplicate copies of business documents to people other than the primary recipient since the invention of carbon paper in the latter part of the 19th century. Over time, it became customary to use the notation Cc (an abbreviation of the words, carbon copy) to indicate that the document has been copied to others.

## **Distribution Lists**

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The ability for participants to duplicate a single message to numerous recipients emerged as a highly valued element of email's functionality at Station 99. "Without email, you'd pick up the phone. But what it means is that one call that used to be made by phone unless it was a conference call, can be sent to, well, it's an endless list," Craig explained. Ivan described how his staff would have received the minutes of the group's weekly meeting in the past. "Before we had email, if, if that was done at all, it (the minutes) would have been typed up once and it would have been left in a folder for people to have a look at, if they wanted to have a look at it."

*My second journal extract is pertinent at this point. Turn to the endnotes again to read my thoughts exploring my inclusion of long quotations into the story.<sup>2</sup>*

Vince was the only other participant who mentioned this older and more manual method of delivering information and he explained that he still used the "old fashioned way" in combination with the newer email system.

Vince's mention of "a document of importance" in the context of his choice to reject email as the most appropriate communication medium was significant in that for him, information appeared to be less important simply as a result of having arrived via the email system.

In addition, although Vince's "old fashioned way" allowed him to choose the order that the information is delivered to receivers, it also creates a potential timing paradox in regard to the actual receipt of his "document of importance."

\*VINCE. Sometimes I'll simply send an email out to the managers or at least, forward it on. With a note saying that this is of interest, perhaps you can distribute this to your producers or senior producers of program areas. Errr, sometimes if I want to make a special point, I'll take it off the electronic system and I will print it out and I'll put a list of names which personalises it as far as I'm concerned. And I put a list of names, say ten people I want to see it, I'll list their names in order, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10. Ask them to pass it on and errr, so that it eventually comes back to Glenda for filing. That way I think I'm conveying particularly to those people that I would like them to read it because it's a special note of special interest. So in that case, I've used the electronic messaging device to receive it and print it.

\*EILEEN. Emmm, as the source.

\*VINCE. And then if you like, gone to a more personal method of distributing it so, I think it's really using it in a mixture of ways.

\*EILEEN. Would you actually write the people's names on there?

\*VINCE. I handwrite them, usually, either on the document itself or on one of those yellow stick-on pieces of paper. So, I find that a quite successful way of making sure that people see things or do things 'cause they are then asked to convey it to the next reader and they usually sign it and pass it on. So that's an old fashioned way, takes a bit longer but it's meant to, as I say, impress on people that it's a document of importance.

\*EILEEN. Emmm and more personal too, you said.

\*VINCE. And more personal, that's right.

Email systems transmit messages synchronously (that is, a copy of the email is available in the inbox of everyone on the distribution list at the same time). Conversely, Vince's old-fashioned way means that significant time may have elapsed before the last person on his list actually receives his note of special interest (particularly if there are many people on his list and if they do not all place the same high degree of importance on moving his message on). Thus, Vince's intention of impressing people with the message's importance may not result in that outcome and may actually have the opposite effect.



This incongruence between the sender's intention and the outcome/s for the receivers was not further explored in this study, however, it hints at intriguing possibilities for future research directions.

## Senders and Receivers

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One method utilised in the analysis to probe the ways in which the people of Station 99 considered distribution lists was to explore what they said from the following two viewpoints.

- The perspective of the sender of the message
- The perspective of the receiver/s of the message

In his reflection on the methods used to produce and deliver the minutes of the weekly meeting of his section, Ivan placed himself in the role of sender or originator of the message. He spoke about how the minutes had been done in the past and compared this to his current distribution method.

\*IVAN. Some of the stuff that goes out, I think if we didn't have email, I'm just wondering how we would have done it in the past. [pause] It probably, [pause] it could well be more, it's certainly more detailed.

\*EILEEN. Emmm, more information.

\*IVAN. More information. Now, for example, sending out more information. Now, for example, sending out the minutes of our weekly meeting, I put that on email and follow up action if there is anything to follow up and the minutes can be quite detailed and that gets distributed to everybody via the email system.

From his tone, Ivan indicated that he believed his current strategy of using email to distribute the minutes was more effective. However, as a receiver of team meeting minutes, Marcus expressed a view in sharp contrast to Ivan when he said, "at least, sometimes in the old days, we used to get photocopies of this. But, you may just miss out if you're not there or whatever. I used to read them, now we don't seem to get any of that." Marcus seemed to regret the change in the way the meeting minutes are now distributed.

Based on this example, Marcus's view (as the receiver) appeared to conflict with the picture given by Ivan as the sender. Later in the interview with Marcus, he again gave the impression of being troubled when he explained that he did not know how the names of individuals on distribution lists were put together. "But, I wonder, if y'know, we seem to be on some lists of decisions but maybe not on others ... maybe we miss out on stuff." He pondered about who decides who the message recipients are to be.

Such differences in opinion would amplify the possibilities of incongruent interpretations of the message content and thus become barriers to effective communication. At a very basic level, these differences in outlook between the two parties involved in the interaction (that is the sender and receiver) could be portrayed as traditional management/operative positioning. However, current trends in management practice, particularly in professional settings, indicate that power and control are being distributed more widely throughout organisations, for instance, through self-managed workgroups. Irrespective of whether this decision-making power regarding access to information is a centralised function (for instance, in a highly traditional, hierarchical organisational structure) or whether it is distributed more widely through the organisation, it must be strategically managed. Achieving successful information transfer requires effective planning and control measures, not just at the highest levels but also consistently throughout the organisation.

## **Doubts About the Message Recipient**

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Although the question of the identify of the person who actually read the incoming message was not specifically explored during the fieldwork stage, it emerged as significant through the data analysis. The study participants seemed to generally assume that the person who read the message would be the same person to whom it was sent. And this was reflected in Ivan's comment, "most people, who have got access to email, read their email." As managers, Mike said, "I normally read all my emails addressed to me" while Vince did the same except for those times he was away from the office.

However, I discovered that everyone did not read their own messages at Station 99 and it became evident that Owen knew (or suspected) this was the case when he said that "the odd boss ... don't read their emails." Glenda confirmed this when she explained that SM (Station 99's Senior Manager) did not read messages sent to him. Instead, she dealt with them in her role as his

Personal Assistant. It was only on very rare occasions that he actually read emails addressed to him directly off the computer screen, perceiving it as being “a time waster,” Glenda said. And while this could be seen to represent a very traditional workflow collaboration, it also links into Muller & Gruen’s work on IBM’s CUE project that email can be “reinvented” as the object of collaboration (2000) rather than a tool for collaboration.

Glenda screened all of SM’s incoming email messages, which, in itself, was relatively unremarkable in that most Senior Managers have personnel who act as gatekeepers to select the information and the people they personally interact with. However, what was noteworthy was that many participants seemed to be unaware this was occurring with SM’s email. Glenda even said, “a lot of staff don’t know that I do SM’s email.” She went on, “I get them [SM’s incoming email messages] and if I think that we can handle that without him worrying about it. I won’t tell him.” She said that he personally sees only about a third of the emails that are addressed to him.

Such a situation raised questions as to who knew that Glenda screened all of SM’s incoming email messages and who did not. When staff send an email message to SM, are they aware that he would only know about it if, and when, Glenda deemed it to be appropriate?

While it seemed that all the management team knew Glenda screened SM’s messages (albeit as tacit knowledge), my assumption was that many of the operative staff who participated in the study did not. For instance, Faye mentioned that she suspected that Glenda might screen all of SM’s messages and Amanda told me she knew but only as a result of her providing relief in Glenda’s position in the past.

Such silence or lack of awareness of this screening challenged fundamental and taken for granted assumptions made by email message senders that the person to whom they address the email will be the person to read it. At Station 99, it was clear that this was not always the case with SM’s email. Covert deception such as this on organisational knowledge places pressure on interactions between management and staff particularly if, and when, they discover that such screening occurs within their message web.

The implications of using officially sanctioned gatekeepers in such ways and their impact on the social dynamics of email-based intraorganisational communication still appear to be under-researched — a knowledge gap which also presents significant possibilities for future communication research.

## The Unknown Decision Maker

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As the study continued at Station 99, my understandings of their email cultures grew. While there was considerable discussion around distribution lists messages generally, the more fundamental issue of universal access to the email system itself was taken for granted by most participants.

Apparently some people at Station 99 had access to the information they required but there were others who did not (the have-nots). I asked Cliff whether people in the “have-not” category felt they missed information. “I honestly don’t think they realise [they miss out],” he said.

Speaking from a more personal perspective, Edith reached a similar conclusion when I asked her if she felt better informed because of email access. Her initial response was that if she needed to know something and she didn’t have email, she would simply have to go and ask. It was at this point that she seemed to discover that there “might be things that I wouldn’t think of asking [about].”

For organisations such as Station 99 who rely on email as one of their major internal communication vehicles, the invisibility of the person who is responsible for decisions about information access becomes a barrier to the flow of communication. But it is not only that the decision-maker is invisible. The decision itself can also become invisible — you do not know what you do not know.

Mike also touched on this notion of an “unknown decision-maker” in regard to who is (or who is not) on specific distribution lists but he took a different perspective. He explained some of the difficulties inherent in maintaining accurate lists. The example he gave focused on the fact that membership of

\*MIKE. I’ve raised this with the people in ... I mean, you have a situation where you continue to get emails, which, with what I’d call, standard distribution lists. [pause] And I mean, I’ve looked at them and I’ve got, there are names on that, on that list of staff who sort of left the organisation nine months. Now, what I’m saying is maybe it really doesn’t make a terrible, a lot of difference but, as I say, you just wonder whether [pause]. I guess it’s only distribution lists ... But, it seems to me that the system sort of has, has a, generates an impetus of its own. And I don’t think enough time is spent sort of trying to [pause] review it and, and, and cull out recipients of emails who are no longer there.

individual groups fluctuated on both a permanent and short-term basis. People resign or transfer to other departments; while in the short-term staff take leave from work. Mike was concerned about what he saw as the system becoming unruly and even generating a life of its own unless *this invisible decision-maker* implemented proper administrative controls.

Clearly, Mike was aware the interactions facilitated through email distribution lists could become unruly. He highlighted the importance of list creators consciously deciding who needs the information and then ensuring that the message was only sent to those people. But there did not appear to be any formalised procedure or process to ensure this happened at Station 99.

It is through experiences of email such as these (encompassing users' attitudes and expectations), that we define what Ducheneaut & Bellotti (2001) have termed the "habitat where we now all live." And, clearly, there are significant implications for managers that I discuss in more detail towards the end of this chapter. Vince also mentioned the issue of distribution list maintenance with him providing an example that illustrated an opposing view to Marcus's concerns.

\*VINCE. There have been occasions when I've asked to be taken off the list of regular stuff which I don't want to get ... there are some items which I get regularly which just appear and I delete them before I even read them. Not very many but there are some stuff that I will do that. Occasionally I will ask to be taken off a list because it's a waste of time.

Vince's problem is relatively simple to solve as he knows where the information comes from — the decision-maker is not invisible — and all he had to do was ask to be taken off the list. While both Vince and Marcus experienced problems related to the receipt of messages, the actual difficulties themselves were different. Marcus did not receive some messages but felt he should have the opportunity to make his own choices. On the other hand, Vince as one of the management group, made his own choices but he was still restricted by the efficiency or otherwise of the list management process, echoing Mike's point about the need for proper administrative controls.

In terms of effective organisational communication, particularly as organisations move from traditional hierarchies with bureaucratic structures to decentralising the decision-making process and working in more virtual ways, the invisibility of information access decisions is significant. Both Edith and Marcus drew

attention to it with Marcus actually commenting about taking such things for granted, “that’s something that I’ve not really looked at.”

However, Marcus had discovered his own way of addressing the problem of not being on specific distribution lists. He explained that their small section shared a common printer with another group. Following up on the idea that he and possibly others were missing information, he said, “I think there may be things that we, which will interest us but we don’t see.” Then, in quite a mischievous way, he explained that sometimes he sees a message on the printer that interests him but as he was not included on the list, he did not get a copy himself. “Sometimes I see email printed there and think, ohhh that’s interesting. In fact, I read it, sometime pin it ... on the wall [the noticeboard].” Marcus provided a telling example of the imaginative ways that people find to sidestep communication barriers in organisations and the ways that information is valued.

In practical terms, decisions are continually being made concerning who should have access to what information. One way these decisions are then enacted is by the creation and use of email distribution lists to deliver electronic information internally throughout the organisation’s message web. And it was the decisions being made about distribution lists which appeared to be of considerable interest and concern because the decision-maker was invisible to many. Lack of awareness like this opens up dramatic possibilities of mismanagement and abuse, for instance Schwartz’s (2003) study found that 396 work-hours were wasted as a consequence of a cross-posting error. Again, important implications for managers are discussed later in the chapter.

## **Cc-ing as a Strategic Act**

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We now move to a discussion of the findings associated with the second major thread weaving through the research — Carey’s (1989) notion of communication as being essentially fundamental acts of ritual which form the essential lifeblood of human relationships. This study revealed that email has a pervasive and transforming influence on the social interactions of people at work.

The act of copying email messages through the Cc-ing function moved into prominence during the study. Initially, the Cc-ing theme appeared to have more in common with Carey’s idea of communication as transmission. Martin

explained that email at Station 99 meant he communicated with more people. “Because of all these copies, well, in a sense, at least somebody, I mean, say you send a copy to six people, that’s communication. At least, they know you’re there, that you’re interested in such and such and it’s a sort of communication.”

Kraut & Attewell (1997) claimed that this spillover effect of electronically copying and forwarding documents could enhance organizational knowledge. “In using electronic mail, it is easy to add additional readers” (p. 335). And so it was at Station 99.

However, on reflection, it became clearer that the ways the Station 99 participants spoke of their behaviour with Cc-ing could be encapsulated more successfully within Carey’s idea of communication as ritual. They were linking multiple social interaction layers as a form of ritual communication into their processes of Cc-ing email to others. However, as seen from Martin’s quote above, both of Carey’s ideas of transmission and ritual were clearly evident in many instances.

## **Emerging Practices**

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Martin’s acknowledgment that email improved message transmission and delivery could be seen as a first level effect. But, consistent with Sproull & Kiesler’s (1991) classification of first and second level technological effects, and also with Muller & Gruen’s (2002) more recent ideas about users reinventing new purposes, there were indications that at least some of the study participants were finding different and sometimes unexpected uses for email.

Staff were Cc-ing email messages to each other as part of their normal operational activities. However, there were also other, less overt, uses being made of the Cc-ing function to further both personal and organisational aims. Email messages were being copied and distributed to strategically influence the perceptions and behaviours of others within the organisation. One strategy concerned rather blatant attempts by individuals to manage how they were perceived by others (i.e., impression management), while subtler forms of pressure and even in some cases, manipulation techniques were being applied through the Cc-ing process.

Martin innovatively used the Cc-ing function as an attempt to create a positive picture of himself in his colleagues’ eyes. He said, “At least, they know you’re there, that you’re interested in such and such.” He was using email as an

impression management tool in that he was consciously attempting to influence the receiver of his message. Such an attempt can also be discerned in Edith's comments. She said, "you can send to somebody but you want other people to know that you've done that and you can take, you can send them all."

Staff using email in such ways to reinforce or generate positive impressions diverges somewhat from O'Sullivan's (2000) findings that mediated communication channels tend to be used if a positive impression may be under threat. Martin and Edith were not reacting to a threat but rather were proactively attempting to create and/or confirm a positive impression. However, work-related relationships at Station 99 are not the same as the intimate relationships that O'Sullivan studied.

The discovery of these "multiple layers" or second level effects at Station 99 provide support for Phillips & Eisenberg (1993) finding that employees use the features of email strategically to realise their goals.

## **Operative/Manager Relationships**

Some of the study participants spoke specifically about the use of Cc-ing email messages in the context of the operative/manager relationship with three different perspectives (involving both senders and receivers in numerous configurations) becoming evident. These perspectives are firstly summarised and then explored in more depth.

The first perspective concerns an operative staff member sending an email to a colleague. The sender also forwards a copy of the message upward to either the receiver's manager or their own with the aim of exerting more pressure on the original recipient of the message. The management response provides a second perspective when a Station 99 Manager discussed his response to this practice while also mentioning how he used the Cc-ing facility in managing his staff. Another participant offered a third perspective on this practice when she explained how she improved the likelihood of a positive outcome to her requests by directly emailing the relevant Manager but also Cc-ing a copy to their Personal Assistant as well.

Moving now into more detail in regard to the first perspective, Martin, as a member of the operative staff at Station 99, saw advantages in being able to exert pressure over colleagues via email. He said that sometimes he had to rely on an interstate colleague to provide specific information. As well as sending his request by email, he also forwarded a copy of the email upward to his



(Martin's) manager. Martin explained his reasoning behind this strategy as being to let his colleague know that his manager had also been informed. This would then subsequently put "more pressure on the person to answer your query."

It became apparent when Amanda explained how she used email in comparison to the telephone — that she also believed email could be used in a strategic sense to put pressure on others. However, Amanda seemed a little less confident in talking about the process.

\*AMANDA. But [tone of voice drops] somehow, in my mind [chuckles] emails have more urgency. I don't know whether it's because they're in writing. Whether there's that extra pressure because copies are sent to other people, whether there's that behind it, that psychology behind it as well. Perhaps it's to do with, I know that my boss, y'know, knows that this is an issue and what am I doing about it. Orrrrr, it, it maybe because of that as well, maybe because of the fact that other people receive copies of this [pause] so I'd better respond to it straight away.

Vince, in his role of Manager at Station 99, indicated he was aware of these strategies. He provided an example of how he responded to the practice when he said that a staff member's request might be afforded a higher priority if it was evident that he (Vince) had received a copy of the request as well. "They probably feel that there might be some action that otherwise they might not get." Very pragmatically he went on, "course the downside is that we may see something in that which we don't like. And be immediately aware of it and say so." He summarised his view when he said, "Well, it's something [sending him copies] that I guess, some people use advisedly depending on the situation."

Clearly, Vince also understood that email could also be used to exert an indirect form of pressure downward to his staff. In the following extract, he spoke of a specific situation where he was kept informed about the progress of maintenance/repair work via an emailed copy of the fault report.

It was apparent that Vince believed his monitoring and surveillance via the emailed copy increased the pressure on his staff to expend greater effort to clear the fault more quickly. Evidence that managers know about these manipulation tactics and that they also use them themselves.

\*VINCE. But I need to know and if, for example, the faults are serious, I can see just by looking at them, how long they're off air. And I can follow those up, in a sort of special situation or I'll leave it if it's not such a serious situation to the officer who is responsible for dealing with it. But that officer also knows and every other officer knows, involved in the process, that I'm getting a copy of it. So, it's also, it's an alerting mechanism, and it's also a management tool in the sense that others down the line know that a senior management person is able to look at those things. Now, if you had to organise that, some other way, other than electronically, it would be very cumbersome.

Email also opens up the possibility of operative staff responding in kind when seeking to apply similar pressure upwards to Managers. Owen provided a third person view on this although, like Amanda, he appeared a little hesitant in talking about it.

\*OWEN. My guess is that a manager may respond differently via email if that response is going out to 50 people on the distribution list rather than just the individual person. Y'know, he may take a more diplomatic line, if you like or whatever. I mean, that's only a guess. I mean, I don't know. But, I mean I would imagine if I was replying to an email from someone and there were 50 other names, and it was something, I might choose my words probably a bit more carefully than if I was talking to them directly.

Vince provided a glimpse of his perspective on the control aspect of managing when he explained that with Cc-ing "you can send them off to the people that are concerned, you can copy them to the people who don't need to respond and y'know, you've got a format which suggests to people how you are seeing a message and who should respond and who shouldn't." What appeared to be happening in this instance was that Vince believed the format of his message communicated additional information about his perspective regarding the specific situation. Whether the recipients of Vince's messages actually interpreted such meanings from the format of his messages was not explored in this current study but it remains a pointer towards further research possibilities.

Shifting now to a third perspective of Cc-ing and the operative/manager relationship, Amanda took a different tack as she explained that she used Cc-ing to generate support to bring about a desired outcome in her relationships with Senior Managers. However, she targeted the Manager's support staff as well as the actual Manager involved. "If I want to doubly make sure that something's going to happen, I'll even lobby their [Section Manager's Personal] Assistants [by Cc-ing them a copy of her request]."

Again, this raises interesting questions about the potential gap between the sender's intentions and expectations compared with what the receiver actually does in response to the communication. Berghel discussed this double-blind process back in 1997. "The sender doesn't know how a message is being handled and the receiver doesn't know the circumstances under which the message was sent" (p. 12).

Amanda also provided details of another way that she used the email copy function in terms of her relationship with her Manager. When it was appropriate, she included her boss as a Cc on her email messages. "And, for me, the emails are actually a record, in one way, of what I've been up to, what my activities are." She went on, "I'll just send a copy so that they're up with it because it'll be really hard for me to catch them sometime and have a chat." Amanda was using the Cc-ing function as an upward reporting tool, perhaps with the aim of positively enhancing her work profile as an effective and efficient staff member.

Station 99 staff were discovering and creating opportunities to use email, particularly the Cc-ing function, to shape their interactions with others in subtle as well as in more obvious ways. Further research will provide additional insights about how individuals are Cc-ing email messages in strategic ways, which in turn could have major implications for management practice.

## **Discoveries and Managerial Implications of the Study**

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This research is practice-oriented and the aim has been to seek deeper understandings about CMC technologies (specifically email) in intraorganisational communication. The message web concept emerged as a useful organising framework to describe the communicative fabric of Station

99's operations. In the study, the distribution and copying aspects of email were constructed as being influential threads within their message web. The pertinent findings are now summarised alongside the implications that follow for managers seeking to ensure that email supports organisational objectives.

- *Information distribution within the message web.* The issue of access to specific information being circulated via distribution lists as well as more general access to email itself was significant. It appeared as though they were now being taken for granted, thus supporting the view that email is becoming part of our living space: Ducheneaut & Bellotti's (2001) work habitat, Muller & Gruen's work on IBM Watson Research Centre's Reinventing Email project (2002). Choices made concerning email distribution lists can severely impact on intraorganisational communication effectiveness, particularly in terms of getting the message to the appropriate people. There is also huge potential for holes in the message web resulting from the double-blind process of email interactions (that is, the sender's intentions and the receiver's subsequent actions may be unknown to each other). This can contribute to multiple, and possibly contradictory, meanings resulting in misunderstandings, lost productivity and even interpersonal conflict. And finally, latent opportunities exist at all levels of the organisation for questionable ethical behaviour within message webs, a challenge for management.
- *Strategic copying amid the message web.* Second level uses of email based on tactical manoeuvrings (such as copying email messages strategically) were in use within Station 99's message web. New opportunities were opening up for those skilful in the art of organisational politics as individuals sought to influence others in satisfying their goals: goals which could be the organisation's but were not necessarily so. To consider such practices as "weaknesses" in the way that Ruggieri Stevens & McElhill (2000) classifies them on the People Influences dimension of their positioning model appears to ignore the inherent complexities of the political factors of organisational life. In addition, such activities generally arise from innovative and creative thinking and understanding both the origins and the expression of resourceful thinking evident in such political uses of email can be valuable as organisations move away from the more traditional, bureaucratic and hierarchical structures of the past.

## Looking to the Future

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Being both explanatory and exploratory in nature, this research generated intriguing hints of research questions that were beyond the scope of this current work.

- Further consideration of the message web concept to investigate whether it continues to be a useful framework upon which explanations about what is going on in organisations with CMC technologies can be constructed.
- A more intense exploration of the email strategies that staff (at all levels) use in seeking to influence (and manipulate) others and the subsequent behaviours that these strategies evoke (for instance, Vince's belief that the format of his message suggested the method to be used in responding to a specific situation).
- Ongoing investigation into ways to manage better the distribution of information electronically through an organisation's message web.

As new technologies enter human society, we build up common responses over time regarding the place such technologies occupy in our lives. In a collective sense, we construct this habitat and this is what I believe was happening at Station 99. However, our ability (as a society) to enter into this debate regarding email's place in our lives progressively diminishes over time until it disappears entirely, At which point email will have moved away from being a new technology and its role or place will have become taken for granted. This taken for grantedness will evolve from, and be shaped by, the more dominant view of what email actually is. And it is probable that this will shape and to some extent fix, the standard or common view of what is accepted and what is acceptable about email in the future.

My discovery of the current state of flux and fluidity at Station 99 in regard to their thinking about email's place and its acceptability or otherwise was a major finding of this research. Accordingly, further exploration of the ways that people construct criteria or standards of acceptability versus non-acceptability in regard to email would appear to be a valuable exercise to both the academic population and the more widespread general public community including managers and others in organisations. Such a reflection on what is currently happening will ensure that, although specific ways of thinking about email will

be endorsed as the dominant frame at some point in the future, alternatives will not disappear without extensive discussion now. As message webs within organisations grow in importance, effective management will require strategies to be in place to respond to the dynamic demands of the Interaction Age.

*In finishing this chapter, you may now be interested in reading the final two journal extracts about the completion of the initial draft, my interaction with the book editor and my response to the comments I received from the two anonymous peer reviewers.<sup>3,4</sup>*

## References

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- Berghel, H. (1997). Email: The good, the bad, and the ugly. *Communications of the ACM*, 40 (4), 11-15.
- Bochner, A. P. (2000). Criteria against ourselves. *Qualitative Inquiry*, 6 (2), 266-272.
- Carey, J. W. (1989). *Communication as culture: Essays on media and society*. Boston, MA: Unwin Hyman.
- Day, E. (2002). Me, My\*self and I: Personal and professional re-constructions in ethnographic research. *Forum Qualitative Sozialforschung / Forum: Qualitative Social Research*, 3 (3). Retrieved September 9, 2003, from the World Wide Web: <http://www.qualitative-research.net/fqs-texte/3-02/3-02day-e.htm>.
- Ducheneaut, N., & Bellotti, V. (2001, September-October). E-mail as habitat. An exploration of embedded personal information management. *Interactions*, pp. 30-38.
- Fulk, J., Schmitz, J., & Ryu, D. (1995). Cognitive elements in the social construction of communication technology. *Management Communication Quarterly*, 8 (3), 259-288.
- Gómez, R. (1998). The nostalgia of virtual community: A study of computer-mediated communications use in Colombian non-governmental organizations. *Information Technology and People*, 11 (3), 217-234.
- Kersten, L., & Phillips, S. R. (1992, February 21-25). Electronic identities: The strategic use of email for impression management. Paper presented

at the *Annual Meeting of the Western Speech Communication Association*, Boise, Idaho, USA.

- Kiesler, S. (1997). *Culture on the Internet*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Kling, R., & Scacchi, W. (1982). *The web of computing: Computing technology as social organization*. *Advances in computers* (vol. 21). New York: Academic Press.
- Kling, R., McKim, G., & King, A. (2003). A bit more to IT: Scholarly communication forums as socio-technical interaction networks. *Journal American Society for Information Science and Technology*, 54 (1), 47-67.
- Kraut, R. E., & Attewell, P. (1997). Media use in a global corporation: Electronic mail and organizational knowledge. In S. Kiesler (ed.), *Culture of the Internet* (pp. 323-342). Mahwah, NJ: Lawrence Erlbaum Associates.
- Lamb, R., & Kling, R. (2003). Reconceptualizing users as social actors in information systems research. *MIS Quarterly*, 27 (2), 197-235.
- Levine, R., Locke, C., Searls, D., & Weinberger, D. (2000). *The cluetrain manifesto: The end of business as usual*. Cambridge, MA: Perseus Publishing.
- McKelvey, B., Mintzberg, H., Petzinger, T., Prusask, L., Senge, P., & Shultz, R. (1999). The gurus speak: Complexity and organizations, A panel discussion at the *Second International Conference on Complex Systems*, October 30, 1998. *Emergence, A Journal of Complexity Issues in Organizations and Management*, 1 (1), 73-92.
- Minsky, B. D., & Marin, D. B. (1999). Why faculty members use e-mail: The role of individual differences in channel choice. *The Journal of Business Communication*, 36 (2), 194-217.
- Morgan, G. (1997). *Images of organization* (2nd ed.). Thousand Oaks: Sage Publications.
- Muller, M. J., & Gruen, D. M. (2002). *Collaborating within - not through - email: Users reinvent a familiar technology* (Report No. 02-10). Cambridge, MA: IBM Watson Research Center, Collaborative User Experience Group, Project: Reinventing Email. Retrieved October 31, 2003 from the World Wide Web: <http://www.research.ibm.com/remail/publications.html>.

- Newhagen, J. E., & Rafaeli, J. E. (1996). Why communication researchers should study the Internet: A dialogue. *Journal of Computer-Mediated Communication (Special joint issue with the Journal of Communication)*, 1 (4). Retrieved January 18, 1999 from the World Wide Web: <http://www.ascusc.org/jcmc/vol1/issue4/rafaeli.html>.
- O'Sullivan, P. B. (2000). What you don't know won't hurt ME: Impression management functions of communication channels in relationships. *Human Communication Research*, 26 (3), 403-431.
- Phillips, S. R., & Eisenberg, E. M. (1993). Strategic uses of electronic mail in organizations. *EJC/REC: The Electronic Journal of Communication*, 3 (2). Retrieved April 9, 1997 from the World Wide Web: <http://www.cios.org/www/ejc/v3n293.htm>.
- Phillips, S. R., & Eisenberg, E. M. (1996). Strategic uses of electronic mail in organizations. *Javnost*, 3 (4), 67-81.
- Ruggeri Stevens, G., & McElhill, J. (2000). A qualitative study and model of the use of e-mail in organisations [Electronic version]. *Internet Research: Electronic Networking Applications and Policy*, 10 (4), 272-283.
- Schein, E. H. (1985). *Organizational culture and leadership*. San Francisco: Jossey-Bass Publishers.
- Schultze, U. (2000). A confessional account of an ethnography about knowledge work. *MIS Quarterly*, 24 (1), 3-41.
- Schultze, U., & Boland, Jr., R. J. (2000). Knowledge management technology and the reproduction of knowledge work practices. *The Journal of Strategic Information Systems*, 9 (2-3), 193-212.
- Schwartz, D. G. (2003). When bad email happens to good people: A case of Information Technology mismanagement. In A. Sagie, S. Stashevsky, & M. Kowloosky (eds.), *Misbehaviour and Dysfunctional Attitudes In Organizations*. Palgrave/McMillan Publishing.
- Sproull, L., & Kiesler, S. (1991). *Connections: New ways of working in the networked organization*. Cambridge: The MIT Press.
- Stahl, B. C. (2003, August 4-6). *How we invent what we measure: A constructionist critique of the empiricist bias in IS research*. Paper presented at the AMCIS 2003 - Americas Conference on Information Systems, Tampa, Florida, USA.
- Tyler, J., Wilkinson, D., & Huberman, B. A. (2003, September 19-21). *Email as spectroscopy: Automated discovery of community structure within*



*organizations*. Paper presented at the Communities and Technologies (C&T 2003), Amsterdam.

## **Endnotes – Pertinent Reflective Journal Extracts**

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- <sup>1</sup> ***Reflective Journal Extract No.1:*** *The guidelines provided by Mikael (as book editor) clearly indicates an expectation the chapter would present “issues, controversies, problems” associated with the main thrust of the chapter and then provide “solutions and recommendations in dealing with them.” I wondered though, like Rafaeli did, if effects are the only focus of study? He argued “that some of the more important contributions of communication research are in a better understanding of what goes on, even without these ‘goings on’ necessarily getting anyone anywhere. Intended effects or salient dangers play an important part, but there is much more to studying communication than just documenting what it actually does to people” (Newhagen & Rafaeli, 1996, para. 30). I agree. Hence, understanding more about, and reflecting on, what occurs for people and their interactions with others at work as they use email encapsulates my aim with this chapter rather than the seeking of “solutions or recommendations” in dealing with the issues. However, I will include a brief exploration of some of the management implications that flow from my study at the end of the chapter.*
- <sup>2</sup> ***Reflective Journal Extract No.2*** ... *Hope it’s clear that my research interests centre on understanding more about the social phenomena of email in an intraorganisational context and then telling engaging stories about it. One of my aims with the stories I tell is to craft a vicarious experience for readers that illuminates email as a component of organisational life complete with its inherent social complexity and richness. To this end, I include a range of extracts quoted from the ethnographic conversations I had with the study participants: some are quite succinct while others reflect more fully the rich flavour of the spoken conversations. My aim is to portray what was said as well as what was unsaid (for example, non-speech events such as laughter, pauses and even umms and uhhhs are sometimes in-*

cluded in these extracts). By providing such thick descriptions of the data, I seek to engage my readers with a sense of déjà vu. I am not seeking the truth about email rather I am opening a dialogue where others may find themselves in the text alongside me and the social world that I am describing.

- <sup>3</sup> **Reflective Journal Extract No.3** ... Now that my chapter is written, I'm wondering how well it will 'fit,' particularly with the book coming from an informatics perspective. It's a cross-disciplinary jump for me but I believe that such interactions help paint a more reflective picture of just what is happening. I emailed my concerns to Mikael about my chapter being appropriate and his response was "the idea with the book is to give an overall picture of the emerging Interaction Society enabled by modern information technology which is kind of a broad theme so don't worry too much about the fit and the scope." Then he said, " Good luck."
- <sup>4</sup> **Final Reflective Journal Extract** ... Well, I have now received the two reviewers' feedback and the comments clearly show that the contemporary style of representation did not fit at all well. While support was evident that my work was relevant and appropriate for the book, both suggested I abandon the ethnographic writing style. The story-telling format was soundly rejected by both, as was my writing in the first person. The dialogue opened up by my journal extracts also seemed confusing and they were similarly frowned upon. However, some useful suggestions were made re positioning the theoretical framework more firmly within the IT ethnographic literature and advice re: teasing out the implications of the message web concept more specifically, particularly in the final part of the chapter was also helpful. So, what to do? Do I want to make significant changes to the chapter (in both structure and style) to conform to "the traditionally right way of doing things"?, to enable my chapter to be an acceptable contribution to this book. In resolving this dilemma, I've done some restructuring of the chapter (included a method section and I've also moved these journal extracts from the body of the chapter into these endnotes). One reviewer specifically mentioned an article about the publication process where the author discusses what battles to fight with advice to "only stick your neck into one guillotine". The reviewer goes on to suggest that I "let go of the guillotine of the form of the chapter, i.e., the I-form as well as the

*‘storytelling’.*” After pondering this for some time, I have decided that even though it is important to get my work ‘out there’ and legitimatised through publication, some battles are worth fighting — I’ve chosen to keep the ethnographic techniques I’ve used in writing this chapter.

## Chapter III

# Social Exile and Virtual *Hrig*<sup>1</sup>: Computer-Mediated Interaction and Cybercafé Culture in Morocco

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*“I have indeed – praise be to God – attained my desire in this world, which was to travel through the earth, and I have attained in this respect what no other person has attained to my knowledge.”<sup>2</sup>*

*Ibn Battuta, a 14<sup>th</sup> century Moroccan traveler*

*“Do you think that Ibn Battuta would’ve traveled the world if he’d had access to the Internet?!”*

*A cybercafé user*

## Abstract

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*This chapter explores ways in which computer-mediated interaction and cybercafé culture are appropriated by individuals and groups in Morocco.*

*It argues that computer-mediated communication mediates the construction of cybernetic identities and promotes the rehearsal of invented social and gender relations. This inventive accommodation of the Internet (known among young Moroccan Net communicants as “virtual hrig”) makes computer-mediated interaction, especially through the discursive forum of chatrooms and email discussion groups, act as a backtalk to dominant patriarchal and conservative power structures. By using a qualitative ethnographic approach while sounding the depth of the “cultural noises” and incrustations, which are accompanying the expansion of cyber culture, the author also hopes to foreground the prospective implications of New Media and Information Technologies in a non-Western environment. While it is too early to draw conclusions on the extent of the impact of new media technologies on individual subjectivities and group identities, the point is made that cyber interaction is contributing to the expansion of the public sphere in Morocco.*

In a Friday sermon broadcast on Moroccan national television, the Imam (the Friday sermon preacher and prayer leader) focused on the contribution of the Internet and cybercafé culture to the expansion of spatial production in Morocco. He made the point that the cyberworld should be viewed as a workable alternative to sites of vice and moral deviance, which permeate the real world. Citing as a reference the mosque’s middle class neighborhood in Rabat, he deplored the absence of libraries, museums or other resource centers that could shield the youth from the risks of idleness and moral deviance. For the Imam, it is the emancipatory dimension of cyberspace that must be stressed. In a way, the Imam’s view is in tune with the perception of the important contribution of the Internet to the expansion of interaction and communication in the public sphere. The central argument on this side is that new information technologies are helping to dismantle traditional power structures by allowing previously disenfranchised groups to publicize their concerns.

Along with this view, there is a concern among the general public that highlights the risks of computer-mediated interaction on the affective and performative identities of Internet users. A therapist who runs a weekly section on sex education in a Moroccan daily newspaper reports the story of a woman who blames Internet chat for turning her 17 year old son into a homosexual: “I accidentally came across a letter in my son’s room [...] and that’s how I found out he was gay. I can’t believe that my only son is a homosexual and it’s Internet chat which has turned him into one” (Harakat, 2002, p. 9). The author also

reports the story of a thirty year-old woman who sought therapy to “survive” an addiction to Internet chat and an “emotional dependence” on virtual correspondence. The therapist explains that both cases support the argument that virtual exile provides an alternative space to the inhibitory world of everyday life. The argument here is that instead of regulating access to the Internet or passing legislation to ban access to cybercafés to underage children — as some Moroccan parliament members have proposed — the alternative approach would be to sensitize the public about the risks of a “mindless addiction” to the world of computer-mediated interaction.<sup>3</sup>

These vignettes reiterate some ethical and psychological concerns that have traditionally accompanied the expansion of technological innovations. The freedom intrinsic to a new technology has often been bracketed between the promise of a more effective transmission and dissemination communication model and the anticipated risks of a ritual of interaction that could jeopardize the organizational order of lifeworld relations. In contemporary Morocco, the ongoing deregulation of telecommunications policy is mediating an expansion of the public sphere and reconstruction of gender and power relations. However, this liberation is also generating attempts by conservative forces to reproduce the dominant normative model of spatial production onto the emergent space of the new media and communication technologies.<sup>4</sup>

This chapter argues that virtual *hrig* is to be viewed as a grassroots alternative to the restrictive norms of the public sphere rather than an escape from real life limitations. Similarly, I contend that the construction of cybernetic identities provides disenfranchised communities with a resistance space to deal with global exclusion and marginalization. Cutting across both arguments, I maintain that computer-mediated interaction, especially through the discursive forum of chat rooms and email discussion groups, underlines an expansion of the public sphere and calls for the articulation of a communicative model whose normative conditions can reconstruct the divide between the public and private spheres and transcend the borderlines between virtual reality and social space.

I begin with some reflections on the method of approach to Internet research and computer-mediated interaction. In the second section, I provide a brief discussion of the expansion of Internet and cybercafé culture in everyday life of Moroccans. The third section attempts a description of sites in which virtual interaction may be reconstructing gender and power relations in Morocco. In the concluding section, I highlight ways in which Internet culture may be expanding the public sphere and rewriting the normative conditions of its development.

## On Method: Research and Internet Culture

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In *The Second Self: Computers and the Human Spirit*, Sherry Turkle (1985) argues that in an “ethnography of a science of mind,” the essential question is “how ideas developed in the world of ‘high science’ are ‘appropriated’ by the culture at large.” Turkle rightly states that such investigation “calls for a genre of field research with some special qualities” (p. 317). Though I have not borrowed from the clinical interview style, I maintain that an understanding of the interrelation between thoughts and feelings and computer-mediated interaction requires a special field approach. In *The Anthropology of Online Communities*, S. Wilson & L. Peterson (2002) review dominant research questions that have influenced the study of the Internet. Quoting Hakken’s insightful statement that the incorporation of popular rhetoric on technology in scholarly Internet research has created “multiple, diffuse, disconnected discourses which mirror the hype of popular cyberspace talk” (as cited in Wilson & Peterson, 2002), Wilson & Peterson go on to suggest that research be brought back from:

*cyberspace and virtual reality into geographical, social spaces, to address a variety of issues such as the ways in which new participants are socialized into online practices, how gendered and radicalized identities are negotiated, reproduced, and indexed in online interactions; and how Internet and computing practices are becoming normalized or institutionalized in a variety of contexts (Wilson & Peterson, 2002).*

Wilson & Peterson (2002) also call for a simultaneous interest in online and offline interactions “to address important issues of the social role of technology, the relationship between language and technology, and questions of access to technologies in traditionally marginalized communities.”

In his study of cyberspace community organizing, Stoecker (2002) concludes that the Internet contributes to the construction of both weak and, at times, strong ties. Stoecker praises the Internet and computer-mediated interaction for their important contribution to the emergence and development of an internationally organized opposition to global capitalism going as far as to state

that it is “difficult to say whether this international level of community organizing could have occurred without the Internet” and that “[at] the very least, it would have been a lot much more expensive and time-consuming for activists to find, develop, and coordinate mobilizable networks” (p. 153).

Referring to the Islamic portal “IslamOnline,” J. Anderson (2001), for example, shows how this site services Muslims across the globe and plays the role of the traditional “Shaykh” by providing formal and informal counsel on religious and mundane issues, especially for Muslim women in Diaspora. Anderson makes the point that:

*the medium [cyberspace] affords a continuum not only of formats from counseling to religious ruling but also a continuum of interaction from silent and self-directed seeker to actively engaging the shaykh. Moreover, they are accessible internationally, effectively creating a new public that itself combines traditional elements with modern technology (2001).*

In a more focused study, V. Mamadouh (2001) analyzes the role of computer-mediated interaction in the design and construction of a Dutch Moroccan identity. Mamadouh refers to Websites as “agenda setters and gatekeepers” because they mediate the construction of identities on the basis of selected content they propose to target publics. More generally, Mamadouh concludes that for young Dutch Moroccans, “the Internet may also provide ways to escape the closed group of peers at school and in the streets and widen their horizons while constructing a self-defined identity and deciding to which group(s) they want to relate (most)” (p. 262).

It seems that irrespective of approach or methodological design, most Internet research is now keen on transcending the dividing line between virtual and social reality, on one hand, and computer-mediated interaction and other forms of communication and networking, on the other. The online/offline dichotomy or the elevation of a form of interaction over others displaces the dynamic site where identities are negotiated and overlooks the important role of agency. Computer-mediated interaction is likely to extend to mobile phone and, at times, to face-to-face communication. It is now quite common in Moroccan cybercafés to see Internet users chatting on the phone at the same time as in a private chat box. What must be underlined is that online performances are not only simulated rehearsals in a disembodied virtual world but, for regular Net



communicants, they have become an integrated part of everyday experiences. In the words of Mitra & Schwartz (2001), a “metaphoric shift” is needed “to understand the role of the Internet in everyday life and move away from the naturalized understanding that the Internet is a tool for entering cyberspace only. It is indeed a tool for living both in cyberspace and real life and thus the understanding of the Internet lies in the realm of cybernetic space.”

To accelerate this metaphoric shift, Mitra and Schwartz propose the term “cybernetic” as the space in-between cyber space and real life. They point out that most Internet research has focused either on the discursive or behavioral aspects of Internet use and has consequently failed to conceptualize the space where the discursive and behavioral merge. To overcome this conceptual limitation, Mitra and Schwartz propose the notion of “cybernetic space” to allow for “the simultaneous understanding of both the real and the cyber as one conceptual whole and the Internet can be analyzed from both perspectives.” In addition, they argue that:

*The emphasis on the cybernetic space [...] makes it important to see how people behave when they are faced with the discourse of Internet as they are able to re-negotiate their identities in cybernetic space. The behavioral in the real can become influenced by the discourse encountered in the cyber and it is the sum of the behaviors and the discourses that need to be studied together when looking at cybernetic space. This recognition could lead to a new set of research agendas and goals as we examine the Internet and the many technologies that are being built to make it easier for people to access the discourses and then live in cybernetic space (Mitra & Schwartz, 2001).*

The metaphor of cybernetic space allows observation of the zone of interplay between the real and the virtual. However, even if diasporic people create their own virtual communities and construct autonomous identities, the elements of “location, nationality, and movement” may remain as important in the invented virtual world as they are in real life. In chat rooms, a user’s identity is first established by announcing his/her sex, age, and location (gender, class, and geographical location). Information on sex, age, and location (ASL) is often decisive in triggering the interest of other chat users or starting individual relationships. Likewise, chat users may prefer certain virtual locations to others and, in fact, tend to become regulars of selected chat sites. Such behavior may

be motivated by the desire to “home” the virtual location and turn it into one’s private cybernetic space. However, the emergence of diasporic virtual communities or cybernetic relationships is largely mediated by the user’s identity “in” and “out” of the cyberworld. While cybercafé owners agree that the most popular chat sites are “www.caramail.com,” “www.amitié.fr” or “www.abcoeur.com,” most of my female informants state that they are also regulars at “www.arabia.com” because it is the congregation site for Arabs from different geographic locations. According to my informants, Moroccan female chat users prefer cybernetic correspondence with fellow Muslims from Europe or North America because, in case the virtual correspondence develops into a more “serious” relationship, it would be ethically viable and socially more acceptable for them to wed a Muslim. This is why most of them prefer not to commit to a correspondence when the user’s identity does not correspond to the profile they seek.

From a conceptual perspective, the idea of cybernetic space validates the notion of virtual community by tying it to reality. Also, emphasis on the interplay between “real life” and “cyber identities” corresponds to the dialectical interaction between what Victor Turner (1982) calls “social drama” and “liminality.” Turner defines social drama as an “experiential matrix” which consists of “[b]reach, crisis and reintegrative or divisive outcomes” (p. 78). The cultural life-world of social drama rests upon a dialectical process, which engages the serious and the playful, structure and liminality, and order and randomness. This dialectical process finds its articulation in liminal spheres where moral, artistic, analytical, and ritual orders of culture are simultaneously in play and in question. This “betwixt and between” phase, Turner asserts, is “humankind’s thorny problem [...] [and at] the same time [...] our native way of manifesting ourselves to ourselves and, of declaring where power and meaning lie and how they are distributed” (Turner, 1982, p. 78).<sup>5</sup> Liminal spaces and interactions can mediate conditions for community formation by channeling subversive and oppositional perceptions that act as a backtalk to dominant worldviews. Thus, cybernetic space becomes, along Geertz’s (1973) definition of culture, a site where individuals create a web of symbolic social and power relations to rehearse their identities and subject positions.

In conducting the present study, I share with J. Abdelnour Nocera (2002) the epistemological foundations he lists for cyber research. I start from the premise that:

*A person living in virtual settlements is [...] conceived as a responsible creating agent with a history of its own. As in real life, signification in cybercommunities is a collective achievement, and each one of the members inside that collective recreates, reproduces and changes it (Fernandez, 1994). This vision of the knowing process turns inquiry not into a simple discovery or a critical method of analysis, but into a complicituous partner within the meaningful systems in which we live, whether virtual or real. Cyber research, as any other sociocultural inquiry, is part of the reality-producing enterprise (Anderson, 1992; Caputo, 1992).*

In addition, as a general rule, concepts are constructed ideas/ideals and as such, they are residues of commitments and expectations but also of apprehension and skepticism. The reliance on “concepts” to define forms of social organization and ways of life is an arduous endeavor that needs clarification. The construction of an ideal is in itself an act with manifold implications since it bears directly on the relationship between theory and praxis. Societies and cultures have historically drawn on home-designed and imported constructed ideals for self-identification and for bestowing “meanings” on the systems that regulate relations among group members. Myth, magic, art, religion, science, and technology are examples of constructed ideals that have organized the lifeworlds and systems of human societies from the most isolated and nomadic tribes to the post-modern virtual and cybernetic communities.

This perspective informs my reflections on the organizing interaction principles between real life and cybernetic spatial relations. However, I have been interested in cybernetic space only in so far as it relates to the politics of the public sphere and cultural politics. Similarly, I define the importance of cybernetic culture in terms of its contribution to the ongoing reconstruction processes of power relations in contemporary Morocco. I approach computer-mediated interaction, in general, and the Internet in particular, as media of emancipation. My perspective on the cybernetic world is committed to the view that the Internet has “produced new public spheres and spaces of information, debate, and participation that contain the potential to invigorate democracy and to increase the dissemination of critical and progressive ideas” (Kellner, 1998, as cited in Dahlberg, 2001). However, even concerning the frequently cited case of Internet use by the Zapatista activists in Mexico, theorists have warned against romanticized interpretations of Internet communication.<sup>6</sup> As Wilson and Peterson have noted, case studies which research

online communities in the context of geographical group formation “illustrate how offline social roles and existing cultural identities are played out, and sometimes exaggerated, in online communication” (Wilson & Peterson, 2002). I also take note of their statement that “research in multilingual, multisided Internet experiences would contribute to debates in the literature which seeks to position studies of mediated communication and technology in local social and communicative practices” (Wilson & Peterson, 2002).

This research seeks to extend the exploration of computer-mediated interaction and appropriation of new media and communication technologies to non-Western social and cultural environments. Theoretical designs gain in strength and richness when they travel to new and diverse test-grounds. In traveling theory, as Clifford has noted, “the organic, naturalising bias of culture – seen as a rooted body that grows, lives, dies, etc. – is questioned. Constructed and disrupted historicities, sites of displacement, interference, and interaction come more sharply into view” (as cited in Belghazi, 1995, p. 166). Furthermore, an interpretation of cultural and communication studies in terms of traveling theory is of “particular interest in the Moroccan context” since, as Belghazi (1995, p. 166) argues:

*(...) there has always been a powerful trend among Moroccan intellectuals to conceptualize scholarship as a site of travel and to perceive uprootedness as inextricably linked to dissent. Thus, when schools were founded in the fourteenth century during the reign of the Merinid dynasty, one of the most outstanding scholars of the time, Cheikh Abili, objected to them on the ground that they tied scholars to particular places and made them dependent on the authorities which paid them (Al Wancharissi, 1981: 479).*

There is a lesson for cultural workers to take from this fourteenth-century thinker. If scholars back then resisted placement and containment within circumscribed borderlands, it would be untenable on our part to insist on dwelling a narrow world of cultural and media theory in the age of the World Wide Web. Furthermore, the notion of virtual *hrig* is itself anathema to borders or frontiers. *Hrig* is primarily about transgression and the implosion of borders. It is about navigation, displacement, and estrangement. At the same time as it implodes borders, it also sets off an interaction process between social space and virtual habitat, local geographies and global networks and begins the conversation on identity, subjectivity, and power relations.

As a cultural worker, I have been receptive to both popular and scholarly conversations on cybercafé culture and computer-mediated interaction. While qualitative research findings make the spine of this research, I have also been attentive to all the “noises” accompanying the expansion of new media and communication technologies. I have observed how, in a cybercafé near a mosque in Rabat, at the call for the prayer, Net communicants exit the “profane” World Wide Web and cross over to the sacred realm of the mosque. The smoothness of the transition gives insight into the trans-border zone into which identities emerge. I have traced the beginning of a popular construction of cybercafé culture and computer-mediated interaction in print and visual media and grapevine stories. In parallel, I have borrowed from the general guidelines of ethnographic research. I have done observation in cybercafés, conducted unstructured and in-depth interviews with Internet users, and organized focus and debate group meetings on issues involving technology and cultural implications of computer-mediated interaction. In total, I have met with 220 young people aged between 18 and 25 years. Females constitute about 65% of the sample public I have interviewed. The choice of this age and gender category of Internet users is premised on the personal observation that young women represent a dominant segment of cybercafé clientele. This decision is also based on the assumption that women’s online and cybercafé experience may provide a better insight into the interplay between computer-mediated interaction and identity construction.

Finally, though I have visited cybercafés in middle and lower middle class neighborhoods in Rabat, Casablanca, and El-Jadida, three Northwestern Moroccan cities, issues of class or status have not been taken as criteria for the selection of the sample. Also, my primary interest has been the study of emergent cybernetic culture which online interaction is generating. Rather than online discourse or performance, my interest is in the textual tapestry that accompanies the expansion of chat and Internet culture. Though I do not claim that this research allows for extrapolations on the effects of computer-mediated interaction on the dominant culture in contemporary Morocco, it nonetheless indicates some of the strategies available to the youth to reconstruct power and social relations. In the next section, I proceed with a description of online interaction and cybercafé culture in Morocco.

## Online Interaction and Cybercafé Culture in Morocco

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Like most African countries, Morocco suffers a serious delay in integrating the global information society. Whether in terms of policy, cost or teledensity, access to information and communication technologies is not yet possible for the majority of the population. While it is one of the high-ranking African countries in telecommunications “policy,” Morocco still lags behind in terms of fixed line teledensity. By 2001 there were only 5.03 telephones per 100 inhabitants. Connectivity, too, is very limited since only 0.35% of Moroccans are Internet users (Hafkin, 2002).<sup>7</sup> While the remarkable expansion of mobile telephony has brought the ratio of Moroccans with access to a telephone to 1 out of 4, the decline of the fixed service is affecting the growth of the Internet.<sup>8</sup> Hala Baqain, an Arab Advisors Group’s analyst, has insightfully observed that it may be that “the lack of interest in the fixed services tender is the relative underdevelopment of the Internet and datacomm segments in the country, which makes investing in fixed services even riskier” (as cited in *HatifTelecom*, n. d.).

However, though Internet service is still at a fledgling state, there has been an extraordinary interest in cyber culture over the last five years. The expansion of computer-mediated interaction has generated new jobs and affected the urban landscape. The business of Internet service providers has boomed and there is hardly a neighborhood today that does not have its local cybercafé.<sup>9</sup> Quite a few cafés have transformed their upstairs sections into cybercafés. Though updated estimates put the number of Internet users at 500,000, it is quite interesting to know that this number may have exceeded that of readers (Zyne, 2002).<sup>10</sup> Despite the competitive environment created by the recent introduction of the provider Maroc Connect (a subsidiary of French Telecom), only 5% of Moroccan houses are connected to the Internet, while this service is yet inaccessible in public schools and universities and remains the privilege of top managers in private and public institutions. A recent government agency survey in the workplace has revealed that so far more than 60% of small and mid-sized enterprises are not connected to the Internet. The same study has shown that only big organizations are investing in the new technologies, while only 25,000 enterprises out of 75,000 industrial units are connected to the Internet service (as cited in Mouhcine, 2003, pp. 1-2).

For the general public, cybercafés have played a substantial role in the expansion of cyberculture. For a price, which ranges from eight to 11 dirhams an hour depending on location and available services (about \$1), cybercafés are open to the general public including children. In its evening news on April 8, 2002, Channel 2M ran a report on the growing importance of cyberculture in the life of Moroccan youth. The cyber clients interviewed for the report stated that they spent an average of four hours a day in the cybercafé chatting on the Internet and most of them admitted an addiction to computer-mediated interaction: "Chat has become an essential performance in my everyday life. Just like I need my morning coffee, I also need a chat session to start the day with," one informant said. Another interviewee confessed that he often stayed in the cybercafé till he started dozing on the keyboard: "I can spend up to 12 hours a day in this cybercafé and more than 100 dirhams (\$10). My parents are now more and more concerned about the time and money I spend in the cyber."<sup>11</sup>

Morocco is a promising market for new information and communication technologies, as has been shown by the amazing expansion of mobile phones and the price of \$1,200,000,000 telecommunications giant Vivendi has paid for the exploitation of a second phone license. In the words of its president, Forcom, an annual meeting which brings together telecommunications experts and policy makers, aims at developing the infrastructure and content of information and communication technologies (media and the Internet) "to find solutions so as to reduce and attenuate the phenomenon of 'digital fracture' which leads to exclusion" (as cited in Oudoud, 2002). In an inaugurating statement to Forcom 2002, a high government official stated that the Information and Communication Technologies sector made a decisive contribution to the development of the country between 1995-2000: "The [sector's] contribution consisted in the most important sectorial investments never matched by any other economic activity in Morocco [...] They enabled us to catch up with years of considerable delay and to create an important value added" (as cited in Oudoud, 2002). In his turn, the Secretary of State of the Post and Information Technologies has been aggressively pushing for a "10 million Internet users by 2010" project. He is confident that the annual state funds of 1 billion dirhams (about \$100 million) set for the subsidy of Internet development makes this ambitious project very realizable: "We must accelerate the establishment of the funds to be able to implement our strategy concerning information technologies." In his opinion, if Moroccan economy is to stay competitive in a global market, the state should use these funds to subsidize

Internet connection for administrations, schools, and small enterprises (as cited in Oudoud, 2002). The next section explores some of the ways in which cyber-interaction may be contributing to the expansion of the public sphere in Morocco.

## Cyber-Interaction and the Public Sphere

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Access to the Internet is generating spheres and cultures to predominantly young publics.<sup>12</sup> For school and university students and researchers, the Internet is used as a strategic alternative to the shortage in academic and public libraries. The Moroccan sociologist Fatima Mernissi has humorously remarked that instead of vain attempts to maintain weak university structures, it might be more beneficial for the state to “convert cybercafés into schools and colleges” (Mernissi, 2003, p. 35). For most students and academics, the cybercafé may be the only resource centre: “I regularly use the Internet for my research paper. In fact, there’s hardly a day when I don’t visit a cybercafé. I also use the Internet to correspond with my friends for I don’t have enough time to write letters,” a university student told me. For others, the Internet is the fastest, cheapest, and most efficient resource centre to get information about European and North American academic institutions. Likewise, managers and self-employed publics are becoming dependent on Internet services to track business opportunities, carry out transactions, and stay competitive. As illustrated in Figure 1, the cybercafé has about 70% of the total distribution of leisure and socio-cultural resource centers while the university has no more than 8%. In rural areas where there are no cinemas, theaters or sports centers, the cybercafé is one of the very few resource centers available to the youth. For both males and females, the Internet seems to be the fourth most practiced leisure activity (Figure 2).

Another segment of Internet publics, especially adolescents, uses the Internet to access a world that is otherwise under the strict control of social and state censoring authorities. For this young public, regular visits to adult sites have become an integrated part of their quest experience for identity formation: “I’m not ashamed to say that I tend to visit sites that show adult material. Those who have digital TV are no better than I am since they use it for the same purpose. In addition, I’d rather spend money on this service than develop deviant behavior. I only watch pictures and I try to be as discreet as possible” (as cited



*Figure 1. Distribution of leisure and socio-cultural resource centers in rural and urban zones (%)<sup>13</sup>*

<b>Place</b>	<b>Urban</b>	<b>Rural</b>
Mosque	96.6	96.1
Téléboutiques (providers of pay phone service)	95.6	45.7
Kindergarten	93.5	51
Café	90	58.6
Primary school	86.6	86.6
Secondary School	73.1	59.30
Middle School	73.1	30.4
Neighborhood Hospital	73.1	57.9
<b>Cybercafé</b>	<b>70</b>	<b>2.5</b>
High School	59.3	8.7
Stadium	51.9	42.1
Women's Center	43.8	16
Youth's Center	39.8	11.9
Library	35.2	3.6
Cinema	24.3	0
Conservatory	14.6	0
Sports Center	13.6	0
Theater	9.8	0
University	8	0

in M. F., 2002, p. 5). Though cybercafé owners cannot technically monitor the sites their customers visit, most of them adopt the strategy of “open-view” position of computer screens to deter users from downloading illicit adult material. Some managers view their cybercafés as cultural centers and their role as moral guardians. They resent the thought that their business premises be used to mediate moral corruption: “When I caught a 10-year-old child downloading

adult material, I cleaned all stations from children's games and decided to prohibit entry to untutored children," a cybercafé owner explained to me. The media also report hilarious stories about Internet users and adult sites. Two reporters, for example, tell the case of two ten-year-old boys who said they were searching for "islamway" but ran into an adult site instead, or that of a recently wedded young man who confessed he was hoping to get adult material from the Internet to "spice up" his marital life (Bentaleb & Tribek, 2003, p. 7).

Another integrated part of cyber-interaction is "chat." Most of my informants state that "chat" constitutes one of their most entertaining and "liminal" cybernetic performances. For cybercafé owners, chat addicts are "good clients" since they generally spend more for their cybernetic journey. Chat addicts willingly admit that they almost always end up spending more time on the Net than they initially intend to: "I come here to spend one or two hours and I always end up staying four to five hours," one informant said. "I start by answering mail, then I visit sites of relevant interests, and I always finish with a chat session that may last up to three or four hours." Another high school chat addict admits that his parents are becoming increasingly concerned about the time he spends at cybercafés and the amount of pocket money he now requests: "My father doesn't know much about the Internet and almost nothing about chat, so he can't understand why I need to spend three or four hours at a cybercafé." Even in the workplace where Internet chat is not tolerated, MSN Messenger is mediating a new cybernetic behavior: "I no longer have to leave my work station to get a document from a colleague. Now, it's all done on-line.

*Figure 2. Distribution of leisure activities (%)*

<b>Leisure Activity</b>	<b>Male</b>	<b>Female</b>	<b>Total</b>
Reading	56.5	55.4	56
Sport	71.7	35.3	55.3
Travel	46.7	44	45.5
<b>Internet</b>	<b>24.4</b>	<b>19.4</b>	<b>22.2</b>
Cinema	22.3	9.6	16.8
Music	8.7	3	6.2
Arts	7	6.9	7
Theater	5.1	3.6	4.5
Other	6.8	6.9	6.9

Chat has also become an outlet to release work stress and tension. It feels good to chat with friends and exchange funny documents before you resume work,” an information engineer confesses (as cited in “ça tchatte,” 2002, p. 45).

Others, still, use computer-mediated interaction as a strategic approach to break free from an inhibiting spatial exile imposed on them. The combination of a growing culture of despair among the unemployed and the youth in general and the daunting requirements European and North American embassies impose on visa applicants urge many exile seekers to use the Internet to “hunt” for potential partners, as one of my informants put it, and bypass the deterrent regulations framed by legislators and policy makers in European and North American capitals. Stories about Moroccan young men and women who encountered their spouses in chatrooms and who now enjoy the status of legal residents in Europe or North America constitute an important body of Moroccan youth culture. Iman tells of three “wonder” stories in her immediate entourage. Her brother, for example, met a young Moroccan resident in Spain in a chatroom and has been maintaining a solid relationship with her. When their cybernetic interaction developed into a strong relationship, she came to visit and stayed with his family for one month. Iman is certain that her brother’s relationship with his Internet correspondent will culminate in marriage. She also tells the story of a cybercafé owner who chatted with a Canadian woman for more than a year before she decided to pay him a visit. Their real life encounter further cemented their relationship. They married shortly after and the cybercafé owner is now “happily” settled in Montreal. Iman tells also the sad story of a relative who chatted with an American correspondent for about five years. His family blessed their engagement and everyone was looking forward to their real life encounter. So, when the news came that his American fiancée succumbed to cancer, the whole family was moved to tears. Iman told how for weeks her relative received condolences from family and friends, as is the case when a family loses a beloved relative or acquaintance.

Moroccan youth culture now thrives with stories and tales like Iman’s. In a focus group, Hicham, a 23-year-old middle school dropout, says he uses the Internet as a strategic means to negotiate the “socio-economic pressure” in Morocco. He gives as example the case of a young woman in her late twenties who met an Italian in a chatroom, cyber-interacted with him for about six months before they married and moved to Italy. With a slightly envious tone, Hicham adds that “lucky are those who have had similar opportunities to migrate abroad.” When pressed to say whether he really believed that Internet chat was an effective solution to one’s problems, he told the group that if he had

had a better mastery of French, he would have married a middle-aged French woman and would have long been living in Europe.

“Success stories” about young men and women who married foreigners encountered in virtual chat rooms and migrated to Europe or North America have generated a popular enthusiasm about the power of this new interaction medium. An informant has stated that in some working class neighborhoods, families are now encouraging their children to take up to Internet chat with the hope of encountering potential partners to help them get the necessary papers for immigration visa. Under the title, “Chatrooms lead to jail,” a Moroccan newspaper reports the case of a family feud in which the 21 year convict assaults his cousin because the latter failed to use his Internet competence to find work for his sister in the U.S. The case, as documented in the court files, tells of how the victim has used the Internet to get his sister an employment contract as a baby-sitter for an American family and how he managed to get her all the required paper work for immigration. When the news spread in the family, the victim was approached by many of his relatives who wanted him to find them employment contracts abroad. His uncle paid him \$150 to find his daughter a job in the U.S. However, his clients soon became impatient and family relations started deteriorating. Soon, a quarrel between him and his cousin led to a fight in which the victim was aggressively assaulted. He was miraculously saved from death and his assailant was held in court awaiting judgment (Yassine, 2002, p. 7).

In this context, the issue is not whether chat can actually mediate a marriage deal or an employment contract abroad. Rather, what should be underlined is the fact that computer-mediated information is no longer merely a medium to get to cyberspace or interact with virtual beings, but that it is increasingly affecting people’s everyday life. Cyberculture is now strategically appropriated by different groups to upstage the exclusive politics of the “global village.” For these groups and publics, statements such as “porous borders” are “not” mere figures of speech but expressions of alternative possibilities. The fact that alternative possibilities are sought in the cybernetic world of the Internet makes for an interesting interaction between spatial production and new communication technologies.

Net communicants also assert that the world of chat is open to all kinds of participants, including perverts. Female chat users constitute prime targets for this type of chat room visitor. For most female users, males are not as much interested in interacting as they are in weaving intimate relationships. Most female interviewees complain that male Internet interlocutors are too quick to

ask for the personal mobile phone number or email address. Female chat users also resent the visitors who break the decorum of chat debate by using improper language (“flaming”), lack of respectful listening to others and continuous interruption of discussions. Some male chat users try to be provocative by choosing plain degenerate pseudonyms. In the same way, there seems to be a general conviction among Internet users that some females appropriate the space of chatrooms to “hunt” for clients or establish “lewd” relationships. My informants also seem to know of a common practice wherein some female Internet users choose to get back at their forlorn boyfriends or partners by giving away their phone numbers to correspondents met in chatrooms and deliberately misleading them to believe in the prospects of a perverted liaison. In such situations, the victimized male protagonist usually ends up changing his phone number to stop the flow of callers who take him for the female author of the provocative virtual messages.

Chatroom performance also involves the “risk” of encountering the counterdiscourse of sexual perverts or gays. A newspaper article reports the story of a chat user who tells of his correspondence with a gay Net communicant. The informant admits that his chat pseudonym “*Rêveur doux*” (Tender dreamer) may have attracted the gay surfer who started the correspondence. The informant also tells of how he chose to keep the correspondence in order “to quench the thirst of his curiosity” concerning the “psychological make-up of this unusual communicant.” Once he got his correspondent to confide in him his innermost fantasies, the informant realized that the “playful interaction” was leading into grey areas and decided to put an end to the correspondence (Chatbi, 2002, p. 16).<sup>14</sup> While they confirm the premise that Internet space is shot through with conflicts and contradictions, these experiences also highlight the contribution of computer-mediated interaction to the on-going deregulation of the public sphere and opening up of debate onto issues which the conservative power structure insists on subordinating and silencing. In the next section, I draft an interpretive analysis of a set of cultural implications that cybernetic interaction may be having on gender relations in Morocco.

## **Gender and Cybernetic Interaction**

The Internet’s contribution to the ongoing reconstruction of gender relations in Morocco is better viewed in light of the norms that rule the distribution of space.

In Moroccan society, interaction between men and women is produced and reconstructed through a hierarchical mapping of space. The gender divide is institutionalized through a strict definition of spatial practices: “(strict) space boundaries divide Moroccan society into sub-universes: the universe of men, the Umma (nation) universe of religion and power and the universe of sexuality and the family” (Mernissi, 1975, p. 81). In general, though women have access to public spaces, stepping out into the street is still felt by many as an act of trespassing into a hostile male domain. This may explain why female Net communicants enjoy the anonymity of the World Wide Web, which allows them to build relationships without compromising themselves.

In everyday life, the issue of gender relations reveals that performance in a patriarchal structure may involve life-threatening risks. The guardians of the traditional patriarchal order take very seriously the playful strategies of subversive discourses and do not hesitate to use intimidating tactics to smother emergent voices of dissent. Fatima Mernissi has repeatedly denounced the “terrorist practices” of this traditional patriarchal system. In an article entitled “La conversation de salon comme pratique terroriste” [Salon Conversation as a Terrorist Practice], she tells of how, in the course of a friendly conversation, the masculinist discourse can abruptly turn into a terrorist practice if “threatened” by a feminist counterdiscourse. She also reports that she has often been tyrannized by the arbitrary allegation that she is “totally cut off from the reality of her society,” that she is “ignorant of Islam and the Tradition” or that what she says is “simply” plain “stupid” (Mernissi, 1982, pp. 37-39). Conversely, in the World Wide Web, Internet chat participants can say “anything” in the privacy of the electronic network.

The riposte of the self-proclaimed guardians of tradition can be even more violent in the case of female subjects who defy the delimited spatialized spheres, as is “dramatized” in the tragic incident a Moroccan women rights activist was victim of in 1991. Touria Jebrane, a popular stage actress and outspoken critic of women’s condition in Morocco, was scheduled to appear on a highly rated television program on the Moroccan cable channel 2M. The show, hosted by a woman journalist, was paradoxically called “L’Homme en question” (“The Man in Question”). T. Jebrane was going to be the first female guest on this show. Two days before the scheduled live broadcast, she was kidnapped and subjected to violent physical abuse. To make sure she would not make a public appearance in the near future, her kidnappers shaved her head: “This is the kind of treatment we reserve for women who dare assume a *man*’s role!” she was told (as cited in Daoud, 1993, p. 323). In parallel, while online identity

construction may involve a degree of risk, “nobody can punch you in the nose,” as Rheingold (1994, p. 3) has put it.

Whether at the level of identity reconstruction or spatial and discursive rehearsals, the Internet plays an important role in mediating a reconstruction of gender relations in contemporary Morocco. The thriving business of cybercafés in middle and working class neighborhoods is allowing females to invent new spatial practices and challenge dominant power relations. Unlike cafés, which have traditionally been a male territory, the perception of the cybercafé as a “neutral” cultural space in Morocco is mediating women’s appropriation of this spatial practice. This can be observed not only in newly opened cybercafés but also in the reorganization of spatial production in neighborhood cafés that have transformed an inside section into a cyber. Current female cybercafé regulars might have only occasionally, if ever, experienced a café space before. In a neighborhood café/cybercafé in Rabat, I have observed how the behavior of female customers changes as they cross the café terrace and inside section to get to the cyber in the upstairs section. From a swift and upright walk with eyes level as she crosses the first two sections of the café, the female customer immediately adopts a more relaxed attitude when she gets to the upstairs section. The fact that the upstairs section is “hidden” from the public eye may account for the more “off-guard” position of female customers. Yet, what is important is that the female cybercafé user takes advantage from the fact that her visits to this new technology space are socially tolerated. In a café, a female runs more risks of “staining” her reputation, a fact that explains why even a café regular tends to avoid places frequented by her relatives or acquaintances. Hind, an 18-year-old Internet user who wears the veil, states that she does not feel she transgresses social order by frequenting her neighborhood café/cyber because she visits the cyber not the café. Like Hind, most female Internet users are accommodating new information and communication technologies to rewrite spatial production.

However, male users still constitute the majority of cybercafé publics. My female informants have also confirmed the fact that there are more male than female pseudonyms in chat rooms.<sup>15</sup> As a general observation, one may say that the appropriation of cybernetic space corresponds to dominant cultural politics that regulate spatial production and distribution in Morocco. Also, the fact that Internet service is mainly available in cybercafés may act as a deterrent to women’s online experience. In this case, when Internet service is available to more households, one would expect to see more female Net communicants. Yet, when asked if Internet service at home will substantiate their online

experience, female cybercafé regulars show an ambivalent attitude. While they admit that home Internet connection may further revitalize their online interaction, they also fear lest this advantage would affect their access to public space. Despite the inconveniences a visit to the cybercafé involves, female Internet users seem to agree that such visits create more opportunities for them to experience “real-life” public space. The ambivalent attitude of female Internet users towards the cybercafé provides insight into the on-going interaction between new information and communication technologies and the public-private divide in Moroccan society.

Though still at a small scale, the cybernetic experience is contributing to a reconstruction of gender relations. The ritual of chat involves socialization into etiquette of discursive exchange and intersubjective positioning. All female informants acknowledge that a chat room is a non-regulated space wherein one encounters participants with different motivations and intentions. Myriam, 21 years, says that chat rooms’ visitors no longer surprise her: “Some deliberately seek to offend you. There are a lot of liars ‘out there,’ racists, misogynists, and some are plain sick in their minds. But now the MSN Instant Messenger allows you to interact only with those who are ready to meet the principles of interaction you set.” Myriam asserts that she surfs chatrooms in search of genuine relationships and resents discussions on sex issues. Layla, also 21, adopts discursive strategies to marginalize disrespectful or discourteous participants. She self-contentedly tells about her experiences with participants she has “tamed” and “converted” into considerate and attentive debaters. Layla is conscious of the fact that her achievements are important triumphs in what she takes to be a declared online war against women.<sup>16</sup>

Yet, at this stage, online gender relations seem to foreground the degree of misunderstanding and skepticism, which characterizes the opinion that Moroccan women and men have of each other. In the view of my female informants, male chat users are poorly conversant with the etiquette of interaction and discussion. In general, they hold against them a lack of genuine commitment to the virtual relationships they start and a near total absence of tact and sensitivity. Myriam tells of how, after she has become quite involved in a six-month online relationship with a Moroccan resident in the U.S., her correspondent “disappeared” without warning. For Myriam, “only a Moroccan can behave in such a rude and impolite way.” For her, it is inconceivable to “walk out” of a relationship — be it a virtual one — without explaining the reasons for such a decision to her correspondent. In fact, male chat users seem to find incommensurable pleasure inventing flattering self-portraits. Youssef, 19 years, explains



that, “the most effective strategy consists in choosing an enticing introductory statement to act as bait.” One reliable tactic Youssef recommends is to “be smart enough to welcome the new arrival by incorporating her pseudonym in the welcoming statement.” As a matter of fact, Net communicants seem to agree that the pseudonym plays a key role in attracting correspondents because it is perceived as a window onto the user’s real-life identity. This explains why pseudonyms such as Mehdi, Zack, Hicham, or Moonlight (suggestive of creative and enterprising young men) are popular among Moroccan male chat users. To further embellish their image, most Internet male surfers claim they major in Marketing or Advertising and plan to pursue their higher education in the U.S. or Canada. Omar justifies the reason behind the creation of an embellished cybernetic identity by claiming that “girls always fall for this kind of profile.” Omar also believes that Internet users are further encouraged by the fact that “since you know you may never meet your correspondent, you feel free to invent the kind of identity you fancy!” (“ça tchatte,” 2002, p. 45).

The negative image Moroccan female chat users have of their male compatriots partly accounts for their interests in correspondents from other countries. In this respect, “www.arabia.com” is one of their favorite sites because it acts as a forum for Arabs from different parts of the world. According to my informants, Moroccan female Net communicants have a preference for Arab expatriates in North America or Europe or correspondents from the Middle East and the Gulf countries. As Nawal, 23 years puts it, Middle Eastern correspondents show “a disarming rhetoric and uninhibited affective and emotional sensibility,” an opinion that contrasts with the image she has of the Moroccan Internet user who she views as “a rude, discourteous, and disrespectful conversant.” Conversely, Moroccan male Internet users provide a different explanation for the misunderstanding that underlines Moroccan cybernetic gender relations. Rafik, 26 years, believes that “Moroccan women find it difficult to negotiate the realist approach of Moroccan Net communicants because they have been socialized into a seductive style mediated by Egyptian and Mexican soap operas and enhanced by Lebanese video clips.” Others blame Moroccan cultural representations, which legitimize “macho” behavior while stigmatizing feminine sensibility. Samir, 21 years, admits that he is “quite expressive and forthcoming with Net communicants from other cultures but that as soon as he interacts with a Moroccan female, language fails him and he becomes tactless.”

Last but not least, cyberspace functions as a meeting space where friendships are made and relationships started and developed. Chat users, in general, tend to nurse the hope of extending cyber correspondence to real-life encounters.

The potential convergence of cyber upon real world experience makes of chat and virtual correspondence an alternative to dominant gendered politics of spatial production and distribution. In the face of a strict regulation of gender relations along spatial boundaries, cybernetic interaction mediates liberating experiences, which act as a backtalk to dominant conservative culture. The privacy of the medium provides Net communicants with unchecked freedom to meet, debate, exchange information, tell jokes or play pranks away from the alert and watchful eyes of social censors. Once the cybernetic correspondence lays out the foundations of a potential friendship, the correspondents extend the medium of interaction to phone conversations. It is now quite common to see cybercafé users simultaneously engaged in cybernetic interaction and phone conversation with their correspondents. Quite a few of my informants note that the music tapestry of mobile phones and the sustained rhythm of loud phone conversations inside cybercafés undermine the feeling of “privacy and intimacy” cybernauts need at times. The next stage in the construction of a relationship may involve the exchange of pictures before the correspondents set an appointment in a real-world space, usually a café or a cybercafé (Parks & Floyd, 1996). In this respect, the simulated world of cybernetics acts as a subversive backdrop to dominant conservative culture, which insists on policing gender relations along territorial borderlines.

Though the Internet and cybernetics are not yet integrated into Moroccan mainstream practices, cyber culture is rich with fabulous stories about online romantic involvement. The story of Hajar and Mokhtar, which an informant has reported, bears the ingredients of a Hollywood production.<sup>17</sup> Hajar, 23 years, and Mokhtar, 27, were neighbors but did not get along at all. They resented each other so much that they picked a quarrel every time they met. Their reciprocal feelings of hostility turned into aversion and none of their respective friends could bank on their reconciliation. Hajar reproached him his insensitivity and rudeness while Mokhtar did not like her aloofness. The turning point in their relationship occurred when they met in a chatroom. It was not long since Hajar started frequenting a cybercafé when, in the course of a chat session, she felt attracted to a new arrival. Hajar remembers that even though the guest introduced himself as “Mokhtar,” it did not occur to her that it could have been her neighbor. They immediately connected and Hajar invited him to meet in a private chat room. In their subsequent correspondence, Hajar gathered unflinching information that her correspondent was none but her neighborhood acquaintance. For her, this discovery was astounding. She could not make out how a person could be so intolerably rude in real-life and so irresistibly sensitive

in the virtual world. Mokhtar had the same reaction when he knew about the real-world identity of his correspondent. The protagonists' cybernetic relationship developed into a real-life love story culminating in their engagement. It was moving to hear that this story had a sad ending because Mokhtar died in a road accident a few months before the wedding.

Hajar and Mokhtar's story is interesting in more than one respect. First, it highlights the gradual incorporation of an emergent cyberculture into everyday life of Moroccans. Stories about online romance are opening a breach in the opaque veil of conservative culture by short-circuiting the gendered spatial division engineered by a patriarchal power structure and rewriting the simulated world of cybernetics to rehearse new identities and alternative relations. Second, this story announces the discovery of a new space in the mind of cybernauts and addresses alternative possibilities to real-world social constraints. The politics of spatial division which consist in regulating access to social spaces and meeting places are being undermined by the world of cybernetics, which opens up more spatial freedom to meet and interact away from the sanctioning social and cultural authorities. Also, whether the story of Hajar and Mokhtar corresponds to real-life events or whether it incorporates the figments of its authors' imagination is of secondary importance. The fact is that it underlines an interaction between cybernetic and everyday life experiences and points to the repercussion of such interaction on social relations and human communication. The importance of such interaction is that it is inventing unprecedented experiences in Moroccan culture.

However, while this story reads like Hajar was the lead agent in the cybernetic interaction, the fact is that cyber interaction may be reproducing dominant gender relations. My informants, for example, assert that they would rather give up a chat correspondence than engage in conversations or debates on "taboo" issues like sex, religion or politics. Even if virtual correspondence warrants participants' absolute anonymity, female Internet users are reluctant to state their personal views or opinions and commit to an exchange they would not allow in real life. They are also generally overcautious in their cybernetic interaction and a female chat participant is less likely to be the first to ask a male correspondent for personal information or invite him to a private chat room. Also, while a female chat user can keep more than one cybernetic relationship going at the same time, she is generally reluctant to extend a cybernetic relationship to a real-life encounter for such a decision involves "risks" she may not be ready to take. In addition to the risks a real-life commitment may entail, there is first that of "falling" on "a bad catch." Layla, 21 years, tells of a two-

year cybernetic relationship she had with a correspondent from the Gulf and her total disappointment when she met the real person when he made the trip to visit her. She says he was as “sweet and nice” in real life as she expected him to be but that she, nonetheless, did not connect with him, a fact which made her position difficult to negotiate. Overall, online female behavior is still framed within dominant norms of Moroccan culture, a fact indicative of the enduring impact of the patriarchal culture and its socializing institutions.

## **Concluding Thoughts**

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This chapter has not sought to argue that the Internet or cyber-interaction is profoundly transforming Moroccan society. The cost of Internet access in Morocco is still too high for most phone subscribers to afford home Internet service. For that matter, since the introduction of an independent mobile phone provider, the tendency has been to end home phone line subscription with the state-owned telecommunications agency Ittissalt al-Maghrib and use a mobile instead. In addition to its practical advantages, most users would also confirm that a mobile phone is way cheaper than a home line subscription. Informants have admitted that, given the current rates of local calls and the high taxes charged by Ittissalat al-Maghrib, home Internet connection is financially unaffordable for most households. Also, though Internet cafés are becoming an integrated part of urban landscape, they too remain inaccessible to a wide public because of cost, know-how or other limitations such as proximity, café reputation or location. Additionally, most users complain about the slow Internet lines in cybercafés and the frequent disconnections of the service.<sup>18</sup>

Conversely, what I have sought to demonstrate are ways in which Internet and computer-mediated interaction permeate people’s everyday practices and help in the invention of new identities, performances, and experiences. I have sought to pin down the ongoing changes by documenting samples of incrustations and subtexts computer-mediated interaction is writing on Moroccan culture. The contributions of Internet to the expansion of the public sphere in Morocco are multi-fold. The public has access to previously undreamed-for information sources and forums for debate. As an ISP manager explains, “there is no ‘usage contract’ which needs to be signed or agreed to by the Internet subscriber whether purchasing an hour in the cybercafé, a dial-up account, or a leased line” and that, on the contrary, “all Internet subscribers in Morocco can

be completely anonymous if they wish” (as cited in *Human Rights Watch*, 1999).

In a closely regulated news media environment, unfettered access to news and online speech maintains public opinion enlightened and channels into public debate marginalized and subversive voices. Different publics use the Internet to come to terms with their social, economic or cultural exclusion. For students, the Internet is a universal library; for free-lance entrepreneurs, it is a global market; for human rights activists, it is a window onto the world to project Moroccan reality while the unemployed, the poor, and the dispossessed pin their hopes on the Internet to generate alternative identities and possibilities to an oppressive everyday environment. Also, the Internet, in its spatial dimension of cybercafés, is allowing women access to public spaces traditionally appropriated by men. Online forums and public chatrooms provide subjects with space and opportunities to rehearse new positions and identities and, thus, contribute in ways which may still be undetected, to the reconstruction of gender and social relations.

This chapter has also argued that conservative powers are putting up a stiff resistance to the freedoms generated by new media technologies. From proposals which seek to ban underage users access to cybercafés to resolutions which propose to extend the enforcement of “red lines” policy which regulate commentary in traditional media to Internet usage, proponents of the status quo are trying very hard to contain the space of freedoms the new media technologies have generated. Besides attempts to legislate forms of legal liability concerning Internet usage or materials Internet Service Providers carry, the forces of reaction have filtered popular culture with stories that represent the Internet as an alienating technology which carries a potential danger for social order. *Dalil al-Internet*, a newspaper that specializes in Internet news in Arabic, recently ran a story about the risks of Internet usage that epitomizes the negative representations in which reactionary forces try to couch the new technology. The story, entitled “The Wolves of Chat,” tells of the seduction and tragic fall of a homemaker. Written in first-person narration, the story tells of how an upper middle class virtuous wife and mother becomes an addict to Internet chat and develops an online romantic relationship.<sup>19</sup> The narrative provides “realistic” details that trace the steps and processes through which this virtuous homemaker becomes enticed into “the web of sin,” how she forsakes her marital and parental duties, and is eventually caught into a trap set by a “chat wolf” who, taking advantage of her naiveté, abuses of her emotionally and physically. The story ends by depicting how the once joyful and generous wife

and mother has become a manic-depressive and unpleasant being who undergoes therapy to cope with her tragic experience.<sup>20</sup> The ideological implication behind this story is that the freedoms provided by the new technology must not be extended to bear on the norms of the real world. Female Net users must be reminded, the message in such stories seems to be, that preying wolves hunt the virtual world as well and that they had better fill their time with “more useful” activities than roam chatrooms “unchaperoned.” Obviously, traditional intimidation tactics are being adapted to the environment created by the new technology to curb a woman’s freedom and keep under check her virtual rehearsals for self-recognition and self-assertion.

This is not to say that virtual interaction warrants a safe environment for its users. A female Net user is still prone to substantial dangers, which could have serious consequences on her life. In the course of this research, I was quite frequently compelled to forego the position of a researcher to draw an informant’s attention to certain realities. As a general observation, I realized that most young Internet users were impressed by the idea of receiving invitations from foreign correspondents met in chatrooms. Even if I knew that most would turn down such offers, I felt I had to be quite emphatic with a few young informants who hinted that they seriously considered responding to certain invitations. The case of Iman, 21, required that I spent time trying to talk her out of what seemed to be an imminent misadventure. Iman had a Dutch correspondent who offered to send her a return ticket and provide her with an apartment in Amsterdam for her visit. Iman was a nice attractive young woman who worked as a shop assistant. In the course of the interview, she confided that she used the Internet to search for migration opportunities because her family was poor and she had low prospects about her future in her country. For her, virtual *hrig* was only a prelude to a promising real life experience in exile. I realized she was so desperate to go that she seemed ready to take unnecessary risks. I also concluded that her Dutch correspondent must have reached the same conclusion since he made his offer quite irresistible. I was astounded to find out that she did not even consider the possibility that she was being lured into a dangerous network. I had to try hard to make her realize the risks she was facing. In short, the environment may be virtual, but the risks for a female Net communicant are real.

In the final course, it should be remembered that the importance of the Internet does not only lie in the unfathomable pool of information it now makes accessible to its users. For that matter, as Philip Bereano has put it, “[only] the naïve or the scurrilous believe the Third Wave claim that ‘information is power.’”

Power is power, and information is particularly useful to those who are already powerful” (as cited in Stoecker, 2002, p. 148). Moreover, following Mowlana (1994), one can make the point that Moroccan society has long been an information society. While Moroccans have traditionally appropriated folk culture (Haddad, 2001), folk media and public spaces for information transmission (Graiuid, 1998, 2003) and grassroots organizational channels in the case of social movements (Belghazi & Madani, 2001), traditional communications tend to reproduce existing power relations and spatial division.

The Internet, by contrast, provides a space where individuals can implode borders and rehearse multiple identities. It is too early to have a clear view of how Internet use is affecting users and society at large. Cummings, Butler, & Kraut (2002) are right to insist that “[only] by examining people’s full set of social behavior and examining their full inventory of social ties can we assess the net social impact of online social relationships” (p. 108). Yet, it is already evident that one important contribution of new media and communication technologies lies in their appropriation by different groups and communities as forum for interaction and the rehearsal of invented identities and relations. Given the strict spatial divide which regulates gender and social relations in Morocco, the Internet acts as a palliative channel to the separation between men and women and as a sphere of interaction where participants exchange opinions about issues of general concern. At times, relations built in this virtual space migrate to other settings and may even develop into global partnerships. However, we need to remember that emancipation or empowerment is not mapped onto online interaction. Rather, the World Wide Web is better viewed as a nexus in which relations are negotiated, contested, but also reproduced. Eventually, virtual *hriq* comes out not as an escapist exercise practiced by dysfunctional individuals but as an engaging rehearsal for more tolerant and accessible worlds, both virtual and real.

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## References

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- Abdelnour Nocera, J. L. (2002, January) Ethnography and hermeneutics in cybercultural research: Accessing IRC virtual communities. *Journal of Computer Mediated Communication*, 7 (2). Retrieved February 4, 2002 from the World Wide Web: <http://www.ascusc.org/jcmc/vol7/issue2/nocera.html>.
- al-Ahdat al-Maghribia*. (2003, January 7). NO. 1447.
- Anderson, J. W. (2001). *Muslim networks, Muslim selves in cyberspace: Islam in the post-modern public sphere*. Prepared for a conference on "The Dynamism of Muslim Societies," Tokyo, October 5-8, 2001. Retrieved February 12, 2003 from the World Wide Web: <http://nmit.georgetown.edu/papers/jwanderson2.htm>.
- Belghazi, T. (1995). Cultural studies, the university and the question of borders. In B. Adam & S. Allan (eds.), *Theorizing culture: An interdisciplinary critique after postmodernism* (pp. 165-173). London: UCL Press.
- Belghazi, T., & Madani, M. (2001). *L'action collective au Maroc: De la mobilisation à la prise de parole*. Rabat : Publications de la Faculté des Lettres et Sciences Humaines.
- Bentaleb, A., & Tribek, H. (2003, October 17). Cybercafés prohibit access to adult websites. *Assabah*, (1097) (original work in Arabic).
- ça tchatte au Maroc. (2002, March 30-April 5). *Tel Quel*. NO. 23.
- Chatbi, S. (2002, December 30). Chatrooms: spaces of confession, expression, and other things. *al-Ahdat al-Maghribia*, (1439) (original work in Arabic).
- Consultation nationale des jeunes*. (2001). Rabat: Ministère de la Jeunesse et des Sports.
- Culcutt, A. (1999). *White noise: An A-Z of the contradictions in cyberculture*. New York: Macmillan.
- Cummings, J. N., Butler, B., & Kraut, R. (2002, July). The quality of online social relationships. *Communications of the ACM*, 45 (7), 103-108.
- Dahlberg, L. (2001, October). Computer mediated communication and the public sphere: A critical analysis. *Journal of Computer Mediated Communication*, 7 (1). Retrieved from the World Wide Web: <http://www.ascusc.org/jcmc/vol7/issue1/dahlberg.html>.



- Dalil al-Internet. (2002, March). No. 21.
- Daoud, Z. (1993). *Féminisme et politique au Maghreb (1930-1992)*. Casablanca: Editions EDDIF.
- Dudd, R. S. (1989). *The adventures of Ibn Battuta: A Muslim traveler of the 14<sup>th</sup> century*. Berkeley, CA: University of California Press.
- Feenberg, A. (1995). *Alternative modernity: The technical turn in philosophy and social theory*. Berkley, CA: University of California Press.
- Geertz, C. (1973). *The interpretation of culture*. New York: Basic Books.
- Graiouid, S. (1998). Theories of communication and ideas of the university: the university as an alternative public space. In T. Belghazi (ed.), *The idea of the university* (pp. 125-141). Rabat: Publications de la Faculté des Lettres et des Sciences Humaines.
- Graiouid, S. (2003). The most outstanding trait of the Moroccan character: Observed in the café. In A. Youssi, M. Dahbi, & L. Haddad (eds.), *The Moroccan character* (pp. 49-62). Rabat: AMPATRIL.
- Greene, R. W. (1998, September 23). Is Internet addiction for worrywarts or a genuine problem? CNN.Com. Retrieved October 10, 2003 from the World Wide Web: [www.cnn.com](http://www.cnn.com).
- Haddad, L. (2001). *Le résiduel et l'émergent: Le devenir des structures sociales traditionnelles*. Rabat : Publications de la Faculté des Lettres et des Sciences Humaines.
- Hafkin, N. J. (2002). The African Information Society Initiative: A seven-year assessment (1996-2002). *Perspectives on Global Development and Technology*, 1 (2), 101-142.
- Harakat, A. (2002, January 5). Ce n'est pas la faute à l'Internet. *L'Opinion*.
- Hatif Telecom News. (n.d.). Retrieved June 13, 2003 from the World Wide Web: <http://www.hatiftelecom.com/news/morocco.html/>.
- Human Rights Watch. (June 1999). *Morocco*. [document online]. Retrieved from the World Wide Web: <http://www.hrw.org/hrw/advocacy/internet/mena/morocco.htm>.
- Kellner, D. (1998). Intellectuals, the new public spheres, and techno-politics. In C. Toulouse & T. W. Luke (eds.), *The politics of cyberspace: a new political science reader* (pp. 167-186). New York: Routledge.
- La crise de la lecture. (2002, April 21). *L'Opinion*.

- La téléphonie mobile touche aujourd'hui 1 marocain sur 4. (2003, April 4). *La vie économique*, (4210).
- Mamadouh, V. (2001). Constructing a Dutch Moroccan identity through the World Wide Web. *The Arab World Geographer/Le Géographe du monde arabe*, 4 (4), 258-274.
- Mernissi, F. (1975). *Beyond the veil*. New York: Schenkman Publishing Company.
- Mernissi, F. (1982). La conversation de salon comme pratique terroriste. *Lamalif*, (139).
- Mernissi, F. (2003, September 13-19). Interviewed by Laetitia & Ksikes. *Tel Quel*, (92).
- M. F. (2002, February 2). Moroccan adolescents frequent cybercafés. *Al Jomhour* (original work in Arabic).
- Mitra, A., & Schwartz, R. L. (2001, October). From cyber space to cybernetic space: Rethinking the relationship between real and virtual spaces. *Journal of Computer Mediated Communication*, 7. Retrieved February 4, 2002 from the World Wide Web: <http://www.ascusc.org/jcmc/vol7/issue1/mitra.html>.
- Mouhcine, A. (2003, January 2). Entreprises/Réseau Internet. *L'Opinion*.
- Mowlana, H. (1994). Civil society, information society and Islamic society: A comparative perspective. In S. Splichal, A. Calabree & C. Sparks (eds.), *Information society and civil society: Contemporary perspectives on the changing world order* (pp. 208-232). West Lafayette, IN: Purdue University Press.
- Odone, C. (1995, September 18). A patchwork of catholic tastes. *The Guardian*.
- Oudoud, L. (2002, April 17). Forcom 2002: Objectif, dix millions d'internautes d'ici à 2010. *Le Matin*.
- Parks, M. R., & Floyd, K. (1996, Winter). Making friends in cyberspace. *Journal of Communication*, 46 (1). Retrieved September 18, 2003 from the World Wide Web: <http://www.ascusc.org/icmc/vol11/issue4/vol11no4.html>.
- Poster, M. (1990). *The mode of information: Poststructuralism and social context*. Oxford: Polity.
- Rheingold, H. (1994). *The virtual community: Finding connection in a computerized world*. London: Secker & Warburg.

- Savicki, V., Lingenfelter, D., & Kelley, M. (1996, December). Gender language and style group composition in Internet discussion groups. *Journal of Computer-Mediated Communication*, 2 (3). Retrieved from the World Wide Web: <http://www.ascusc.org/jcmc/vol2/issue3/savicki.html>.
- Soukup, C. (1999). The gendered interactional patterns of computer-mediated chatrooms: A critical ethnographic study. *The Information Society*, 15 (3), 169-176.
- Stoecker, S. (2002). Cyberspace vs. face-to-face: Community organizing in the new millennium. *Perspectives on Global Development and Technology*, 1 (2), 143-164.
- Turkle, S. (1985). *The second self: Computers and the human spirit*. New York: Touchstone.
- Turner, V. (1982). *From ritual to theatre: The human seriousness of play*. New York: Performing Arts Journal Publications.
- Turner, V. (1984). Liminality and the performative genres. In J. J. MacAloon (ed.), *Rite, drama, festival, spectacle*. Philadelphia: Institute for the Study of Human Issues.
- Wilson, S. M., & Peterson, L. C. (2002, June 14). The anthropology of online communities. *The Annual Review of Anthropology*. Retrieved from the World Wide Web: <http://anthro.annualreviews.org>.
- Winston, B. (1995). Tyrell's owl: The limits of the technological imagination in an epoch of hyperbolic discourse. In B. Adam & S. Allan (eds.), *Theorizing culture: an interdisciplinary critique after postmodernism* (pp. 225-235). London: UCL Press.
- The World Bank. (1998/99). *World development report*.
- Yassine, M. (2002, September 28). Chatrooms lead to jail. *al-Ahdaf al-Maghribia*.
- Zapatistas in cyberspace: a guide to analysis and resources. (n.d.). Posted on the World Wide Web: <http://www.eco.utewas.edu/faculty/Clever/zapsincyber.html>.
- Zyne, A. (2002, February 11). Half a million of Moroccans roam about the world. *Al-Jomhour*.

## Endnotes

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- 1 From the Moroccan Arabic verb *h'rag* ("to burn"), the word *hrig* has been used in the context of "burning the traffic light" before it has become the household term for "illegal migration." *Hrig* has been predominantly used to describe the attempts of desperate young migrants who risk their lives on board of *pateras* (small boats) or hidden in the asphyxiating trunks of lorries and trucks to make it to the Spanish shores. The term "virtual *hrig*" has been recently appropriated by cybernetic communities to describe online interaction in search of virtual partners.
- 2 Cited in R. Dudd (1989, p. 310).
- 3 Similar concerns about the role and implications of new technologies and cyberculture have been made by a number of thinkers. Howard Reingold, one of the first theorists of virtual communities, noted that to "the millions who have been drawn into it, the richness and vitality of computer-linked cultures are attractive, even addictive" (1994, p. 3). C. Odone, for example, has also noted the empowering dimension of computer-mediated interaction: "... the web could serve as the first building block in the creation of a whole new social solidarity, founded upon cross-cultural, interdisciplinary dialogues and cemented in an 'empowerment' and 'enfranchisement' of marginalised individuals" (1995, 10). By contrast, Sobchack believes that "the new electronic frontier promotes an ecstatic dream of disembodiment," an estrangement he calls "alienation raised to the level of ekstasis" (as cited in Culcutt, 1999, p. 21). M. Poster (1990) laments the dispersion and dislocation of the subject through electronically mediated interaction while Kevin Robins perceives in new technologies "a negative agenda" and "the desire to rise above reality, as if we've been living as caterpillars and new tech will turn us into butterflies" (as cited in Culcutt, 1999, pp. 20-21).
- 4 In this respect, I note, with Brian Winston, the pitfalls of technological determinism: "when considering the impact of technology it is absolutely necessary to keep the realities of our socio-cultural-economic arrangements - including their dynamics - in mind. It is not enough simply to look at technology and its dynamic and assume, in a deterministic fashion, that because a technology exists or is possible its diffusion is therefore inevitable" (1995, p. 226). However, I also underline Andrew Feenberg's (1995, pp. 14-15) celebration of the democratic potential intrinsic to technology: "Coupling the technical design process to aesthetic and

ethical norms and national identities through new and more democratic procedures is no utopia. Modern technologies open not only possibilities internal to the particular world they shape but metapossibilities corresponding to other worlds they can be transformed to serve. Technical change is not simply progress or regress along the continuum so far traced by the West; it may also come to include movement between different continua.”

- <sup>5</sup> Turner even pins the survival of societies on the availability of liminal spheres: “any society that hopes to be imperishable must carve out for itself a piece of space and a period of time in which it can look honestly at itself. This honesty is not that of the scientist, who exchanges the honesty of his ego for the objectivity of the gaze. It is, rather, akin to the supreme honesty of the creative artist [...] All generalizations are in some way skewed, and artists with candid vision ‘labor well the minute particulars,’ as Blake knew. This may be a metalanguage, but all this means is that the “meta” part of it is not at an abstract remove from what goes on in the world of “getting and spending,” but rather sees it more clearly, whether more passionately or dispassionately is beside my present point. Whether anthropology can ignore this incandescent objectivity and still lay claim to being “*the study of man*” I gravely doubt” (Victor Turner, 1984, p. 40).
- <sup>6</sup> I note here that even in the frequently cited case about the use of the Internet by Zapatista rebels in Mexico, the impact of this new technology must be kept within perspective. As one activist has warned: “Despite all the media hype which came with the discovery of the role of cyberspace in circulating Zapatista words and ideas, subcommandante Marcos is not sitting in some jungle camp uploading EZLN communiqués via mobile telephone modern directly to the Internet. Zapatista messages have to be hand-carried through the lines of military encirclement and uploaded by others to the networks of solidarity” (Cleaver 1999, as cited in R. Stoecker, 2002, pp. 151-152). See also “Zapatistas in Cyberspace: A Guide to Analysis and Resources” at <http://www.eco.utexas.edu/faculty/Cleaver/zapsincyber.html>
- <sup>7</sup> See Hafkin (2002) for a historical account with progress index of the African Information Society Initiative covering the period 1996-2002.
- <sup>8</sup> See “La téléphonie mobile touche aujourd’hui 1 marocain sur 4” in *La vie économique*, (2003, April 4, N0. 4210). For a historical survey of telecom liberalization process in Morocco, see *Hatif Telecom New:*

Retrieved June 13, 2003 from the World Wide Web: <http://www.hatiftelecom.com/news/morocco.html/>.

- <sup>9</sup> Maroc Telecom, the public telephone service provider, has further reduced the rate of connectivity for cybercafés by about 47%. This decision will most likely constitute a significant impetus to the cybercafé business and to the extension of democratic access to information and communication technologies. In a recent press release, the Ministry of Industry, Trade, and Telecommunications has indicated that there are 7 million mobile phone subscribers in Morocco (they were 3 million in 2000, 5 million in 2001, and 6 million in 2002) while fixed phone subscribers stopped at 1,990,167. According to the same document, there are now 2,500 cybercafés in the country and, while there are only about 45,000 Internet subscribers, the number of Internet users is estimated at about 1,000,000 (*al-Ahdat al-Maghribia*, 2003, December 24, NO. 1796, p. 10).
- <sup>10</sup> See also a special report on the crisis of reading in Morocco (La crise de la lecture. In *L'Opinion* (2002, April 21).
- <sup>11</sup> A court ruling in Cairo, Egypt, granted the right to divorce to a woman who accused her husband of Internet addiction. The plaintiff explained to the court that her husband spent an average of 14 hours a day online and mostly visiting adult sites, a fact which the court thought made him fail his marital duties. The information was reported by the Egyptian daily *al-Gomhuriya* in its December 18 2002 issue (as cited in *Tel Quel*, (2002, December 21-27, NO. 57, p. 40).
- <sup>12</sup> Chatbi quotes a cybercafé owner who asserts that up to 60% of Internet users are teenagers (Chatbi, 2002, p. 16). My own observation tends to confirm that the representation of cybercafé clientele is largely under the age of 25.
- <sup>13</sup> Data in Tables 1 and 2 comes from an exhaustive 2001 national study, which sought to analyze the behavior and lifestyle of Moroccan youth. Funded by the Moroccan government, the study surveyed about 18,000 young people across the country (Consultation *nationale des jeunes*, 2001, Ministère de la Jeunesse et des Sports).
- <sup>14</sup> In *al-Ahdat al-Maghribia*'s controversial section "From Heart to Heart," a gay correspondent writes that while he feels alienated by his immediate social environment, he has found in chatrooms enough solace to help him negotiate his homosexuality (*al-Ahdat al-Maghribia*, 2003, January 7, NO. 1447, p. 10).

- <sup>15</sup> Though Savicki, Lingenfelter, and Kelley (1996) call for “caution” in the interpretation of gender proportion in Internet discussion groups, the findings of their quantitative research demonstrate that the percentage of online male subjects and messages outnumber female online experience.
- <sup>16</sup> In this, Layla supports the claim of disillusioned feminists who find that computer-mediated interaction has not kept its emancipatory promises concerning the construction of an alternative space to the patriarchal structure (see Savicki, Lingenfelter & Kelley, 1996; Soukup, 1999; Dahlberg, 2001).
- <sup>17</sup> This story reads very much like Nora Ephron’s “You’ve Got Mail” which stars Meg Ryan and Tom Hanks.
- <sup>18</sup> In 1998, Internet access in Morocco cost about U.S. \$40-50 per month for a subscription that included 15 hours online plus the cost of the telephone connection (approximately \$2 per hour). This cost was quite high for a country with one of the region’s lowest per capita gross national products (Morocco’s GNP per capita was U.S.\$1,250 in 1997, according to The World Bank, *World Development Report, 1998/99*, p. 191). By 1999, the average subscription dropped by about \$20 per month for unlimited access, with telephone charges remaining at about \$2 per hour. The owner of a major Casablanca-based Internet Service Provider “pointed out that Internet growth was impeded by the structure of telecommunications in the country. For the services it provides them with, IAM (Ittissalat Al-Maghrib) ‘imposed whatever prices it wants’ while competing with them as an ISP itself” (*Human Rights Watch*, “Morocco,” June 1999).
- <sup>19</sup> For views of mental health workers and therapists on the nature of Internet addiction, see R. W. Greene (1998), “Is Internet addiction for worrywarts or a genuine problem?” in CNN.Com, posted September 23. Retrieved October 10, 2003.
- <sup>20</sup> *Dalil al-Internet*, 2002, March, N0. 21, p. 7.

## Chapter IV

# Keeping Track of Notes – Implications for Mobile Information and Communication Technology in Homecare Practice

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### **Abstract**

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*This chapter provides a case and an investigation of how a particular mobile ICT support has been used within an established practice of homecare work. The discussion shows a perspective of how technology and practice coevolves and gets enmeshed together. The importance of seeing the interface of either the mobile devices or the stationary computer as common information spaces is stressed, since the single-user interface the current system offers is not enough support for the collaborative activities the mobile workforce of homecare work is engaged in. The problem resides in this case in the relations to predecessors of the system,*



*found in diaries and coordination tools. A modest suggestion posed by the author is that an understanding of the work maintaining the role of these predecessors can provide beneficial information for the future design of these technological supports.*

## **Introduction**

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Research on mobile information and communication technology has, during the few last years, expanded along with its employment in both work and leisure (see, for instance, O'Hara et al., 2001; Esbjörnsson et al., 2002; Hedestig et al., 2002; Weilenman, 2003, Ling, 1997). Weilenmann (2003) argues that there is a lack of studies on the use of mobile technologies in situations where people move and where the activities they are engaged in occur. Until today, studies of mobile work and mobile technology have (1) had a work-oriented focus, (2) given an extra attention to office work, (3) treated some places as bases and finally (4) treated mobility and mobile work as means of transportation (Weilenmann, 2003). One could argue that many of these studies also provide an account for work environments that already are technology intensive. It is easy to accept such organisations as default examples, where technology is taken for granted as one standard component. I will in this chapter emphasise organisations where information and communication technology (ICT) have historically not yet been supporting work at all, and where mobile information and communication systems have become the first encounter. One challenge information technologies need to deal with in these environments is traditional systems that have been shaped by the tradition and culture of practice, especially resources used in collaboration and coordination. One could argue that studying such an environment would be like walking down the memory lane of technology implementation and design, acknowledging that the lessons taught have been learned, and that time would have equipped us with the knowledge to present solutions that account for identified needs. Or perhaps face the opposite, and learn yet another lesson that needs to be told. Homecare work is a field of practice that has a history contradictory to other sectors of healthcare in general. This sector has in the last few years attracted a lot of attention, and homecare work in Sweden is about to meet a huge challenge in the next couple of years. The number of elderly continuously increases in most western countries, and higher demands on performance and

the quality of service will be critical. Involved parties are forced to find new ways that meet future expectations. One initiative towards this is to employ mobile information and communication technology. The intention is to give a technological support to homecare workers, and generate possibilities to measure work performance more effectively. State-of-the-art technology is seen as one possible contributor to secure and assess the quality and efficiency of mobile work, and with the very same technology simultaneously support the mobile practice. As organisational needs and practice are to be served by one solution, critical voices have been raised arguing that the long-term effect of these systems is that predefined categories will deviate the line of work and prioritise articulated categories that only account for a limited part of the work as a whole. Thereby, the consequence would be that important aspects of work are set aside in favour of others. The critics' worries reside in the fear that the practice, over time, through instrumental guidance of documentation, slowly will starve the work practice of valuable knowledge (Christensen, 1999). Thus, studies are needed to identify implications that this technology brings along in homecare work as well as in mobile practice where mobile technologies are put in use.

This chapter builds on an investigation of two homecare organisations where mobile information and communication technology have been employed. One of these organisations has used the system for two years and the other has recently employed the system in their practice. Moreover, in neither of these organisations has ICT been used in the hands of the homecare workers before. Questions that have guided this research are, firstly, how is this system used in practice, and secondly, how does the use of the system correlate to important mechanisms of practice? To give direction for answering these questions, the chapter will draw on an interpretative case study, where mainly ethnographic study techniques have been used and where traditional concepts developed by the community of computer supported cooperative work (CSCW) have guided the analysis of the investigation. The remainder of this chapter is as follows. First, a discussion of the concepts used for the analysis is presented. This expose strongly focuses on the relation between new technologies and its predecessors, and technology as a support for collective activities. Second, the research method is briefly presented. Finally, a discussion is made, where the practice of homecare work is deconstructed revealing dimensions that call for our attention. This both in terms of understanding the role of different repositories and their relations through practical uses, and furthermore, as base for further work, in terms of how these systems could be designed in the future.

## **Tools and Social Organisation of Resources**

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A recently published study by Pinell et al. (2003) that directly concerns homecare work delivers a proposal based on extensive field studies for how homecare work can be supported by ICT. They have in their work explored how the characteristics of loosely coupled mobile groups found in multi-disciplinary teams of homecare workers can be supported by technology using a wide area mobile groupware. Their studies show that groupware applications can be a favourable approach to support homecare work, even though the homecare workers were autonomous in both the planning and execution phases of work, and mostly relied on asynchronous communication that provided an awareness of other persons' activities. In their study, the latter dimension was an important aspect of how the communication in the system should be designed; both due to the reliability of network access, and due to the work as such, especially in situations when communication with colleagues was inappropriate, i.e., while tending to a patient or the elderly. Their work pinpoints well the context the following text will discuss: their focus is how the flow of information goes, and how awareness can be attained due to the complex conditions the context imply. From my point of view, their perspective is that of design, while this chapter aims at understanding the uses of a system that already has been employed.

### **Struggling with Predecessors and Mechanisms**

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A starting point to understand the culture homecare workers are involved in is to follow researchers that have studied implementations of information technologies in similar contexts. Berg (1997) brings in his studies of the new technology implementations in medical work forward, that the predecessors always will be the standard or the reference when its users' judge new technology. Berg addresses the embedded logic artefacts carry and the importance of having an intention to understand its relation to practice, especially how these tools get involved and get incorporated into work practice. Berg stresses the importance to see the inner logic that technology carries.

Groupware has been one core issue for the CSCW community, and one scholar that has brought intriguing insights into the role of these systems is Schmidt

(1991). He provides us with a modest suggestion that design of groupware applications should aim to support the coordinative and collaborative dimensions of a work practice in order to fit into organisational practice. He states further that embedded mechanisms within a work practice that involves coordination and collaboration are important dimensions, as they are unique for each context. (Schmidt & Simone, 1996). Thus, if these aspects were considered, one could argue that technology would melt into practice in a more natural way than if one needs to reconfigure practice according to technology demands, a discussion that aligns to the problems of customisation versus standardisation.

The expectations homecare organisations seem to have on the employment of mobile information and communication technology are very similar to what Sellen & Harper (2001) see as the advantages of paper, and why paper according to them in the future will still be a natural piece of office work. Sellen & Harper (2001) discuss the role of paper in offices from the standpoint of its affordance and its role in human activities. They conclude that paper functions as a tool for managing and coordinating action among co-workers in a shared environment, paper provides a material for discussion and exchange of relevant information among co-workers, and the fact that paper is easy to carry, store, file, and reuse if necessary, makes it even more useful.

## **Distributed Cognition**

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Distributed cognition (Dcog) was originally developed by Hutchins and his colleagues in the mid to late 1980s. The approach gives us means to understand how tools and technologies are intertwined with humans in collective activities. Earlier studies are found in work on navigation of naval vessels (Hutchins, 1995), air traffic control (Halverson, 1994), and construction work (Perry, 1997). Hutchins (1995) states that the same model used within cognitive science where computations take place by means of the propagation of representational states across representational media also can be applied to reveal the cognitive work in collective and external activities. Following this line of thinking means that a collective activity needs to be seen as a “computational or information-processing system” (Hutchins, 1995, p. 49). The solution here is to see collective work towards common goals as a computational activity, which in Hutchins terms is socially distributed cognition. Key concepts that Dcog comprise are representational states and the propagation of these states in representational media (Hutchins, 1995). A representational state according

to Hutchins (1995, p. 117) is, “a configuration of the elements in a medium that can be interpreted as a representation.” The representation refers to a meaningful aspect of the practice, as in Hutchins’ case, a symbolic abstraction and representation of the ship by pointers found at the naval chart. The naval chart is, in Hutchins’ case, one example of a representational media. These media may either be internal or external resources, e.g., the individual memory, or found in different tools, e.g., manuals, calendars, coordination tools, drawings on paper, and in an ICT artefact, etc.

According to Halverson (1998), the sequence of analysis that Dcog provides can be seen as an action in three phases. The first phase is to work out a functional definition of the cognitive system. The second phase is to make a list of the representational states and processes in the system. The third phase is to determine the physical instantiation of the representations, what Halverson calls the algorithm(s) that control the processes. A work context is from the lens of Dcog seen as functional system. This system in turn involves several functional levels, which encompass shared task knowledge and a shared understanding of the conditions that structure the work situation. In these different functional levels, information follows certain trails incorporating both individuals and technology. If one follows these trails of information, one also will have an opportunity to grasp an understanding of the cognitive work, and thereby understand the role technology has in these activities. Through these activities, the actors develop a common ground, maintain an awareness of ongoing activities, and build up the shared body of knowledge that continuously is developed over time. Thus, one has an opportunity to uncover the role and transformation of tools and technology in the context, but more importantly, one has the opportunity to inform the design of representational media in a particular practice. As the unit of analysis concerns the specific practice, we are facing an activity-centred approach of events (Thereau & Filippi, 2001) rather than user-centred approach (Norman & Draper, 1986).

## **Coordinative Tools and Common Information Spaces**

In collective work, the social organisations of distributed cognition are, according to Perry (1997), embodied in artefacts where a common information space, discussed by Bannon & Bødker (1997), would be one example of such a tool. Representations of such tools can be found in paper and files or, for example, as an interface in a groupware application or similar application, which offer common views of information to its’ users. Common information

spaces are negotiated and established by the involved actors (Bannon & Bødker, 1997); the space functions as an important factor when co-coordinating activities.

The understanding of the common information space as such, however, does not need to be identical among actors, but simply common enough to coordinate their work activities (Reddy et al., 2001). As individuals, we interpret the information provided by the common information space as it best will suit and be relevant for our work and us. This implies, as argued by Reddy et al. (2001), that people engaging in different work, but sharing the same information, will frame and interpret it differently from different perspectives. The work maintaining such an information space is what it takes to balance and accommodate these different perspectives. One must assume that this balancing and accommodation is managed through everyday communication and interaction, and not necessarily through prescribed structures of work.

What we have here are coordinative tools and collaborative means that can be seen as representations of mechanisms embedded in practice. In order to understand why certain tools are preferred in relation to others, we need to identify those mechanisms that structure the world of the specific practice. Such a position would ease the identification of design incentives for information technologies that aim to support practice.

## **Research Method**

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The empirical material presented in this text has been collected by a study of two different homecare organisations that have employed the same mobile information and communication system. These organisations will be denoted Alfa and Beta in the following text. Alfa is an organisation that had used the system for period of two years and Beta had used the system for half of a year when the study was performed. One could have chosen to study one single organisation that has employed, and one that has not yet employed, mobile information and communication technology in their work. However, since the focus is upon the relation between traditional tools and mobile information and communication technology, such an option falls out of the scope of this study. Data was generated from a number of visits and an observational study during three weeks in the fall of 2002. Sellen & Harper (2001) emphasise a relational perspective on the use of technology and other artefacts. The method I have

used follows a similar approach, directed towards the relation between the collective activities and technology and tools used in practice. The goal has been to understand the work that people do and engage in, on a daily basis, and from there understand how practice and technology coevolves and gets integrated together.

In this study, ethnographic observations (see Hutchins, 1995; Harper, 1998; Orr, 1996, Weilenmann, 2003) have been the main source of information. These observations have been complemented with informal discussions and interviews, providing an understanding of knowledge embedded in practice. In my investigations of the mobile workplace, I have used a number of strategies, which all take different dimensions of the workplace into account. These strategies have also been used successfully by other scholars such as Weilenmann (2003) and Harper (1998). One strategy has been *to follow the actors*, which in this case illuminated what the actors did and how they handled the technology in different situations. The actors that I followed were carrying out their work in many locations, e.g., people's homes, and what the approach especially helped me to understand was situations where the technology was left aside, even if one could have supposed to observe a use situation according to the rationale of the system and other incentives. An alternative approach has been *to follow the technology*, which in this case mean to follow the technology and observe when the technology is used. This strategy illuminated places where the technology was kept, carried, and used. A third approach was *to follow the information* and its way in and through different artefacts. In this case, the use of these approaches illuminated connections between the micro and the macro levels of the mobile work place, which discovered the purpose and strategies the information is part and parcel of.

The strategies above reveal a whole field of study, and the results are a joint effort of them all, describing the functional systems the workers act within. The data presented in this chapter have mainly been obtained while studying the workers' actions out in the field, and the actions occurring in the homecare office. I have recorded meetings and interviews on video and on tape from both organisations, which in part have been transcribed. Regarding one of the organisations, I have paid extra attention to the historical dimension and the development of the system. This was because the homecare workers from this organisation had an important role in the design of the system, which currently both organisations use. In the reconstruction of the developmental process and implementation, I have relied on documents and other information documented through processes, e.g., photographs and access to key persons, from both the homecare organisation and the software company.

## The Structure of Homecare Work Practice

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Homecare work is a definition that gathers many different occupations under one roof providing patients or the elderly services in their homes. The occupations this investigation focused on have been home help aids and assistant nurses. In this chapter, these two occupations will both be denoted as homecare workers, because the difference is hard to distinguish as they perform the same work together. To separate them is, from my point of view, not necessary and fills no purpose in order to answer the questions posed in the introduction. Homecare work is autonomous, as the work mainly is carried out individually in the homes of the elderly. However, the degree of autonomy differs according to the organisation of work and to restrictions in work descriptions. For instance, restrictions in the work description emphasise that some tasks must be dealt with working in pairs, which require an effective coordination of events if collaboration among the workers is to be solved with ease, bringing in time and place restrictions that in turn also need to be solved.

The work I have studied can be divided into three separate dimensions, *the organising*, *the performing*, and *the networking*. I have chosen to define these dimensions not as functional levels even though they easily and correctly can be discussed in such terms. These dimensions are the core structure of homecare work, and within these dimensions, functional levels operate building the dimensions, guiding our attention further towards mechanisms that are central for the organisation of work and the uses of technology. The dimension that this text mainly explores is the organising dimension, primarily since the materials have shown that this dimension is crucial for the workers' performance, and the uses of the application designed to support their work.

### The Organising Dimension of Homecare Work

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The organising dimension consists in turn of a number of *functional levels*. These are *the administration* and *the coordination levels*. The latter in turn, is constructed of two sublevels that are defined as the functional sublevel of articulation and the functional sublevel of notification. The sublevel of notification concerns all communication mediated through technology and tools. Face-to-face communication is denoted as face-to-face communication, when such denotation is necessary. The functional sublevel of notification has a particular



role, as it functions as a bridge between the other dimensions of performing and networking.

All assignments are organised and coordinated during morning meetings each day. The static plan that is produced most often needs to be changed and renegotiated, since conditions can change rapidly. Access to information is in these situations important and the workers often discuss and exchange information about how the work is performed, mainly to be aware of each other's activities. Information about the elderly has always been accessible in paper binders located in the filing cabinets in the office. The information is found in several different binders, which correspond to certain services, such as delivery statistics about lunch boxes and assistance decisions. Information about their own work has long been held in their own private calendars inaccessible for others.

The fragmentation of information is a crucial problem to deal with, especially for newcomers, as one really needs to know where crucial information is to be found, in particular when the unexpected occurs, as when an unplanned house call needs to be dealt with, or an emergency call comes in that requires a direct attention. If such situations occur, the workers need to have quick and easy access to relevant information. Since homecare work until recently has been forced to manage without the aid of computers, the manual information system has been the main resource.

*Table 1. The organising dimension of homecare work*

Functional level	Hierarchy	Focus	ICT Role	Degree of support by ICT	ICT used in practice
<b>Coordination</b>	Main	Group	Division of labor, coordination	Fully	Partly
-Articulation	Sub	Group	Articulation	Fully	Yes
-Notification	Sub	Group/ Individual	Awareness, Backtracking, coordination	Fully	No
<b>Administration</b>	Main	Group and management	Backtracking and preparation, reports	Partly	Partly

The use of these traditional resources has evolved a culture of practice maintaining the resources and its interwoven parts. This culture results in the way in which communication and notification are handled, particularly in that asynchronous communication sets the agenda for how communication and messages are managed, as pointed out by Pinell et al. (2003). Today, this culture and its ways of communication are challenged by the employment of information technology and the inner logic of the system.

To ease the management of information, the homecare organisations have used a computer-based information system. The system consists of a server software application distributed on two interrelated components, a desktop computer and a number of PDAs. The mobile information and communication system has slowly been deployed into both homecare groups and is now, step by step, taking over more and more of those roles traditional repositories have had earlier. Instead of memorizing the content of different files held in the archive cupboard, as before, the workers are now able to carry information about the elderly stored in the PDAs. Before leaving the office, the PDAs are synchronised with the stationary PC.

The management of information is possible both on the PDAs and on the desktop computer. However, the latter is the resource where almost all the changes of information are made. One reason for this is that the interaction styles and the small screen on the PDA provide less support to manage these tasks effectively. Table 1 shows that the application supports all the functional levels of the organising dimension, the only functional level that is partly supported is the administration level. The reasons for this is that some important files and documents are only found on paper stored in binders, and have not yet been converted to electronic documents. The functional level of notification is also supported, but is in reality not used at all. The following discussion will focus on two functional levels in the organising dimension, namely, the coordination and the notification levels.

## **The Functional Level of Coordination**

The uses of repositories in these functional levels have no connection to an obvious hierarchal structure of power among the workers. Thus, none of the workers is more in charge than any of the others. Homecare work is independent and autonomous, carried out towards a collective goal and where all the

*Figure 1. The wallboard*

workers should be capable of handling all tasks. Everyone has a specific area of responsibility. Each person handles the maintenance work of specific files connected to their area of responsibility. Even if all the workers have specific knowledge and interest areas, the workers' knowledge coincides. This is one of the collective strengths utilised in the organisation of work.

One of the roles the use of the application has taken is assisting the articulation and coordination of work on a daily basis. The organization of basic homecare work is more or less the same throughout the country, and similar tools and ways of handling artefacts have been established over time. In this respect, to use the system is a challenge for the whole branch. One of the artefacts that can be seen as its predecessors is the wallboard concept (see Figure 1). The concept of the wallboard is one important cognitive tool the designers managed to encapsulate, and the software carries several similarities on that account. Currently, the division of work is exclusively prepared by means of the software in both organisations, functioning as virtual representation of the wallboard (Orre, 2002).

## **Articulation Work Assisted by the Software Application**

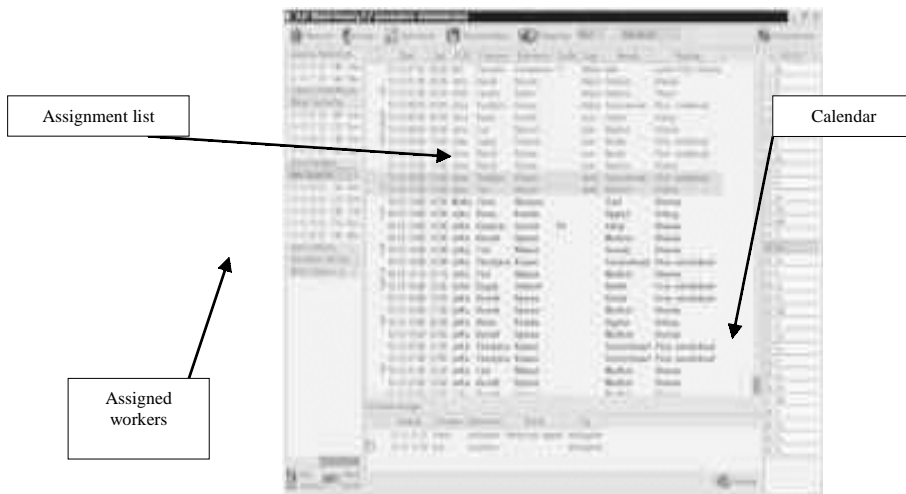
The personnel divide and coordinate their work in concert each morning and the procedure is similar to that of an auction. All the elderly are represented by

numbers and one of the workers, the application operator, sits by the desktop computer and calls out the numbers to the others. For her eyes only, all the numbers are displayed on an assignment list that automatically lists all the assignments for the particular day.

The assignments pop-up automatically according to service plans scheduled in the system for each elderly person. The assistant, who wants to accept a particular call, does so by saying “I’ll take him or her.” What happens next is that the application operator drags the number from the frame on the screen containing the assignment list, to a button corresponding to the specific name of the worker that has accepted the call. The duties requiring collaboration of two workers are not accepted by the application before two assistants have accepted the call and the application operator has assigned it twice. The application operator only articulates the assignments. She does not do any coordination as to when these tasks are supposed to be carried out more than prioritising assignments that need to be attended to during the morning hours; those it concerns during the meeting negotiate the coordination of activities on their own.

Previously, the tasks were coordinated within three smaller groups of four to five workers. What the system does is to display the information and the tasks on a specific information space that provides an overview that easily can be

*Figure 2. The assignment list*

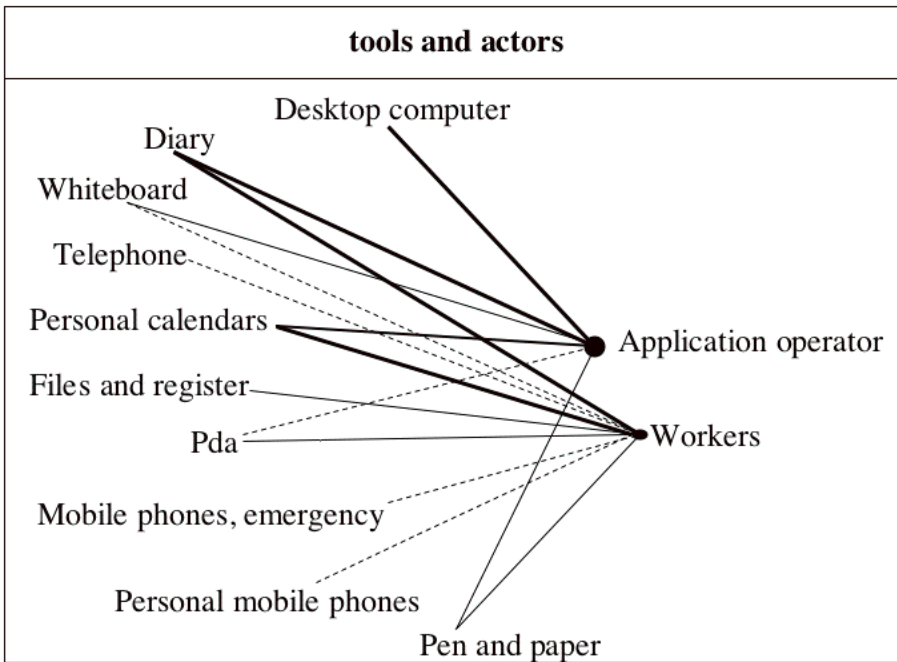


handled by the application operator. In Alfa, the application has made a considerable difference, and changed both the structure of the work group and the “talk about the elderly” (Orre, 2002). If one follows the importance of war stories, “Talking about machines,” discussed by Orr (1996), this is an important dimension that functions as a carrier of knowledge, not only providing an awareness of other workers’ activities but also as an exchange of experiences that can be useful for the future development of one’s own practice. One important aspect here is the automatic delivery by the system of assignments on the assignment list. The application manager only needs to focus on the tasks that need to be performed during a specific day. During this procedure, no efforts are in to planning actions towards the elderly for a whole week, indicating that the long-term coordination of actions is done through other means. The role of the application is from my observations the repository that is used to determine what is going to be done, and not to keep track of the ongoing activities for the members of the group, even though such activities and actions towards the elderly are recorded after their completion. The use of the system in this respect is more in line with what to do and what were done questions, rather than questions searching for what is going on, which are more relevant for practice and the activities of micro-coordination and exception handling.

## **Uses of Tools at the Functional Level of Coordination**

The discussion above may give the idea that the software is the only support used during the procedure of coordination. At first glance, these morning meetings are a mess of voices, telephone signals, mobile phones conversations, PDAs, papers and binders, jokes and laughter, and it is difficult to see what is being decided and coordinated. After a while, one can see patterns and roles among the workers, and especially how different artefacts are used during this procedure. The application operator and the computer, as discussed above, play one distinct role. She is the only person doing the articulation tasks while the others can focus on the coordination of tasks and events. However, what about the other tools at hand? The picture below gives an account of tools that are used during the coordination of work, providing a map of the functional system in terms of actors and tools, where the thick black lines drawn between tools and the application manager or the workers as a group indicate a direct use in relation to the accomplishment of the procedure. The grey and spotted

Figure 3. An illustration of the tools used during the meetings



lines point out uses of tools that are used, but have less or no immediate role in the coordination procedure.

What we can see in the figure is that the computer provides no other assistance than first-hand support for the application operator accomplishing her task, that is articulation work, and later, providing the others after synchronising the PDAs with updated information. The denotation of the application manager is mine, mainly to separate her from the other workers. The complex network of the other tools that are used in order to organise and prepare the work through the procedure of coordination highlights tools functioning as important resources in practice. The application and its connected mobile devices are not alone in this procedure. The stationary computer provides the group during this procedure with a single user interface that will prove important in the following discussion of the functional system of notification. Another resource that needs to be mentioned is the use of mobile phones. There are a number of mobiles used to stand guard for the safety and emergency system installed in the homes of the elderly. These phones, three in number, together with the personal mobiles the staff have access to are an important resource for coordination of

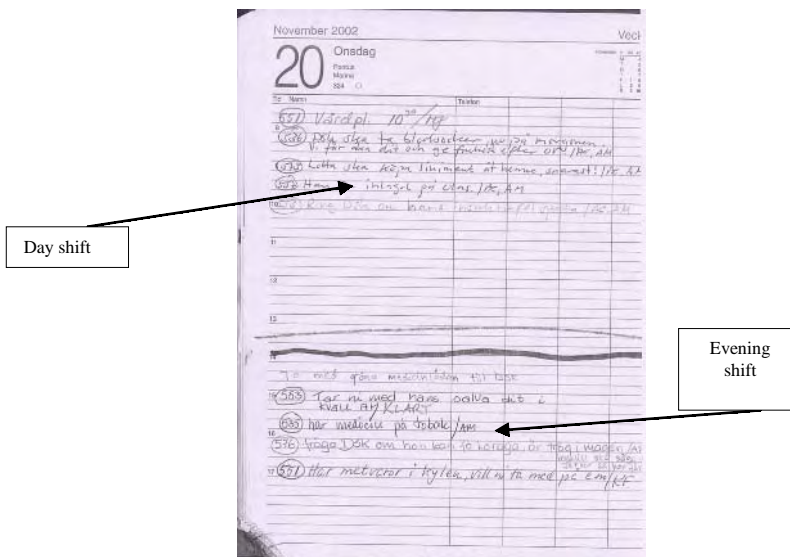
meeting points, etc. During the morning meetings calls not connected to the work at hand are handled, which can be seen as a distraction from the task, but also a natural part of the daily work.

## The Functional Sublevel of Notification

The use of notes and messages is one central aspect and can be seen as a continuum of actions taken during the morning meeting. Notes and messages can in this context be discussed in terms of what Sellen & Harper (2001) define as hot and warm files — frequently used documents in the workplace. Hot and warm documents in this case function as a means for coordination and awareness of ongoing activities in the mobile work place. Notification is one important factor in the accomplishment of the collective strategy for the whole group. One repository that plays a leading role in this work is a diary found on the desk in the office.

The diaries have a central role at both sites but the uses of them differ. Different uses of similar tools indicate dissimilarities in how the social organisations of

Figure 4. A page of the diary



tools and work are structured (Hutchins, 1995). Following this indication, one needs to go further and see where these differences can be identified and why they occur, especially in relation to the use of the software application and other tools.

## **A Cultural Transformation of the Diary According to New Circumstances**

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The diaries are used to memorise and communicate events and actions, initiating follow-up errands from previous house calls, or just informing the others about certain events that it can be useful to have knowledge about. If we go back, tracing the developmental process of diary uses in Alfa, a number of interesting landmarks can be identified closely related to the introduction of the software application and how the coordination procedure changed the structure of the group. Before the systems were introduced in Alfa, several diaries were in use. The homecare group as whole consisted of three sub-groups. Each of these groups had a certain responsibility for a particular group of elderly, each group also had a diary of their own, and the result was that three separate communication spaces were maintained using the diaries. The boundaries between these groups were tightly drawn and each group solved their own problems and worked autonomously, only caring for those elderly that “belonged” to their own group. One clear indication here is the diary’s role as a common information space, where the practice of using the diary was one of the components that isolated information within the group’s boundaries, and consequently, no information was shared over these boundaries. There was one diary though, used by workers who worked the evening shift, which was shared among all of the groups. It contained important information about certain events and conditions of the elderly that needed attention during the evening or needed a follow-up house call the next morning.

When the software application was fully implemented, the three groups merged into one. This can be seen as an effect of the particular use the application required. If one follows the earlier discussion of how the coordination during the morning meeting was handled, one can clearly see the consequence if the application were to be used by three groups simultaneously assisted by one desktop computer only. The new order that the software application introduced was negotiated among the actors, which resulted in that the whole structure of the morning meetings is being changed. Consequently, the use of



the diary went through a similar process. The number of diaries was reduced to two, one for the day shift and one for the evening shift. Information had to be transferred between these diaries and the workers had to decide which information to give and which to consider important depending on task or task content. As this procedure was hard to maintain in the long run, a decision was made to use only one of the diaries. The pages of the diary were divided into an upper section and one latter section for each day; the former was used for day activities and the latter for evening activities. At this moment, the workers only had to view one page in order to see events that had taken place during a particular day and the following night. The history of events in Alfa connected to the diary show how embedded the diary is in practice. The developmental process of the diary is one where a need for a common information space is negotiated (Reddy et al., 2001). The work with the diary has certain rules as to how it should be used and how the space should be managed in order to function in practice. These rules structure the use of the diary, and are a result of an evolution rather than a design. The process can be seen as an adaptation to altering circumstances in the environment where the practice, that is the collective activity, searches for reasonable ways to solve practical problems (Hutchins, 1996).

Unfortunately, no story is available for Beta regarding this matter. The application had just been up and running for a short while when I conducted my study. But what could be identified was that the procedure of coordination was continuously negotiated and that the disagreements of this process had an impact on how both the diary and the application were used. The following discussion will illustrate different implications that diverse social organisations have on practice when the diary is used in relation to the application.

## **Uses of Tools in the Functional Subsystem of Notification**

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The tools that are used in the functional subsystem of notification can be extracted from the previous picture of the functional system of coordination. The same relations are found between the workers, the diary and the mobiles, indicating that there exists a certain structure of communication across functional levels of work. These relations concern coordination of other times than during the morning meetings. The computer and the PDA are not used in this functional sublevel. The diaries seem to be the tool that, more than any of the others, mediates human activity and it clearly plays an important role. An

interesting note here is that mobile phones are part of the functional system of notification. Both personal mobiles and mobiles dedicated to handle emergency calls are used in concert by the workers, mainly to micro-coordinate activities out in the field that function as notifications and awareness of actions to provide information about delays and new meeting places. As the application is not used at all, and if we strive towards an understanding that can assist to inform design of information technologies, we need to compare the diaries with the software application's functionality handling notification.

## **Uses of the Diary in Alfa: Collective Mean as a Mnemonic Tool**

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Information recorded in the diary does not contain regular tasks such as those listed on the assignment list. The nature of this information is added with the intention of informing: telling whether an assignment has been accomplished, or the outcome of a particular house call, or about actions and events that are going to be dealt with in near future. This information is strongly connected to the condition of the elderly and errands that need to be followed-up on because of a particular house call. This also means that a house call is more a fluid than fixed activity, in the sense that it not always correlates to the stipulated time given on the assignment list. Thus, the diary helps to inform the other workers about ongoing activities or to provide an awareness of actions and conditions that otherwise would be difficult to attain.

As the routine during the mornings gives a possibility to structure the activities according to individual interests and strategies, there is a concern among the actors to have all the tasks on the assignment list each morning. What is requested is to have those errands listed in the diary to pop up on the assignment list each morning, an initiative that would provide a bridge between the application and the diary. An indication of the central role of the diary has is found in the diary in Alfa. It contains cross-references to information held in the system or to paper binders concerning information important for tasks or events. The fact that information available in the application is noted in the diary as a reference indicates firstly that the diary is one of the main communication tools, but also that the workers have strategies to handle two diverse set of tools that slowly get enmeshed together in the line of practice. Their different uses are based on the suitability for their particular function and the need these repositories efficiently support.

Examples of uses can be illustrated by the following situations and show how different strategies towards the diaries are developed. In the first situation, one actor leaves a note about an older person who is about to have a visit by a dental hygienist. The note concerns the whole group and will be noticed and taken care of as such, since it contains useful information for all the actors. The second situation exemplifies another strategy where the diary functions as memory for one single worker. The worker wanted, in this case, to remind herself about the day and time when she had promised to follow one of the elderly to the hairdresser, something she most likely had forgotten about if she had put the note in her own diary or wallet. These two situations are examples of uses that clearly show the collective and shared affordances the diary has and the intentions that the workers have when they approach the diary.

### **Uses of the Diary in Beta: The Diary as a Depot**

The diary is frequently used in Beta, but plays quite a different role. The assignment list is not only used to handle regular tasks. Errands that in Alfa are handled through the diary are here listed on the assignment list. If these errands and follow-up assignments are to be included into the assignment list, they also need to be added into the computer application. Some of the actors experience the work with the computer uncomfortable and choose to put forthcoming assignments into the diary instead. This information is in most cases added as paper notes attached to the diary page for the specific day when the information is to be used. The use of paper notes indicate that messages not always are written directly into the diary, and the diary has mainly, since the implementation of the system, functioned as a depot of assignments. Since the application manager articulates regular assignments and errands at the same time from the assignment list, they are seldom forgotten about, which also provide a control of the work as a whole. But it also imposes that the responsibility of certain errands among the personal is lost, and especially concerning the task the application manager does every morning. The communication of ongoing events through the diary are also hampered since the diary rather solves problems attached to the handling and work with the computer, rather than giving awareness of other workers' whereabouts.

Moreover, the result of these actions is that the application operator may have a list of ten or more additional assignments to record into the system the following morning. These need to be handled before any articulation work can

be managed, as the assignments need to be on the assignment list. The procedure in Beta differs in that the application manager is responsible for both the articulation of assignments, but moreover, she also needs to articulate them, as they are to be coordinated at the same time. This was in Alfa solved by doing this task in concert each morning. This is a problem, since the application manager only has half an hour for the task. When assignments need to be added to the assignment list, the time for this task shrinks the time-frame by ten to fifteen minutes, which is a very short time managing a proper arrangement for ten persons. This approach of using the articulation function in the system stress that skills and familiarity with the system is needed.

The task appointed to the application manager during the morning is stressful and some of the workers avoid the task because of this. This in turn excludes some of the workers from learning how the technology can be used in practice. They not only miss an opportunity to learn how to manage the system, they also reduce the possibility of an understanding its practical implications, for instance, the consequence of leaving the tasks to be dealt with the following day on paper notes. In addition to this, those who can cope with both the stress and the task learn the skills at the same time as they are given another position to have control over their own work situation.

One way of handling this situation is that one of the two persons working with the division of tasks during the morning has more experience than the other person, which is a standard routine. This use of the system can also be connected to the use of the diary. As discussed above, the diary is used as a depot of assignments that needs to be recorded in the system. The workers that arrive later have no control over the plan of their daily work, since someone else settles the plan. The arrangement of procedure in Beta hinders communication and notification both through the diary and the system; both are part of the articulation of work, and neither for notification of events or actions.

The observations indicate that the coordination work in Beta is not an overall collective achievement as it is in Alfa. Moreover, hierarchies and differences are established among the personnel in Beta mainly due to lack of skills in computer use and knowledge of how this technology functions in practice, which creates a fear of the technology. Furthermore, it also indicates that the cultures and the roles the coordinative tools play are different in the two organisations. However, the observations underline that the use of the diary and its relation to the system needs to be further investigated, as an integration of the application and the function of the diaries seems to be a promising way to take in both cases.

## Disagreements of How Notifications are Handled Through the System

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During a user meeting arranged by the system designers, users from both homecare groups, representatives from the municipality, and other interest groups discussed their experiences with the system. One problem the homecare groups agreed upon that needed to be redesigned was the notification function in the application. Very strong opinions from both the homecare groups were articulated about how this note function currently was managed by the system, and how it counterworked their intentions. The assistants do not use the note function at all, as they feel it to be unmotivated and cumbersome to handle. A consequence was that when the function was used information ran a bigger risk of being lost or forgotten, since the software in its current design separates crucial information into two sections that are impossible to view at the same time.

The reply from the designers of the system was that they considered the function manageable and tried to avoid the problem, since they believed it worked. A disagreement of what was working or not when it came to software and systems solution can be put in Bergs' (1997) remark:

*“Advocates overlook how tools are always located; how a local context and reflections of past negotiations are built into the heart of the rational tool” (Berg, 1997, p. 169)*

During my discussions and interviews with the actors, they were very decisive about the fact that the note function needed to be handled according to their line of work. The workers wanted to get the full picture of a particular day's activities displayed in one view, e.g., the assignment list, which is closely related in terms of need of a common information space that gives the similar affordance as the representation of the diary.

## What Kind of Support Do the Tools Provide?

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The identification of the functional levels of interest has arrived at the point where the propagation of representational states can be discussed. The coordination seems to be working in both groups, even though the uses and the procedure differ. These uses can be understood as a matter of cultural interpretation where employment of information technologies is straightforward and where it allows different approaches towards its use. Beta is in a situation where the negotiation of how this system is going to be used has just started. One could argue that technology through negotiation is starting to find its role among the workers and other repositories. The final step in the analysis is to identify the representational states the tools offer and their propagations and thereby give an explanation why the diary is preferred.

The role of the diary can be illustrated in terms of the following dimensions. Firstly, accessibility, as the tool is easy to access for all the members of the group. Secondly, we have the shared information space it provides. Thirdly, we see the overview of the state of affairs. Fourthly and finally, how the communication of events gives an awareness of urgent and important task that goes beyond the ordinary is handled. All these dimensions are negotiated in practice, which have led to an adaptive role of the diary. Negotiation of the purpose and function of specific tools' maintenance and development is a crucial aspect, which is hardly considered from a systems designer's perspective. The propagation of the dimensions above and their representational states is found in the simplicity of the affordance of the paper diaries. Using one's own handwriting, small paper notes attached with paper clips, business cards that hold important information, or writing directed messages to specific colleagues, and knowing that the information will be addressed, are what makes the whole difference when choosing between the diary and the software.

The weakness that the technology seems to have in this case is that almost all information is displayed on a single user interface and that the use of the software requires certain skills in computer use. Another problem connected to the single user interface is that the worker, if the relevant information is to be attained or noted down, needs to work through several steps in the structure of the software. This also applies to the PDA, which is experienced as difficult to use in terms of writing information into the device. The propagations of representational states of the dimensions above were harshly rejected when the two user groups discussed the notification function in the software.

The application and the mobile devices are not as tools excluded by the homecare workers. Rather, one can see that these tools are slowly interwoven with practice. One of these roles is the use of the software in the coordination and division of work since the application eases the burden for the articulation of activities. Furthermore, the fact that the mobile devices allow the workers to carry information when working tending to the elderly gives a feeling of safety and readiness among the staff. The workers expressed an idea that if the notes were to be held in the software instead of the diary, these notes should be displayed on the assignment list for an easy access. If implemented, this idea would merge two functional systems into one tool. This study cannot tell if such solution would be beneficial, but the single user interface of the computer would still be a crucial problem to overcome.

*Table 2. The functionality of different tools in the functional sublevel of notification*

Dimensions	Accessibility	Shared information space	Overview	Communication of events	Negotiated
<b>Tools</b>	<b>Propagation of representational states</b>				
<i>The software application</i>	Requires a log in, then you need to work your way through several menu choices.	The application provide a single user interface	Provided by different windows e.g. the assignment list and the notification list	Not provided as the identification of notification is found at the bottom of the structure	Only as how it should be redesigned in order to be used.
<i>The application on the PDA</i>	Requires a log in, then you need to work your way through several menu levels.	The device offers a personal user interface, displaying the assignment list for each worker	Provided by different windows e.g. the assignment list and the notification list, the device is cumbersome to manage regarding these features	Though information can be recorded and synchronised, the cumbersome operation of the device hinders this.	Only as how it should be redesigned in order to be used.
<i>The mobile phones</i>	Immediate	Not provided	Not provided	Initiated by the caller	Not negotiated, rather taken for granted
<i>The diary</i>	Immediate	The space is visible for many at the same time	Immediate access to information and sources	Visibility of ongoing activities	Denoted and negotiated on daily basis

## Conclusions

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This study has the intention to investigate how a particular ICT support is used within an established practice of homecare work. The discussion has dealt with a case showing a perspective of how technology and practice coevolves and gets enmeshed together. To put forward the conclusion that the new technology support slowly is integrated with other repositories and tools in the environment would not be a surprise. However, is this the result of the study's design, or what other aspects can be identified? These two organisations have had their first encounter with ICT through these systems. It has been a bottom-up implementation of technology in both cases, which means that no overall organisational strategy says, "this is it, from now on this is the computer system that we will use, and we do it for these particular reasons." The personnel have instead been forced to jointly negotiate the role of the system. As their knowledge of technology is found in their own practice and repositories used by tradition, the key problems in their negotiations have been those affordances the tools carry, related to situations where the specific tools are found applicable. In some situations, the new technology has been accepted and in another, it has been rejected, but in every negotiation of the tools, the practical benefit is the underlined outcome. This is shown by the importance of the diary, and by the observation that the design of the application has managed to encapsulate mechanisms of practice, such as in the case of the articulation part of the coordination work. The implication when the functionality of the system partly is accepted, is that these parts slowly are interwoven in the web of tools of practice.

What also is revealed by this study is that if one wants to propose a new technology support in a specific environment, one needs to pay attention to the collaborative dimensions of the work practice. Once again, the example of the diary shows that the notion of the common information space is crucial. The importance of seeing the interface of either the mobile devices or the stationary computer as such common information spaces, one also need to address those design challenges such an option imposes. The single-user interface the current system offers is not enough support for the collaborative activities the mobile workforce of homecare work is engaged in. There is a danger to reside on the notion that mobile devices, as used in this case, will provide the users with such a support. The mobile devices function only as a carried safety while working alone, moreover, the technical and functional display of the mobile devices constrains usage and the information is fixed, and, furthermore, the user



interface is not negotiable by the actors. Instead, relying on established tools seems to be a rescue when the practical usefulness of the new tools is lost or difficult to grasp.

When it comes to keeping track of ongoing events and actions, traditional tools still have the workers' attention, providing flexible and negotiable interfaces. The history of events is clear on this point, stressing that more attention should be put on an understanding of how different tools are embedded in practice, especially if one has the purpose of replacing these with new technology. This also concerns media that is used for communication. In this case, the diary and the mobile phones along with face-to-face encounters are main communication sources found in the mobile work place. If one wants to take advantage of these media and situations, then the technology support should be designed to account for those means.

Technology is negotiated *per se*, and the relation between new technology and the means that are familiar have a promising potential to generate a valuable input for design and development of related systems in the future. What is needed to provide for such a generation of information is to get closer to the activity, more than the user. I do not stress to downplay the role of the user, but I would stress a move towards a focus on the activity the users are engaged in — their practice. Following such an approach, one would be able to isolate dimensions that give a better account for the needs the practice impose than what pre-described documentation formats can give guidance for, which in many cases now is guiding the design of these systems. When cultural tools are digitally transformed, they are also given new affordances that, despite similar procedures, change the particular situation completely, restructuring relations between workers and groups, and giving information and communication new pathways to follow. Note that this addresses the importance of understanding the mechanisms that underlie certain procedures and dimensions of work, and the work maintaining the tools, which not necessarily is mentioned in work descriptions or a step-by-step instruction for documentation. The mechanisms crucial for the practice are manifested in the cultural tools, as shown by the diaries, and as in the example of the articulation of work through the software application. These artefacts are or have been central tools of coordination and collaboration. If we manage to grasp and understand their function, we have one pointer giving direction as to how approach established collaborative work practices and the development of new technological support.

## References

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- Bannon, L., & Bødker, S. (1997). Constructing common information space. In *Proceedings of the European Conference on Computer-Supported Cooperative Work ECSCW'97* (pp. 81-96). Lancaster, UK, Dordrecht: Kluwer.
- Berg, M. (1997). *Rationalising medical work: Decision-support techniques and medical practices*. Cambridge, MA: The MIT Press.
- Brown, B., Green, N., & Harper, R. (eds.). (2001). *Wireless world: Social and interactional aspects of the mobile age*. Godalming: Springer Verlag.
- Christensen, K. (1999). Computerbruk og omsorgsarbeid- lar det seg forene? In K. Thorsen & K. Waerness (eds.), *Blir omsorgen borte*. Oslo: Gyldendal.
- Esbjörnsson, M., Juhlin, O., & Östergren, M. (2002). The Hocman Prototype: Fast motor bikers and ad hoc networking. In *Proceedings of MUM 2002*. Finland.
- Haddon, L. (ed.). (1997). *Communications on the move: Experiences of the mobile telephony in 1990's* (COST 268 Report). Telia, Farsta.
- Halverson, C. (1994). *Distributed cognition as a theoretical framework for HCI: Don't throw the baby out with the bathwater—the importance of the cursor in air traffic control* (Report 9403). Department of Cognitive Science, University of California, San Diego.
- Halverson, C., & Rogers, Y. (1998). An introduction to distributed cognition: Analyzing the organizational, the social, and the cognitive for designing and implementing CSCW applications. *Proceedings of ACM CSCW'98 Conference on Computer-Supported Cooperative Work* (pp. 429-430).
- Harper, R. (1998). *Inside the IMF: An ethnography of documents, technology and organisational action*. London: Academic Press.
- Hedestig, U., Kaptelinin, V., & Orre, C. J. (2002). Supporting decentralized education with personal technologies. In *Proceedings of the International Conference E-Learn 2002*. Montreal, Canada.
- Hutchins, E. (1995). *Cognition in the wild*. Cambridge, MA: MIT Press.

- Ling, R. (1997). One can talk about common manners! Use of mobile phones in inappropriate situations. In L. Haddon (ed.), *Communications on the move: Experiences of the mobile telephony in 1990's* (COST 268 Report). Telia, Farsta.
- Luff, P., Hindmarsh, J., & Heath, C. (eds.). (2000). *Workplace studies: Recovering work practice and informing system design*. Cambridge, MA: Cambridge University Press.
- Norman, D. A., & Draper, S. W. (eds.). (1986). *User centered system design: New perspectives on human-computer interaction*. Hillsdale, NJ: Lawrence Erlbaum Associates.
- O'Hara, K., Perry, M., Sellen, A., & Brown, B. (2000). Exploring the relationship between mobile phone and document use during business travel. In B. Brown et al. (eds.), *Wireless World: Social, Cultural and Interactional Issues in Mobile Communications and Computing*. Berlin: Springer-Verlag.
- Orr, J. (1996). *Talking about machines: An Ethnography of a modern job*. Ithaca, NY: Cornell University Press.
- Orre, C. J. (2002). Implementing IT artefacts in Homecare Organisation K. In *Proceedings of the 25<sup>th</sup> IRIS*. Bautahøj, Denmark.
- Perry, M. (1997). *Distributed cognition and computer supported collaborative design: The organisation of work in construction engineering*. PhD Thesis. Brunel University, UK.
- Pinell, D., Dyck, J., & Gutwin, C. (2003). Aligning work practices and mobile technologies: Groupware design for loosely coupled mobile groups. In L. Chittaro (ed.), *MobileHCI 200, LNCS 2795* (pp. 177-192). Berlin: Springer-Verlag.
- Reddy, M., Dourish, P., & Pratt, W. (2001). Coordinating heterogeneous work: Information and representation in medical care. In *Proceedings of the European Conference on Computer Supported Cooperative Work (ECSCW'01)* (pp. 239-258).
- Schmidt, K. (1991). Riding a tiger, or computer supported cooperative work. In L. Bannon, M. Robinson, & K. Schmidt (eds.), *ECSCW '91. Proceedings of the Second European Conference on Computer-Supported Cooperative Work, 24-27 September 1991* (pp. 1-16). Amsterdam: Kluwer Academic Publishers.

- Schmidt, K., & Simone, C. (1996). Coordination mechanisms: Towards a conceptual foundation of CSCW systems design. *Computer Supported Cooperative Work: The Journal of Collaborative Computing*, 5 (2-3), 155-200.
- Sellen, J. A., & Harper, R. (2001). *The myth of the paperless office*. Cambridge, MA: MIT Press.
- Theureau, J., & Filipi, G. (2000). Analysing cooperative work in an urban traffic control room for the design of a coordination support system. In P. Luff, J. Hindmarsh, & C. Heath (eds.), *Workplace Studies: Recovering Work Practice and Informing System Design*. Cambridge: Cambridge University Press.
- Weilenmann, A. (2003). *Doing mobility*. Doctoral dissertation, Department of Informatics. Gothenburg University, Sweden.

## Chapter V

# Learning While Playing: Design Implications for Edutainment Games

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### **Abstract**

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*This chapter reports on the initial results of a study conducted in the project FunTain. The main purpose was to identify general guidelines/implications for edutainment games, in order to guide designers of such games as they often lack in design guidelines. Usability evaluations were conducted on an edutainment game in order to find usability problems. These findings were analyzed and used as input in focus group meetings, held with joint teams of game designers and HCI experts. The outcome of the focus groups was a proposal of a list of ten general design guidelines. Findings indicate that users had problems in understanding the underlying model for the game as well as identifying the knowledge related content. Experts, further, gave comments about feedback problems and different*

*types of consistencies. Some of the implications from the findings are guidelines for earning and losing points, scoring and performance feedback and game object characteristics.*

## **Introduction**

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Currently, both research and practice show a great interest in studying and developing ways to use computers in various forms to support and enhance interaction between humans. Although the issue of human-to-human interaction by use of computers is of great relevance and importance, we still must not forget about the interaction between humans and computers. New factors and aspects, not previously grasped by the Human Computer Interaction (HCI) discipline, are becoming recognized as important in the interaction between users and technology. Aspects such as emotions, experiences and entertainment are more and more frequently considered when designing and developing new computer applications in many different areas.

Entertaining experiences is one of these new aspects that today are becoming in focus not only in traditional areas of entertainment, but are currently used in previously non-entertaining contexts as a mean to improve products and user/consumer experiences. Examples of this could be found both in the physical world (i.e., restaurants and theme parks) but also in computer contexts such as on the World Wide Web and in different kinds of software (Pine II & Gilmore, 1999; Wolf, 1999). The application of entertainment in previously non-entertaining environments and contexts opens up new research questions, as entertainment is applied and used with purposes beyond creating plain amusement and fun for the user. One of the areas where entertainment is applied with purposes beyond just creating an amusing experience is the area of edutainment, where entertainment is used in combination with education in order to create a motivating and successful environment for learning.

Adams et al. (1996) describe edutainment as a blend of education and entertainment, pursued in multimedia software. The description, or definition, indicates that the two major dimensions of importance in edutainment is some kind of pedagogy (education) and some kind of “fun” or entertaining experience (entertainment). Edutainment is therefore one example where research on new appliances of entertainment in previously non-entertainment contexts may be conducted.

Considering the definition of the edutainment concept (as a blend of entertainment and education), we might conclude that design of edutainment includes the design of both entertainment and educational aspects in a design artifact. This may cause some difficulties. The pedagogical aspects that are of importance for the educational part of the artifact may in some cases be in opposition to the aspects of importance for the entertainment part of the artifact. There seems to be a need for some kind of trade-off to be made in order to achieve a good result in the design of both the entertainment and the education in the artifact. A parallel could be made to Nielsen's (1999) discussion about content and package of the content in a web page design context. According to Nielsen (1999) the users of a web page are focused on the content of the page and consider the user interface, or package, as a barrier through which they reach for the content they want. Despite a cool, sizzling or "killer" interface or environment, the usability of a web page would be negatively affected if the content of the web page fails to deliver something to the user (Nielsen, 1999). Therefore, Nielsen (1999) concludes that content is king.

There is a need for design guidelines and implications when designing edutainment under these circumstances. This paper reports from an initial study conducted for the purpose of providing guidelines/implications for design of edutainment games (an instance of edutainment), performed within the FunTain project, a joint project between HCI academics and game design practitioners. The purpose of this chapter is to report the findings from initial usability evaluations on an edutainment game in order to provide design implications for design of edutainment games.

## **Qualities of an Edutainment Artifact**

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In related work, suggestions of aspects that are of major importance for educational software and multimedia can be found. These suggestions should be of importance also in design of edutainment artifacts such as edutainment games.

Adams et al. (1996) suggest that multimedia products for educational purposes should be designed with the following aspects in mind: effective learning, effective teaching, effective communication of the content and effective use of technology to achieve the previous aspects. In order to achieve effective learning, the artifact, or product, should be simple (explain topics in terms for the user's already known knowledge), clear (define topics in their entirety) and unambiguous (distinguishing specific topics from others). Effective teaching,

they argue, will be achieved by highlighting perspectives needed to master the topic and by providing appropriate feedback mechanisms to the learners. They suggest that effective communication could be achieved by presenting material so as to increase the learner's understanding of the topic in a monotonically fashion. Technology should then be used to ensure the previously mentioned aspects, and not to obscure them. In design of multimedia for education, the usual human factors must be addressed, and the technology should bring together the benefits that the different media provide.

Lin et al. (2001) highlight the possibility to pass control of learning sequences from the program designer to the learner in web-based teaching. Good education software should be active, not passive, in that the learner should be doing something actively and not watching something passively. Adams et al. (1996) seem to agree with this recommendation, and they conclude by suggesting that active engagement by interaction with multimedia can increase the attention span for learners with positive effects, such as customization of pace and learning style to suit the individual learner's specific needs.

The suggested aspects and factors above all tend to focus on the education dimension of edutainment. When designing edutainment games this dimension is of great importance. However, if the game itself is not considered entertaining, it is likely that users will quit playing the game, with no educational experience as a result. Further, the above suggestions give high-level implications with no specific guidance for designing edutainment games specifically. In HCI there is a long tradition of development of design guidelines and overall these are very much on a micro level and specific on the technology itself.

## **The Edutainment Game Prototype**

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The game is called "Laser Challenge" and was designed in order to educate the player/user about appliances of laser technique. No specific knowledge about the laser technique was required for playing the game, but the user was supposed to be inspired by the game to learn more about lasers. The game followed a linear, platform metaphor, and consisted of four episodes with increasing difficulty in the interactive parts. The main theme was intended to be non-violent and the basis was that the user should collect CDs to give a party. The player controlled and steered a character on the screen in order to collect CDs and avoid "enemy" objects in the game environment, presented in the

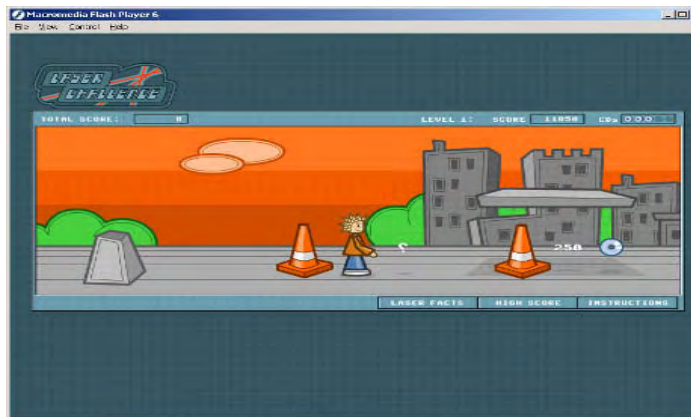


shape of skateboard kids who were trying to steal the CDs from the player's character. Further, the user got points when answering questions about lasers that were presented in the game. Below, some screen shots from the game are shown.

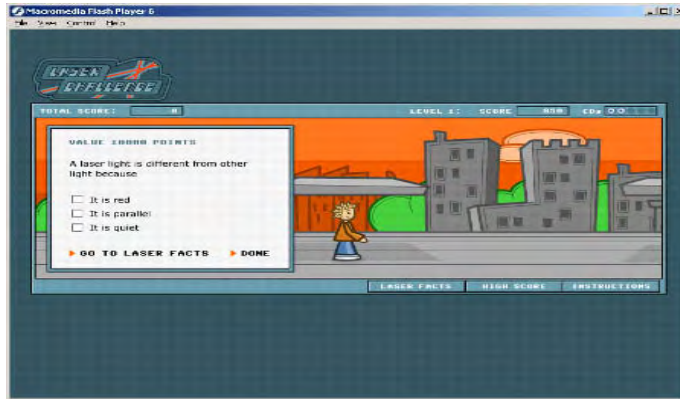
*Picture 1. Pre-game instructions screen (the overall goals and objectives of the game is described, as well as the basic game controls)*



*Picture 2. User controlled character to the left, a spinning question mark that leads to a question that must be answered by the user, a CD that must be collected in order to complete the game and a number (250) that represent “free” points to score*



*Picture 3. Character has touched a spinning question mark, and a question box is shown (The question is multiple choices, and deals with the topic of laser. Correct answer gives the user a high amount of points.)*



*Picture 4. Character, numbers representing points to score, CDs to collect in order to achieve the game objectives and the antagonist of this game level (the Skateboarder)*



## Evaluation Method

When evaluating educational software, learning and usability need to be considered as interacting in order to avoid superficial evaluation (Jones et al., 1999). Given the interaction between learning and usability, usability evaluation

methods should be well suited for evaluation of edutainment artifacts in the case presented here, since the methods would capture both design implications (Karat, 1997) and potentially also the interaction between usability and learning. Therefore, an approach based on evaluation methods from the usability discipline was used for the purposes of identifying empirical design implications for edutainment games. This approach would then potentially address the learning aspects and, most importantly for the focus of this case, obtain implications for design.

Previous findings in the related area of interactive entertainment evaluation (Wiberg, 2001a) reveals that evaluation of entertainment websites based on methods from the usability discipline, and user testing in particular, tend to provide findings that are focused on basic usability problems concerning navigation, design of menu buttons, etc. This implies that more subtle factors such as immersion, absorption and engagement, all potentially important to both entertainment and education, are difficult to grasp with the user testing method (Wiberg, 2001b). Several studies reveal that usability inspection methods, such as Design Walkthrough (e.g., Karat, 1997), Cognitive Walkthrough (e.g., Lewis et al., 1994) and Heuristic evaluation (e.g., Nielsen, 1993, 1994) in many cases identifies problems overlooked by user testing, but also that user testing may identify problems overlooked in an inspection (Nielsen, 1994). In this study, we therefore used a combination of evaluation methods including both user testing and inspection methods. A combination of user testing and inspection would provide a broad picture of the important aspects and issues at hand, and seems to be a fruitful approach when generating a foundation for deriving design implications. In order to refine the results provided by the user testing and inspection method and to generate a set of empirical design implications, the focus group method was used. In practical terms, a focus group is a collection of people gathered together at one time to discuss a topic of interest for the researcher. The explicit use of the group interaction provides the researcher with data and insights that would be less accessible without the interaction (Sullivan, 1994). By collaborating the results from the user testing and inspection method in a focus group session, the intention was to create a set of design implications of importance for edutainment games, which is the major purpose of this chapter.

## Participants

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Subject	Age	Gender	Computer literacy (1=Novice, 5=Expert)	Computer gaming literacy (1=Novice, 5=Expert)	Comment
1	25-30	Female	3	1	Researcher HCI
2	25-30	Female	5	5	Researcher HCI
3	50-60	Male	3	1	Engineer
4	20-25	Male	4	4	HCI analyst and lecturer

A total number of five (5) subjects were invited to participate in the user testing, of which four (4) actually participated.

The subjects performed the test one at a time, and each test took about 30 minutes in all. The user tests consisted of three parts:

- 10 minutes of free surf with Think Aloud
- 10 minutes of Walkthrough, performed by the test subject in collaboration with the test leader (collaborative evaluation)
- 10 minutes of post-interaction interview

In the first part of the session, the subjects played the game without any specific task to solve or instructions to be carried out. They were asked to verbalize their thoughts throughout the interaction, and they finished the session when they wished to do so. In the second part, the subjects performed a Walkthrough of the whole game prototype in collaboration with the test leader. Different aspects of the game were discussed, and the subjects were asked to give their opinions about specific features and parts of the design. They were also able to express any thoughts and comments they wanted to share. The post-interaction interview gave the subjects an opportunity to give comments and thoughts on general aspects of the game, the interaction and the performed test procedure. Here, the subjects could develop or refine their opinions and ideas from the previous parts of the test, and the test leader could follow up on issues that needed to be clarified.

## **Expert Walkthrough**

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In the design walkthrough, or here called expert walkthrough, the experts investigated and collaborated with the game prototype and made comments on possible problems or design improvements. The comments were written down and discussed in the last part of the evaluation, the focus group. The instructions were very brief, and the experts had a large degree of freedom in the evaluation procedure. In a large extent they relied on their personal experience and opinions in their evaluations.

## **Focus Group**

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When the User tests and Expert Walkthrough parts were finished, the HCI researchers and test leaders from the empirical evaluations, as well as the game designers, performed a joint focus group meeting. In the focus group, the findings from the previous parts of the study were reported and discussed. The first step in this process was to analyze and categorize the different findings from both the empirical and the expert evaluations into problem areas or groups. From the grouped findings, the participants constructed a more general picture of the reported issues in the prototype. This picture was then used to generate a number of implications for the next step in the overall design process; design implications. The general picture was thoroughly discussed, with focus on how the problem picture could be reconstructed into guidelines or implications that designers would benefit from.

Each group of problems in the picture were discussed in terms of: which part(s) of the game prototype design that was related to the problems, what kind of more general usability issue the problems could be interpreted as demonstrating different aspects of, and eventually how the essence of the usability problem expressed by the problem group could be formulated into a guideline or an implication for design.

Since the study was performed as a collaborative part of the process of designing the edutainment game, implications were kept at a level that was considered to be meaningful for the overall design process in terms of guidance for designers when conducting re-design. That is, implications that would be possible to use as meaningful input to the designers in the next step of the design process.

## **Usability Problems Identified**

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In order to highlight the research process, some of the usability problems identified are stated below. These are kept short, with the purpose to pinpoint the overall picture of what occurred. Most of the usability problems in the examples occurred both in the expert walkthroughs as well as in the empirical usability evaluations, however not in all the empirical sessions.

### **Expert Walkthroughs**

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- It was unclear which actions the player should perform in order to gain points in the game. Strange question marks and other moving objects were confusing, and searching after hidden objects that gave points was fruitless.
- It is not obvious what “enemies and dangers” the player should be aware of in the game. What other characters and objects are really dangerous in the game? What actions and objects should be avoided?
- The skateboard kid seemed somewhat dangerous, however it was not clear at all how and in what ways he could harm the player’s character.
- Overall, feedback problems occurred in the game. When feedback was expected (when different actions suggests feedback to be expected) it did on many occasions not occur.

### **Empirical Usability Evaluations**

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- A lack of interest (from the test players) in reading initial instructions results in frustration later in game when events, objectives and actions become difficult to interpret and understand.
- Loss of only some game points as a result of an action was confused and mixed up with a total loss of all points earned, which led to unnecessary (and unmotivated by the game) disappointments among the test players.
- The music in the game is not connected to the actions taking place in the game, which confuses players, as it does not highlight levels of danger (which would be consistent with other games).

- The level of difficulty in playing the game is by many test players experienced to be too low. The game is too easy and does not have an increasing level of difficulty, which was expected by many test players.
- Test players reveal frustration over a lack of consistency with other arcade games similar to this game, like for instance the possibility to jump on (and “kill”) “bad guys” in order to gain points.
- The lack of possibility to move information pop-up windows, revealed when questions concerning lasers are asked, frustrates the test players. The pop-up windows prevent the players from reading additional information placed in windows hidden by the pop-ups.
- Test players are frustrated over the fact that some objects, for instance a plastic road cone, do not work/ behave as in real life. In real life a road cone could be pushed over, but in the game the player has to go around the cone since the cone behaves more like a fixed object (similar to, for instance, a fire post or a fence).

## **Design Implications**

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The above stated usability problems are examples of some of the issues identified in the expert walkthroughs and empirical evaluations of the game. In the focus group session, a thorough discussion of all previous sessions was conducted (see “Focus Group” above for description) and the general list of guidelines/implications below was created.

Further, design implications for this specific game was also put forward. These were also implemented in the design process. However, the specific implications are not further discussed here. The general list of guidelines/implications is listed below.

## **Earning and Losing Points**

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The overall scoring system should be clear, unambiguous and provide distinct feedback to the user concerning changes in the points scored or lost.

- Positive audio and visual feedback should be provided to notify the user when points are scored.
- Negative audio and visual feedback should be provided to notify the user when points are lost due to some erroneous action performed by the user.

## **Scoring and Performance Feedback**

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The points should be summarized in a visible and easily interpreted counter, placed at a location in the environment according to conventions in the game genre. The meaning of the sum of points should be unambiguous and clearly indicate what kind of points that are represented, if there are multiple types of points that the user may score in the game.

## **Differences in Valuable Objects**

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There should be intuitive, easily understood representations of objects and actions that result in scoring points when performed. If there is various levels of points to be scored, the objects used to represent the different levels should be easy to interpret and clearly indicate the value of the specific point represented.

- Objects that represent major amounts of points should look more valuable than objects representing minor amounts of points.

## **Task Performance and Feedback**

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In order to achieve good gameplay and competition, a failure to achieve a certain task that successfully performed will result in a large amount of points scored should lead to the disappearance of the opportunity to score that particular set of points.

- If the user answers a question worth a large amount of points incorrectly, the opportunity to score that particular set of points by answering the same question again correctly should be suspended (the user should only have one opportunity to score each particular set of points).



## **Promoting Exploration**

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There should be “hidden points” in the game environment to reward the user when exploration of the environment is performed and to provide variation and discrimination in the overall performance of users considering points scored.

- A high score should require a performance above the normal from the user, in order to motivate the users to engage in the game and achieve good gameplay.

## **Game Objects’ Characteristics**

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The difference between objects that affect the gaming procedure and objects that constitute the background surroundings of the environment should be clear and unambiguous.

- Objects that are “active” and may be manipulated or used by the user should distinguish themselves from the background and from other active objects.
- “Dangerous” objects that imply something negative for the user in the game should be represented in a way that clearly indicates their negative effect on the user’s performance.
- Positive objects that imply scoring points or help for the user in the game should indicate their positive attributes by their representation.
- Obstacles in the environment should clearly and unambiguously indicate that they are interferences that need to be worked around and not objects that may be manipulated by the user.
- The environment should demonstrate to the user where it is possible and not possible for the user’s agent or character to move around.

## **Real World Inheritance**

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When designing objects in the game environment, it is important to be aware of the conventions considering the specific object generated by other similar

types of games, but also conventions and affordances provided by real world connections.

- If an object has a real world counterpart, the designer must be aware of the properties of that real world counterpart and consider them when deciding the properties and function of the game object. Game objects with real world counterparts will, in the user's interpretation of them, likely inherit the properties and affordances from the real world, with effects on the user's assumptions of the game object's properties.

## **Understandable Menus**

Menu buttons and choices should be clear, descriptive and context sensitive

- “Back” buttons should link to the section or part previously visited by the user, and never to a sector that is new to the user.
- Action buttons (that lead to some kind of action) should clearly describe the action they initiate; submitting an answer for instance should be done by a “submit answer” button rather than by a “done” button.

## **Supporting Tools and Their Layout**

Pop up menus and additional tools for problem solving (i.e., information databases or dictionaries) should never occur on top of the main element (i.e., a particular question) which they are supposed to support, but should occur beside that particular element. Additional tools offered to support the user in solving a particular task should not hide the description of the task to solve.

## **Game Instructions**

Instructions dealing with basic movements and actions in the game environment should be visually presented and explained in a short and compact fashion.

- Instructions on how to control the character and the meaning of different objects in the environment must be kept short and intuitive in order to ensure that the user utilizes them.
- The main objectives of the game in terms of the overall goal that the user should strive to accomplish and how that goal may be reached in terms of actions should be presented and explained in a short and informative way.

## Conclusions

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In this paper we have presented an initial study with the main purpose to find design guidelines for edutainment games. After the evaluation process, where expert walkthroughs as well as empirical usability evaluations were conducted, focus group sessions with HCI experts and game designers were performed. This resulted in a list of guidelines. These guidelines included: (1) Earning and losing points, (2) Scoring and performance feedback, (3) Differences in valuable objects, (4) Task performance and feedback, (5) Promoting exploration, (6) Game objects' characteristics, (7) Real world inheritance, (8) Understandable menus, (9) Supporting tools and their layout and, finally, (10) Game instructions.

Issues for future research includes further testing of other types of edutainment games in order to further verify the generality of the above developed design guidelines for edutainment games.

## References

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- Adams, E. S., Carswell, L., Ellis, A., Hall, P., Kumar, A., Meyer, J., & Motil, J. (1996). Interactive multimedia pedagogies: Report from the working group on Interactive Multimedia Pedagogy. In *Proceedings of the First Conference on Integrating Technology into Computer Science Education*.
- Jones, A., Scanlon, E., Tosunoglu, C., Morris, E., Ross, S., Butcher, P., & Greensberg, J. (1999). Contexts for evaluating educational software. *Interacting with Computers*, 11, 499-516.

- Karat, J. (1997). User-centered software evaluation methodologies. In M. Helander, T. K. Landauer, & P. Prabhu (eds), *Handbook of Human-Computer Interaction* (2<sup>nd</sup> ed.). Elsevier.
- Lin, B., & Hsieh, C. (2001). Web-based teaching and learner control: A research review. *Computers and Education*, 37.
- Nielsen, J. (1993). *Usability engineering*. San Diego, CA: Academic Press.
- Nielsen, J. (1994). *Usability inspection methods*. Conference companion, CHI'94, Boston, Massachusetts, USA.
- Nielsen, J. (1999, January). User interface directions for the Web. *Communications of the ACM*, 42 (1).
- Pine II, & Gilmore. (1999). *The experience economy: Work is theatre & every business a stage*. Boston, MA: Harvard Business School Press.
- Sullivan, P. (1991). Multiple methods and the usability of interface prototypes: The complementary of laboratory observation and focus groups. In *Proceedings of the 1991 ACM Ninth Annual International Conference on Systems Documentation*. Chicago, Illinois, USA.
- Templeton, J. (1994). *The focus group: A strategic guide to organizing, conducting and analyzing the focus group interview*. New York: McGraw-Hill.
- Wiberg, C. (2001a). From ease of use to fun of use: Usability evaluation guidelines for testing entertainment web sites. In *Proceedings of Conference on Affective Human Factors Design, CAHD*. Singapore.
- Wiberg, C. (2001b). Join the joyride: An identification of three important factors for evaluation of on-line entertainment. In *Proceedings of WebNet 2001*, Charlottesville, VA: Association for the Advancement of Computing in Education.

# **Part II: Theories**

## **Making Sense of Technology-Enabled Interaction**

This second part of this book, entitled “Theories,” takes on a theoretical perspective on the Interaction Society. In this section, the contributing authors bring forward various discussions concerning the basic and fundamental concepts of the Interaction Society including, e.g., “interaction,” “communication,” “collaboration,” and “coordination.” The contributing chapters in this second section also contain models and theories developed to help us to better understand, analyze and even predict the role and impact of modern information and communication technologies on us as individuals, social groups, organizations and on our society. Further on, this second part of the book provides us with some models for analyzing current efforts made to support both online interaction and interaction using mobile devices in ad-hoc networks.

Overall, the purpose of this third section is thus to provide us with some analytical tools in order to help us better understand computer-supported, and mediated, interaction. If we are to deal with a new society, which is right now in the making, it is important to have the analytical tools to help us see what is important and what is not, what is unique and what is not, what is highly dynamic and what is stable, and at least, but maybe foremost, enable us to identify what is affected, or changed by, through, in, and via this new technology and technology use.

## Chapter VI

# Informational and Communicational Explanations of Corporations as Interaction Systems

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### **Abstract**

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*Whilst many proponents of “interactive communication” and “social interaction” do not see the concept as problematic, they focus attention on practices. I choose to re-examine both “interaction” and “communication,” and to relate these concepts to the concepts of society and organisation/corporation<sup>1</sup>. The concept of “interaction” is examined, and social interaction is considered as exchange. The patterning of social interaction in markets, bureaucracies, solidarity groupings, and co-operative collectives, and their respective core values are considered. The “organization” is explained as a complex dynamic interaction system. An alternative sociological analysis of the social is compared with that of the*

*social psychology tradition. Communication is discussed as a mode of interaction, to reveal monologic and dialogic conceptions of communication. Conclusions are raised around the themes of “interactive communication,” IT, and dialogue and appreciation in a society constituted by interaction. Interaction, it is concluded, requires presence, whereas ICT allows absence.*

## **Introduction**

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This is a discussion of the nature of human sociality in a society in which most interaction is mediated by personal communication technologies (PCTs) or information and communication technologies (ICTs). My question is, given that electronic tools of interaction are rapidly approaching ubiquity, and the incidence and quantity of interactions is unquestioned, what kind of interaction can we expect, and how does this constitute our society?

What drew me to this project was my curiosity over the apparent effortless move from discussing “interaction” to invoking concern for “communication.” Why do we commonly use two apparently synonymous terms? Do these terms identify a single phenomenon — “communicating”? If so, is communication a particular form of interaction, and what are the other forms? If not, how can we distinguish the two phenomena, and how can we be clearer in the alternate use of these terms?

My purpose in this discussion, then, is to think sociologically (meta-theoretically, reflectively) about the idea of an Interaction Society, and to produce from this inquiry contrasted accounts to explain social interaction (with particular attention to the events that arise when people work in occupational settings and use ICTs and PCTs in support of working together). See Weber (2003) for helpful comments on “speaking theoretically.”

We all experience actions of people in the social world. No one doubts the occurrence of social interaction. The notion, then, of an Interaction Society appears unproblematic, requiring only guidance on effectiveness and efficiency. What does account for differing explanations of this social phenomenon is differing social constructions (theories) drawing upon philosophical differences of understanding and theory (explanation) of knowledge, value, and reality.

This chapter will critically overview information theory and communication theory to examine human interaction in organised co-operative working. This will show that much “communication theory” is not communication theory, but rather information theory. To be human is to be social — an interactor.

The emergence of the concept of “information” is traced back to less than a century ago, where the technical concept of “information,” first evident as recently as in Hartley’s work (1928), problematically avoids any reference to ideas or meaning, and, thus, to people. The emergence of “information theory” in the 1940s, and usually attributed to Shannon & Weaver, will be charted. What will be identified is the desire for action-at-a-distance.

It will be confirmed that nowadays a shift in thinking and acting away from emphasis on information towards greater emphasis on interaction *is* discernable. The differences in social conditions that brought these ideas to the fore will be characterised through a historical analysis. It will be further argued that we have always had an “Interaction Society,” and that the locus of attention has been established as a “scientised” informational conception of interaction since the nineteenth century, when the problem of “communication” became explicit.

The concept “communication” allows for contact<sup>2</sup> without presence. Somehow, reflects Peters (1999), the natural history of humans as talkative can never lose the notion of wordless contact. The worry of how to connect with people has become a given in our daily lives — even as we are surrounded by so many other people. In the lonely crowd observed by David Riesman (1961), interaction is alienated — distant, impersonal — each afraid of close contact with another and equally afraid to be alone and have no contact. So what attracts us to talk of the possibility of interaction?

When we review the term “interaction” we find two concepts: inter (between, among, of) and action (exertion of energy or influence). The term interaction is usually taken to mean to act reciprocally or to act on each other. Similar terms — cooperate, coact, engage — are used to express mutual or reciprocal act or relation.

Much talk of the “communicating corporation” and the “learning/flexible organisation” subsumes the social phenomenon of interaction. Indeed, in recent years the advent of much chatter about “relationship marketing” and “learning communities” has included the notion of “interactive communication.” This is muddling, and the discussion here will seek to reclaim the corporate social grouping as a purposeful system (Checkland & Holwell, 1998) and system for interaction (Deetz, 1992, 1995), in which communication is a mode of



interaction, rather than the means. Can, then, interaction produce emergent outcomes, such as a “third way of knowing” (Shotter, 1993) that is not possible in monologue?

The ubiquitous term “Information and Communication Technology” (ICT) is reviewed through this philosophical analysis. This is in pursuit of conceptual synthesis, not merely technological convergence. Deetz’s analysis of human interaction shows that information *and* communication is right — so where does that leave us with a conception of interaction, seemingly synonymous with communication, as the locus of attention? This discussion will move the explanation from “Information Technology” to “Interaction Technology” — this importantly reintroduces the people into the system — a social interaction system with supporting technologies.

The discussion will recognise that our technicist notion of communicating inhibits the hard work of connection by attending to improvements to the wiring, whilst the task of building worlds together is neglected. Communication is more a moral problem than a problem solvable by semantics, psychology, or telecommunications. The informational conception of interaction is inherently monological. The notion of an “Interaction Society” implicates dialogue, unless interaction is taken to be nothing more than mutually reactive or directive dyadic monologues (engaged in reciprocal manipulation). The notion of a “Communication Society” seems to be therapeutically valuable, but care has to be taken that “communication” is not taken merely as the transmission of cognitions (products of cognition) between selves.

The widespread adoption of mobile telephones and other ICTs and PCTs may indicate that we are creating an Interaction Society. If the advertising rhetoric is to be believed, use of such devices enables more talk, and indeed much social interaction is now mediated by electronic devices. But when some of us choose to “interact” through the intermediary of a wireless connection, even by use of “text” in place of audible speech, rather than to co-locate for conversation, what kind of interaction is possible? I claim that we need to address this as a political and ethical problem, and not just a technical problem.

Resources drawn upon for this philosophical analysis will include Peters’ history of communication, Deetz’s analysis of corporate communication processes and power relations, Checkland’s and Vickers’ respective analyses of the social process of appreciative systems, Luhmann’s critical theory of society, Simmel’s sociological analysis of human interactions, Myerson’s reflection on ‘mobilised’ communication, and a thorough review of the concepts of interaction and dialogue, in both practical and ethical terms.

## **Interaction as Problematic**

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Interaction is one of a number of ideas, such as information and communication, that have relatively recently entered day-to-day discussion around our underlying longing for action at a distance and connection or contact across the chasm of human separation (Peters, 1999). What I find curious is why we nowadays notice “interaction” and centre the idea as a social phenomenon and basis for action? Katz & Aakhus (2002) report a range of investigations on the ideal of “perpetual contact.” Is the notion of the “Interaction Society” supported, even prompted, by the presupposed ideal of “perpetual contact” as the means to interact and communicate socially, or at least providing potential contact with anyone at any time or place? The advent of “personal communication technologies” (PCTs) seems to manifest the “presumed natural progression of humans toward the ideal of open, transparent communication” (op. cit., p. 9). The good person communicating well maintains both contact and availability, yet a person is bad and communication is poor when a person is prevented from being an open, authentic communicator. Nowadays, electronic devices are “naturally” included in what would otherwise be a face-to-face dyad or small group. Our theories about communication have ignored technology, except as a mass medium, a weakness that Katz & Aakhus aspire to set right.

The common sense everyday notion of social interaction originally centred on co-presence. Goffman (1983), for example, took interaction as the event that occurs during, and by virtue of, co-presence. Social interaction transpires in social situations in which two or more persons are physically in one another’s response presence. This does not require co-presence, but is altered by the insertion of a mediating technology. Nowadays, the common-place meaning is something like “action at a distance” or “mutually responsive communication.” This could seemingly be mediated by electronic connection.

We are currently going through a transitional period, standing at the intersection of the industrial society from the past and the so-called Interaction Society of the future (with many others labels: post-industrial society, information age, communication age, the age of Aquarius — all suggestive of our longing for “being” together). Social critic Hillaire Belloc saw capitalism as the unstable transitional period between two stable periods. In transitional periods, the grounds for activities of the outmoded period will always lose significance, whilst new models of operation come into circulation to replace them. For the future, actors need to strive to understand their actions in a broader social frame of reference. One characteristic of this time is a shift from a mass production

approach towards smaller units, both in work organisation and administration. Small-scale community, in which social bondage prevailed, was displaced by large-scale society through the process of industrialisation, bringing freedom to participants. Most interactors were then strangers. Now we see the re-ascendance of social units on a human scale. Various networks have emerged to enable communication between these units. Indeed, a characteristic feature of the Interaction Society is the emergence into consciousness of various networks in work groups and in private life.

The idea of a life among others in which social interaction is a prominent and frequent activity is appealing. We all feel strong social pressure to interact. How else are we to resolve problems of politics, knowledge, religion, rights, and morals? But, in an era of inserting (mostly electronic) mediations into our actual and potential relationships, are we really justified in our anticipations of personal security and satisfaction? What are we hoping for as members of the Interaction Society? Is this a hope forlorn?

While modernism championed the individual, and fragmented the unit of social community, post-modernism (or whatever we can call what succeeds industrialisation) attends to the interaction of the parts. Recently, too, developments of a predominantly economic/technical nature have undermined the sovereignty of the individual as rational reasoner (Gergen, 1991; Sampson, 1993).

Manuel Castells (1996, for example) has said more than a little about the emergence of the network society (the basic structure of which has a networking logic). Several writers on the information society (especially from Finland, for some reason) have said that we can characterise post-industrial society as a network of networks that “process information,” with the primary production being more knowledge.

I want to apply my critical social constructionist review of human interaction (informational vs. communicational) to say something about the problem of the idea of interactive communication (that isn't communicational/dialogical — controlling reproduction, but rather informational/monological — liberating production).

Are these terms referring to different phenomena? — Interactive Society (Castells, 1996), Interaction Society, and Network Society. Is interaction (in a particular manner) a fundamental characteristic of a Network Society?

The centrality of interaction in work-flow has identified interactional processes (Strauss, 1985) of persuading, teaching, negotiating, manipulating, and coerc-

ing in the workplace. Task performance is articulated with that of others through interactions before and after the task (Strauss, 1988). Alignment in the flow of work is accomplished through interaction.

Computer Mediated Communication (CMC) is a broad term covering several configurations of communication processes — it is referring not so much to a form of communication, so much as to a set of arrangements or conditions within which forms of communication can arise. With the advent of the Internet there have emerged new transaction “marketplaces,” which create more efficient means of exchange. But can we accept a conflation of “transaction” with “interaction?” Whilst the growth of Information and Communication Technology (ICT) use appears to allow more interaction, much of it is automated between machine and person, or machine with machine. “High-touch” interactions can’t be automated, but the central economic effect of ICT is to free people from interactive activities — by enabling communication — people can be in touch in absence from a distance. Yet, distance matters (Olson & Olson, 2000) in that synchronous and asynchronous interaction arise in collocation and mediated/distributed spatial conditions, respectively. The advent of ICTs has established an expectation of easy communication and coordinated accomplishment of difficult work even though remotely located and rarely overlapping in time.

The problem as I see it is that the increasingly popular idea of “interaction” is being taken as synonymous with “transaction.” For me, the Transaction Society doesn’t sound so good, and this switch of terminology helps to veil the unpalatable contemporary emphasis on impersonal social arrangements. George Soros (2000) concludes from his analysis of the emerging new economy within the dominant forms of capitalist society that we currently live in a Transactional Society — not an Interaction Society — in which relations among people are guided by instrumental rational calculations of self-interest. To be a Relational Society, we would have to shift to relations that are guided by calculations of common interest. In a Transactional Society we talk of “touch points” and “contacts,” rather than of colleagues, acquaintances, friends, relatives, partners, community, and so on. Scarbrough’s (1995) critique of Williamson’s (1975) concept of transaction cost in his “new institutional economics” shows that by defining the transaction as the unit of analysis, Williamson aimed to take the debate about organizational forms outside the realm of social relations. Scarbrough argues that whilst transaction is a category of socioeconomic interaction, there is both economic exchange and social relation in a transaction — the latter underpins the former. The forms of organization governance —

economic exchange (market-based control through material incentives) and social control (hierarchy-based control through social relations) — are co-existent mutually dependent dimensions of a transactional continuum (in which the network is the hybrid form of governance).

## **Social Interaction**

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The Social Psychology of interaction has been widely adopted as the basis for understanding social interaction [see, for example, Argyle (1969, 1973)]. The motivation is to understand the making of a life among others, yet today, almost all of the others are strangers to us. In this perspective, the terms “interaction” and “communication” are often used almost synonymously. For example, in Porritt (1990), in guiding the behaviour of healthcare professionals in situations of distress and ill health, communication is taken to be the basis (means) of interaction. A social relationship is a case of enduring social interaction (temporally extended, with a shared history, and surviving of interruptions of face-to-face contact), although Goffman (1961) does not accept that a relationship is merely a “two-person” group — the two forms are distinct and different. Later in this discussion, we will consider an alternative Social Systems explanation [drawn from the work of Niklas Luhmann (1995)]. Bales (1999) has made extensive studies of social interaction systems in which “situations” are comprised of multiple systems of interacting persons, and has developed a range of instruments of social interaction analysis. Others have studied human interaction as discourse [see van Dijk (1997) for example].

In the sociological tradition, symbolic interaction examines how each actor takes account of each other’s meanings as well as their respective acts. In the behavioural perspective on interaction, it is assumed that each actor relates only to the overt behaviour of the other participants. For the adherents to symbolic interactionism, society exists as individuals in interaction. For Simmel [see Ritzer (1992)], society is merely the name for a number of individuals connected by interaction. These individuals are constituted only in their interactions. This is a step forward from imagining autonomous selves whose actions bear upon each other. Such actions are understood as either expressive (an end in themselves) or instrumental (as means to an end). Simmel was concerned with the effect of spatial conditions on social interaction (in terms of social, physical, and psychological distance). Interaction is the mutual regula-

tion in which two persons are within one another's perceptual fields and signal their responsiveness to one another.

In this view of social interaction, at what point does mere co-presence escalate into interaction and communication? How does this come about? The unit of analysis is the interactor, with attention paid to such dimensions of interaction as actor style, purpose, reason for (interaction), motivation, outcome, manner of (interaction), and the characteristic features of the interaction event. Forms of interaction include exchange (economic aspect of society), conflict (state or regulatory aspect of society), and friendship (characterised by intensifying interaction). Interaction within a community (with known others) differs from that with strangers. People interact with each other to conduct, and participate in, one or a combination of four basic types of relationships, seeking, making, sustaining, repairing, adjusting, judging, construing, and sanctioning their relationships. Fiske's (1992) work identifies the modes of interaction as communal sharing, authority ranking, equality matching, and market pricing. These are implemented differently in different social domains and in different relative degrees in different cultural groups. Domains of the complex realm of social interaction include: exchange, decision-making, moral judgement, self-presentation, consumption, and conversation.

Taken as a (social) process, interaction can be understood as productive or reproductive of some "things:" meanings, interests, negotiation, closure, and so on. Thus, we can speak of "productive interactions," as well as of "unproductive," "reproductive," or "destructive" interactions. Alternatively, is an interaction a "thing" (social event) or a property of a thing?

In sociological thinking, society is understood as a stable and integrated system — conditions brought about through social interaction. Studies have investigated how interaction creates, fits into, reproduces, functions within, or contributes to the social system. It is assumed in these inquiries that order, stability, structure, coherence, and organization arise from face-to-face communication. Order is assumed in symbolic interactionism (e.g., Mead), role theory (e.g., Turner), dramaturgy (e.g., Goffman), and phenomenology (e.g., Berger & Luckman and Garfinkel, following Schutz). Supposedly, then, ICT enables, accelerates, and connects by creating and extending a social web in society. Smith (1992) challenges this by emphasizing instability. He argues convincingly that interaction is best understood as a self-organising system, rather than an idealized arrangement of "actors" performing "roles" (in a society constituted as a system of roles). Commonly, interaction produces not order but misunderstanding, discomfort, estrangement, and conflict — rather than

meaning and understanding. We yearn for the interaction, but we don't feel good about what happens, so we interact in ways that don't require engagement!

People interact with norms and rules in mind — they have interactional expectations (of sincerity, brevity, openness, intimacy, and so on). Following Elias' (1939) resolution of the problem of dichotomising the psychological and the sociological, Stacey (2003) explains the "organisation" as patterns of meaning in iterated interaction, as patterns of power relations sustained in self-organising patterns of communicative interacting or conversation/meaning in which human identities emerge. The individual is the singular and the social is the plural of interdependent people. Learning is the activity of interdependent people.

## **Interaction as Exchange**

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The social exchange perspective complements symbolic interactionism by examining concepts of value, sanctions, cost, profit, reward, and so on. Blau (1964), for example, seeks to explain how individual exchanges emerge from social attractions into personal exchanges and power, and group authority and opposition.

People are interdependent with one another and thus attempt, abort, avoid, and accomplish the exchange of things (food, goods, services, money, etc.). This requires agreement on who does and should exchange what with whom for what reasons and on what terms. The necessary interaction, as individuals and as a group member, is through shared meanings and learned values, and through social role enactment. Note the similarity here with commonplace explanations for "communication," Within interaction, people offer (or don't offer) things to one another and demand, accept, or avoid things from one another. Vickers (1983) didn't accept goal pursuit as the foundational motivation for human behaviour, but rather the pursuit or elusion of human relationships.

Social exchange is distinct from strictly economic exchange, and establishes bonds of friendship or superordination over others. Within an institution, social exchange may cement peer relations or produce status differentiation. Social exchange is a voluntary action motivated by expected returns.

Commercial interaction is the basis for the Market System, which is the society-wide social process that brings about coordination of human activities, not by

central command, but by the interactions of the participants. The actions of producers are controlled and coordinated by the promise of profit-making revenue from buyers through their actions in expressing preferences and needs.

## **Patterns of Social Interaction**

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The job and trading are two of a number of social domains in which interactions are sought. Each has characteristic particular forms of interaction (in terms of rules, expectations, conventions, and so on).

A social relationship is a pattern of the coordination of interaction. People coordinate with each other so that their action, affect, evaluation, and thought are complementary. Strauss (1985, 1988) has investigated workplace interaction, for example. What each person does, feels, judges, and so on, makes sense with reference to what other persons do, feel, judge, etc. A social relationship exists when a person acts under the implicit assumption that they are interacting with reference to imputedly shared meanings. It is not necessary that the other people be present or that they perceive the action or understand it as it was intended, nor even that they exist.

The social problem is the coordination of actors, each of whom can behave adaptively towards others: they can give something to the other, accept something from the other, leave something of the other's alone, or not inflict something on the other. For each actor, the question to be asked is "Why should I...?" The answers characterise alternative forms of social coordination.

**Market:** "because if you do, I will give you something that you value more than that which I am asking you to give up"

**Tradition/legal/bureaucracy:** "because it is my right to tell you to do it, and your duty to do it"

**Solidarity:** "because you value my welfare, and your doing this will make me better off"

**Cooperative:** "because what I am asking you to do is, in these circumstances, the best way to achieve your goal, which I share"



Markets, bureaucracies, solidarity groups, and cooperative teams are different kinds of social structures, with different rules for the conditions under which exchanges take place.

The hierarchical form is constituted by conscious organisation through systematic administration with overt rules-based control and a hierarchy of authority. The predominant value is planned orders. In the market, “automatic” coordination is accomplished in the pursuit of self-interest by individually motivated and welfare-maximising individuals, leading to the best outcome through “free” exchanges. The predominant value is price competition. The network comprises informal and exclusive social, political, economic relationships among relatively independent trusting and trusted social agents. The predominant values are trust and cooperation.

The market and the hierarchy are special cases of the network way of coordinating among and within social units, and these forms often are found operating in mixed mode. Movement (flow) within a network has replaced presence at a location as the locus of power, according to Castells (1995).

These different social structures each require a special kind of value consensus — a medium of exchange (see Table 1).

In this analysis, adaptation involves obtaining “things” (matter, energy, human services, information) from the environment, disposing of things to it, avoiding things that are in it, and retaining things inside that might escape to it.

Smith (1995) examines the market and the hierarchy in terms of interaction partners as persons responsive to basic attachment needs, and explains the market as a dissipative structure of arrangements of rational activity. Smith asks how it is that it is possible for people to act as if their interaction partners are

*Table 1. Values of alternate modes of social co-ordination of adaptive actors (based on the discussion by Bredemeier, 1979)*

Market mode	The Money symbol substitutes for direct social interaction
Tradition-Legal-Bureaucratic mode	Insignia as symbol of a right, and compliance with a symbol of respect for right and acknowledgement of duty
Solidarity mode	Demonstration of need by exposure of dependency
Cooperative mode	Expertise and goal acceptance
Coercive mode	Weapons

cold, impersonal, unempathic fictions (the impersonalized other)? In this, partners construe each other in ways that are interpersonally distancing. He also points out that the facilities and media that enable profit-oriented market exchanges yield instrumental relevances to partners. Smith highlights that firm-based economies are characterized by competitive pressure being primarily between sellers, whereas in bazaar-type economies competitive pressure is on the transactions between buyers and sellers. This supports impersonality in buyer-seller transactions. As Smith points out, “interaction itself is always a form of market behavior, however imperfect” (p. 226), and “many persons, observing one another in competitive attachment processes, constitute an interaction system and form a social market” (p. 226).

## **Social Action**

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An action is a unit of intentional behaviour that produces expected consequences. Experience is the result of interaction between the person and some thing(s) — person, object, idea. So, then, interaction is action done together — a purposive interpersonal process. Interaction, taken literally, means reciprocal action or co-action. Transaction, on the other hand, is across, beyond, over, or to the other (e.g., trans-Atlantic). In the terms of symbolic interactionism, in social interaction the self is observed and analysed as subject and object. Social interaction is interpersonal action, or relations between self and other: there is negotiation of meaning, there is reciprocation, and actions of self and other are reflected on. So, is social interaction merely the “coming together” of people into co-presence? Is social action events of behaviour in, *and by virtue of*, the presence of other(s)?

## **Social Systems**

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Luhmann (1995) moved beyond the socio-psychological analysis of individuals to distinguish three forms of social systems or modes of social system formation: interaction systems, societal systems, and organised social systems.

The system of interaction comprises those who are “present” “together” at a point in time, with a set of rules. Interaction is, in this view, a social system that

emerges among those who are present to one another. Interactions are temporally arranged episodes of societal process, only possible within pre-existing and continuing societal communication. Interactions are embedded within the flow of ephemeral individual actions. Interaction systems include everything that can be treated as “present,” and are able to decide who and what is to be treated as present and who and what is not. Presence is determined by the perception mode of information.

Society is, on the other hand, the totality of all social communication, and characterised by comprehensiveness (or inclusivity). The societal system is not composed of interactions — societal action is interaction-free — for example, demonstrated in mass communication events.

The extensive differentiation of society and interaction leads to less reliance on the resolution of societal problems of science-politics, economy-education, and science-religion, by interaction (for deliberative democracy). There is a gap between the interaction sequences a person lives through, and the complexity of the societal system (whose consequences cannot be influenced or controlled). But interaction has not lost societal relevance. Highly consequential developments are initiated in interactions. Contemporary society is more indifferent to, but also more sensitive to, interaction than pre-modern societies were.

In thinking back to the notion of social action, we can now see that this is evident whenever one person considers what others would think of their action, whereas societal action arises when action is intended and/or experienced as communication.

Some social action is free of interaction — we can act without the presence of others and can give our action a meaning that for us (and any possible observer) refers to society (e.g., reading, writing, sitting alone in a waiting room, and so on). Solitary action is much more common in modern societies than in older societies, and much of this has reference to society (I’m writing this chapter with some anticipation of some reading by others some time in the future). It is now possible, through writing, printing, etc., to withdraw from interaction systems and to communicate with far-reaching societal consequences — society is a result of interactions with a standardised, disciplined use of a language.

Organisations (i.e., organised social systems) are a special form of social system. Formal organisations regulate their boundaries by membership roles and control of admission to membership. Thus, “customers” are members of the extended organisation. What is significant is that organisations standardise the motives that guide interactions.

## **Communication as a Mode of Interaction**

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So, is interaction a special case of communication? Is communication a special case of social interaction? Whilst interaction is widely taken to be a mutually responsive form or style of communication, and communication is commonly located as the site of organisational problems, this is a muddling and thus wasteful use of the concepts. Deetz (1992, 1995) has explicated the centrality of social interaction. The two modes of interaction are informational and communicational. The former is a reproductive technology for use in a societal system that is a closed, self-referential communicative nexus. The latter is a productive technology (better explained as a social process) for the interaction system as the processing of contingency on the basis of presence. Luhmann (1995) distinguishes, in German, *Interaktion* (presence) from *Kommunikation* (absence).

### **The Informational Conception of Human Interaction**

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This is the commonsense conception of “communication” — the presentation of the individual’s point of view in which meanings arise in the private cognition of individuals. This is a reproductive technology that is a vehicle for overcoming difference through message exchange with the purpose of arousing a response. Meaning is strategically reproduced, i.e., for a pre-defined purpose, to serve the interest of the individual.

Born of the emergence of telecommunications practices in the 1940s, information theory (originally termed communication theory) was developed as a theory not of significance and meaning but of signals (in copper wires) (see Shannon & Weaver, 1949). “Information” became a popular idea, and communication theory became an explanation of meaning as well as of telegraph and telephone channel signal capacity. Communication became, in the *common sense* of everyday talk, the sharing of information. Several academic disciplines came to be defined in terms of information production, manipulation, and interpretation including computer science, management sciences, economics, journalism, and communication studies.

Some people have even suggested that all that is human should be explained by information, communication, and control [see Beniger (1986), and Peters’

critique (1987)]. Yet, in our communication we are not concerned only with information, but also the body it comes from. Unfortunately, for it muddles and veils unnecessary biases and distortions, the notion of communication as information exchange touches on the ancient notion of instant contact between minds at a distance, but also allows that any “thing” that processes information is a communicator, and thus for people to be reduced to information processors.

Myerson (2001) has examined the change in the idea of “communication” that has enabled, and is driven by, the move to widespread mobilized communication (the pervasive adoption of PCTs, especially the mobile phone). This discussion is elaborated in the end case study.

## **The Communicational Conception of Human Interaction**

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Communication is a process for exploring and negotiating difference. Meaning is produced through interaction. This is a productive technology.

Monologism takes communication to be the action of a person as a self-sufficient whole, whilst dialogism takes communication to be a “between” process (Sampson, 1993). The communicative interaction is the unit of analysis, not individuals, intentions, or abstract language systems. Social approaches to communication are in opposition to a psychological approach, and characterised as “organic” rather than “mechanistic,” concerned with “ritual” rather than “transmission,” and fundamentally “interpretive” rather than “scientific” [Leeds-Hurwitz (1995) provides a comprehensive collection of essays around this “new paradigm”].

Social approaches to communication describe events occurring between people in the process of interacting. This is in contrast to the reporting of how events are perceived through a single individual’s understanding. Thus, communication is thought of as inherently collaborative and cooperative visible behaviour, rather than as merely personal cognition. An utterance, often referred to as “a communication” in common parlance, is not in itself a communicative act. The instigator needs the other to “complete it.” Communicative actions are collaborative accomplishments. Communication is the project of reconciling self with other, to make friendly after estrangement or to adjust into accordance (Peters, 1999). The notion that communication is interaction reduces problems of relationship to problems of contact at “touch points”

(common jargonese in Customer Relationship Management circles). The concept of “communication” allows for contact without presence. Communication is then the disembodiment of interaction — contact without touch (Peters, 1999). ICT-based technologies mediate — there is interaction without personal/physical contact.

A particular definition of what constitutes communication is adopted. This focuses on process as well as product or outcome. For example, Carey (1975, p. 17) defines communication as “a symbolic process whereby reality is produced, maintained, repaired, and transformed.”

Social reality is not seen as a fact or set of facts existing prior to human activity — it is created in human interaction [see Berger & Luckmann (1967) for the classic exposition of this view, and Gergen (1985)]. Berger & Luckmann analysed knowledge in society in the context of a theory of society as a dialectical process between objective and subjective reality. They concluded that people interact and produce meaningful behaviour patterns that construct a shared reality. We create our social world through our words and other symbols and through our behaviours. Such an approach requires that we question the validity of traditional “scientific” experiments. The business of the interpretivist is not to reveal the world to us but to create some part of the world for us. “Inquiry is the professional practice of the social creation of reality” (Anderson, 1990, p. 14). Interaction is forwarded as a creative social accomplishment. Deetz feels very strongly that, “[I]f the study of human communication is not ultimately the study of how we *make* the world in which we have our human existence, then it is as trivial as our dominant ‘model’ of it would seem to say it is” (1995, p. 130). Further, “[c]ommunication, then, is the process in which we create and maintain the ‘objective’ world, and, in doing so, create and maintain the only human existences we can have” (Deetz, 1995 p. 203).

The central problem attended to is how social meanings are created. The focus is on people not as passive rule followers operating within pre-existing regulations, but as active agents — rule-makers within social contexts. Identity is seen as a social construction, and study of social role and cultural identity lead to study of power and what happens when particular identities are chosen or ascribed by others. The concept of culture is central and is defined as the knowledge that people must learn to become appropriate members of a given society. Cultural contexts include the community in which particular communicative behaviours arise. Social approaches are mostly holistic — the study of

interaction requires the whole picture to understand how the multiple components are related.

Reddy (1993) observed that our major metaphor for communication takes ideas as objects that can be put into words, language as their container, thought as the manipulation of these objects, and memory as storage. Thus, in this view we send ideas in words through a conduit — a channel of communication — to someone else who then extracts the ideas from the words. A consequence of this metaphor is that we believe that ideas can be extracted and can exist independently of people. We also expect that when communication occurs someone extracts the same idea from the language that was put in by someone else. Meaning is taken to be a thing. But the conduit metaphor hides all of the effort that is involved in communication, and many people take it as a definition of communication.

Mantovani (1996) heralds the obsolescence of the *old model of communication* as the transportation of information from one person to another. No longer should we be satisfied with an outmoded model, which conceives of communication as “the transportation of an inert material — the information that actors exchange with each other — from one point to another along a ‘pipeline.’” There is no account of the cooperation, which stimulates reciprocal responsibility for interaction and the series of subtle adaptations which occur among “interlocutors.” Nor does the old model consider that communication is possible only to the extent that participants have some common ground for shared beliefs, they recognise reciprocal expectations, and accept rules for interaction, which anchor the developing conversation. The old theory of communication treats knowledge as an object (i.e., as a body of information as independent facts to be processed) existing independently of the participants that can be carried through channels and possessed by a receiver when communication is successful. The dissemination of information is non-interaction or suspended interaction.

The *alternative conception of communication* is of a common construction of meanings. Information is not moved from one place to another — it is always a means to an end, produced and used by social actors to attain their goals in daily life.

In the informational conception of social interaction, “I already have my required meaning for this (desired) situation, and I talk to you because I want to change your choices of possible actions — I seek to persuade.” In the communicational conception of social interaction, “Meaning is always incomplete and partial, and the reason that I talk with you is to better understand what

you and I mean, in the hope that we can find more satisfying ways of acting together — I seek to create and learn.”

Non-interaction is entirely monological. Others are treated as absent and distant. Informational interaction is a hybrid form that is dialogical in intent, but monological in execution. The other is treated as distantly present. Communicative interaction is dialogical. The other is treated as present. Social systems come about only through communication. One cannot not communicate in an interaction system — one must withdraw to avoid communicating. Society is an autopoietic system consisting only of communication. Societal communication, on the other hand, is largely, but not exclusively, conducted as interaction.

## Conclusions

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What now, is my answer to the question I posed at the outset of this chapter? Social interactions are socially constructed realities — we can see this phenomenon when we look for it. Two “tribes” explain the province, purpose, and product of social interaction quite differently, based on competing ontological and epistemological pre-suppositions and assumptions [see Varey (2000) for a meta-review in business and management literature]. In talking of an Interaction Society, we can attend to matters of technology or morality. Both, of course, have substantive value. Do we want the former to determine the latter, or vice versa? Human interaction both produces, and is subject to, deep philosophical differences.

It is not that interaction has become a social phenomenon, but rather that we can use the concept of interaction to better explain what we can observe in social settings. The “organisation,” for example, arises as the patterning of some people’s interactions, and this produces learning. Following Elias (1939), the social is the plural of interdependent people — interaction is requisite.

In a capitalist society that is dominated by the market mode of social coordination, the concept of “interaction” takes on a special meaning — responsive communication. However, communication can be interactional or interaction-free. It is better to reserve the term “communication” for dialogical interaction, and not use it in place of “information dissemination.” Social action is not societal action: communication is possible without interaction — i.e., without presence.



A number of themes can be highlighted from this discussion.

## **What's Wrong with Interactive Communication?**

Why is the alternative conception of interaction better than the commonsense conception? Castells (1996, p. 359) is not alone in referring to the idea of “interactive communication,” but I ask what kind of communication is not interactive? Of course, the answer is given by the analysis of modes of interaction. Thus, we find that informational (monological) interaction is not communicational (dialogical). Communication *is* an interactive social process. Much so-called “interaction” is better termed and explained as “reaction” — the action of a person prompts (catalyses) a response by the other. For example, someone asks for directions or for a chocolate bar. The other describes a route with landmarks, or hands a chocolate bar from a box. An effect is produced, but there is no necessity for reciprocity or mutuality (another fuzzy term in common use). We might better speak of “re-action” in place of interactive when we mean responsive action. Perhaps “reciprocal” should be reserved for situations of giving in return (“give-and-take”) — what we have referred to earlier as exchange.

## **From Information Technology to Interaction Technology**

In considering possible effects of the involvement of ICTs and PCTs, we are attending to the problem of the spatial organization of social relationships. ICTs and PCTs do impact on our lives, in terms both of relationships and social practices [see Katz & Aakhus (2002) and Hutchby (2001) for examination of this issue]. When persons are not in the presence of the other, their respective glances, looks, postural shifts, words spoken, tone of voice — that “carry” implications and meanings — are concealed or lost.

Information technologies make possible the mass reproduction of meaning for dissemination, yet the core processes of learning and innovation require a dense network of face-to-face interaction that shape the way that, and the degree to which, ICT is absorbed into, and used within, societies. ICT adoption doesn't necessarily enable a network of social interactions. Gergen (in Katz & Aakhus) explains that monologic technologies of interaction lead to monologic presence, providing information or simulation, moving from the collective to the private, removing or minimizing any transformation through collective deliberation. TV

and radio are fine examples of this. On the other hand, dialogic technologies of interaction, especially, for example, email, and also telephone and print, allow a high degree of dialogic engagement. What is created by insertion of these technologies, points out Gergen, is “absent presence.” The growth in ICT and PCT use diminishes the importance of face-to-face relations. There is more interaction, but of an increasingly shallow nature. The technologies divert and redirect attention, expanding the range of actual and imagined relationships. Absent presence makes a cultural shift in the form of a wholesale devaluation of depth of acquaintance to breadth/number of acquaintances. My Microsoft Outlook Address Book has an ever-increasing number of contact details, and the proportion of people registered therein with who I have active communication decreases each time an entry is made.

Castells (1995) points out that CMC has been the medium for communication for the most educated and the most affluent minority of the population of the most educated and affluent countries — it is not available to, nor used by, most people. Interaction mediated by ICT is a minority sport, it would seem. Habits of usage will be shaped by a cultural elite.

Castells also points out that “the symbolism of power embedded in face-to-face communication has not yet found its language in the new CMC” (p. 360) (written in the early 1990s). Email is replacing telephone conversation, but not face-to-face conversation — the return of the written word, according to some commentators. For others, email is a new form of orality. Castells suggests that we have an emergent new medium, mixing forms of communication that were previously separated in different domains of the mind (speech, writing) in a many-to-many mode of interaction.

CMC reinforces pre-existing social patterns rather than creating new networks — it is used in addition to telephony and transportation — it expands the reach of networks, and enables more activity and more choice in patterns of time and place. However, this does not apply beyond the cosmopolitan elite, who live symbolically in a global frame of reference, unlike most people who hear and see only what happens among those present.

The mobile phone privatizes public spaces. There is physical presence, but mental absence. Private conversations are open and shared in public places. They allow instant contact and ensure availability, but is this freedom or control? PCT enable more and more frequent interaction. In society that explicitly values interaction, we can acquire new contacts and enlarge our social network. We can talk more with more people. But how much of this activity is talk with a reason? Much is emotionally empty chatter — texting for texting’s

sake. ICTs and PCTs may indeed shorten social distance, but in doing so weaken emotional bonds. Paradoxically we can be alone in a crowd — in contact, but increasingly lonely. Peer pressure in the form of obligation to chatter without meaningful and emotionally loaded relationships is no more than constant connection. Maybe (excuse the telephonic pun), to be engaged is what we want!

Hutchby (2001) helpfully suggests the power of talk-in-interaction and the pervasive use of ICTs and PCTs for conversation. He highlights the inherent strangeness of talk-in-interaction with others as if they are co-present, when they are not. This technologised interaction emerges through the effects of the properties of the technologies that support many conversations. The systems are designed with a computational model in mind: encoding and decoding of intended meanings as messages. Hutchby traces this mindset back to Saussure (1915) and subsequently Shannon & Weaver's (1949) process of monologic message transmission. What this conception of communication misses is that perception produces experience, but not meaning; interactants may or may not accomplish communication, and interaction is for the coordination of action. An interactional conception of communication is inherently dialogical.

## **Dialogue and Appreciation in the Interaction Society**

Dialogue has both practices and forums. We have witnessed the rise of “team working,” “cooperative” organisation, and similar calls premised on a social hope for “working together” over several decades, resulting in the term dialogue entering our everyday vocabulary. Participation processes have been designed and deployed in many spheres of work and local politics, and we have been invited to work towards and with communication and information to make “better” decisions, and have been provided with “information age” resources for this purpose. What seems, however, to be absent in this is the logic of participation in communication and information processes. Thus, “dialogue” is productive, rather than reproductive, communicational interaction. In dialogue, there is continual social formation of consensus in interaction, beyond the intentions and opinions of the participants. A dialogic theory of communication is necessary for the practices of working together (Deetz & Simpson, 2003). In a society constituted by interaction, the most likely occupation of members is influencing and being influenced through talk (conversation), determined by communicative acts, events, and styles.

Sir Geoffrey Vickers (1983) refocused attention on the initiation and pursuit of desired relationships and the elusion of undesirable relationships. This is quite different from Herbert Simon's earlier explanation of human behaviour as essentially goal-seeking. Every act of a person is interpreted by other people and so becomes communication only when meaning is attributed to it by the other(s), i.e., when it is perceived and appreciated. Vickers could find no accepted word to describe the attaching of meaning to perceived signals to create communication. He thus referred to this mental activity as "appreciation," the code it uses as its "appreciative system," and the state of the code as the "appreciative setting."

Vickers clarified the nature of the human communication problem. Culture and communication cannot be separated. For us to communicate and cooperate, we must share some common assumptions about the world we live in, and some common standards by which to judge our own and each other's actions. These shared *epistemological assumptions* must correspond sufficiently with social reality to make common action effective. The shared *ethical assumptions* must meet the minimal mutual needs that the members of our society have of each other. "Culture" is the shared basis of appreciation and action which communication develops within any political system (a corporation is simply a sub-system of wider society).

Philosophically, "the purpose of words is to give the same kind of publicity to thought as is claimed for physical objects" (Russell, 1979, p. 9). Pragmatically, "[c]ommunication is the management of messages for the purpose of creating meaning" (Frey et al., 1991).

According to Kreps (1990), human communication occurs when a person responds to a message and assigns meaning to it. Specifically, we should be careful to define a message as any symbol or thing that people attend to and create meanings for in the communication process, whether or not intended by another person. Meanings are the mental images created to help us interpret what happens around us so that we develop an understanding. Human communication is irreversible, bound to the context in which it occurs (e.g., time and place), and arises within relationships between communicators.

Acceptance arises from the apprehender's choices, not the initiator's intentions. Participants to a communicative event take part in a process of creating shared meaning. First we interpret the situation, then act, influencing one another.

We all have concerns, in response to each of which we construct an inner representation of the situation that is relevant to that concern. The *Apprecia-*

Table 2. Levels at which human communication may arise (Vickers, 1983)

<b>1. Violence</b>	<i>Erodes trust and evokes a response to contain it and to abate it, but has no specific communicative purpose</i>
<b>2. Threat</b>	<i>The conditional “do it or else” – involves trust only to the extent that the threatened needs to believe both that the threatener can and will carry out a threat unless the condition is fulfilled and to fulfil the condition will avert the threat</i>
<b>3. Bargain</b>	<i>Involves a greater shared assumption – each party has to be confident that the other regards the situation as a bargain – the attempt to negotiate an exchange on terms acceptable to all the parties – each must believe that the other parties can and will carry out their undertakings if agreement is reached – each is free to make not merely an acceptable bargain but the best they can, or to withdraw from the negotiation</i>
<b>4. Information</b>	<i>The receiver must not only trust that the giver’s competence and reliability, they must also be assured that giver’s appreciative system corresponds sufficiently with their own to ensure that what is received fits the receiver’s needs. Even if it does, it will, to some extent, alter the setting of their appreciative system</i>
<b>5. Persuasion</b>	<i>The giver actively seeks to change the way in which the other perceives some situation and thus to change the setting of their appreciative system more radically</i>
<b>6. Argument</b>	<i>When the process is mutual, each party strives to alter the other’s view whilst maintaining their own</i>
<b>7. Dialogue</b>	<i>Each party seeks to share, perhaps only hypothetically, the other’s appreciation and to open their own to the other’s persuasion with a view to enlarging both the approaching mutual understanding, if not shared appreciation</i>

*tive System* (Vickers, 1983) is a pattern of concerns and their simulated relevant situations, constantly revised and confirmed by the need for it to correspond with reality sufficiently to guide action, to be sufficiently shared among people to mediate communication, and to be sufficiently acceptable for a “good” life. The appreciative system is thus a mental construct, partly subjective, largely inter-subjective (i.e., based on a shared subjective judgement), constantly challenged or confirmed by experience.

Only if the appreciative mind classifies the situation as changeable or in need of preservation does the person devise possible responses and evaluate them with criteria determined by their other concerns. Thus “problems” are discerned, and “solutions” sought. Action may or may not follow.

Vickers (1983) distinguished seven overlapping and coexisting ascending levels of trust and shared appreciation (Table 2).

The most basic, fundamental, defining characteristic of a social group is interaction. There is no self-identity or group identity without interaction — interaction is a relational concept — i.e., not several discrete entities in monological contact, but dialogically constituted. When we speak of “interactive,” we mean dialogical/reciprocal. The social act of communication is a strategic attempt to reproduce meaning, or an opening to create meaning in response to the other (person, object, situation).

Interaction cannot be understood as “communication” (the exchange of information). Giddens (1984) viewed interaction as a social “space” with three dimensions: signification (communication: understandings meanings), domination (power: understanding who has authority), and legitimation (morality: norms of acceptability). His theory of structuration explains the production and reproduction of a social system through members’ use of rules and resources in interaction. The social structure enables and constrains human action. Knowledge is the product of interaction.

By focusing our attention on the notion of “interaction” we find that this is “working together.” This normative idea is for hoped for “togetherness,” where actions are with, rather than done to. There is inclusion, rather than exclusion. People participate, rather than are subjected. There is a parallel call for “dialogue” in our social affairs. Interactive ways of doing things are appealing — so is dialogue. There seems to be a separation: “interactive” ways of acting are mediated interactions, whereas dialogical ways are personal. Philosophical analysis reveals not ambiguity, but absence of conceptual clarity in the everyday use of these words and ideas. The concern is the manner of interaction practices.

Interactionally produced understanding can be characterised as based on creativity, commitment, contribution, and co-determination.

## **Final Comment**

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In the age of affordable (by some) information and communication technology, there is lots of talk about “communication.” It is widely agreed commonsense that it is a necessary activity, as a means to various ends, and that we need to be good at doing it to function well in contemporary society. We also now popularly recognise that “one-way communication” is inferior to “two-way communication” or “dialogue.” Thus, “interactive communication” is a solution to the problem of weak and unsuccessful communication, or communication breakdown.

But, this is a wrong and unhelpful commonsense discussion of good communication and dialogue. The primary concern should be human interaction (‘working together’), and we need to discern and explain two modes. It is dialogic interaction that is needed for creativity, celebration of difference, and productive liberation from dominatory discursive closure. Communication taken as an act of self-expression is too limiting, and leads to ICT development and deployment that is no more than mass reproduction of fixed meaning.

Until we have the necessary widespread conceptual clarity, we will at best try to implement political participation processes with an inappropriate explanation and understanding of communication and information. We really need to break out of the taken-for-granted instrumental rationality that pervades daily life, so that we can re-insert a productive explanation and understanding of participation in social processes of communicating and informing. Attention on “interaction” should be a prerequisite for dealing with communication and information.

## **The Case of Mobilizing Communication**

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To illustrate the destructive shift in our conception of communication, I have drawn from an excellent little book (with a big conclusion) entitled *Heidegger, Habermas and the Mobile Phone* (Myerson, 2001). Here I attempt to distill

Myerson's 75 pages into a focused case study that, I believe, shows how human interaction is distorted from talk to "communication" by the insertion of the mobile phone into (it sometimes seems almost) everyone's hands.

We have a western philosophical tradition of understanding that it is human to talk, that we become human through being with one another (Heidegger, 1962). Jaspers (1932) tells us that it is our (unfulfillable) moral duty as human beings to communicate with all others. For Heidegger, communication is discourse in which the hearer reaches understanding. For Habermas (1984 — remember George Orwell's great book?) communicative action is the use of language oriented to reaching understanding, and this is distinct from instrumental/strategic action that is about taking control in pursuit of personal goal fulfillment. Yet we are being seduced by mass-market promotion of mobile phones and other personal communication technologies (PCTs) with the promise that "universal communication" is quicker, richer, and an essential part of business, commerce, and society, and that this can replace talk and conversation. Talk is to be just one part of a web of uses for the mobile phone, and everyone and everything is available to us through a keypad and screen.

This "mobilization" is based on a change to the meaning of the "communication" concept. To be able to communicate is now to be free — to get what you want — to be in control as an individual (recall Stacey's point about interdependence!). Communication, when "mobilized," is a solitary action and works best when there is only one person involved. In connecting to the ever-expanding network, we can reap the benefits of large-scale universal interconnection, but this is as separate individuals in pursuit of our own goals. The great selling point is that it's cheaper to send a text message than to talk and that it doesn't require real-time availability of the two persons "communicating." Interaction gets promoted as a means to an end — to satisfy other wants. We are to communicate to "say what we want (to have)."

Alternatively, speaking philosophically, we can define the *act* of communication as not one person's action (I), but two-person contact or small group engagement (We). Imagine one hand clapping! For Habermas, we communicate in order to disclose and make understood our "internal talk," not to satisfy a want. He sees true communication as the slow, distinct "conversation" through which parties seek a deeper contact. Any other interaction is information. Human agents conversing are not sources and destinations of message flow. Yet, ask those around you to define "communication" and they will tell you that "objective" data is duplicated and distributed. Much of the interactivity of the "Interactive Society" — that is "interactive systems" and "interactive



marketing and “interactive communications” — is one person with the system which behaves like a human agent, but is more efficient and “intelligent.” Meaning is bypassed as too slow a medium for the ideal interaction.

Habermas distinguishes system integration as people bound together by fixed common rules and procedures, from social integration in which people stay together through a common understanding that they continually work out together. Without communication there can be no true sense of free choice — only procedures of the system to follow. Mobile phones are not really “communication devices,” but access tools that enable realization of the potential for imperfect, partial, compromised authentic human communication. In Habermas’ terms, this is a system for organizing people in relief (or substitution) of full dialogue. This in contrast to the “lifeworld” — the shared sense of the significance of human actions and experiences. Note this is not about isolated individuals alone. So, mobilization is not liberation, as the vendors would have us believe, but constraint. The system does our “communication” for us! There is the flow of data, messages, images, and so on. Habermas is careful and anxious to warn us that our democracy is at stake. The social integration we crave is dependent on consensus through true communication, but is repressed and replaced with anonymous non-dialogic socialization.

Now, back to the notion of interaction. This process socializes people into a (collective) society. The question is how do we want that to happen? Can we be satisfied with the cooperation of individuals independently following the demands of a system, or do we need collective understanding. With the mobilized conception of communication, there is no distinction! In my view, we have to decide whether communication is a function of systems (the exchange of messages) or the human pursuit of understanding (dialogue). With the proliferation of ICTs and PCTs we are witness to, and participant in, isolated individuals making sporadic contact for functional purposes, hooked into a message system that multiplies and reproduces messages without human agents, deriving information by data processing. These messages have purposes, but no reasons. For Habermas, “rationality” is the potential that people have to act and speak in ways for which they could give reasons. Expressions have meaning insofar as the speaker could give reasons for them. As Myerson succinctly puts it “to make such messages definitive for mainstream communication is to exclude most of the possibilities of human expression” (2001, p. 41). Mobile communication has no scope for reasons, only for getting what you want.

For Habermas, interaction is gestures that serve as stimulus eliciting a response with insight, through interpretation and understanding. Communicative rationality is to grasp the meaning and understand the reasons behind and the potential weaknesses. The ideal dialogue looks like a debate. Expressions can be defended against criticism. This is a far cry from taking “communicating with” to mean making a connection with a system.

By, then, the “Interaction Society,” do we mean the web of connected persons with mobile phones and Internet access devices that have been produced to sell to us? Or do we mean more or other than that? The technology is not the first or primary concern. The pressing issue is not how we interact (means), but how, when, and why we interact (mode). Mobilised communication threatens to make a minor, special part of communication (information) into the central case. Mobile technologies are tools for informing, so mobile communication is far from merely “wireless” — it is not communication as we have previously known it.

## References

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- Anderson, J. A. (ed.) (1990). *Communication yearbook* (vol. 13). Newbury Park, CA: Sage Publications.
- Argyle, M. (1969). *Social interaction*. London: Tavistock Publications/Methuen & Co.
- Argyle, M. (ed.) (1973). *Social encounters: Readings in social interaction*. Harmondsworth: Penguin Books.
- Bales, R. F. (1999). *Social interaction systems: Theory and measurement*. New York: Transaction Publishers.
- Beniger, J. R. (1986). *The control revolution*. Princeton, NJ: Princeton University Press.
- Berger, P. L., & Luckmann, T. (1967). *The social construction of reality: A treatise in the sociology of knowledge*. Garden City, NY: Doubleday.
- Blau, P. (1964). *Exchange and power in social life*. New York: John Wiley & Sons.
- Bredemeier, H. C. (1979). Exchange theory. In T. Bottomore, & R. Nisbet (eds.), *A History of Sociological Analysis* (pp. 418-456). London: Heinemann.

- Carey, J. W. (1975). A cultural approach to communication. *Communication*, 2 (2), 1-22.
- Castells, M. (1996). *The Information Age: Economy, society and culture* (vol. 1: The rise of the network society). Oxford: Blackwell Publishers.
- Checkland, P. & Holwell, S. (1998). *Information, systems, and information systems: Making sense of the field*. Chichester: John Wiley & Sons.
- Deetz, S. A. (1992). *Democracy in an age of corporate colonization: Developments in communication and the politics of everyday life*. Albany, NY: State University of New York Press.
- Deetz, S. A. (1995). *Transforming communication, transforming business: Building responsive and responsible workplaces*. Creskill, NJ: Hampton Press.
- Deetz, S. A., & Simpson, J. (2003). Critical organizational dialogue: Open formation and the demand of "otherness." In R. Anderson, L. A. Baxter, & K. N. Cissna (eds.), *Dialogue: Theorizing Difference in Communication Studies*. Thousand Oaks, CA: Sage Publications.
- Elias, N. (1939). *The civilizing process*. Oxford: Blackwell.
- Fiske, A. P. (1992). The four elementary forms of sociality: Framework for a unified theory of social relations. *Psychological Review*, 99, 689-723.
- Frey, L. R., Botan, C. H., Friedman, P. G., & Kreps, G. L. (1991). *Investigating communication: An introduction to research methods*. Boston, MA: Allyn & Bacon.
- Gergen, K. J. (1985). Social constructionist inquiry: Context and implications. In K. J. Gergen, & K. E. Davis (eds.), *The Social Construction of the Person* (pp. 130-180). New York: Springer-Verlag.
- Gergen, K. J. (1991). *The Saturated Self: Dilemmas of Identity in Contemporary Life*. New York: Basic Books.
- Giddens, A. (1984). *The constitution of society: Outline of the theory of structuration*. Berkeley, CA: University of California Press
- Goffman, E. (1961). *Encounters: Two studies in the sociology of interaction*. Indianapolis, IN: Bobbs-Merrill.
- Goffman, E. (1983). The Interaction Order. *American Sociological Review*, 48, 1-17.
- Habermas, J. (1984). *The theory of communicative action*. (T. McCarthy, trans.) (vols. I & II). Cambridge: Polity Press.

- Heidegger, M. (1962). *Being and time* (J. Macquarrie, & E. Robinson, trans.). Oxford: Blackwell.
- Hutchby, I. (2001). *Conversation and technology: From the telephone to the Internet*. Cambridge: Polity Press.
- Jaspers, K. (1932/1994). *Basic philosophical writings* (E. Ehrlich, L. Ehrlich, & G. Pepper, trans.). London: Humanities Press.
- Katz, J. E., & Aakhus, M. (eds.). (2002). *Perpetual contact: Mobile communication, private talk, public performance*. Cambridge: Cambridge University Press.
- Kreps, G. L. (1990). *Organisational communication: Theory and practice* (2<sup>nd</sup> ed.). New York: Longman/The Guilford Press.
- Leeds-Hurwitz, W. (ed.). (1995). *Social approaches to communication*. New York: The Guilford Press.
- Luhmann, N. (1995). *Social systems* (J. Bednarz & D. Baecke, trans.). Stanford, CA: Stanford University Press.
- Mantovani, G. (1996). *New communication environments: From everyday to virtual*. London: Taylor & Francis.
- Myerson, G. (2001). *Postmodern encounters: Heidegger, Habermas and the mobile phone*. Cambridge: Icon Books.
- Olson, G. M., & Olson, J. S. (2000). Distance matters. *Human-Computer Interaction, 15*, 139-178.
- Peters, J. D. (1987). The control of information. *Critical Review: A Journal of Books and Ideas, 1* (4), 5-23.
- Peters, J. D. (1999). *Speaking into the air: A history of the idea of communication*. Chicago, IL: University of Chicago Press.
- Porritt, L. (1990). *Interaction strategies: An introduction for health professionals*. Melbourne: Churchill Livingstone.
- Reddy, M. J. (1993). The conduit metaphor: A case of frame conflict in our language about language. In A. Ortony (ed.), *Metaphor and Thought* (2<sup>nd</sup> ed.). Cambridge, MA: MIT Press/Cambridge University Press.
- Riesman, D., Glazer, N., & Denney, R. (1961). *The lonely crowd*. Yale, CT: Yale University Press.
- Ritzer, G. (1992). *Sociological theory* (3<sup>rd</sup> ed). New York: McGraw-Hill.
- Russell, B. (1927/1979). *An outline of philosophy*. London: Allen & Unwin Paperbacks.

- Sampson, E. E. (1993). *Celebrating the other: A dialogic account of human nature*. New York: Harvester Wheatsheaf.
- Shannon, C., & Weaver, W. (1949). *The mathematical theory of communication*. Urbana, IL: University of Illinois.
- Shotter, J. (1993). *Cultural politics of everyday life: Social constructionism, rhetoric, and knowing of the third kind*. Buckingham: Open University Press.
- Smith, T.S. (1995). *Strong interaction*. Chicago, IL: University of Chicago Press.
- Soros, G. (2000). *Open society: Reforming global capitalism*. London: Little, Brown and Company.
- Stacey, R. (2003). Learning as an activity of interdependent people. *The Learning Organization*, 10 (6), 325-331.
- Strauss, A. (1985). Work and the division of labor. *The Sociological Quarterly*, 26 (1), 1-19.
- Strauss, A. (1988). The articulation of project work: An organizational process. *The Sociological Quarterly*, 29 (2), 163-178.
- van Dijk, T. A. (1997). *Discourse as social interaction*. London: Sage Publications.
- Varey, R. J. (2000). A critical review of conceptions of communication evident in publications on business & management. *Journal of Communication Management*, 4 (4), 328-340.
- Vickers, G. (1983). *Human systems are different*. London: Harper & Row.
- Weber, R. (2003) Editor's comments: Theoretically speaking. *MIS Quarterly*, 27(3), iii-xii.

## Endnotes

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- <sup>1</sup> A corporation in the U.S. legal system is a trading entity. Here “corporation” is chosen as the preferable term over “organisation” to mean a group of co-operative interacting members who collectively produce and trade.
- <sup>2</sup> Closeness of space, time, and understanding

## Chapter VII

# Fluid Interaction in Mobile Work Practices

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## Abstract

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*This chapter discusses the increasing fluidity of interaction that workers perform in contemporary work settings. Everyday working life is increasingly constituted of a heterogeneous mélange where people, work objects and symbols, as well as their interactions, are distributed in time, space and across contexts. When considering interaction where participants, work, and interactional objects are mobile, the challenges of supporting the fluidity of interaction in collocated settings are immense. This chapter outlines mobile interaction in terms of the fluid topological metaphor and analyses the dimensions of struggling with fluid mobile interaction based on a framework characterising interactional asymmetries.*

## Introduction

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Our recent history has seen an upsurge in Information and Communication Technologies (ICT) supporting the mobilisation of computer-mediated interaction in general and, during the past decade, the mobilisation of organisational actors in particular. The ongoing mutual adaptation of work practices and such mobile and wireless technologies has both resulted in new work and technology practices and in the need for re-appreciating the perception of these practices. Everyday working life is increasingly constituted of a heterogeneous *mélange* where people, work objects and symbols, as well as their interactions, are distributed in time, space and across contexts. When we then consider interaction where participants, work, and interactional objects are mobile, the challenges of supporting the fluidity of interaction in collocated settings are immense. Many years of research and commercial efforts have sought to establish technological means by which interaction can be conducted with the same ease, or in the same fluid manner, as collocated interaction. However, as argued by Olson & Olson (2000), distance does matter.

This chapter addresses one particular aspect of organisational life for mobile workers, the constant negotiation of fluid work, based on the assumption that an essential aspect of mobile work is the negotiation of desirable versus disruptive interaction. We here take a closer look at mobile interaction in the locus of the individual meeting the others. The purpose of the chapter is to initiate a broader discussion of fluid mobile work by drawing upon social topology and the study of ICT use in organisations, as well as experimental research constructing and testing innovative interaction management technologies. In order to initiate the debate we ask the question: *What are the pertinent issues involved in individuals negotiating mobile work?* This is based on the assumption of temporary asymmetry between individual mobile workers in terms of fluid mobile work – what for one person is a perfectly justifiable request can for another be a disruption.

Previous research has demonstrated the richness of means by which people working “at arms length” negotiate fluid ongoing interaction (Heath & Luff, 2000). However, the increased mobilisation of work activities across temporal, spatial and contextual barriers has placed localised technology practices at the centre of the constant negotiation of fluid ongoing interaction. The need to seek advice, inquire, coordinate, delegate, arrange and sort out implies that mobile workers critically rely on ICT support for negotiating their interdependencies. There is also a rich body of literature demonstrating new and

interesting ICT-mediated interaction practices, but mostly in so-called “stationary” settings, i.e., where participants primarily work from a stationary computer.

The chapter reflects upon the theoretical implications of advanced mobile work practices for the ways in which we understand contemporary ICT use. The numerous claims that we are entering an “*always-on*” society where people will interact “*anytime*” and “*anywhere*,” is far too simplistic a notion. Mobile work is often temporally, spatially and contextually dependent. Even when it is not, the asymmetry of situated interactional needs and preferences imply, for the individual mobile worker, an ongoing struggle to obtain fluid work practices. It is concluded that the specific and theoretical study of mobile work practices simultaneously highlights the relative poverty of current technologies in supporting fluid mobile interaction and the need for rich detailed management of interaction.

In the following section we first outline *mobile interaction*, and then characterise it in terms of the fluid topological metaphor. Based on a framework characterising interactional asymmetries, we analyse the dimensions of struggling with fluid mobile interaction, and conclude this chapter with discussion on the findings.

## **Mobile Interaction**

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It is obvious that during the latter half of the last century, our ways of living in general has been transformed considerably. Among many vital drivers of the transformation, information and communication technologies (ICTs) are perhaps the most conspicuous in terms of the widespread impact upon our social lives as a whole. There is no doubt that because of their pervasiveness and our intensive use of them, ICTs have changed ways of living in virtually all realms of our social lives.

*Mobile work* is clearly one of such most conspicuous emerging phenomena induced by ICT diffusion in our modern lives. Traditionally, “work” has been conducted in fixed formal places, such as an office in a building, a factory and a laboratory, based on clear division of labour. However, we are now able to do our job flexibly largely beyond geographical and temporal barriers and contextual constrains by effectively using various ICTs such as the Internet, email, personal data assistants (PDAs), mobile phones, short messaging service (SMS) and instant messaging (IM), along with traditional technologies



such as fixed telephones and fax machines. In particular, contemporary “office” workers are not just working in an office in a building, but also moving out from it and doing their job remotely at various sites. We can also see the increasing number of workers who do their job at home. It is this kind of work style, often called telework, telecommuting or SOHO (small office, home office), that has emerged since the 1990s clearly resulting from the widespread and a rapid decline of the cost of ICT options for individual workers. As seen in these examples, ICTs have diversified our working modes, not only working inside the office, but also working remotely and flexibly.

Here, it is crucial to look at mobile work more carefully. In spite of the upsurge of interest in mobile work in our social lives, current research perspectives into it and, more specifically, the notion of “mobility” have been quite narrow, dealing with it exclusively in terms of humans’ geographical movement. Much of literature characterises mobile work as its flexible geographical movement of people (e.g., Makimoto & Manners, 1997; Dahlbom & Ljungberg, 1998; Fagrell et al., 1999; Kopomaa, 2000). It can be said that conventional understanding of the notion of mobility has been clearly confined into the corporeal characteristic of humans freed from geographical constraints thanks to mobile computing technologies such as mobile phones and PDAs. However, in order to grasp the significance of mobile work in our modern lives in general and work settings in particular, we need to take a broader perspective and rethink the fundamental aspects of human interaction and the transforming notion of mobility, looking beyond human movement (Kakihara & Sørensen, 2002).

In addressing mobile work supported by various ICTs, we need to look also at *temporal* aspects of human interaction. In a face-to-face meeting of two or more people, for example, they do and need to share the same, constantly proceeding, linear clock time. In a sense, the people are forced to “synchronise” in a face-to-face meeting. Yet, using ICTs, especially Internet technologies such as emails and IM, people no longer need to share, not only the same space, but also the same time; their interaction can be “asynchronous” with regard to efficiently using their time in their interaction. It is reasonable to say that such a temporal shift, from synchronous to asynchronous, resulting from using the Internet technologies, increases the mobility of human interaction in work settings, since the people using such Internet technologies in their work become largely freed from temporal constraints such as necessity of sharing the same time and different national time zone. In this sense, mobile work clearly signifies not just humans’ flexible movements but also the temporal transformation of human interaction in work settings.

Furthermore, another important aspect of human interaction, which needs to be considered in the debate of mobile work, is the contextual aspect. Human action and interaction with others are inherently situated in a particular context that frames and is reframed by his or her performance of the action recursively. Such contextuality, or situatedness, of human action is critical for capturing the nature of human interaction. Suchman (1987) argues: “The coherence of situated action is tied in essential ways not to individual predispositions or conventional rules but to local interactions contingent on the actor’s particular circumstances” (p. 28). In this sense, it could be argued that in addition to spatial and temporal aspects discussed above, contextual aspects where the action occurs are of equal importance in organising human interaction. In considering mobile work, such contextual aspects of interaction are significant. We then could argue that contextuality plays a critical role in constituting human interaction just as spatiality and temporality do. Contexts in which people are immersed continuously reframe their interaction with others, including people’s cultural backgrounds, particular situations or moods, degrees of mutual recognition, exchanges of facial and bodily expression. Thanks to various ICT applications and mediated communication, people nowadays can easily interact with others largely freed from such contextual constraints, interacting with people in largely different contexts. In this sense, the relationship between interaction among people and the contexts in which they are is becoming mobilised in terms of flexible patterns of interaction across different contexts. It is also clear that such contextual, or relational, aspects of human interaction are increasingly “uneven” among interacting people beyond neat time-space conditions of interaction. Hence, when considering human interaction in mobile work settings, we need to deal with contextual as well as spatial and temporal aspects of human interaction.

It is worth pointing out here that from our extended perspective, increasing mobility of human interaction in terms of special, temporal and contextual aspects, does not necessarily mean that our interaction becomes *totally freed* from spatial, temporal and contextual constraints of our everyday activities. Many scholars, especially in computer science and engineering, tend to offer the simple proposition that, using mobile ICTs, we are now able to interact with others “*anytime, anywhere*” (e.g., Kleinrock, 1996; Agre, 2001). This is valid in the sense that ICT, especially email and mobile phones, help us interact with those who are in a different location either synchronously or asynchronously. However, as Wiberg & Ljungberg (2001) clearly show, this does not necessarily mean that we can interact with others “*everytime, everywhere*.” In their analysis of mobile work at Telia Nära, mobile workers’ activities are in most

cases dependent upon particular place and time, sometimes significantly. As we have seen in the discussion of contextuality above, every human action and interaction is inherently situated in a particular context; so is it in the case of mobile communication and interaction ensured by ICTs, including mobile technologies (Kim et al., 2002). Thus it is clear that the notion of mobile work itself is not such a simple concept as signifying working remotely or “*anytime, anywhere.*”

As we have discussed in this section, the emerging debate of mobile work has been discussed from quite a narrow perspective, almost only dealing with humans’ geographical movement intensified by effective utilisation of ICTs in work settings. From the wider perspective we take, mobile work is not just about a working mode or style to be done remotely from various sites; much more importantly, it also signifies *the increasing mobilisation of human interaction* in work settings in terms of spatiality, temporality and contextuality. What has been freed by various ICT options, particularly mobile technologies, in our modern work style, is not humans’ corporeal movement but interactional pattern they perform (Kakihara & Sørensen, 2002), which we may call *mobile interaction*.

## **Fluidity of Mobile Interaction**

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In order to capture the complex and diversified nature of mobile work, or more specifically mobile interaction in work settings, it might be beneficial to conceptualise the significance of mobile interaction itself to contemporary work environments. Here we want to take a metaphorical approach with ideas from social topology.

Topology is a branch of mathematics that deals with various geometrical properties and spatial relations. However, it is not restricted by Euclidean three-dimensional geometry; it localises objects in terms of a variety of coordinate systems. In topology the three standard axes, X, Y and Z, are no longer a fixed or concrete geographical frame of reference. Applying the basic ideas of topology, Mol & Law (1994) proposed three distinct “social topologies” drawn from their investigation on the spatial properties of the medical condition anaemia in which there are too few red blood cells in the blood. First, the *region* is a distinct topology whereby objects are clustered together and boundaries are drawn around each particular regional cluster. In short, this

topology can be characterised by “boundary.” Second, the *network* is a topology whereby relative distance is a function of the relationship between components constituting the network. Complex patterns of connected nodes create the whole network structure. This topology can be characterised by “relationship.” Third and most important to our discussion, the *fluid* is a topology whereby “neither boundaries nor relations mark the difference between one place and another. Instead, sometimes boundaries come and go, allow leakage or disappear altogether, while relations transform themselves without fracture. Sometimes, then, social space behaves like a fluid” (p. 643). This is a particular image of the topology of anaemia discussed by Mol & Law. Anaemia, like blood, can be seen as flowing in and out of different regions, across different borders, using diverse networks.

Applying these metaphors from social topology, we can appreciate the nature of mobile interaction in work settings more properly. The *region* metaphor can be clearly applied to the traditional, geographically dependent human interaction in the pre-ICT age. Even in the early computing era, the region metaphor is pertinent to characterise that computational support then was limited to mainframes with connected terminals. The *network* metaphor can characterise modern life styles. Interaction among people via various media networks such as telephones and the internet has been relatively mobilised in terms of symbolic travel of data, images, sounds and so on. Computer installations comprising of local- and wide-area networks are precisely characterised as networks, and the metaphor can also be expanded to characterise the socio-technical mesh of humans and technologies in organisational settings.

However, given the rapid diffusion and domestication of various ICT applications including mobile phones, SMS, PDAs, laptop computers, and awareness technologies such as ICQ into our everyday lives, a network metaphor seems increasingly insufficient to explain our social activities in general and work mode in particular. In the environment where people can interact with others by using such emerging technologies as mobile phone, SMS, pagers, email, laptops, PDAs, and ICQ, relational disposition of human interaction is becoming ambiguous and transitory. Such a social topology can be a *fluid*. According to Mol & Law, a fluid world is “a world of mixtures” (p. 660) and “variation without boundaries and transformation without discontinuity” (p. 658). A fluid world ensured by multiple mobilisation of interaction can be characterised as “the remarkably uneven and fragmented flows of people, information, objects, money, images and risks across regions in strikingly faster and unpredictable shapes” (Urry, 2000, p. 38). This is clearly the world of the contemporary

mobile work mode. Mobile workers engage themselves in getting their job done not only at their formal offices but at various sites such as home, clients' offices, hotels, moving vehicles and so on. Looking at their nature of work, there is no rigid boundary that determines whether inside or outside the office: anywhere can be their office. They permeate across "regions" and "networks." In this sense, we can argue that mobile work is the fluid mode of working.

Fluidity of mobile interaction raises a variety of new issues to be addressed. For example, due to increasing flexibility in interacting with others with various ICT supports, people tend to be exposed to "interaction overload" (Ljungberg & Sorensen, 2000), which inevitably provides them with various unwelcome consequences. Whereas high fluidity of interaction in work settings offers workers a wide range of benefits, such as interacting with people remotely and flexibly, it also creates interruption and disturbance in their actual work environment. By having a mobile phone, for instance, you can be disturbed by anyone who knows your number regardless the level of your busyness. Although email is basically an asynchronous communication way that does not require you immediate response, if you keep storing emails without any reply then you are "overloaded" by email. PDAs enable workers to check and send email outside their offices, but colleagues who know that you have a PDA would expect that you *always* check and reply to their email. As seen in these immediate examples, high fluidity of mobile interaction offers us a practical issue to be solved: *the asymmetry of interaction* (Nardi & Whittaker, 2000), which will be discussed in the following.

## **Asymmetry of Interaction**

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In order to initially analyse aspects of mobile interaction, we intersect one level further down from the notion of human interaction understood as a *fluid* where attention and expressions in emerging patterns shift across time, space and context. In this section we project this topology onto the operational level of the individual desiring to interact or to be left alone. The overall goal is to analyse the elements affecting the fluidity of interaction from the perspective of one actor, acknowledging the inherent asymmetries of everyday organisational interaction (Nardi & Whittaker, 2000), as well as the fact that much work cannot be accomplished independent of temporal, spatial and contextual constraints (Wiberg & Ljungberg, 2001). It, therefore, makes sense to take a

closer look at how individuals manage their interaction with others. This is exclusively viewed from the perspective of understanding the struggle to maintain fluid mobile interaction. The asymmetry of interaction occurs when “the time and topic are convenient for the initiator, but not necessarily the recipient. This asymmetry arises because while initiators benefit from rapid feedback about their pressing issue, recipients are forced to respond to the initiator’s agenda, suffering interruption ” (Nardi & Whittaker, 2000). A distinct focus on issues related to establishing fluid mobile interaction will inevitably place some significance on the initial phases of interaction, which in particular can be characterised as *oueration*, i.e., negotiating the communication (Nardi & Whittaker, 2000). Current research characterise organisational conversations as mostly being between two people, spanning brief periods of time, opportunistic, containing multiple concurrent threads, and ongoing rather than one-shot. Whittaker et al. (1997), furthermore emphasises issues of personal desire as opposed to only studying organisational or functional rationality. This leads to the inclusion of concerns for individuals improvising and allowing their emotional disposition to affect decisions as to how they interact and with whom. This concurs with Ciborra’s call for better understanding of the role of improvisation and moods in meetings between people and contemporary technologies, and to acknowledge these as a basic tenet for analysing the relationships (Ciborra, 2002).

In order to analyse more closely the issues related to an individual maintaining fluid mobile interaction in organisational conversations, we initially distinguish between an individual’s desire at a given point in time to be *interactive* or *interpassive*. Being *interactive* implies communication and collaboration between two or more people around a shared object (Dix & Beale, 1996), whereas *interpassive* is a state in which a person is passive in relation to others. This distinction is essential since it precisely characterises desire to interact versus desire *not* to interact. It does, however, not characterise the distinction between being active and being inactive. A person can be interpassive whilst immersed in his or her own individual activities. We can then for a given person and at a given moment analytically characterise the interactional asymmetries (Nardi & Whittaker, 2000) in terms of the individual’s desire to be interactive or interpassive, versus the preferences of every potential interactor to be interactive or interpassive in relation to this particular individual in a particular moment of time. An interactor characterises a person that can initiate interaction or respond to a request for interaction. The model, therefore, analytically distinguishes between “you” and “them.”

The first scenario covers situations where there — at least instantaneously — are no interaction asymmetries. Here both the person at the centre as well as the surroundings are interpassive — they are left on their own, undisturbed and, for example, involved in individual activities or reflecting. This relates to the distinction between action and reflection (Schön, 1983), or Norman's (1993, p. 15) distinction between experiential and reflective cognition:

*“There are many modes of cognition, many different ways by which thinking takes place. The two modes particularly relevant to my analyses are called experiential cognition and reflective cognition. The experiential mode leads to a state in which we perceive and react to the events around us, efficiently and effortlessly. This is performance. The reflective mode is that of comparison and contrast, of thought, of decision-making. This is the mode that leads to new ideas, novel responses. Both modes are essential for human performance, although each mode requires very different technological support.”*

It is, therefore important to be able to configure technology so as to allow for sustained interaction, but also for non-interaction, to provide support for both the experiential mode as well as the reflective mode of cognition (Wiberg, 2001).

Secondly, in instances where the person at the centre, in order to maintain a fluid work pattern for example, needs to get hold of another person by the use of a mobile phone, the person instantiates a potential interaction asymmetry when contacting a person who may be interpassive. This invokes the subsequent issues of managing the interaction, of session management and of the problems of the central actor potentially by means of an obtrusive technology (Ljungberg & Sorensen, 2000), forcing him or herself into the fore.

Thirdly, the opposite instance is characterised by the asymmetry being evoked from outside and the interpassiveness of the person at the centre being broken by someone who request interaction in order for that person to maintain fluid mobile work. Here, the issue, from the point of view of the central actor is managing temporary interruptions of one session for another or engaging in interaction from being interpassive. From the point of view of the person at the centre, maintaining fluid mobile work can be an issue of dealing with interruptions (O'Conaill & Frohlich, 1995), even to the extreme where work can be characterised in terms of constant interruptions (Rouncefield et al., 1995).

The fourth situation covers instances where the asymmetry of interaction is resolved in interaction. Both the actor at the centre and people in the surroundings desire to interact. If this is the case, then one of the primary issues will be to prioritise between different strands of interaction. This implies that interaction can lead to meta-interaction, or “outeraction” (Nardi & Whittaker, 2000): “Outeraction is a set of communicative processes outside of information exchange, in which people reach out to others in patently social ways to enable information exchange.” The negotiation of interaction here also involves thread swapping where decisions to hold or wait relate to discussion and negotiation of availability and relative importance of different threads involving different configurations of involved actors.

Viewing the analytical distinctions between attempts to negotiate the interactional asymmetries over time leaves us with a potentially ever-changing configurations and negotiations. These changes can lead to fluctuations between symmetry and asymmetry with potential consequences for the central actor being engaged in both fluid and disruptive mobile work. From the perspective of the central actor, the challenge is to manage the configuration so as to actively encourage interaction when it either serves the purpose of contributing to fluid mobile work, or when disruptions are deemed desirable by the actor in order to establish interpassive situations at a later stage (Ljungberg & Sorensen, 2000).

If certain configurations between the central actor and others persist over some period of time, or if the same configurations of interactors frequently experience recurrent asymmetries, this in itself can raise essential issues of interaction management. In the case of both the central actor and others remaining interpassive, then there may be an absence of interaction over a prolonged period. If the central actor persistently over time instigates interaction despite others’ preferences for interpassiveness, the result can be fragmentation of work activities on their part. To some extent, the work of the central actor can in this situation be conceived as fluid. In the opposite asymmetry, the central interactor constantly being interrupted can result in fragmentation of the mobile work activities, but equally in perceived fluid work on the part of the instigators of the interaction. However, if an asymmetric pattern is reiterated over time, participants who constantly are disrupted, and therefore may not experience fluid work, could desire to proactively affect the situation and for example control it by switching off their mobile phones or avoiding reading email for a couple of days. In the case where interactiveness is the primary preference of all parties, it raises the issue of balancing the participation of all involved and the need to maintain awareness of the interaction, its status and results.



## **Struggling with Fluid Mobile Interaction**

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This section outlines and reviews the issues involved when a central actor manages interactional asymmetries in order to be able to engage in fluid mobile work. Firstly, we must recognise that distance matters (Olson & Olson, 2000), and that a host of issues related to the struggle for maintaining fluid mobile work emerge from the mobilisation of interaction and from the fluidisation of work activities across temporal, spatial and contextual boundaries. Many of the issues discussed below are also interesting to study and discuss in settings where the interaction is “at arms length,” but here the main objective of such a study could be the opposite — demonstrating the richness of means by which collocated interactors manage fluid interaction (Goffman, 1982; Heath & Luff, 2000; Olson & Olson, 2000). Studies show that collocated office workers spend between 25% and 70% of their time on face-to-face conversations. Collocated synchronous interactions can be characterised in terms of (Olson & Olson, 2000): rapid feedback, multiple channels, known identity of contributors, shared local context, impromptu interactions on arrival and departure, easy establishment of joint references to objects, free individual control of attention and participation, implicit peripheral cues, and the spatiality of reference. As outlined previously, empirical studies have characterised most interpersonal interaction as dyadic (involving two people), brief, opportunistic, synchronous, focused on shared objects, ongoing rather than one-shot, and containing multiple threads (Whittaker et al., 1997). Conversations are typically brief, synchronous and opportunistic interactions with multiple concurrent threads, thus leading to issues of context regeneration and conversation thread tracking (Whittaker et al., 1997).

The first issue to consider relates to the relevance of the interaction. Although much of the contemporary discourse on the application of ICTs seems to focus on the increased ability to interact anytime and anywhere, and that this apparent ability is translated into a subsequent necessity of interacting anytime and anywhere, studies of actual work activities demonstrate that by far all work can indeed be conducted anytime and anywhere (Wiberg & Ljungberg, 2001). Distance matters not only in terms of geographical distance but also in terms of temporal and contextual asymmetries between interactors. The initiator may be in one frame of mind, focused on for example getting a meeting schedule finished, whereas the person he or she contacts on a mobile phone in order to clear some details may be in the middle of an important meeting, or concentrat-

ing on writing a memo. In the case of the telephone engineers studied by Wiberg (2001), their work depends critically on travelling to where the fault has been reported. They must therefore negotiate access with the house owner. Wiberg (2001) found examples of lack of mutual awareness of what the status of the cases were at a given time, such as in the example where the engineer had travelled quite far only to find out that rebooting the telephone switch had solved the problem remotely, rendering the long trip unnecessary. We here have a potential deepening of the interaction asymmetries, when at the one hand mobile work is conducted in certain spatial, temporal and contextual circumstances and on the other hand pervasive mobile communication technologies offers an apparent stability of dissolving temporal, spatial and contextual barriers — the mobile worker can be reached no matter where and when they are and irrespective of what they are engaged in (Agre, 2001).

Generally, interaction modalities can be characterised in terms of their degree of obtrusiveness and ephemerality (Schmidt & Simone, 1996; Ljungberg & Sorensen, 2000). Interaction can be perceived as more or less obtrusive in terms of how the interaction forces upon the participants the need for them to devote their attention towards the interaction. Ephemeral interaction unfolds in time and space without leaving behind external traces, whereas persistent interaction is characterised precisely by traces being sedimented from the interaction. Both modes of interaction offer continua and not distinct categories. Interaction can be perceived as more or less obtrusive to the fluid accomplishment of mobile work dependent on the actor's subjective perception. Mackay (1988) showed that different actors experienced different levels of stress coping with email overload. Similarly, the degree of persistency can depend on the actual technology used and the specific way in which it is appropriated and combined with other technologies. Whilst a face-to-face conversation clearly can be characterised as ephemeral since it only verbal, and an email clearly is persistent in that it leaves a trace behind that can be inspected at a much later stage, then instant messaging such as ICQ and MSN message service clearly can be viewed as both asynchronous persistent interaction as well as synchronous ephemeral interaction. Although the streams of interaction may be stored at the server for later retrieval as digital traces of human activity (Sørensen et al., 2000), the situated use can equally be viewed as real-time conversation where the trace only serves a highly temporary primary purpose. When investigating the struggle to obtain fluid mobile work, interesting insights can be gained from investigating configurations of the two interaction modalities. Using a traditional stationary phone with no caller ID displays results in a fairly obtrusive and ephemeral interaction. Modern mobile phones, on the other

hand, offers increasingly advanced ways of setting the interaction requests as unobtrusive, so only the acceptance of an incoming call will lead to obtrusive ephemeral interaction. It is not unrealistic to assume that mobile ICTs will support more sophisticated awareness, filtering and notification mechanisms (Ljungberg & Sorensen, 2000), for example by allowing the semi-automatic filtering of incoming requests for interaction and subsequent conversion of a request for a conversation to a reply by SMS explaining the interactional preferences of the receiver of the request. Generally, the current mobile ICTs primarily support interaction modalities that are not ephemeral and unobtrusive — the aspects of human interaction, which have been demonstrated, handled in very sophisticated ways when interactors are collocated and working at “arms length”. We will below discuss the related issue of mutual awareness further.

Taking a closer look at the relationships between ephemeral and persistent modes of interaction, work studies have illustrated how actors actively will make ephemeral interaction persistent; for example by audio or video taping conversations, by photographing whiteboards, or simply by taking notes during meetings or during telephone conversations (Ljungberg & Sorensen, 2000). Since it is associated with considerable transaction costs — for example to transform audio notes to written text — some research has looked into enabling easy retrieval of passages in audio material such as voice mails (Whittaker et al., 2000). In a sense, these activities partly can serve the purpose of crystallising work activities, for example by making discourses and discussions publicly known for others to inspect and comment. Written documents, audio or video notes, email trails, voice mails, SMS messages etc, therefore provide a common and shared, although fragmented, awareness of dyadic interrelationships for later inspection and reference. Such awareness is at least to some extent quite crude since they can not be assumed to be synchronous, nor can they be assumed to reveal significant information of the other part’s willingness or readiness to be interrupted.

Increasingly technologies offer ways of managing fluid mobile interaction by offering the receiver of the request for interaction to postpone or stack the interaction (Wiberg, 2002; Wiberg & Whittaker, 2004). These technologies are either asynchronous, such as the basic email that can be accessed from a mobile phone or PDA, or can be gateways between synchronous and asynchronous technologies, for example allowing a telephone conversation to be postponed by having the number stored in a “missed calls” register or by allowing the caller to leave a message to be picked up at a later point. These mechanisms of postponing synchronous interaction can be combined with

various filtering and awareness mechanisms (Ljungberg, 1999; Ljungberg & Sorensen, 2000), such as a discretely vibrating phone, which from the user's trouser pockets alerts of an incoming call, or the more advanced awareness filtering of assigning different groups of callers to different ring tones. The ability to translate a synchronous attempt to interact into an asynchronous trace can obviously lead to severe consequences for everyone involved. Establishing fluid mobile work in the short-term by disconnecting and stacking all interaction requests clearly may result in others' struggling to maintain fluid mobile work. Around 60% of workplace phone calls have been reported to fail to reach the recipients (Nardi & Whittaker, 2000). In the case of networked mobile workers, this can of course be assumed to change, but against an increasing intensification of interaction, it may still be a significant problem. Wiberg (2001) reports of telephone repair engineers with three mobile phones for each engineer. Furthermore, not all problems may go away by being transformed from synchronous to asynchronous requests for interaction. Postponing implies spending time at a later stage retrieving the information and subsequently attempting to contact people who have attempted to contact. Easy access to the available interaction threads is therefore important (Nardi & Whittaker, 2000). Recent empirical studies of availability management have also revealed that having technological support built into the mobile phone for being able to briefly and instantly micro-negotiate with the sender of an interaction request upon an alternative and more appropriate time to initiate the interaction is more efficient for the receiver than taking calls immediately which might be interruptive to the task at hand (Wiberg, 2002; Wiberg & Whittaker, 2004).

Given the increase in available means for communicating with others and the general increased technical sophistication of mobile ICTs, maintaining fluid mobile work is also increasingly a matter of managing multiple ongoing conversations over multiple technologies. Here, mutual awareness comes to the fore as a crucial issue. In cases of single synchronous technology scenarios, such as the traditional office with one stationary telephone, others will immediately be aware of essential interactional aspects of the owner's behaviour — if the phone is busy, the person is on the phone. However, with an increased fragmentation and mobilisation of interaction across multiple ICTs, lack of mutual awareness can lead to increase in the interaction asymmetry. Establishment of mutual awareness of location has been promoted as an important element of mobile interaction (Mäenpää, 2001), but also conflicting accounts of the awareness of activities as the primary element has been promoted (Weilenmann, 2001). However, in both cases, a generalised notion of location awareness is being negotiated since Weilenmann argues that the awareness of

activity infers awareness of location. It can, therefore, be argued that the use of mobile phones, for example, socially constructs a location-based service, both in terms of allowing constant update mutual awareness of locations, as well as in bringing the interaction to the location. Much research has discussed applying specific awareness technologies, AwareWare (Nilsson et al., 2000). The most common of these technologies is a stationary interaction technology in its own right, namely Instant Messaging, where platforms such as ICQ allow participants explicitly to declare their interactional status. Other systems, such as the one reported by Nardi et al. (2000) supported implicit awareness by monitoring user keystroke rates and therefore enabling others to gain an impression of whether or not the person to be contacted is situated by their desk or, alternatively, perhaps is too busy to be contacted at all. Tang et al. (2001) demonstrate a multi-platform mobile awareness system with implicit location logging. Dix et al. (2000) suggest a generic systems architecture for mobile awareness technologies that integrates the technologies technical “awareness” of internal state with the inclusion of the external context to support mutual awareness between users.

The extent to which ICTs model the properties and behaviour of the interactors can greatly affect both the degree of sophistication to which the ICT can support the establishment of mutual awareness, as well as the extent to which the people involved will find the technology a breach of their privacy and more serve as a surveillance technology. Here, we would assume as a first hypothesis the same interrelationship as argued by Schultze & Vandenbosch (1998) concerning the perceptions of information overload when using Lotus Notes. Here it was demonstrated that, although there were initial reports of information overload as a result of implementing Lotus Notes, a subsequent study showed that the actors had adapted and therefore no longer experienced information overload. Similarly, Nardi et al. (2000) discuss how the introduction of the Instant Messaging system led to initial discussion of how people felt observed since everyone else could inspect their key-typing rate constantly. However, this concern was subsequently forgotten and a positive stance had prevailed — people saw the immediate benefits of gaining awareness of the typing speed of the person they would wish to interact with in order to know if they were busy or not. This mechanism is an example of an awareness mechanism, where information pertaining to the interaction is provided to others in order to facilitate their decision as to whether or not they still wish to interrupt.

In terms of managing fluid mobile interaction in situations where a number of participants are engaging in ongoing interaction, traditional CSCW issues

pertaining to session management and floor control are brought to the fore. Clearly most organisational conversations have an ongoing character as opposed to the traditional view of sessions discretely organised in time (Whittaker et al., 1997). Participants will need to engage in prioritisation of competing conversation threads, and the generally poor support for ephemeral and unobtrusive modes of interaction, which are essential for obtaining fluid session management (Whittaker et al., 1997; Olson & Olson, 2000; Wiberg, 2001), implies significant challenges.

We have based the analysis of fluid mobile interaction on the assumption of proactive actors exercising their judgement in the situation as to who they wish to interact with, for how long and if they choose to turn on the answering machine and email instead of engaging in a telephone conversation. Here, we therefore critically emphasise the role of the individual's subjective preferences as opposed to organisational or task rationality in terms of purpose, duty, or need. We acknowledge that there of course exist systems of power, domination, division of labour and so on.

## **Discussion**

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This chapter has, through theoretical inquiry, aimed at outlining the main challenges for understanding fluid mobile interaction from the perspective of the individual actor constantly faced with detailed decisions as whether or not to engage in interaction with others. Our discussion in this chapter has been based on the explicit choice of attempting to integrate theories from social topology, sensitising how we generally can characterise changes to work practices, with theories emerging from detailed operational studies of how new technologies can be integrated within organisational practices. Traditionally the former strand of research retains great distance to discussions of actual technologies and work practices, whereas the latter almost exclusively focus on how concrete technological innovations integrate with the performance of specific tasks. We find that both perspectives ought to be called upon when attempting to address some of the most important issues organisations are faced with at the moment. One of the reasons for this relates to a particular discourse we have not related to in this chapter, but which naturally would be a key subject for further consideration, namely the issue of the relationship between modes of organising and the mobilisation of interaction.

Rapidly adopted technologies such as email, mobile phones and instant messaging can be characterised by their interpretative flexibility in terms of the individual user locally defining the patterns of use. They basically provide a backbone mobilising conversations, and relative little else. Thereby, they support the individual actor in engaging in encounters with others whilst retaining emergent processing of information, thus enabling the individual user effectively to cope with tasks of relatively low complexity but relatively high degree of complexity (Mathiassen & Sørensen, 2002). The local application of locally conditioned microprocedures (Lanzara & Patriotta, 2001) is used as a means of coping with conflicting interactional requirements. The individual actors specific configuration and application of a single ICT, as well as the specific patterns of use and portfolio choice of multiple technologies, can be viewed as locally conditioned improvisation to resolve the local messiness (Ciborra, 2002).

Some of the unintended consequences of the flexibility and immediacy of these technologies are then their flexibility to be applied, for example, for tasks of high complexity and low degree of uncertainty. Here, simple mobilised conversation representing emerging information processing could, for example, be replaced by a systematisation of the information processing, thus reducing the risk of participants experiencing interaction overload (Mathiassen & Sørensen, 2002). Imagine the slightly silly proposition of having to replace Amazon.com's automatic order handling system with a call centre. However, in order to comprehensively analyse the mobilisation of interaction and the struggle to obtain fluid mobile work, we cannot exclusively look at the overall social or managerial issues of rational ways of organising work. The individual actor's intentions, desires, moods, local dispositions, etc., will greatly affect the microprocedures they employ for managing their own availability and interactivity (Ciborra, 2002). Here, one of the key issues pertaining to the individual's experience of fluid work will be the daily unfolding of both interaction and outeraction, where the latter characterises communicative processes employed solely to establish and discuss connections with each other, as opposed to actually communicating (Nardi & Whittaker, 2000). When, for example, mobile voicemails only containing the message "*ring me at...*" are served in a ping-pong fashion between people, all they do is outeraction. If there are constantly discrepancies between individual actors' desire to be interactive or interpassive, the increased mobilisation of interaction can lead to dramatic increases in this "coordination of coordination work" (Ljungberg & Sorensen, 2000). The recursive relationship between interaction and outeraction does, however, not stop after the first recursion, and a question for further empirical

and theoretical investigation is the changes to the ways in which individuals and organisations manage interaction in general. When all members of an organisation have mobile phones, then there needs to be both general as well as highly specific discussions of how these can be used to facilitate fluid mobile work. However, the organisation may also need to discuss how to coordinate and discuss the use of new interaction technologies.

Neither can we exclusively study these phenomena in a bottom-up fashion. The mobilised interaction always takes place within a social and perhaps even an organisational context. This raises socially conditioned issues of power, influence, domination, culture, privacy, surveillance, etc. It may, for example, be a very good idea for mobile workers to know what close colleagues are doing and where they are located, such as discussed from a technical and operational perspective by Tang et al. (2001). However, in some contexts it will be considered surveillance of work if the information is shared with others in the organisation (Ciborra, 1996). Similarly, if the project team members are distributed and highly mobilised, it is probably not acceptable from an organisational point of view if a key member of the project decide that maintaining fluid mobile work involves sustained periods of disconnectedness.

There are, in our view, significant methodological consequences of the mobilisation of interaction. When studying CSCW systems, it is a significant challenge to sufficiently cover and understand the roles, opinions and detailed actions of distributed interdependent actors (Grudin, 1994). Even more distribution and mobilisation of interaction will potentially imply even more methodological challenges for fieldwork design. The mobilisation of interaction also brings novel approaches to the fore, such as conducting virtual ethnographies, studying mediated interaction patterns (Hine, 2000).

Summarising, it is clear that a host of research results from varied fields can inform the discussion of fluid mobile work, and that this research at the same time must be appropriated to situations where the interaction as well as the actors are highly mobilised. The state-of-the-art technologies we have seen so far show us interesting glimpses of the future, but it is evident that the real issues in contemporary working life are radically changing and that the current technologies being used do not sufficiently address the main issues.



## References

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- Agre, P.E. (2001). Welcome to the always-on world. *IEEE Spectrum*, pp. 12-13.
- Ciborra, C.U. (ed.). (1996). *Groupware and teamwork: Invisible aid or technical hindrance?* Chichester, UK: John Wiley & Sons.
- Ciborra, C.U. (2002). *The labyrinths of information: Challenging the wisdom of systems*. Oxford: Oxford University Press.
- Dahlbom, B., & Ljungberg, F. (1998). Mobile informatics. *Scandinavian Journal of Information Systems*, 10 (1&2), 227-34.
- Dix, A., & Beale, R. (eds.). (1996). *Remote cooperation: CSCW issues for mobile and teleworkers*. London: Springer-Verlag.
- Dix, A., Rodden, T., Davies, N., Trevor, J., Friday, A., & Palfreyman, L. (2000). Exploiting space and location as a design framework for interactive mobile systems. *ACM Transactions on Computer-Human Interaction*, 7 (3), 285-321.
- Fagrell, H., Ljungberg, F., & Kristoffersen, S. (1999). Exploring support for knowledge management in mobile work. In S. Bodker, M. Kyng, & K. Schmidt (eds.), *Proceedings of the Sixth European Conference on Computer Supported Cooperative Work (ECSCW '99), Copenhagen, Denmark*.
- Goffman, E. (1982). *Interaction ritual: Essays on face to face behavior*. New York: Pantheon Books.
- Grudin, J. (1994). Groupware and social dynamics: Eight challenges for developers. *Communications of the ACM*, 37 (1), 93-105.
- Heath, C., & Luff, P. (2000). *Technology in action*. Cambridge: Cambridge University Press.
- Hine, C. (2000). *Virtual ethnography*. London: Sage.
- Kakihara, M., & Sørensen, C. (2002). Mobility: An extended perspective. In *Thirty-Fifth Hawaii International Conference on System Sciences (HICSS-35), Big Island Hawaii*. IEEE. Retrieved from the World Wide Web: <http://www.hicss.org/>.
- Kim, H., Kim, J., Lee, Y., Chae, M., & Choi, Y. (2002). An empirical study of the use contexts and usability problems in Mobile Internet. In the *35th Hawaii International Conference on System Sciences (HICSS-35)*,

- Big Island, Hawaii*. IEEE. Retrieved from the World Wide Web: <http://www.hicss.org/>.
- Kleinrock, L. (1996). Nomadicity: Anytime, anywhere in a disconnected world. *Mobile Networks and Applications*, 1, 351-357.
- Kopomaa, T. (2000). *The city in your pocket: Birth of the mobile information society*. T. Snellman (trans.). Helsinki: Gaudeamus.
- Lanzara, G.F., & Patriotta, G. (2001). Technology and the courtroom: An inquiry into knowledge making in organizations. *Journal of Management Studies*, 38 (7).
- Ljungberg, F. (1999). Exploring CSCW mechanisms to realize constant accessibility without inappropriate interaction. *Scandinavian Journal of Information Systems*, 11 (1), 25-50.
- Ljungberg, F., & Sorensen, C. (2000). Overload: From transaction to interaction. In K. Braa, C. Sorensen, & B. Dahlbom, *Planet Internet* (pp. 113-36). Lund, Sweden: Studentlitteratur.
- Mäenpää, P. (2001). Mobile communication as a way of urban life. In *Proceedings of the Workshop on "Mobilize!: Interventions in the Social, Cultural and Interactional Analysis of Mobility, Ubiquity and Information and Communication Technology"*. UK: Digital World Research Centre, University of Surrey.
- Mackay, W.E. (1988). Diversity in the use of electronic mail: A preliminary inquiry. *TOIS: ACM Transactions on Office Information Systems*, 6 (4).
- Makimoto, T. & Manners, D. (1997). *Digital Nomad*. Chichester: John Wiley & Sons.
- Mathiassen, L., & Sørensen, C. (2002). A task-based theory of information services. In *Proceedings of the 25th Information Systems Research Seminar in Scandinavia (IRIS 25)*. Denmark: Copenhagen Business School.
- Mol, A., & Law, J. (1994). Regions, networks and fluids: Anaemia and social topology. *Social Studies of Science*, 24, 641-71.
- Nardi, B. & Whittaker, S. (2000). Interaction and outeraction. In *Proceedings of Computer Supported Cooperative Work, Philadelphia, USA* (pp. 79-88).
- Nilsson, S., Svensson, L., Bengtsson, F., & Johansson, C. (2000). Exploring awareware. In *Doing IT Together: Proceedings of the 23rd Informa-*

- tion Systems Research Seminar in Scandinavia (IRIS 23)*. Laboratorium for Interaction Technology, Trollhättan Uddevalla University, Sweden.
- Norman, D.A. (1993). *Things that make us smart. Defending human attributes in the age of the machine*. Reading, MA: Addison-Wesley.
- O’Conaill, B., & Frohlich, D. (1995). Timespace in the workplace: Dealing with interruptions. In *Proceedings of CHI’95 Human Factors in Computing Systems, New York* (pp. 262-263). ACM Press.
- Olson, G.M., & Olson, J.S. (2000). Distance matters. *Human-Computer Interaction, 15*, 139-178.
- Rouncefield, M., Viller, S., Hughes, J., & Rodden, T. (1995). Working with constant interruption: CSCW and the small office. *The Information Society, 11* (4), 173-188.
- Schmidt, K., & Simone, C. (1996). Coordination mechanisms: An approach to CSCW systems design. *Computer Supported Cooperative Work: An International Journal, 5* (2&3), 155-200.
- Schön, D.A. (1983). *The reflective practitioner: How professionals think in action*. New York: Basic Books.
- Schultze, U., & Vandenbosch, B. (1998). Information overload in a groupware environment: Now you see it, now you don’t. *Journal of Organizational Computing and Electronic Commerce, 8* (2), 127-148.
- Sørensen, C., Fagrell, H., & Ljungstrand, P. (2000). Traces: From order to chaos. In K. Braa, C. Sørensen, & B. Dahlbom (eds.), *Planet Internet* (pp. 113-136). Lund, Sweden: Studentlitteratur.
- Suchman, L.A. (1987). *Plans and situated actions: The problem of human-machine communication*. Cambridge: Cambridge University Press.
- Tang, J.C., Yankelovich, N., Begole, J.B., Van Kleek, M., Li, F., & Bhalodia, J. (2001). ConNexus to Awarenex: Extending awareness to mobile users. *CHI 2001, 3* (1), 221-228.
- Urry, J. (2000). *Sociology beyond societies: Mobilities for the Twenty-First Century*. London: Routledge.
- Weilenmann, A. (2001). “I can’t talk now, I’m in a fitting room:” An initial investigation of the ways in which location features in mobile phone conversations. In *Proceedings of the Workshop on “Mobilize!: Interventions in the Social, Cultural and Interactional Analysis of Mobility, Ubiquity and Information and Communication Technology.”* UK: Digital World Research Centre, University of Surrey.

- Whittaker, S., Davies, R., Hirschberg, J., & Muller, U. (2000). Jotmail: A voicemail interface that enables you to see what was said. In *Proceedings of CHI2000 Conference on Human Computer Interaction* (pp. 89-96).
- Whittaker, S., Swanson, J., Kucan, J., & Sidner, C. (1997). TeleNotes: Managing lightweight interactions in the desktop. *Transactions on Computer Human Interaction*, 4, 137-168.
- Wiberg, M. (2001). *In between mobile meetings: Exploring seamless ongoing interaction support for mobile CSCW*. PhD Dissertation. Umeå University, Sweden.
- Wiberg, M. (2002). Interaction, interruptions, and lightweight support for availability management: A pre-study of issues related to the fluidity of work in the interaction society. Working paper 02.03, Department of Informatics, Umeå University, Sweden.
- Wiberg, M., & Ljungberg, F. (2001). Exploring the vision of “anytime, anywhere” in the context of mobile work. In Y. Malhotra (ed.), *Knowledge Management and Virtual Organizations* (pp. 157-69). Hershey, PA: Idea Group Publishing.
- Wiberg, M. & Whittaker, S. (2004). Managing interruptions: Supporting lightweight availability negotiations on mobile phones. Submitted to international journal.

## Endnote

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- \* The authors have all contributed equally to this chapter and are listed in alphabetical order only.

## Chapter VIII

# Mobile IT as Immutable Mobiles? Exploring the Enabling Qualities of a Mobile IT Application

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### **Abstract**

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*This chapter explores the social consequences of mobile IT. Even though the need for better theorizing on the topic has been highlighted recently, most attempts to date have failed not only to properly explore the social consequences of mobile IT, but also in being specific about the technology itself in any detail. A promising approach with which to explore mobile IT and its social consequences may be found in actor network theory (ANT). ANT's rich methodology embraces scientific realism in its central concept of hybrids that are simultaneously technological and social. The advantages of conceiving mobile IT applications immersed in and a part of a network of hybrids are explored by drawing from a project concerned with mobile IT use in the context of the mobile bank terminal (MBT). It was found that the users were less than enthusiastic over the MBT, and two key problems*

*were identified. First, the poor design of MBT hampered the possibilities for ad-hoc activities. Second, the users felt that ad-hoc activities could be seen as somewhat irresponsible in the context of banking business. To this end, the problems related to the MBT use were both social and technical. We conclude by identifying and elaborating on some aspects of the social consequences of mobile IT use in order to shed new light on the possibilities and challenges that mobile IT use conveys.*

## **Introduction**

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Dramatic advances in technology, fierce economic competition, and processes of globalization are changing the world at a rapid pace. Linked to these changes is the need for increased and ongoing interconnectedness between people. Most pertinent, perhaps, of today's advanced technologies are the new and highly advanced mobile IT applications. Clearly, interest in mobile applications is increasing, and savvy firms are pondering the strategic implications of m-commerce to their products and markets. Mobile phones are becoming omnipresent and we are only beginning to see their effects on social and economic life. Worldwide, at the beginning of 2000, the number of cellular subscriptions was 470 million, and this was thought to grow to 1 billion by the end of 2003 (Ovum, 2000). It is also thought that the number of Internet-enabled mobile phones (using WAP or its successors) will increase from 1.1 million at the end of 1999 up to somewhere around 80 million worldwide by 2003 (Jupiter Communications, 2000; Yankee Group, 2000).

A central question for IT researchers is how the process of mobile IT use changes perceptions of relationships and interpretations of time and space. This paper seeks to answer this question and provide a direction for future research on mobile IT use. To this end, it is important to consider technological as well as social issues in this process.

It is fair to say that, in general, research on mobile IT use has not often been theory-informed. More typically, research on mobile IT use has been primarily an observational endeavor composed of a diverse and idiosyncratic range of studies, often uncoupled to each other and to theory. This lack of theoretical platform is unfortunate, as researchers are confronted with a great number of different technologies and a great diversity of contexts. Although it can be argued that recent research on mobile IT use has been better linked to theory

(e.g., Cooper, 2002; Kopomaa, 2000; Laurier, 2002), a clear need remains in research on mobile IT use to improve the linkage between formal theory and observations. An ancillary need is for the field to develop central, key questions that are pertinent today, but unanswered.

For this reason, the present study undertakes a further analysis to understand the dynamics of mobile IT use. The study is an attempt to explore issues of temporality and spatiality, and their relation to mobile IT. The study examines empirically experiences from a project focused on the development of a mobile IT application to be used by bank customers. The findings highlight the theoretical implications of the combined deployment of notions of time and space in the use of mobile IT, and contribute to the literature on IT-enabled activities in a broader sense. Finally, the results yield practical insights into how we can best support mobile IT use.

## **Understanding Mobility**

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### **Mobile IT and the Need for Better Theorizing**

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The topic of mobile IT use brings together, ideally, theories about the organization of social behavior, and the enabling role that technology plays in such processes. Mobile IT use, thus, should be seen as an emergent property, resulting from technological advances and social organization.

Dahlbom & Ljungberg (1999) discuss the need for better theorizing on the topic:

*“Once IT support for mobile work is brought into focus as an important subject matter of informatics, our discipline receives a whole new agenda. Mobile IT use, mobile computing becomes the subject matter of what we may call mobile informatics, and in view of the importance of its subject matter, mobile informatics becomes one of the more important sub-disciplines of our discipline. We need to develop a theory of mobile IT use. And in order to do so we have to answer such questions as: Why has mobility increased? What are the major varieties of mobile IT use? How do we define mobile computing (mobile IT use)? What are the condi-*

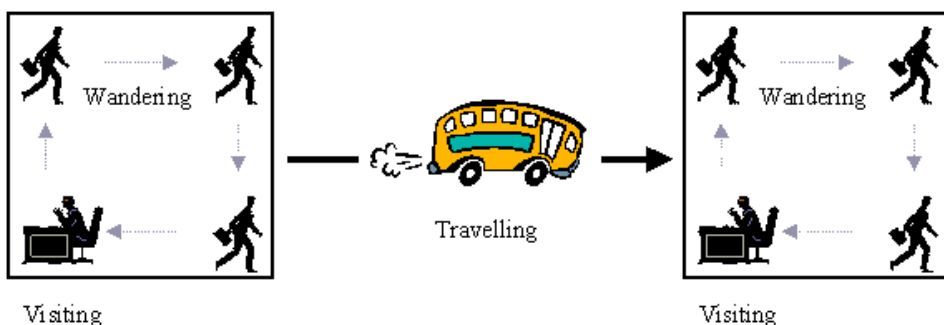
*tions of mobile work and other activities that now become mobile? What kind of technology is there to support mobile activities, and what kind of technology could we develop?” (Dahlbom & Ljungberg, 1999, pp. 228-229)*

As an attempt to explore the issue theoretically, Kristoffersen & Ljungberg (1998) attempt to name and frame mobility in three aspects or modes:

- *Traveling* – refers to the movement towards a specific goal. This is an activity that takes place when traveling in a vehicle. From the perspective of mobile IT support, we find technologies such as street finders and restaurant guides, etc. However, this modality can allow for stationary IT use as well.
- *Visiting* – refers to the ways in which a person stays in a specific place before moving on to other places. It is an activity that happens in one place and for a restricted period of time.
- *Wandering* – refers to movement within a limited area or domain. For instance, the IT support staff described by Kristoffersen & Ljungberg (1998) spend much of their time “wandering” around the building to meet users that want their help. This extensive local mobility is referred to as wandering.

Unfortunately, these aspects of mobility does very little to uncover the very character of mobility. First, it says little or nothing of the ways in which mobile IT enabled these modalities. Second, implicit in these modalities is that they are

*Figure 1. Three modalities of mobile IT use*





temporary and can only be understood from the point of view of that which is to be considered as “normal” is not mobile. In other words, they all relate to a “home base” (Wiberg, 2001: 72) that is not mobile in its character.

It is important that we explore mobile IT use in more detail. Mobile ITs are everywhere and their implications cannot be grasped by looking at mobile IT use as merely a temporary deviation for that which is stable, stationary, and static. Recognizing the pervasiveness of today’s mobile IT application, Lyytinen & Yoo (2001) describes “nomadic computing” as something of paradigmatic importance in that it changes not only our society in a profound way but also requires us to reconsider some of the fundamental and underlying assumptions in IS research. Being nomadic, in their view, is not a temporary mode we pass through between stationary modes, but rather something we constantly face and thus something in need of critical scrutiny.

A nomadic information environment, in Lyytinen & Yoo’s (2001) view, is described as:

*“...a heterogeneous assemblage of interconnected technical and organizational elements, which enables physical and social mobility of computing and communication services between organizational actors both within and across organizational borders. The novel features of such an environment are its high level mobility, the consequent large scale of services and infrastructure, and the multiplicity of services in terms of data processes and transmitted – often called digital convergence. These three technological drivers – mobility, digital convergence, and mass scale – underlie most developments in future computing technology” (Lyytinen & Yoo, 2001, p. 3).*

Recognizing the fundamental shift for IT use that the mobile IT applications represent is an important endeavor, and downplaying this by explicitly or implicitly understanding mobility as a temporary state and to understand the stationary and static as the default, would be to miss a central and paradigmatic societal shift. Thus, we recognize that the model presented by Kristoffersen & Ljungberg (1998) provides us with a somewhat limited understanding of mobility. For the purposes of this paper, we will seek to explore the character of mobility from a theory-informed perspective, so as to better understand not only the social interplay of multiple actors who attempt to make sense of their

is for one actor to get another actor (or network of actors) to act in a desired manner. The changes that occur are referred to as *translation*.

Another important concept is that of *immutable mobiles*. We are faced with immutable mobiles when objects “have the properties of being mobile but also immutable, presentable, readable and combinable with one another” (Latour, 1990, p. 26). Immutable mobiles thus provide us with a way of “structuring vision” where we probably find the map as the best example. It is “immutable” in as much as it remains the same as it passes through time and space, and “mobile” to the degree that it can be circulated from hand to hand. Constructing an immutable mobile demands that all the inscriptions to be placed within it be first produced and then collected in one particular place — a “centre of calculation.” However, it should be noted that immutable mobiles require some work function. In short, they still need to be immersed in a network (Mol & Law, 1994).

The theoretical framework for studying mobile IT applications must be sufficiently rich to comprehend the complexities of these the interactions involved, and ANT offers a promising set of analytical resources for this purpose [see Cooper (2002) for an example of ANT used to explore the nature of mobile IT].

## **The Case of MBT – An Offline Service for Mobile Banking**

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To illustrate the interplay between technology and social practices in the context of mobile IT use and to provide a concrete example of how this new technology enables support for new activities across time and space we will below outline a case study of MBT — a Mobile Bank Terminal.

### **Background and Research Methodology**

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The Swedish bank *Förenings sparbanken* has developed a mobile bank terminal (MBT) as an additional customer channel to their infrastructure (besides ATMs, the telephone bank, the WAP bank, and the Internet bank). For the purposes of the first version of MBT the bank made use of a Compaq handled computer, an iPAQ 3630 together with a GSM-phone with possibili-

ties for communication via Bluetooth or IR. It allows the user to do all various kinds of activities that can be done today on the Internet bank or the telephone bank (e.g., checking account balance, move certain amount of money between different accounts, pay bills, etc.).

The target group for this service is well-educated business people looking for time-efficient technologies to enable them to do things like banking while waiting for something else (e.g., while sitting on a train waiting to reach the destination). This target group was chosen based on an assumption that these persons are probably interested in new technology, are typically used to technology in their work life, and probably have a relatively high income. Another assumption made was that it is important to have comfortable solutions and different channels for managing bank business for today's bank customers.

The MBT banking service is implemented on handheld devices and has been co-developed by *Förenings sparbanken* and a company in the US. The MBT is still a research prototype but has been put into use in a pilot study. The study involved 100 test persons. This relatively large test group consisted of people working in the bank as well external persons. During a period of three months the MBT prototype was tested by people working at the bank and external persons. During the test period the test persons borrowed the handheld devices from the bank with the MBT application preinstalled. As a precondition for becoming a test person the person needed to be: 1) a customer at the bank, and 2) an Internet bank customer at the bank, to be able to pay their bills via the Internet bank. The only instruction given to the test persons was to feel free to use the MBT as much as they liked, but at least three times every week. They also committed themselves to fill out a questionnaire handed out by the bank in the end of the test period.

The empirical material was collected through 11 semi-structured interviews with MBT users, and two interviews with the project manager. These interviews were conducted at the bank's head office in Stockholm on two occasions. During the first occasion the project manager and three users were interviewed. During the second occasion the project manager was interviewed again, and an additional eight users were interviewed. These interviews were all audio taped and transcribed. In addition, four different meetings were held with people involved with the project where we got information and documentation about the project, gained access to the users, and were presented with the MBT application. In the presentation of the results the users are given numbers from 1 to 11 to enable the reader to keep track of the different voices in the empirical material.

## MBT as a Complementary Channel between Bank and Customer

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The key ambition with the service is “to bring the bank closer to the customer” (project manager). Since MBT is an offline service it can support the user wherever he/she is (e.g., on the beach, in a foreign country, or onboard an airplane) since no other infrastructure (e.g., a reliable wireless network connection to the Internet) is needed. However, to keep the data in MBT updated with the bank and transactions made the user needs to synchronize his/her device now and then. Today, this can be easily done by just putting the PDA in its cradle, which is connected to a computer, or simply by using a mobile phone with built-in modem to call up the bank over GSM or GPRS. When a secure connection is established between the PDA and the bank server, all transactions made on the PDA is transferred to the bank and synchronized with any other transactions made (e.g., VISA card transactions, Internet bank transactions, etc.).

MBT makes it possible to do almost any kind of action that is possible to do over the Internet bank channel. However, the main advantage with the MBT is not that it supports all the online Internet services, but that it supports offline activities. For instance during flight trips, the user can manage his or her accounts and make some transfers offline and then just synchronize the information whenever its possible to connect to the Internet.

The bank saw MBT as a *complementary channel* to the other channels available to the customers (e.g., the bank offices, the telephone bank, the Internet bank, the ATM machines, etc.).

One of the users commented on this:

*“I guess this is a good idea, and I can see myself using it if only the next version is more easy to use. It is pretty similar to the Internet bank with the difference that now I can bring this with me wherever I go.” (user 1)*

Some users were concerned, however, about the benefits with a new channel:

*“I just don’t see the point. To be honest, I tried to be open about this. Maybe it’s just me being, well... older than the target group,*

*but I just can't see what type of business that needs such an urgent attention. I do my banking business at home by my PC.” (user 4)*

Another intention with the design, as expressed by the project leader at the bank, was that it could be a good complement for customers on vacation where the customer might not have access to the Internet so easily.

One of the users commented on this possibility:

*“In all honesty, I try to put these types of things out of my head while on vacation. I just don't want to bother with it, and it is no problem whatsoever to deal with transactions before going on vacation. “ (user 7)*

In sum, there were mixed feelings about MBT as a new channel that would complement the other existing channels. While some users were positive about it, others felt no benefits from MBT.

## **Perceived Limitations with MBT**

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According to one of the users the effect was “a few sessions fewer with the Internet bank and the bank-on-the-phone” (user 7). For those who used MBT, the benefits of using it were seen as moderate. There were also many users who never got around to actually using it. The key reason for this lay in the feeling that it was simply not well designed to be used while on the run:

*“This handheld thing they gave us, I actually never brought it with me. It was still a bit big to carry around... “ (user 4)*

Among those who actually used it, a main concern was that it contained too few features and thus enabled a limited set of activities. Moreover, the MBT does not work as a channel in and of itself; in fact it is a presupposition that the user is also a user of the Internet bank. A general concern among the users was that MBT was perceived as a complement to the Internet bank. In fact, one of the users referred to the MBT as a “light version” of the Internet bank.

A general concern among the users was that the functions were seen as somewhat limited. To become really useful future versions had to contain more functions.

*“Seeing as there are so few features in MBT I just can’t see the need to bring it with me. I can use the bank-on-the-phone to transfer money. Had it only contained more features I probably would have used it.” (user 5)*

The users were also a bit uncomfortable with the offline concept. In fact, the idea of being able to work offline is a fundamental idea behind the whole project and this idea did not go down well among all users. People raised concerns about the offline status and the real status. The users felt that a potential problem for them could be the difference between the real status on their accounts and the status that they are given by the PDA. Of course, this only happens if the user does not log on and update the status on the account, but it was still a concern among the users.

The overall distrust towards the service was also reflected in the ways in which the users felt it necessary to double-check the figures on the Internet bank:

*“I like to have a total control over my transactions (...) I can have that on the Internet bank. I use that to go through all the figures to make sure everything is alright.” (user 11)*

There were several practical concerns raised in the interviews with the users dealing with the problems in using the MBT while moving around. It was perceived as somewhat problematic to log on, and many users had experienced problems to log on at all at times. One of the users also pointed out that the log on process, where two different passwords were needed, also hampered any ad-hoc use of MBT.

## **Supporting Action Across Time and Space**

The primacy of *place* as is apparent in studies of formal organization. While there are many problems in mobile work, such as getting the support one might

need while on the move, the potential of reducing the ties to a certain place is certainly interesting. In this process we can witness the transformation of locations, such as public and private transport sites, into locations where we perform our business transactions. The same can be said about *time*: since the mobile IT user brings with her the artifact, aspects such as the plans of the user can potentially be changed over time more easily.

The users involved in the MBT pilot study were not overly enthusiastic over the new possibilities for transcending time and space:

*“In my mind this is not a very good item. I mean, if I am to bother about using it I also need to see the benefits. I guess I am a bit critical about the whole idea here, but the whole thing needs some serious thought before this item can be presented to the customers on a large scale. I can see a scenario where the technology is more easy to use and where the services are a bit more interesting. Then I would use it. Now I just don’t bother.” (user 8)*

A key idea behind the project was that of enabling the users to perform improvised and ad-hoc activities. None of the persons interviewed could give a good example of this. Even though several users did use the MBT and found it useful to some extent, their use was planned beforehand:

*“I take it [the MBT] with me when I travel. I make a lot of transactions on the plane and on the bus. I find it really convenient and it is really a practical thing for me. I always try to prepare my flights so that they won’t be just time wasted. I take care of the transactions on the MBT and then quickly log on when at home to ship it all out. I know I can use the mobile phone for this but there’s no rush really. But I wouldn’t say that this is an example of me improvising. I do what I plan to do and that’s it.” (user 2)*

The whole idea of banking business being something that you plan well in advance and not a domain that is open for improvisation was expressed by all the users we interviewed. It was apparent that the users felt that banking business was a serious undertaking and that they were careful in planning transactions. To this end, it seemed as if the ad-hoc possibilities were not interesting for the users:

*“While this is all very interesting, I guess that at the end of the day I don’t feel that people will be interested in improvising with one’s money. I guess most of us have a different stance towards money, I know I do anyway. You never know, this may turn out great in the end. But for now I just can’t see myself making transactions the way they [the project management] seem to picture me doing”*  
(user 7)

The project manager felt that there were more possibilities related to MBT than meets the eye and expressed a view that had to do with improvements not only in the MBT but also in finding the right target group.

*“I know that the users are not wild and crazy over it, but I must say that this says a lot about them too. I must say that some of them are difficult to please and you need to be interested in technology if you are to overcome the barriers here. We will consider their feedback naturally, but I am still certain that we must be better at finding the correct target group for MBT if we are to make a hit out of this.”*  
(project manager)

In sum, the potential of transcending time and space was not realized in this pilot test. There was some potential of doing this, but the barriers were seemingly too difficult to overcome.

## **Discussion**

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The results provide empirical indication that while there is a huge potential in mobile IT in banking, the poor design of MBT hampered the effects of the prototype. Moreover, the results also demonstrate how use of mobile IT provides only partial support for banking activities because of the distrust people have against ad-hoc activities in relation to what they perceive as very serious business.

The study makes a contribution into the barriers involved in mobile IT support for improvisation and situated action. This contribution is well in line with the insights provided to us by Suchman, who argues that plans can only be



understood as vague resources for situated actions (Suchman, 1987). Drawing from the initial findings from the MBT case, we share this view and our attention should be drawn towards the situated actions where humans and non-humans interact. The fact that MBT did not support the user with possibilities to act on an ad-hoc basis was related to two aspects of the MBT use. First, the poor design hampered the possibilities for ad-hoc activities. Second, the users felt that ad-hoc activities could be seen as somewhat irresponsible in the context of banking business. To this end, the problems related to the MBT use were both social and technical. Thus the study satisfies a need for a balanced debate where both social and technical elements related to mobile IT use are considered. In particular, we do not reduce socio-technical matters to merely a social matter. Clearly, it is becoming increasingly difficult to distinguish between the social and the technical in mobile IT use – both dimensions mobilize each other and they are interrelated in a fundamental way. From an analytical point of view this may prove to be a dilemma that is hard to resolve. Looking at the intertwined socio-technical elements from an ANT point of view, however, does not embrace the ambition to treat social and technical elements as separated elements, but rather to see them as profoundly inter-related. The complex, network-dependent nature of artifacts is captured by ANT's conception of them as actants or hybrids. The development of MBT reminds us how the enrollment or inclusion of elements into actor networks involves an ongoing negotiation, as these elements may prove to be difficult to hold in place. As noted by Law, "...there is almost always some degree of divergence between what the elements of a network would do if left to their own devices and what they are obliged, encouraged, or forced to do when they are enrolled within the network" (Law, 1990, p. 114). Even though it is far from obvious at this point to say anything about who enrolls whom (will the mobile IT user enroll the technology to better reach her agenda, or will she comply to the inscribed behavior?), it is safe to say that technology does matter for social issues, and vice versa.

To better grasp the character of today's mobile IT use, we can explore this notion in some detail by looking at the ways in which mobility relates to the notions of temporality and spatiality.

MBT makes it possible to take action (e.g., transfer money between different accounts) while being mobile independently of any infrastructure other than your iPAQ. Such relative freedom from the "home base" makes it possible to plan for some actions (i.e., transactions) at home and then make changes to these plans according to new and unforeseen circumstances. Hence the

*Figure 2. Temporal and spatial aspects of mobile IT use*

		Plans extension in time	
		Continuous	Discontinuous
Relation between user and home base	Separated		Improvised action
	Co-located	Planned action	

distinction in the relation between user and home base in terms of co-located and separated. Home base, in this context, refers to the infrastructure needed to perform banking activities, such as the PC and Internet connection for using the Internet bank. The bank aimed at a separation between user and home base by means of the MBT. They also aimed at enabling the user to act on an ad-hoc basis, meaning that her plans could be easily changed when the MBT is carried around everywhere. It is always handy and any idea for a transaction can soon be realized. The possibilities for improvised action, then, lie in the ability to change plans over time and to act in a context separated from the home base. This stands in sharp contrast with planned action, where the user and home base is co-located and the plans are generally continuous over time. It should be noted that in practice, of course, these ad-hoc actions are only about preparing some transactions while being mobile and then finishing them when back at the home base (i.e., in front of any computer with Internet access).

One key aspect of mobility is how it represents a transcending of space in the way that plans and actions no longer are separated in space. As we move from space to space, we no longer need to plan ahead to make sure that when we

reach a new space we will have planned beforehand about possible alternatives. Instead, enabled by mobile IT, plans can continuously be reconsidered and re-adapted in the light of new circumstances. Moreover, for the mobile IT user, plans about activities in a given context are not presupposed before the user enters that particular context. That is, the actor contemplating his alternatives in a given context has, by means of mobile IT use, become enabled to access information of importance to the context at hand, and also enabled to continuously re-evaluate the situation based on new information.

Having said this, we must consider how technologies have the potential both to enable us to transcend our current *modus operandi* as well as to reproduce it. In the MBT case, the *modus operandi* from the Internet bank use was reproduced in the MBT use. There were little or no differences between the uses of these two technologies. The two problems identified – the poor design that hampered the possibilities for ad-hoc activities, and the users feeling that ad-hoc activities could be seen as somewhat irresponsible in the context of banking business – presents us with a major challenge for future versions of MBT. Some problems can be dealt with by better design. To this end, this study also makes a contribution into issues related to customization and personalization. The challenge related to enable the mobile IT user to act in an improvised manner could, to some degree, be dealt with by customization. But the fact that the users felt a discomfort in using MBT in an improvisational mode suggests that the mobile IT application maybe cannot be put to use in such a manner that the project manager had pictured. From an ANT perspective it can be said that the translation process came to a halt. It did not end up with a morphed version of MBT due to the translation process, nor did it pass through time and space unchanged (or recombined with other elements) like an immutable mobile. Rather, it just failed to make an impact on the mobile scene for the user. To this end, it is important to reflect over the project in terms of its underlying visions and see if these visions can be changed for future versions of MBT. As it stands today, it needs to be revised and redesigned in a fashion that considers both the problems the users had with the design of the first version of MBT, and the context in which it will be situated. In the ANT vocabulary, the scripts need to be revised.

We believe our research is a demonstration that the theoretical lens offered by the ANT literature provides a rich conceptual framework for understanding how mobile IT can enable some activities while other activities are not enabled (or enable in a poor fashion). Using the ANT vocabulary, we can see how interpretations and re-interpretations are often revised collectively in a process

of conversation and retrospection among actors in the network. The result is often a level of convergence between understanding, knowledge and values among the actors involved. However, as new actors are enrolled to the growing actor-network their interpretation does not always converge with the inscribed behavior. Inscriptions can always be disputed and to a certain extent converted. Technologies generate actions and chains of consequences that in turn can provoke new actions, but while technologies are only meaningful inside a network of associations, the inscribed behavior can at times resist reinterpretation.

## Conclusions

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While many studies have drawn attention to the interplay between technology and social practices in the context of mobile IT use, few studies have ventured deeply into the social consequences of mobile IT. To date, very little relevant and theory-informed research has been conducted on the social consequences of mobile IT use, and most of the research that has been conducted has focused on only limited and fragmented aspects of mobility. We must do better than that in order to explore mobility and its consequences in full. To this end, this paper echoes the call for theories of mobility expressed by Dahlbom & Ljungberg (1999).

Bringing in social theories as tools to think with helps us to better understand not only mobile IT applications but also their social contexts. It should be clear that our minds are extended in space and time through the use of IT, once such technologies have been digitized, and it seems as if human bodies to some extent merge with these technologies (Haraway, 1989). Mobile IT use illustrates this well, as the mobile IT user equipped with mobile IT application can be seen as a “socio-technical hybrid” (Latour, 1993).

The fundamental challenge at hand is to explore in detail the nomadic nature of mobile IT use – they move with us and should thus be understood as part and parcel of the social. To this end, we suggest that ANT can play a role in better making sense of the new socio-technical hybrids we are facing. Looking at the problems identified in the MBT case, we can see how deeply intertwined the social and the technical aspects are. First, the poor design hampered the possibilities for ad-hoc activities. Second, the users felt that ad-hoc activities

could be seen as somewhat irresponsible in the context of banking business. To this end, the problems related to the MBT use were both social and technical. It is our hope that exploring these problems related to mobile IT use we also shed new light on the possibilities and challenges that mobile IT use conveys. If there is one thing that the discussion shows, it is that there were and still are other ways to square the circle as long as some of the initial assumptions are questioned. Mobile IT use includes local interpretations of the technology as well as the values inscribed in the technology. Inscriptions in the technology do not prescribe its use or how any particular use is to be promoted. Rather, they are only a part of the whole package, and approaching mobile IT use from an analytical position we should see to conduct an analysis in the light of situated knowledge and partial perspectives in line with the ANT approach, and ask what these inscriptions are and what their effects might be.

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## References

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- Akrich, M., & Latour, B. (1992). A summary of a convenient vocabulary for the semiotics of human and nonhuman assemblies. In W. E. Bijker & J. Law (eds.), *Shaping Technology/Building Society*. Cambridge, MA: MIT Press.
- Brown, J.S., & Duguid, P. (2000). Organizational learning and communities of practice: Toward a unified view of working, learning and innovation. In E. L. Lesser, M. A. Fontaine, & J. A. Slusher (eds.), *Knowledge and communities* (pp. 99-121). Boston, MA: Butterworth Heinemann.
- Callon, M. (1986). Some elements of a sociology of translation: Domestication of the scallops and the fishermen of St. Brieuc Bay. In J. Law (ed.), *Power, action and belief: A new sociology of knowledge?* (pp. 196-

- 233). *Sociological Review Monograph*, no. 32. London, Boston, & Henley: Routledge & Kegan Paul.
- Cooper, G. (2002). The mutable mobile: Social theory in the wireless world. In B. Brown, N. Green, & R. Harper (eds.), *Wired world: Social and interactional aspects of the mobile age* (pp. 17-31). London: Springer.
- Dahlbom, B., & Ljungberg, F. (1999) Mobile informatics. *Scandinavian Journal of Information Systems*, 10 (1&2), 227-234.
- Jupiter Communications. (2000). *Research overviews*. Jupiter Communications, New York. Retrieved from the World Wide Web: <http://www.jup.com/home.jsp>.
- Kalakota, R., & Robinson, M. (1999). *E-business: Roadmap for success*. Reading, MA: Addison-Wesley.
- Kalakota, R., & Robinson, M. (2001). *M-business: The race to mobility*. New York: MacGraw-Hill.
- Kleinrock, L. (1996, January). Nomadicity: Anytime, anywhere in a disconnected world. *Mobile Networks and Applications*, 1 ( 4), 351-357.
- Kopomaa, T. (2000). *The city in your pocket. Birth of the mobile information society*. Helsinki: Gaudeamus.
- Kristoffersen, S., & Ljungberg, F. (1998). Representing modalities in mobile computing. In *Proceedings of Interactive Applications of Mobile Computing*, (IMC'98), Rostock, Germany.
- Latour, B. (1987). *Science in action. How to follow scientists and engineers through society*. Cambridge, MA & London: Harvard University Press.
- Latour, B. (1988). *The Pasteurization of France*. Cambridge, MA: Harvard University Press.
- Latour, B. (1990). Drawing things together. In M. Lynch & S. Woolgar (eds.), *Representation in scientific practice*. Cambridge, MA: MIT Press.
- Latour, B. (1992). Where are the missing masses? The sociology of a few mundane artifacts. In W. E. Bijker & J. Law (eds.), *Shaping technology/building society: Studies in sociotechnical change*. Cambridge, MA & London: MIT Press.
- Latour, B. (1993). *We have never been modern*. Cambridge, MA: Harvard University Press.

- Laurier, E. (2002). The region as socio-technical accomplishment of mobile workers. In B. Brown, N. Green, & R. Harper (eds.), *Wired world: Social and interactional aspects of the mobile age* (pp. 46-60). London: Springer.
- Law, J. (1990). Technology and heterogeneous engineering: The case of Portuguese expansion. In W. E. Bijker, T. P. Hughes, & T. J. Pinch (eds.), *The social construction of technological systems: New directions in the sociology and history of technology* (pp. 111-34). Cambridge, MA & London: MIT Press.
- Luff, P., & Heath, C. (1998). Mobility in collaboration. *Proc. Conf. on Computer-Supported Cooperative Work (CSCW98)* (pp. 305-314). ACM Press.
- Mol, A., & Law, J. (1994). Regions, networks and fluids: Anaemias and social topology. *Social Studies of Science*, 24, 641-71.
- Ovum. (2000). *Business-to-business electronic commerce: Opening the market*. Ovum Consultancy, London. Retrieved from the World Wide Web: <http://www.ovum.com/>.
- Suchman, L. (1987), *Plans and situated actions: The problem of human-machine communication*. Cambridge: Cambridge University Press.
- Wiberg, M. (2001) *In between mobile meetings: Exploring seamless ongoing interaction support for mobile CSCW* (Ph.D. Thesis). Department of Informatics, Umeå University, Umeå, Sweden.
- Yankee Group. (2000). *Press releases: Technology research for the Internet economy*. The Yankee Group, Boston. Retrieved from the World Wide Web: <http://www.yankeegroup.com/>.

## Chapter IX

# Supporting Proximate Communities with P3-Systems: Technology for Connecting People-to-People-to- Geographical-Places

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### **Abstract**

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*In this chapter we examine systems that link **People-to-People-to-geographical-Places**, which we label **P3-Systems**. Four major **P3-Systems** design approaches have been identified by an analysis of systems prototyped to date: (1) *People Centric P3-System* design that use absolute user location, based on awareness of where somebody is located (e.g., Active Badge); (2) *People Centric P3-System* design based on user co-location/*



*proximity (e.g., Hocman); (3) Place Centric P3-System design based on the use of virtual spaces that contain representations of user's use of physical spaces (e.g., ActiveMap); and (4) Place Centric P3-System design based on the use of virtual spaces that contain online interactions related to physical location (e.g., Geonotes). This chapter explores how proximate community member interactions can potentially be well supported by P3-Systems through the improved geographical contextualization and coordination of interactions and the identification of previously unidentified location based affinities between community members.*

### **THE MARAUDER'S MAP**

It was a map showing every detail of the Hogwarts castle and grounds. But the truly remarkable thing were the tiny ink dots moving around it, each labeled with a name in minuscule writing. Astounded, Harry bent over it. A labeled dot in the top left corner showed that Professor Dumbledore was pacing his study; the caretaker's cat, Mrs. Norris, was prowling the second floor; and Peeves the Poltergeist was currently bouncing around the trophy room (Rowling, 1999, pp.192-193).

## **Introduction**

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Improvements in communication and transportation technology over recent centuries have resulted in shifts in community ties from being primarily people-to-people-in-geographical-places to people-to-people irrespective of local geography (Wellman et al., 2001; Gillespie & Williams, 1988; Carincross, 1997). Much effort has gone into freeing interpersonal interactions from geographic constraints and into enabling communication any-where, anytime. However, there are many situations in which communication within a local geographical context is desirable. For example, an administrator of a physical university campus may see increased interactive communication between students, faculty, and staff as beneficial to campus life. Similarly, local community activists might see increased interactions between local residents as being of significant value.

Until recently our ability to use technology to seamlessly locate individuals and provide them with geographically contextualized personal information manage-

ment tools was quite limited. However, this situation is now changing with the widespread adoption of wireless technologies, such as the global positioning system, 802.11, Bluetooth, RFID, etc., and geographical routing technologies. Using such technologies, computer mediated communication (CMC) and location data such as the geographic location a user is communicating from or to, can be combined to provide appropriate geographic context to interactions. A number of proof-of-concept systems have explored this possibility. For example, various systems have enabled individuals and groups to associate text notes with locations (Burrell et al., 2000; Marmasse & Schmandt, 2000; Persson et al., 2001). Others have provided users with an interface that provides awareness in terms of the location and availability of “buddies” as means to increase informal interactions (e.g., Griswold et al., 2003). These developments show how the emerging technology environment raises the opportunity for a new and emerging category of information systems that connects **People-to-People-to-geographical-Place**, which we refer to here as P3-Systems.

Proximate communities are communities built around individuals co-located in a physical region. In this chapter we explore how P3-Systems can provide support for proximate community interactions in four steps. First, theoretical concepts of community, proximate community, and online community are examined. Secondly, the emerging technology environment that now enables new P3-Systems to be developed and deployed is described. Thirdly, P3-Systems design approaches are categorized and described. Fourthly, the potential advantages and difficulties associated with various P3-System design approaches for supporting proximate communities are examined. We conclude the chapter with a review of our observations and make suggestions as to key research that could be undertaken to improve our understanding of the utility of various P3-System design approaches.

## **Community and Online Community**

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### **Proximate Community**

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In the literature, the term “community” is replete with ambiguity, and so in this section we will briefly explore the term and state how it is understood in the context of this chapter. In the 1950s, the analysis of various definitions of

community was a thriving sociological industry. The *piece de resistance* was Hillery's analysis of ninety-four definitions in his paper *Definitions of Community: Areas of Agreement* (1955). In the early 1970s, Bell & Newby wrote that, "the concept of community has been the concern of sociologists for more than two hundred years, yet a satisfactory definition of it in sociological terms appears as remote as ever" (1972, p.21). In late 1980s, *The Penguin Dictionary of Sociology* stated that, "the term community is one of the most elusive and vague in sociology and is by now largely without specific meaning" (Abercrombie, 1988).

Part of the problem has arisen from a debate around the relationship between physical space and community. In 1960, Nelson et al. wrote "the confusion of space with the community itself is doubtless a result of the strong influence of space upon human relations" (Nelson et al., 1960). This is in part due to the fact that historically the towns and villages where people lived and worked were automatic places of "community," as people were interdependent and not isolated from each other. By the 1970s it was realized that "community" was independent of the concept of locale. By the end of the 1980s this had led many sociologists to argue for a conceptual revolution in defining the term community in terms of social networks (Wellman et al., 1988).

The social network approach arose in part from sociologists examining how technological changes have affected community (Wellman & Gulia, 1999). Until the 1950s sociologists feared that rapid modernization would mean the loss of "community," which was operationalized to mean that individuals would only have a handful of transitory, disconnected, weakly supportive relationships or "social ties" (Stein, 1960). However, research into the validity of this position concluded that this was not the case, because individuals can maintain strong social networks of kin, friends, and workmates who do not necessarily live in the same neighborhoods (Wellman, 1988). It is now clear that community can survive physical distance and social differentiation. The result of this has been that many sociologists interested in community came to see individual and shared social networks, and the strengths of social ties, as of primary importance. This led such researchers to write about "group communities" and "personal communities," and to define community as "networks of interpersonal ties that provide sociability, support, information, a sense of belonging, and social identity" (Wellman, 1988). In line with this thinking, we adopt the notion of "communities" as a set of individuals with partially overlapping personal social networks that collectively provides a sense of belonging.

It can be concluded from the above that in the modern world connections are dependent on personal networks that are highly mediated by technology and the market system. As a result, people can now occupy the same residential areas or urban work environments while having only very limited number of interactions with their geographic neighbors. This raises the issue of how emerging technologies can be used to build and maintain proximate communities. Proximate communities are communities where the personal social network ties of members are associated with a particular geographic area, place, or region. Proximate communities may be residential geographic communities or may result from a shared work physical work environment such as a university campus or central business district.

## **Online Communities**

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Like the term “community,” no dominant definition of the terms “virtual community” or “online community” exists (see Jones, 1997 for a history of the term). Instead, a wide variety of definitions and understandings abound that can be clustered into three groups. The first, oldest, and broadest use of the term is as a descriptor of a group of people who share characteristics and interact in essence or effect only (e.g., Hill et al., 1995). While this definition is logically coherent, its usage has gone out of fashion, because it is overly broad, and is therefore not used here. The second way that the term has been used is to describe computer mediated group-discourse spaces (e.g., Hagel & Armstrong, 1997) or what is referred to here as online community spaces (see the following section). However, this is problematic as “discourse spaces” and “communities” are not equivalent. Online community spaces can be “empty” but communities cannot. Further, while it might be possible to create through programming a computer-mediated discourse space, it is not possible to program social interactions. Therefore, online community is not equivalent to online community space where users interact. It follows then, that it is important to distinguish a virtual community from its medium or platform through which its users or agents build social relations. This leads to the third definition of virtual or online communities used here, as a set of individuals with partially overlapping personal social networks tied together by computer technology that collectively provides a sense of belonging. For many sociologists, this follows naturally from analogy to real communities (e.g., Wellman & Gulia, 1999). From this perspective, both are based around social networks, although in the case of online communities they are computer-supported social networks (CSSNs).

Online communities can be “networked communities;” communities whose interactions are mediated primarily through the Internet (Carroll & Rosson, 2003) with non-geographic affinities leading to shared social ties. They can also be formed through “community networks” which are computer-mediated communication systems that aim to support interactions among geographical neighbors (Schuler, 1994). So online communities may or may not be closely related to proximate communities. Proximate communities are typically comprised of individuals that have heterogeneous attitudes, beliefs, and interests. As such, there are special difficulties with motivating user participation in online community systems, because in part meaningful affinities between people are not always readily apparent (Millen et al., 2001).

## **Online Community Spaces**

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Online communities are often built through “online community spaces.” Online community spaces are symbolically delineated computer mediated spaces such as email lists, newsgroups, Internet Relay Chat (IRC) channels, graphical avatar chat spaces (e.g., [www.thepalace.com](http://www.thepalace.com)), etc., which enable a wide range of individuals to attend and contribute to a shared set of computer-mediated interpersonal interactions, and can therefore be considered relatively transparent and open. These spaces support online communities by providing a space in which ties can be formed between people through public shared interactions. Such spaces are different from personal spaces, such as email inboxes, where interactions are not publicly shared between members of the online community.

The notion of online spaces, such as email lists, may be confusing to readers who conceptualize space in terms of day-to-day activities in physical space. Because cyberspace transcends physical space, it highlights the need for a different conception of space – one that recognizes the boundaries to computer mediated actions. Cyberspace, like geographical or physical space, is relational and needs to be understood as socially constructed (Curry, 1995, 1998).

The utility of online community systems and spaces relates not just to how well they support different forms of interactive communication, but also how they help individuals manage the process of enabling communication to take place at all. This has been described as *outeraction* (Nardi et al., 2000), which is defined as “communication processes outside of the direct information exchange that enables people to reach out and enhance the information exchange” (p.79). Outeraction includes such tasks as the use of information communica-

tion to negotiate an individual's availability (e.g., "when can we talk?") and media preference (e.g., "can I call you on the phone?").

Through distinguishing between online community and online community spaces we are able to understand how the impact of basic design decisions on the ability of a CMC system to support community. By enabling users to be mobile, locatable, reachable and capable of rich multimedia communication, the current wave of handheld communication devices raise the opportunity for new types of online community spaces that better support proximate communities. This is because they increase the means for relating online community spaces, associated messages, and users, to physical location, and thus increase the possibility of finding and utilizing location-linked affinities. It is from this perspective that we examine the potential of P3-Systems for supporting proximate community interactions.

## **The Emerging Technology Environment**

By definition, a key commonality that members of specific proximate communities have is a shared relationship to a physical location — the area or region or place that makes the community "proximate." Building information systems that utilize that commonality to support interactions between proximate community members has been difficult. This has been, in part, due to the technological limitations of available consumer technology. However, a number of changes in the technological environment are slowly changing this situation by providing large numbers of people with one or more devices that enable mobile, location aware, hi-speed, and multimedia communication.

There is a general movement to provide Wi-Fi (802.11 standard high-frequency wireless local area network) coverage by universities, public network activists, cities, rural communities, and businesses (Schmidt & Townsend, 2003). A number of telecommunication companies offer user access to a range of wireless sites in the United States (e.g., T-Mobile) and internationally. An example of how coverage is expanding and will probably change the way we work, is the systematic roll out of Wi-Fi coverage at U.K. train stations and plans to provide coverage on the trains themselves (<http://news.zdnet.co.uk/story/0,,t269-s2135177,00.html>). Many new top end laptops and personal digital assistants (PDAs) now have Wi-Fi built in. Wi-Fi is fast enough to enable high-speed delivery of rich multimedia. In parallel, many operators are

offering mobile phones capable of playing, recording, and delivering multimedia. Further, PDA phones are coming to market with both broadband capabilities and Wi-Fi connectivity (Vaughan-Nichols, 2003).

U.S. Federal Communications Commission rulings (initially Docket 94-102) require that cellular operators, personal communications services and specialized mobile radio carriers provide precise location information to 911 call centers (Zagami et al., 1998). The European Union is preparing similar legislation referred to as e112. These legal imperatives apply not just to the abilities of the cellular network, but also to a significant proportion of new communication devices coming to market, which must be enabled by the global positioning system. At the same time, cellular operators are aware of the economic and competitive advantages inherent in being able to offer customers location-specific services such as recommendations about nearby shops and restaurants, or directions to the nearest gas/fuel station. The result is that in the near future mobile phone network operators should be able to detect a subscriber's exact whereabouts for the provision of location-based services, and a large proportion of subscribers will be able to utilize their location data independent of network operators. There is also technology coming to market that enables the locating of devices on Wi-Fi networks (e.g., [www.ekahau.com](http://www.ekahau.com)).

In addition to wireless personal communication infrastructure and devices becoming more sophisticated, "things" are getting smarter with the advent of technologies such as radio frequency identification (RFID). Such technologies make every significant object in the environment potentially identifiable through ubiquitous digital labeling. The extent to which this appears to be becoming a reality is reflected by the world's biggest retailer, Wal-Mart, deciding in 2003 to demand that its 100 largest suppliers use RFID tags to track inventory (something like 8 billion tags a year). RFID potentially enables communication to be placed within a very rich geographic-digital context. The trend appears to be towards numerous real world environments in which everything is digitally labeled, everything is connected, and everyone can communicate from anywhere. At the same time, no single technology for computing location and proximity and digitally describing the world appears to be gaining universal dominance.

There are still numerous problems in supporting proximate communities with location aware devices and networks. For example, as evidenced by field study experiences of the *ActiveCampus* group (Griswold et al., 2003) that found that the short battery life of current devices (four hours or so), and the ease with which personal user data can be lost (often as a result of the short

battery life), resulted in an extremely high user drop out rate. Despite the current difficulties, it is clear that the emerging technological environment will allow for the creation of new types of information systems that have the potential to ground users' interactions in geographic place.

## **Categorizing Features of Systems that Link People-to-People-to-Geographic-Place**

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In the above discussion we noted that proximate communities have strong associations with physical spaces and have suggested that they would be well supported by information systems that can tie user interactions to geographic places, which we refer to as P3-Systems. A number of P3-Systems have been prototyped since the early 1990s, but each has implemented only a limited set of features. In fact, each system developed has been a narrow exploration of a design space whose overall characteristics remain unknown. This is not simply because of technological constraints but also because the building of such systems has lacked a firm theoretical foundation.

A theoretical framework for understanding the utility of various designs of a particular class of system can only come about after the class of systems under discussion is recognized as distinct. Information systems that systematically link people-to-people-to-geographic-place have not been considered as a related or distinct category. This is probably on account of the dearth of location aware systems that seamlessly link people-to-people-to-geographic-places. However with an exponential growth in the number and types of such systems being prototyped, it is now apparent that a new collective term is needed. Further, while terminology such as "location based services," "augmented reality," "virtual reality," "teleportation" and "mixed reality" can be used to explain some of the technology utilized, these terms on their own do not describe the functional similarities of these systems. As such, we have coined the term P3-Systems to describe various information systems that systematically link people-to-people-to-geographic-place. P3-Systems that have been prototyped to date have incorporated only a limited number features from the potential design space. Recognition of P3-Systems as a distinct class of applications allows us to distinguish between basic design features, and to provide a theoretical/conceptual framework for future development in this area.



Traditionally, the starting point for categorizing a CMC system has been in terms of whether it supports synchronous or asynchronous communication (Rafaeli & Newhagen, 1996). While this categorization can be applied to many systems, it should be noted that such categorical distinctions are not clear-cut. Communications created using synchronous technologies can be stored and made persistent and searchable, thus enabling asynchronous use of the medium. Further, “synchronous communication” is not always real-time. For example, Internet Relay Chat (IRC) requires that users hit the carriage return before the information they have typed is shared. The result is that individuals using IRC, and many other chat systems, can change what they were going to say before having said it. On the other hand, asynchronous communication tools such as email can be used for quick message exchanges that make the interactions near synchronous. These issues highlight both the elasticity of synchronicity and the importance of understanding the significance of making interactions persistent (Erickson & Laff, 2001).

Synchronous and asynchronous systems can be viewed as two sides of a continuum. Consequently, while the division into these two categories may help us understand various design possibilities and implications, they should not be considered absolute. Further, this categorical distinction will be extended to include synchronous and asynchronous location awareness for systems that do not involve traditional forms of communication. “Synchronous location awareness” refers to the provision of current information about user location. This location awareness need not necessarily be reciprocal, in the sense that the system may provide a user with a buddy’s location without necessarily providing the buddy with the user’s location. “Asynchronous location awareness” refers to the provision of historical information about user location. Collectively synchronous communication and synchronous location awareness data is created with the expectation that it will be processed in near real-time, whereas asynchronous communication and location awareness data is produced with the expectation of an unpredictable delay between data creation and consumption.

Beyond questions of synchronicity, existing P3-Systems primarily adopt two basic design approaches to linking people-to-people-to-geographic-place. First, **People Centric P3-Systems** are those that use user location to improve contextualization and coordination of interactions, and to enable the identification of previously unidentified affinities between users. People Centric P3-Systems are people centric in the sense that the user interface provided is focused not on a particular location but on the movements of people in physical

spaces. People's location can be understood in both absolute and relative terms. So a person could be located at a particular latitude, longitude and altitude (absolute location), or the individual could be located near a friend (relative location). The second design approach is **Place Centric P3-Systems** that use virtual spaces that represent physical locations. These systems are place centric in the sense that they use physical space/s to delineate virtual space/s in which an associated user's actions and interactions can be seamlessly represented. The virtual spaces that represent physical locations either contain online representation of people's use of physical space or online interactions related to physical location.

From the above discussion, we derive four basic P3-Systems design approaches:

- (1) People Centric P3-Systems based on absolute user location.
- (2) People Centric P3-Systems based on user co-location / proximity.
- (3) Place Centric P3-Systems based on use of physical spaces by users/people.
- (4) Place Centric P3-Systems based on interactions in virtual spaces representing physical locations (Matching Virtual places).

Each of these four basic design approaches can be instantiated synchronously or asynchronously; as a result there are eight distinct categories, which we outline below. Table 1 summarizes these categories. While the design features

*Table 1. P3-system features*

P3-System Design Approaches		Synchronous Communication or Synchronous Location Awareness	Asynchronous Communication or Asynchronous Location Awareness
People Centric	(1) Absolute User Location	Utilizes remote awareness of current user location	Utilizes people's location histories
	(2) Co-location/Proximity	Utilizes real-time inter-user co-location for the exchange of social information	Utilizes co-location history to enable future interactions.
Place Centric	(3) Use of Physical Spaces by People	Utilizes online representation of user's current use of physical spaces.	Utilizes history of people's use of a particular space
	(4) Interactions in Matching Virtual Places	Utilizes synchronous online interactions spaces related to physical location.	Utilizes asynchronous online interactions related to physical location.

of most categories will be described using examples of systems identified from the literature, a few will be described using theoretical or hypothetical systems.

## **People Centric P3-System**

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As described above, People Centric P3-Systems use community member's location to improve contextualization and coordination of interactions, and enable identification of previously unidentified affinities between users. They can be divided into two sub-categories. These are: (1) absolute user location, i.e., based on awareness of where somebody is located; and (2) user co-location, i.e., based on inter-user proximity. These two categories in turn will be examined according to whether they primarily support synchronous or asynchronous interactions/awareness.

### *People Centric P3-System Features Based on Absolute User Location*

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- Synchronous Communication or Synchronous Location Awareness**

Belonging to this category is the earliest location aware P3-System, “*Active Badge*,” which provides real-time information about people's location. Conceived, designed and prototyped between 1989 and 1992, the *Active Badge* system provides a means for locating individuals within a building by determining the location of their “*Active Badge*” (Want & Hopper, 1992; Want et al., 1992). The *Active Badge* device worn by personnel transmits a unique infra-red signal every 10-15 seconds that is detected by one or more networked sensors within an equipped building. The location of the badge (and hence its wearer) can thus be determined on the basis of information provided by these sensors. System users use the command — FIND (name) — that provides the current location of the named badge, and a list of all the locations it has been sighted at in the last five minutes. The system is designed to coordinate communication between individuals. For example, internal and external phone calls could be routed to the phone nearest to the location of an individual based on the location of the *Active Badge* bearer. The *Active Badge* system has an online community space that could be used to locate employees without a public-address system or without telephoning all the possible locations at which they might be found. Although the system was not designed with the aim of linking people-to-people-to-geographic-place, by providing

awareness of people's movements in remote locations, this system enables such links.

It is not hard to imagine various applications that can be supported by the remote locatability feature of the *Active Badge* system. For example, a location-aware descriptor could be provided next to an instant messaging buddy. In fact, commercial services that allow for the remote location of mobile phone users are already in use. For example *Ulocate* (<http://www.Ulocate.com/>) allows users to see the location of all family members using the system displayed on a map on a 24/7 basis.

An alternative to the above approach is to reverse the process, so that instead of a person seeking out the location of somebody they wish to communicate with, the system provides details of the location of the originator of an incoming communication. For example, the caller-ID of incoming phone calls could also contain a location descriptor, or the message lines in a private online chat could contain details of the location of the sender. This approach is used by the *ActiveCampus Explorer*, where users can have the system automatically index their instant messaging messages with a descriptor of their current location (Griswold et al., 2003).

- **Asynchronous Communication or Asynchronous Location Awareness**

Systems under this category provide asynchronous location awareness. Group calendars that systematically describe the location of individuals over time fall under this category. Systems that provide details of the location of the originator of an incoming asynchronous communication also fit here. For example, an email could be indexed by the location of the sender. In fact, some moblogs (mobile phone web logs) contain pictures that are time and location stamped. In other words, by linking location awareness to asynchronous communication these systems render the location awareness asynchronous.

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### *People Centric P3-System Features Based on Co-Location/Proximity*

- **Synchronous Communication or Synchronous Location Awareness**

This category of people centric P3-Systems uses inter-user proximity or co-location to electronically collect or manage the exchange of social information. A simple application of this approach is chat between co-

located individuals, such as that provided by *Cybiko* ([www.Cybiko.com](http://www.Cybiko.com)) a child's toy that uses Radio Frequency communication. *Cybiko* allows ad hoc networks to be formed between individuals that are within a short distance so that they can interact electronically. Similarly, the *Hummingbird*, a small portable device, supports social awareness between people who are co-located (Weilenmann & Holmquist, 2001). The *Hummingbird* uses wireless communication to give members of a group continuous auditory and visual indications of other group members in the vicinity. The designers of *Hummingbird* hoped to support face-to-face interactions by visualizing group member proximity.

Another system that provides support for face-to-face interactions using co-location is Borovoy et al.'s (1998) "*Meme Tags and Community Mirrors*" System. Meme tags are a class of groupware tags designed to build, in the authors' own words, "community" (p.159). The system has both a personalized online space (individual *Meme-Tags*) and a community space (*Community Mirrors*). In this system a meme is an idea or opinion, expressed as a short piece of text. The Meme Tag contains community relevant memes that a participant has chosen. Inter-user proximity enables the spread of memes from person to person synchronously. This is meant to encourage people-to-people interactions. The purpose of the *Community Mirrors* is to convey a variety of information about meme exchanges between users in near real-time to other users. Included within these displays are the actual texts of the memes, popular ideas, dying ideas, as well as information about group dynamics, such as the "cliquishness" of the gathering. These *Community Mirrors* also give users a sense of what other participants know. The system design aims to facilitate the formative stages of interaction by providing people with additional common reference points for conversation.

Co-location can also be used specifically for social matching. To date, the social matching has typically been in terms of supporting dating rather than proximate community, but the design approach is of potential value in both situations. A system that illustrates this basic design idea is the Japanese dating toy *LoveGety* (Reuters/Wired News, 1998). When a blue (male) *LoveGety* and a pink (female) *LoveGety* are within 15 feet of one another, they beep and flash, telling the user that another *LoveGety* owner is close by. Codes such as "talk," "karaoke," and "get2," with a variety of meanings are used to communicate what the user is interested in. This system design encourages real-time face-to-face interactions around the

idea of “dating,” however the proximity approach can logically be used to encourage interactions based on many other types of social matches.

Another, example of a social matching system is Proxy Lady, a mobile system for informal, opportune face-to-face communication, running on a PDA equipped with a radio transceiver (Dahlberg et al., 2000). *Proxy Lady* lets the user associate information items (e.g., emails) with other people, called “candidates for interaction.” When a “candidate for interaction” is in the proximity, *Proxy Lady* notifies and provides the user with the associated information item (e.g., the email message), and if suitable, is followed by an informal face-to-face interaction.

“*Social Net*” infers interest matching from patterns of co-location over time to recognize social relationships and infer affinities between users (Terry et al., 2002). The *Social Net* handheld client records the time and duration of physical co-location synchronously, and searches for recurring patterns of co-location to asynchronously infer shared interests between users. The system contains two lists, a “friends list” that contains users who are friends, and an “unknown list” that contains users who are not friends that one comes in proximity or contact with in some sort of consistent pattern. This is achieved by recording of encounters between co-located users, as well as their time and duration, in an encounter record. Periodically, the encounter record is examined and if a suitable pattern of co-location is observed between individuals, the name is included in the unknown list. While the friends list is manually created by the user, the unknown list is automatically and synchronously generated by the system and not visible to the user due to privacy concerns. When two “friends” come in contact with each other, their systems communicate by comparing their “unknown lists.” On detection of a friend by one system in the other system’s unknown list, the system informs the user of a potential new friend recommendation that can be made.

In addition to social matching, proximity can also be used to enable or support synchronous information exchanges, which in turn is often supported by various asynchronous components. For example, *Hocman*, a mobile peer-to-peer application, supports social interaction between motorcyclists (Esbjörnsson et al., 2003). *Hocman* users provide personal information of themselves and their bikes in HTML pages, which is exchanged with other bikers equipped with a *Hocman*, typically at traffic light stops. This synchronous interaction is accompanied by audio notifications. There is also a major asynchronous component to *Hocman*,

which will be discussed in the section below. Similarly, *RoamWare* (Wiberg, 2001) uses proximity to semi-automatically identify when individuals get together for ad-hoc meetings, and then supports synchronous *ad hoc* mobile meeting note taking. Mobile meeting notes can then be shared asynchronously using a suite of CMC tools once users return to their desktop computers. Finally, *FolkMusic* (Wiberg, 2004) uses proximity to trigger services for music sharing between co-located individuals. The fully instantiated system will also use GPS receivers to map audio traces left by individuals to geographic locations, resulting in music files being associated with specific locations.

- **Asynchronous Communication or Asynchronous Location Awareness**

To date, no P3-systems based on user proximity that we know of provide an interaction/communication framework that is primarily asynchronous. *RoamWare* with its focus on seamlessly connecting planned and mobile *ad hoc* meeting through the distribution of mobile meeting notes using synchronous chat and asynchronous email through the *RoamWare Desktop* makes aspects of the ad hoc meetings asynchronous. As mentioned above, *Hocman*, the application that supports social interaction between motorcyclists has a significant asynchronous component. That is, the system is designed so that when the biker ends her/his journey, s/he browses the pages received from other motorcyclists. *Social Net* also allows for asynchronous exchanges between users, by waiting for friends to interact before exchanging information about unknown but potential friends.

It is possible to imagine numerous designs of hypothetical systems that would fit into this category by more extensively utilizing asynchronicity. Some possible systems are those that stretch our understanding of proximity to include asynchronous use of shared physical space rather than synchronous use of physical space. This would be similar to *Social Net* but would require a history of a user's use of various geographical locations. This would allow the identification of affinities such as similar routes of travel to work, use of gyms, etc., even if they occurred at different times of the day. This in turn could be used to encourage face-to-face interactions when individuals are co-located synchronously. This design would still be people centric because it would be based on individual location history data, however, it should be noted that this is perhaps most easily achieved by taking an absolute rather than relative

proximity approach to user location. An alternative approach is to asynchronously use, at a later, more convenient time, the data recorded synchronously by the system when individuals were co-located in real time. While this is done by *Hocman*, the early prototypes described in the literature did not strongly support interaction post data exchange. A stronger example might be a system that automatically exchanges individual's business cards electronically when co-located, and then encourages asynchronous interactions through the provision of personal card-exchange histories tied to a social network visualization and an asynchronous communication system such as email.

## **Place Centric P3-Systems**

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Place Centric P3-Systems use physical space/s to delineate virtual space/s in which associated users' actions and interactions can be seamlessly represented. In other words, this approach uses virtual spaces that represent physical locations. These can be divided into systems that are built around virtual spaces that contain online representations of people's use of physical space and those that contain online interactions related to physical location. The first approach can be used to provide users with a remote understanding through virtual spaces of how an associated physical space is used. It is only with the recent advent of person-locator technology that it is now possible to seamlessly provide such data, and the review of this approach will be fairly brief. The second approach is where virtual space/s representing physical space/s are used to manage user interactions, such as message exchanges. This is one of the traditional approaches adopted by community networks and digital cities projects to support community interactions.

### *Place Centric P3-System Features Based on Use of Space by People*

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- **Synchronous Communication or Synchronous Location Awareness**  
A number of Place Centric P3-Systems exist that provide visualizations of current use of defined geographical areas/spaces. *ActiveMap* is a software application that enables users to visualize the location and movement of users within a workplace environment, providing large-scale, real-time awareness (McCarthy & Meidel, 1999). The application provides a window with a background showing a map of the physical



layout of the workplace. In the foreground, images of the faces of people in that workplace are superimposed over the locations in which they were last seen. Similarly, the *ActiveCampus System's ActiveCampus Explorer Map* enables such a feature by overlaying online maps with avatars representing online buddies at a physical location (Griswold et al., 2003). The *Active Badge* system also provides a similar feature with the LOOK (location) command, which supplies users with details about the badges that are currently in the specified location. A number of operators of Wi-Fi networks provide visualizations of the physical location of users connected to their network, although this is typically in an anonymous format. An example of this is *CMUSky*, which shows usage of CMU's Wireless Andrew System ([http://www.cmusky.org/map\\_usercentric.html](http://www.cmusky.org/map_usercentric.html)). All these systems provide synchronous location awareness of users in either an identified or anonymous manner.

- **Asynchronous Communication or Asynchronous Location Awareness**

The visualization of use of physical space online can be based on historical (asynchronous) use of the space in question. In a sense online room calendars providing information about the usage of room spaces are such systems. Using location technology, such systems can be extended to include a mechanism for noting attendance in a physical space and making the data available in persistent historical format. This works similarly to the people-centric asynchronous systems, however, the focus here is on defined physical places rather than people's use of multiple locations. *FolkMusic* (Wiberg, 2004), when fully instantiated, system will use GPS receivers to map audio traces left by individuals to geographic locations, resulting in music files being associated with specific locations. Result would be a labeling of a physical space by the musical preferences of people who use the space in question.

### *Place Centric P3-System Features Based on Interactions in Matching Virtual Places*

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As noted above, this approach involves virtual spaces, which represent physical space being used to manage user interactions, such as message exchanges. This is the traditional method used by community networks and digital cities projects to support community interactions. "Community networks" aim, through computer-mediated communication systems, to support

interactions among geographical neighbors (Schuler, 1994). An example of a community network system can be something as simple as an email list for and about residents of a small township or something more complex such as a MOOsburg. The MOOsburg community network system of Blacksburg, Virginia in the United States provides a choice of tools including an interactive map that can be panned or zoomed to locate and navigate to virtual representations of geographical places, along with a related chat area, and location linked web board (Carroll & Rosson, 2003).

Digital cities integrate urban information and create public online spaces for people living or visiting those cities. “Digital cities” typically provide online interaction spaces. For example, America Online’s Digital City, Inc., service (<http://digitalcity.com>) provides online interaction spaces for local chat and personals in addition to standardized location-relevant content such as hotels, restaurants, amusement parks, day trips and itineraries, airport information and shopping. “Digital city 2” projects in Europe and Japan use high-fidelity, Internet-based simulacra of cities, updated continuously via cameras and other sensors to provide data (Ishida, 2002). Digital City Kyoto, like many digital city projects, addresses a wide range of goals spanning technology development, new information services and applications, and support for community life (Ishida, 2002; <http://www.digitalcity.gr.jp/>). However, such a broad assortment of features can reduce the chances of gaining broad community support, participation and collaboration (Aurigi, 2000).

- **Synchronous Communication or Synchronous Location Awareness**

Synchronous online interaction spaces used by “community networks” and “digital cities” are of this type. With the creation of more immersive online environments, the specificity of the representations of physical geography is increased as it allows interactions to be associated with specific areas of cartographic visualizations. Wireless network coverage is also used to increase geographic specificity of interactions by both enabling and limiting the geographic area in which a set of online interactions can occur. For example, Wi-Fi (802.11) access points can offer community chat (e.g., Michigan wireless AP chat) that is limited to the geographic range of the access points in question. Interactions can be tied to a place through visualizations of the interactors using the space. The *ActiveCampus Explorer* system’s makes this possible by allowing for nearby buddies displayed on a community map to be messaged (Griswold et al., 2003). However, this approach is place centric rather than people

centric because the interaction space is not simply created by interpersonal proximity, rather it is framed within an online map which represents physical location.

- **Asynchronous Communication or Asynchronous Location Awareness**

Perhaps the most common type of online interaction space used by community networks and digital cities is of this type, using traditional asynchronous communication tools such as email lists and web boards to support online community interactions for or about a particular physical location. Some interesting examples of system design approaches developed outside of the framework of community networks and digital cities include: spatially (latitude/longitude) addressable web-based bulletin boards, such as IBM's *World Board*, that enforce the *geocoding of messages* (Spohrer, 1996); "community geoblogs" (<http://www.brainoff.com/geoblog/>); and systems that allow computer mediated messages to be linked through virtual post-it notes or graffiti to location. These digital notes behave like electronic Post-its, visible to authorized users on their mobile devices when they enter the vicinity (Brown, 1995) or remotely (Burrell & Gay, 2001). In the systems that do allow the reading of such messages remotely, messages are indexed by locations, which can be searched or found through the navigation of online maps. Examples of such systems include *E-Graffiti* (Burrell & Gay, 2001), *Geonotes* (Espinoza et al., 2001), and the "graffiti" function of the *ActiveCampus Explorer* (Griswold et al., 2003).

## Summary

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*Table 2* summarizes the systems and major system features reviewed in this section.

Table 2. P3-systems and key design approaches

P3-System Design Approaches		Synchronous Communication or Synchronous Location Awareness	Asynchronous Communication or Asynchronous Location Awareness
People Centric	Absolute User Location	<ul style="list-style-type: none"> <li>• <i>Active Badge</i> Find Command</li> <li>• <i>Ulocate</i> current user location.</li> <li>• IM buddies with Location Descriptors</li> <li>• Location Labeled Messages</li> </ul>	<ul style="list-style-type: none"> <li>• <i>Ulocate</i> user location history.</li> <li>• Hypothetical Group Calendar with detailed Individual Location tracking data.</li> <li>• Location Labeled Messages</li> </ul>
	Co-location/Proximity	<ul style="list-style-type: none"> <li>• <i>Cybiko</i> chat</li> <li>• <i>Meme-Tags</i> and <i>Community Mirrors</i></li> <li>• <i>Proxy Lady</i></li> <li>• <i>LoveGety</i></li> <li>• <i>Hummingbird</i></li> <li>• * <i>Hocman</i> motorcyclist data exchange</li> <li>• * <i>Social Net</i> user co-location monitoring</li> <li>• * <i>RoamWare</i></li> <li>• * <i>FolkMusic</i></li> </ul>	<ul style="list-style-type: none"> <li>• * <i>Hocman</i> - web message board for post proximity interactions</li> <li>• * <i>Social Net</i> recommendations</li> <li>• * <i>RoamWare Desktop</i> - distributes information about collocated ad hoc meetings.</li> </ul>
Place Centric	Use of Physical Spaces by People	<ul style="list-style-type: none"> <li>• <i>ActiveCampus</i> Explorer Buddies Map</li> <li>• <i>Active Badge</i> – Look</li> <li>• <i>ActiveMap</i></li> <li>• <i>CMUSky</i></li> </ul>	<ul style="list-style-type: none"> <li>• Online Room Calendars</li> <li>• * <i>FolkMusic</i></li> </ul>
	Interactions in Matching Virtual Places	<ul style="list-style-type: none"> <li>• Digital Cities And Community Network Chat</li> <li>• Map based Instant Messaging of Nearby Buddies</li> <li>• Wi-Fi AP Chat</li> </ul>	<ul style="list-style-type: none"> <li>• Community Network and Digital Cities Spaces</li> <li>• <i>Geonotes</i></li> <li>• <i>E-Graffiti</i></li> <li>• <i>Active Campus</i> Graffiti</li> <li>• <i>IBM-World Board</i></li> </ul>

\* Systems approaches dependent on both synchronous and asynchronous use of data

## Analysis of P3-System Design Approaches to Support Proximate Communities

We defined “community” in the *Community and Online Community* section as a set of individuals with partially overlapping personal social networks, which collectively provide a sense of belonging. Further, we noted that “proximate communities” are communities built around individuals co-located in a physical location. They can also be understood as communities where the personal social network ties of members are associated with a particular geographic area, place, or region. Proximate communities may be residential communities or may result from a shared physical work environment such as a university campus or central business district. In this section we will explore how P3-Systems can be used to support interactions in proximate communi-

ties. We do this because we believe that P3-Systems are by their very nature well suited to support proximate communities, since by definition they aim to link people-to-people-to-geographic-places.

Wellman et al. (1988) note that communities can provide various social functions such as sociability, support, a sense of belonging, and social identity. However, P3-Systems do not provide social functions directly to users, as these functions are generated by people or users of a system, rather than the mediating technological infrastructure. For this reason, the P3-System design approaches will be examined in terms of their ability to support people-to-people-to-geographic-place interactions. The P3-Systems support such interactions through the provision of user location awareness, making apparent location-related interpersonal affinities, and the geographical contextualization of public or private interactions.

Table 1 classifies existing P3-System design approaches into eight basic categories. In this section we will first compare the significance of the division into synchronous and asynchronous communication/awareness. This will be followed by an examination of the two people-centric and two place-centric design approaches in terms of their ability to support proximate community interactions.

The largest division of design approaches described in Table 2 is into Synchronous Communication/Synchronous Location Awareness or Asynchronous Communication/Asynchronous Location Awareness. An examination of the systems described in the fourth section suggests that this division appears to closely parallel our understanding of how the level of synchronicity impacts on computer mediated communication in general. Synchronous communication and synchronous location awareness data provided by P3-Systems is created with the expectation that it will be processed in near real-time, whereas asynchronous communication and asynchronous location awareness data is produced with the expectation of unpredictable delays between data creation and consumption. The result is that synchronous data is more useful for management of user actions in real-time within the physical spaces of proximate communities. This is because synchronous system design allow users to address issues such as, “where is somebody,” “who is there,” and “who is around me,” which can be expanded to questions such as “who is around to eat or chat with right now.” In other words, synchronous P3-Systems are well suited to the task of supporting ad hoc interactions grounded in geographic place. Asynchronous system designs, on the other hand, allow users to make long-term plans in relation to their use of space, by the provision of information

such as “how is this space used over time,” “who uses this space like me,” “what do others think about this place,” etc. The synchronous and asynchronous design approaches are complementary with the provision of one approach, not negating the possibility of the provision of the other, and with each supporting different social requirements.

The most important division of the design space provided by *Table 2* for our purposes is the four basic P3-System design approach types: (1) Absolute User Location; (2) Co-location/Proximity; (3) People’s Use of Space; and (4) Interactions in Matching Virtual Places. These four types will be examined and compared in terms of how systems can be used to support proximate community interactions. This will be achieved by an examination of the ability of various design approaches to enable the following. First, proximate community interaction processes (processes outside of the direct information exchange that enables people to enhance and coordinate information exchanges). That is, those that relate to the management of people-to-people-to-geographical-place interactions. Secondly, proximate community interactions through either personal or online community interaction spaces. These interaction and interaction process can be done publicly through online community spaces or privately through online personal spaces. The provision or lack thereof of such spaces in P3-Systems has a profound impact on the formation of social ties, privacy management, and scaling.

### **P3-System Designs Based on Absolute User Location**

Systems under this category, such as *Active Badge* and *Ulocate*, provide clear support for proximate community interaction processes. This is because they provide users with information about the location of others, so that users are better able to coordinate their interactions. Seeing a user’s history of movements in space can also help coordinate interactions in a manner similar to that of a conventional day planner. The location information also allows users to contextualize their proximate community interactions. For example, a student might ask another student to bring him coffee if he sees that remote student near the cafeteria. Similarly knowing the location from which a person sent a message will inform recipients as to the environment in which the message was composed. Further, a community system that knows of people’s collective habits, schedules, appointments, and location could use individual’s trajectories to better manage face-to-face community interactions. For example, if an individual was running late, the system could use awareness of his location,

calendar data, and analysis of his trajectory to, where appropriate, semi-automatically advise others to delay the meeting.

P3-Systems based on absolute user location focus on location awareness rather than interactive communication. *Active Badge* system provides a listing of the current location of *Active Badges* that are available to the community of users. This raises some design issues in regards to scaling. For example, if the listing of the number of users expands greatly, then it becomes harder to gain an instantaneous feel for the whereabouts of community members. Cartographic visualization may be able to display larger groups in a slightly better fashion, but they too have their limits. Further, such a design approach using cartographic visualization of all community member locations would lean towards making the system Place Centric rather than People Centric.

Of the four P3-System design approaches we review here, this is the most problematic in terms of management of privacy. This is because, by definition, the design approach discussed here focuses on the provision of personal location data of individuals to others. Monitoring or tracking somebody's whereabouts can be extremely invasive. To address this issue the designers of *Active Badge* limited the storage of location history information to a one-hour period, and made that data available to users through a specific user history command (Want et al., 1992). However, the lack of location data history does not resolve the privacy issue associated with real time monitoring of the users' locations. The other obvious mechanism to address privacy concerns is by simply taking off the badge when one desires not to be monitored. This however also fails to truly address the problem because of the likely social implications for anybody deciding to opt out of wearing the badge even if it be for a brief time. In fact, differing perspectives on privacy and personal freedom were noted as reasons for successful and unsuccessful implementations of the *Active Badge* in early field studies (Harper, 1992).

### **P3-System Designs Based on Co-Location/Proximity**

The P3-Systems of this type systematically support opportunistic meetings (Kraut et al., 1990) and informal communication through outeraction processes, such as proximate location awareness, and the finding of affinities based on location histories. In addition, co-location data can be used to support ongoing community interactions through the use of online community spaces. For example, "*Social Net*" could be expanded to include a related online

community space, which enables affinities to be inferred not only from pair-wise patterns of co-location but also community location histories. Another example is *Hocman* where proximate exchanges could be systematically uploaded to a public website so that users could gain a community perspective and proximate interactions could be used as a spring-board for community discourse. Of course, the storing and utilization of people's interaction histories could potentially result in significant privacy problems. To address this problem the designers of *Social Net* do not make the history of proximate interactions stored on the device known to the user, however they acknowledged that this resulted in users complaining that they were not sure why a social recommendation was made. Hence, for the systems examined here, there is a clear tradeoff between overall utility and the provision of potentially private personal location data.

### **P3-System Designs Based on People's Use of Space**

Place centric P3-Systems that provide online visualizations of current use of defined geographical areas/spaces that have been prototyped to date are useful in terms of outreaction. That is, the provision of awareness of how a space is being utilized, or where a person is within a predefined area, to support the coordination of future and current activities. These systems present user location data that is public and anonymous, public and identified, and or private/restricted. Using the *Active Campus Explore Map*, users can see only those individuals that make their location data available to everybody, or those included in the represented user's buddy list. In this case privacy issues arise with the added complexity of location data ownership. For example, do individuals wandering in a private office complex own their location data, or does the owner of the physical space have some rights to the location data of people that using his or her physical space?

### **P3-System Designs Based on Interactions in Matching Virtual Places**

P3-Systems designed around this approach by definition enable proximate community interactions. Further, because they link messages to locations, they are also good at enabling outreaction processes. For example, a user could



leave a digital Post-It note/graffiti in a room notifying people about an upcoming event, this in turn could help other users coordinate their activities.

A design issue that confronts these types of systems is how to explicitly link a message to location. This has been in one of three ways: (1) through labels that describe the matching virtual place; (2) through use of cartographic visualizations; and (3) through user locatability. An example of the user locatability approach is that used by *Geonotes* which allows only local/in situ reading and authoring of “*Geonotes*” so that a user clearly knows the location to which a message is relevant. This contrasts with the visualization approach of the *Active Campus Explorer Graffiti*, which allows both local and remote reading and authoring, but ties messages to location by placing the messages on an online map.

Privacy is an issue with these systems if messages posted are identified by author or if physical presence in location is required. However, it is clearly possible to design a system that allows for anonymous postings and remote authorship as discussed above. Further, in the majority of situations it is likely that message posting would be voluntary, meaning that users make the decision as to when they are willing to reveal themselves.

## **Global P3-System Design Issues**

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The review of the four basic P3-System design approaches leads us to discuss a number of interrelated issues that designers of all P3-Systems must address. These are scalability, online community space construction, geographical contextualization of interactive communication, and approaches to the management of privacy.

Scalability refers to the extent to which the system maintains functionality and usability as the number of users being located, geographical coverage, and interactive communicators increases. If functionality is reduced then users may lose sense of what is happening in a geographic area covered by the system, or suffer from information overload (Jones & Rafaeli, 2003b).

Closely related to scalability is the issue of use of online community space segmentation strategy (Jones & Rafaeli, 2000) and approaches to geographical contextualization. Online community spaces through labeling or visualization can be used to geographically contextualize interactive communication, al-

though it is not required. Online community spaces support online community by enabling ties between people to be formed through public shared interactions. While online community spaces are of value, their use is not automatic (as noted above in regards to *Social Net*). A decision by designers not to provide an online community space may arise for a variety of reasons, such as privacy concerns, which may be amplified if users' locations are publicly shared. For example, the use of location-aware descriptors next to each instant messaging buddy on a buddy list would geographically contextualize instant messaging discourse, but not through use of an online community space. If online community spaces are to be used, then to make the system scalable, an online community space "segmentation strategy" has to be adopted. "Segmentation strategy" refers to any systematic method used to divide the overall interaction space into a number of related online community spaces. For example, Amazon.com's segmentation strategy is that each book has its own online community space. As the number of books Amazon sells grows, the number of online community spaces it maintains expands. For P3-Systems based on enabling interactions in matching virtual spaces, an online community space segmentation strategy could be tied to cartographic visualizations, i.e., linking each online community space to a different point on an online map.

In building P3-Systems, designers have to address how user location data will be managed. In other words, designers have to deal with location privacy management. Privacy management needs to be addressed as both a social and design issue. For example, the adoption of a big brother approach to the public tracking of users raises various ethical and social issues but does not represent a major technological design challenge. On the other hand, we are a long way from knowing how to design systems that enable seamless user control of location data to satisfy personal data privacy needs while maximizing overall system utility. Here we are only interested in privacy as a design issue. In this regard, the focus in the privacy literature has been on ensuring data privacy, using means such as including access control lists (providing a list of users that must be authenticated in order to access some information), and cryptography (to protect the data being transmitted). However, in this case, the important issue to be addressed is in what situations should personal location data be made public and when should it be kept private. This is complicated by the fact that the precision of data about individuals (e.g., individual, member of subgroup, anonymous user), location (room, building, street, city, state, etc.), and time can be adjusted. The question then becomes, when and how, and in what situations, are users willing to share their location data with other users,

at varying levels of precision. For example, an individual might be willing to share with a friend or member of his family that he is in a restaurant but not with anybody else. On the other hand, that same individual might be willing to share with everybody anonymously that there were 20 people in the restaurant on Saturday afternoon and that the food was quite good. There are a very wide variety of ways to address this issue. These range from privacy management practices being hard coded by designers through systems that enable full user control of their location data, to systems that use emergence to enable utility through the aggregation of anonymous location data.

## **Future Research Areas**

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As discussed earlier, P3-system designs are still rudimentary. The comparative utility of the four main P3-System design approaches described to support proximate community members is to a large extent unknown. This is not simply because of the need to address privacy concerns, but also because it is not completely clear in what situations individuals would wish to use one system design approach over another. Further, we do not know which interaction and outeraction processes supported by various P3-system design approaches would result in the strongest people-to-people ties and the extent to which those ties are grounded in geographic places.

A number of approaches can be used to help address our lack of understanding of the comparative utility of P3-System designs:

1. The design approaches could be assessed using the comparative prototyping methodology (Trevor & Hilbert, 2002). This usability research methodology uses a three step process of: (1) designing various alternative applications that vary only around the key variable to be studied; (2) deployment of the system in various situations; and (3) the use of qualitative and quantitative field data to compare and contrast the alternative designs.
2. The utility of various features of P3-Systems could also be assessed through research into P3-System recommendation tools (Terveen & Hill, 2001). Such tools would help users choose appropriate interaction and awareness spaces for the task and situation at hand. This will be crucial

in a future in which highly dense small urban environments might contain large number of P3-System users that wish to interact with each other virtually, without suffering from information overload. The value of any recommendation would relate to the underlying algorithms used, which in turn would relate the extent to which it took into account the utility of P3-System features available to the user. Of course determining such utility would require development and deployment in the field of various designs and then determining in what situations users would find different features and spaces of value. We hypothesize that such recommender tools would have to take into account online community space interaction dynamics (such as critical mass and discourse overload, see Jones & Rafaeli, 2000), users' preferences, social, and seasonal rhythms (Handel & Herbsleb, 2002), inter-personal interaction histories, user physical location, and various P3-System design approaches.

3. Rather than simply comparing the usability of various features, large-scale long-term field studies could be used to understand how P3-Systems impact on social network formation and maintenance. Such studies could also be used to understand how wireless information technology could transform the social networks of proximate communities of various types, such as residential communities and university campus communities.

Until the writing of this chapter, information systems that systematically link people-to-people-to-geographic-place have not been considered as a related or distinct category. However, with the recognition of P3-Systems as a distinct class of applications we were able to distinguish between basic design-features, and provide a theoretical/conceptual framework for future development in this area. While we view the classification approach of P3 systems adopted here to be still nascent and emerging with future modifications probably being required as new systems arise, value has been demonstrated in trying to understand the design space. In fact, it is the authors' hope and belief that the recognition of the P3-System category will encourage and help us develop and enhance the future quality of P3-Systems.

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## References

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- Abercrombie, N, Hill, S., & Turner, B.S. (1988). *Penguin dictionary of sociology*. Middlesex: Penguin Books.
- Aurigi, A. (2000). Digital city or urban simulator? In T. Ishida & K. Isbister (eds.), *Digital cities: Technologies, experiences, and future perspectives* (Lecture Notes in Computer Science 1765) (pp. 33-44). New York: Springer-Verlag.
- Begole J., Tang, J., Smith, R., & Yankelovich, N. (2002). Work rhythms: Analyzing visualizations of awareness histories of distributed groups. *Proceedings of the 2002 ACM Conference on Computer-Supported Cooperative Work (CSCW 2002)*, New Orleans, USA, Nov 16-20 (pp. 334-343). New York: ACM Press.
- Bell, C., & Newby, H. (1972). *Community studies: An introduction to the sociology of the local community*. New York: Praeger Publishers.
- Borovoy, R., Martin, F., Vemuri, S., Resnick, M., Silverman, B., & Hancock, C. (1998). Meme tags and community mirrors: Moving from conferences to collaboration. *Proceedings of the ACM 1998 Conference on Computer Supported Cooperative Work (CSCW'98)* (pp. 159-168).
- Brown, P. (1995). The Electronic Post-it Note: A metaphor for mobile computing applications. *IEEE Colloquium, Mobile Computing and Its Applications*. Retrieved from the World Wide Web: <http://www.cs.ukc.ac.uk/projects/mobicomp/Fieldwork/Papers/>.
- Burrell, J., & Gay, G.K. (2001). E-Graffiti: evaluating real-world use of a context-aware system. *Interacting with Computers: Social issue on universal usability* (in press).

- Burrell, J., Treadwell, P., Gay, G.K. (2000). Designing for context: Usability in a ubiquitous environment. *Proceedings of the 2000 Conference on Universal Usability*, 80-84.
- Cairncross, F. (1997). *The Death of distance: How the communications revolution will change our lives*. Boston, MA: Harvard Business School Press.
- Carroll, J. M., & Rosson, M. B. (1996). Developing the Blacksburg Electronic Village. *Communications of the ACM*, 39 (12), 69-74.
- Carroll, J. M., & Rosson, M. B. (2003). A trajectory for community networks. Special Issue: ICTs and Community Networking. *The Information Society*, 19, 5.
- Carroll, J.M., Rosson, M.B., Isenhour, P.L., Van Metre, C.A., Schafer, W.A., & Ganoë, C.H. (2001). MOOsburg: Multi-user domain support for a community network. *Internet Research*, 11 (1), 65-73.
- Curry, M. (1995). On space and spatial practice in contemporary geography. In C. Earle, K. Mathewson, & M. Kenzer (eds.), *Concepts in Human Geography*. New York, Rowman and Littlefield.
- Curry, M. (1998). *Digital places: Living with geographic information technologies*. London: Routledge.
- Dahlberg, P., Ljungberg, F., & Sanneblad, J. (2000). Supporting opportunistic communication in mobile settings. Extended abstracts of *ACM 2000 Conference on Human Factors in Computing Systems*.
- Danet, B., Ruedenberg-Wright, L., & Rosenbaum-Tamari, Y. (1996). Hmm...Where's that smoke coming from? Writing, play and performance on Internet Relay Chat. *Journal of Computer Mediated Communication*, 2 (4). Retrieved from the World Wide Web: <http://www.ascusc.org/jcmc/vol2/issue4/danet.html>.
- Dix, A., Rodden, T., Davies, N., Trevor, J., Friday, A., & Palfreyman, K. (2000). Exploiting space and location as a design framework for interactive mobile systems. *ACM Transactions on Computer-Human Interaction*, 7 (3), 285-321.
- Erickson, T., & Laff, M.R. (2001). The design of the 'Babble' timeline: A social proxy for visualizing group activity over time. In *Conference on Human Factors in Computing Systems*, 3 (1). Seattle, WA: ACM.
- Esbjörnsson M., Juhlin, O., & Östergen, M. (2003). Mobility. Motorcycling and social interaction: design for the enjoyment of brief traffic encounters.

In *Proceedings of the 2003 International ACM SIGGROUP Conference on Supporting Group Work*.

- Espinoza, F., Persson, P., Sandin, A., Nyström, H., Cacciatore, E., & Bylund, M. (2001). Geonotes: Social and navigational aspects of location-based information systems. In Abowd, Brumitt & Shafer (eds.), *UbiComp 2001: Ubiquitous Computing* (p. 17). International Conference, Atlanta, Georgia, September 30-October 2, 2001. Berlin: Springer.
- Federal Communications Commission. (2002). *e911 Guidelines*. Retrieved November 2002 from the World Wide Web: <http://www.fcc.gov/eb/E911/e911.html>.
- Gillepsie, A., & Williams, H. (1988). Telecommunications and the reconstruction of regional comparative advantage. *Environment and Planning*, 20, 1311-1321.
- Griswold, W., Shanahan, G., Brown, S., Boyer, R., Ratto, M., Shapiro, R., & Truong, T. (2003). *ActiveCampus: Experiments in community-oriented ubiquitous computing* (Technical Report CS2003-0750). Computer Science and Engineering. UC San Diego. Retrieved from the World Wide Web: <http://www-cse.ucsd.edu/~wgg/papers.html#ubi>.
- Hagel, J., & Armstrong, A. (1997). *Net gain: Expanding markets through virtual communities*. Boston, MA: Harvard Business School Press.
- Handel, M., & Herbsleb, J. (2002). What is chat doing in the workplace? In *Proceedings of ACM Conference on Computer-Supported Cooperative Work (CSCW 2002)*.
- Harper, R.H.R. (1992). Looking at ourselves: An examination of the social organisation of two research laboratories. In *Proceedings of the ACM Conference on Computer-Supported Cooperative Work* (pp. 330-337). November 01-04, 1992, Toronto, Ontario, Canada.
- Hill, W., Stead, L., Rosenstein, M., & Furnas, G. (1995). Recommending and evaluating choices in a virtual community of use. In *Proceedings on Human Factors in Computing Systems* (pp. 194-201). Denver, CO: ACM.
- Hillery, G.A. (1955). Definitions of community: Areas of agreement. *Rural Sociology*, 20.
- Ishida, T. (2002). Digital city Kyoto: Social information infrastructure for everyday life. *Communications of the ACM*, 45 (7).

- Jones, Q. (1997). Virtual-communities, virtual-settlements & cyber-archaeology: A theoretical outline. *Journal of Computer Mediated Communication*, 3 (3). Retrieved from the World Wide Web: <http://jcmc.huji.ac.il/vol3/issue3/jones.html>.
- Jones, Q. (2003a). *Applying cyber-archaeology (ECSCW 2003)*. Kluwer Academic Publishers.
- Jones, Q. (2003c). Information overload. In K. Christensen, R. Jarrett, D. Judd, D. Levinson, W. Metcalf, R. Moudry, R. Oldenburg, S. Salamon, T. Sander, M. Shuman, B. Wellman, & M. Zuckerman (eds.), *Encyclopedia of Community* (1st ed., vols. 1-4). Sage Reference. Retrieved from the World Wide Web: <http://www.berkshirepublishing.com/brw/pjdescr.asp?projID=18>.
- Jones, Q., & Rafaeli, S. (2000). Time to split, virtually: 'Discourse Architecture' and 'Community Building' as means to creating vibrant virtual publics. *Electronic Markets: The International Journal of Electronic Commerce and Business Media*, 10 (4), 214-223.
- Jones, Q., & Whitworth, B. (2002). Initial thoughts on 'a different kind of space:' Mediating architectures and discourse coherence. Presented at S. Herring, W. Sack, & T. Erickson, *Discourse Architectures: The Design and Analysis of Computer-Mediated Conversation*. ACM's Conference on Human Factors in Computing Systems 2002, Minnesota, Minneapolis.
- Kraut, R., Fish, R., Root, R., & Chalfonte, B. (1990). Informal communication in organizations: Form, function and technology. In R. Baecker (ed.), *Reading In Group-Ware and Computer Supported Cooperative Work: Assisting Human to Human Collaboration* (pp. 287-314). San Francisco, CA: Morgan Kaufmann Publishers Inc.
- Marmasse N., & Schmandt, C. (2000). Location-aware information delivery with ComMotion. In *HUC 2000*.
- McCarthy, J.S., & Meidal, E.S. (1999). ACTIVE MAP: A visualization tool for location awareness to support informal interactions. In *HUC 1999* (pp. 158-170).
- Millen, D., & Patterson, J. (2001). Social interaction and the creation of social capital in a geography-based online community. Paper presented at Internet Researchers 2.0: INTERconnections. *The 2nd International Conference of the Association of Internet Researchers*. Minneapolis, MN, October 10-14.



- Nardi, B., Whittaker, S., & Bradner, E. (2000). Interaction and outeraction: Instant messaging in action. *Proceedings of the ACM Conference on CSCW* (pp. 79-88).
- Nelson, L., Ramsey, C.E., & Verner, C. (1960). *Community structure and change*. New York: The Macmillan Co.
- Pascoe, J. (1997). The stick-e note architecture: Extending the interface beyond the user. In *Proceedings of ACM Conference on Intelligent User Interfaces (IUI'97)*.
- Persson P., Espinoza, F., & Cacciatore, E. (2001). Geonotes: Social Enhancement of Physical Space. Design-Expo at *CHI2001*, Seattle, USA.
- Rafaeli, S., & Newhagen, J. (1996). Why communication researchers should study the Internet. *Journal of Computer-Mediated Communication*, 1 (4). (Special joint issue with the Journal of Communication).
- Reuters/Wired News. (1998). Bleep at First Sight. *LoveGety*. Retrieved from the World Wide Web: <http://www.wired.com/news/culture/0,1284,12342,00.html>.
- Rowling, J.K. (1999). *Harry Potter and the Prisoner of Azkaban*. New York: Scholastic Press.
- Rowling, J.K. (2000). *Harry Potter and the Goblet of Fire*. New York: Scholastic Press.
- Schmidt, T., & Townsend, A. (2003). Why Wi-Fi wants to be free. *Communications of the ACM*, 46 (5), 47-52.
- Schuler, D. (1994). Community networks: Building a new participatory medium. *Communications of the ACM*, 37 (1), 38-51.
- Spohrer, J. (1999). Information in places. *IBM Systems Journal*, 38(4), 602-625.
- Stein, M. (1960). *The eclipse of community*. Princeton, NJ: Princeton University Press.
- Terry, M., Mynatt, E. D., Ryall, K., & Leigh, D. (2002). Social Net: Using patterns of physical proximity over time to infer shared interests. In *CHI 2002 Extended Abstracts*.
- Terveen, L., & Hill, W. (2001). Human-computer collaboration in recommender systems. In J. Carroll (ed.), *HCI in the new millennium*. Addison Wesley.

- Trevor J., Hilbert, D., & Schilit, B. (2002). Issues in personalizing shared ubiquitous devices. *Ubicomp*, pp. 56-72.
- Vaughan-Nichols, S. (2003). The challenge of Wi-Fi roaming. *IEEE Computer*, 36 (7), 17-19.
- Want, R., & Hopper, A. (1992). Active badges and personal interactive computing objects. *IEEE Trans. on Consumer Electronics*, 38(1), 10-20.
- Want, R., Hopper, A., Falcao, V., & Gibbons, J. (1992). The active badge location system. *ACM Transactions on Information Systems (TOIS)*, 10 (1), 91-102
- Weilenmann, A. & Holmquist, L.E. (2001). Hummingbirds go skiing: Using wearable computers to support social interaction. *Proc. IEEE ISWC '99*. Retrieved from: <http://iswc.gatech.edu/>, IEEE Press, 1.
- Wellman, B., & Gulia, M. (1999). Virtual communities as communities: Net surfers don't ride alone. In P. Kollock & M. Smith (eds.), *Communities in Cyberspace*. New York: Routledge.
- Wellman, B., Carrington, P., & Hall, A. (1988). Networks as personal communities. In B. Wellman (ed.), *Social structures: A network approach*. Cambridge: Cambridge University Press.
- Wellman, B., Quan Haase, A., Witte, J., & Hampton K. (2001). Does the Internet increase, decrease, or supplement social capital? Social networks, participation, and community commitment. *American Behavioral Scientist*, 45 (3), 437-456 (Special Issue: "The Internet in Everyday Life").
- Wiberg, M. (2001). RoamWare: An integrated architecture for seamless interaction in between mobile meetings. In *Proceedings of the 2001 International ACM SIGGROUP Conference on Supporting Group Work* (pp. 288-297). Boulder, CO: ACM Press.
- Wiberg, M. (2004). *FolkMusic: A mobile peer-to-peer entertainment system*. HICSS37. Hawaii, USA.
- Zagami, J., Parl, S., Bussgang, J., & Melillo, K. (1998). Providing universal location services using a wireless E911 location network. *IEEE Communications*, 36 (4), 66-71.

# Part III: Supportive Technologies

## Let's Head for the Future of Interaction Technologies

This third and final part of this book, entitled “Supportive Technologies,” is devoted to the future of interaction technologies. Here, research efforts made to realize novel applications and gadgets designed to support interaction are presented, as well as research that aims at identifying new requirements for interaction technology design.

Overall, the following chapters have one thing in common, i.e., they all focus on interaction support in mobile settings. Clearly, and as stated in the introduction to this book *interaction* and *mobility* are highly intertwined, and probably two fundamental things about us as human beings, i.e., we are social beings that need to be able to communicate, and another part of our nature as human beings is that we are mobile thus requiring mobile interaction support to always be able to maintain our social networks, wherever we are.

This third section presents research efforts that, instead of taking on an empirical or theoretical view, strive towards being design-oriented in their approach to the Interaction Society. The basic idea behind conducting design-oriented research lies in the very concept of design. The concept of design is about changing existing situations into preferred ones, to believe in progress, and to have faith in a future ideal world. As such, the design-oriented approach is a constructive approach aimed not only at understanding the present, but to develop the future and understand what new technology might be able to do for us, and how it might affect us as human beings. Thus, these researchers are themselves an active part in the formation of how we will interact and communicate in the near future. In this section we are thus provided with a short glance around the corner that shows us what kind of IT-support we can expect in the next few years from now. So, let's head for the future of interaction technologies!

## Chapter X

# The Mobile Workplace: Collaboration in a Vast Setting

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### Abstract

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*This chapter discusses how truly mobile occupational groups relate to locations in a vast working area when collaborating with each other. It brings forth two ethnographic studies on mobile professionals working on the road. Their work setting has predominantly been described from a perspective where they are isolated in the driver's seat. However, seeing that the environment in which they drive through constitutes their workplace, the chapter examines their relation to the surroundings when performing their tasks. The empirical data illustrates the importance of mutual understanding of locations to successfully perform collaborative tasks. For example, coordinates supplied by a GPS receiver are not sufficient in the performance of their tasks. It is rather the mutual understanding of locations, being in proximity or other visual clues that are of importance. We argue the need for a detailed understanding*

*regarding the use of locations to succeed in the development of future mobile position-based services.*

## **Introduction**

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This chapter focuses on the importance of location in mobile collaborative work. The interest in the topic derives from the rapid technological development in mobile data communication and positioning systems, which facilitates the development of mobile position-based services. The potential to support various mobile occupational groups, as well as supporting leisure activities, emerges. However, current services have not yet reached a major breakthrough in the market.

We argue the need for a detailed understanding of users' behavior to succeed in the development of such new services. The purpose of this chapter is to bring forth an ethnographic study on collaboration among mobile workers. We discuss how truly mobile occupational groups, working on the road, relate to locations in their vast working area when collaborating with each other. Their work setting has predominantly been described from a perspective where they are isolated in the driver's seat. However, we will examine their relation to the surroundings when performing their tasks.

The occupational groups studied consist of bus drivers and road inspectors. Both groups constantly move around in a vast area while performing their tasks. They are not only collaborating with colleagues far remote, but as all other road users they also adapt their actions to the surrounding traffic. Geographical locations along their routes are important in the interaction between the workers. An understanding of this dependency plays an important role in the design of mobile position-based services supporting collaborative activities.

The chapter is organized as follows. First we consider related research on place and space, mobile work and the physical environment as a resource in mobile collaborative work. We continue by describing our methodological approach, followed by the empirical material, introducing the two occupational groups and presenting excerpts from the fieldwork. Finally we summarize and conclude the chapter.

## Background

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### Place and Space in Interactional Work

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Many disciplines, CSCW (Computer Supported Cooperative Work) as one of them, have taken a “spatial turn,” where geographical concepts to understand and describe our social world are widely used. With no intent to be conclusive, we provide a brief background concerning the concepts of space and place by looking at computer-mediated communication (Harrison & Dourish, 1996), organizations (Schultze & Boland, 2000) and technologies (Brown & Perry, 2002).

In a seminal article, Harrison & Dourish (1996) argued that spatial models in computing science were preoccupied with properties of three-dimensional structures rather than the “mutually-held, and mutually available cultural understandings about behaviour and action” (p. 67). Instead, they proposed a shift in focus towards the “invested understandings of place” rather than the structures of space. It was the meanings and the activities of places that should be the inspiration for designing computer mediated platforms for social interaction rather than the evocative objects and the spatially constraining and structuring elements. Thus, they defined space as the spatial structures and place as a space invested with understandings. The challenge in this perspective was to understand places without spaces – i.e., virtual places.<sup>1</sup>

Both Shultze & Boland (2000) and Brown & Perry (2002) provide fairly different definitions of space and place. Shultze & Boland (2000) define space and place as opposite concepts that are “locked into a duality whereby the one meaning constitutes the other” (p. 216). Space stands for the possibility to generalise: globalisation, standardisation, social independence, expansiveness, objectivity, flexibility, perfectibility, unrestrained movement, progress, future, continuous change; whereas place connotes boundedness: tradition, being, restricted movement, limited change, constrained growth, situatedness, subjectivity, presence, physicality, specialist knowledge, stability. However, one aspect of an organization can be both globalized and bounded, i.e., that both space and place operate simultaneously. Shultze & Borland explore how technology workers (contractors) struggle with the dualistic tensions between space and place within the organisation. On a day-to-day basis the contractors were continuously negotiating the relationship between space and place, e.g., their situated involvement in fiddling and fixing the technologies (i.e., place-like

practise) was, by documenting the daily activities, reduced into an objective and detached work practice (i.e., space-like practice).

Brown & Perry (2002) tie characteristics of technologies to the discussion of space and place. The usefulness of technologies is not only a usability issue but also a geographical issue (p. 252). For them space and place are general concepts that “highlight features of geography and action... To call something a ‘place’ brings attention to its located, embodied, personal human nature. And to call something a ‘space’ is to bring attention to abstract, objective, global, general, inhuman qualities” (p. 249). In their article, they illustrate how the tension between these features brings out the conflict between local/contingent and abstract/distributed. For example, maps are predominantly space-like (pp. 250-251). They are representations of a geographical space, formalized and standardized with grids and symbols, easy to understand after learning one map. Maps do also contain many place-like characteristics, such as that they are read in specific places, reveal the history of places and that some places are excluded from the maps. The tension of technologies having both place-like and space-like characteristics helps us in exploring its use of them; the representations through the maps helps us find our way by interpreting them to fit with the place where we stand.

In line with Shultze & Borland (2000) and Brown & Perry (2002), we use the tension between space and place to highlight the issues on the use of locations in mobile collaborative work. The representation of the place, the activities associated to the places, the mobility, the use of communication technologies and the vast setting of their work are important when studying the workplace. In the following we will look how place has previously been described in mobile work.

## **Mobile Work**

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Despite the geographical distances, mobile work is heavily dependent on fixed locations. Consequently, a large body of research on collaborative mobile work explores different notions of geographical dependency (see, e.g., Bellotti & Bly, 1996; Luff & Heath, 1998; Wiberg & Ljungberg, 1999; Bardram & Bossen, 2003).

Mobility occurring within a building, a department or a process plant, has in the CSCW literature been termed “local mobility” (Bellotti & Bly, 1996). The resources such as scanners, meeting rooms, colleagues, etc., were located

within the site, which in turn generated mobility. People moved around, i.e., they were locally mobile within the building in order to talk to colleagues or to use shared resources. Bradram & Bossen (2003) studied local mobility at a ward in detail, where they found that mobility itself is work of trying to make *the right configuration* of people, places, resources and knowledge. Places at the ward were often specialized towards specific activities or to provide solitude. There was also a wide selection of medical equipment and machinery, which was stationary, such as X-ray machines or CT scanning devices. In what they then call *mobility work*, the configuration of people, places, resources and knowledge is balanced in sets of contradictory concerns; i.e., availability vs. seclusion, mobility vs. localization, orderliness vs. flexibility. Concluding that “[a]ction is intrinsically not only temporal but also spatial” (p. 372), they observed that spatial dimension of articulation work has often been overlooked.

Occupational groups working with infrastructure management have a strong geographical dependency, seeing that they need to be at certain places to inspect and repair defective equipment. Recent studies have set out to explore the consequences on organizations of mobile work when the locations where they work are widely distributed. Examples of such studies are the ones on process engineers (Bertelsen & Bødker, 2001) and service technicians (Orr, 1996; Wiberg, 2001). At a glance, the tasks performed by the process engineers (Bertelsen & Bødker, 2001) can be seen as individual, but their actions affect the running of the plant, and therefore also their colleagues. To facilitate their work there is a need to share information, but not in the sense of universal access to everything, everywhere. The information cannot be separated from specific actions, which in turn is tied to specific places. Accordingly, Bertelsen & Bødker characterize the environment as a common information space, and highlight the importance of being on location to take the correct actions. The studies describing service technicians (Orr, 1996; Wiberg, 2001) reveal certain similarities with the process engineers. However, a slight difference can be observed by the fact that they have to move in greater distances between the locations where they work.

These studies show both space-like and place-like aspects of mobile work, such as shared information spaces and mobility work. However they are limited to local mobility within buildings, departments and locations within process plants. In the following we will look at work in a road setting, and driving in particular.



## **Work While Mobile – Driving and Working**

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Some of the studies of mobile work, introduced above, briefly describe how tasks are carried out while moving (Bardram & Bossen, 2003; Wiberg, 2001). This is a distinguishing feature of work conducted on the roads. In one of Laurier's (2002) studies on mobile workers, the workplace consists of a region accomplished by the movement between the customers and the large business company. This accomplishment is not only conducted during meetings at certain nodes, it is performed while being on the move — i.e., they use the time in the car, as they drive, to accomplish their work. The car is a modified workplace, i.e., a mobile office.

However, the car is not a workplace where you can engage exclusively in work. You have to actively attend to road use. Road use refers to multifarious use of roads, such as driving, cycling, exercising, playing or window-shopping (Juhlin et al., 2000). Thus driving involves many other simultaneous side engagements and practical actions. People work while they drive; they talk in their mobile phones; they fiddle with papers; etc. (Esbjörnsson & Juhlin, 2003). Laurier introduces another study on an occupational group conducting sales related work while driving (2001). He argues that the mobile workers in his study try to make the driving hands-free rather than their use of mobile phones. They benefit from moments of less attention on driving, to perform their office work in the car, i.e., they work while being stuck in traffic jams.

Thus driving is an activity that, like other practical actions, requires more than cognition. Subtle negotiations are vital in the activity of using the roads. However, sociological studies on auto-mobility tend to leave out the interaction and collaboration *in* road use and instead study the social and political contingencies *around* road use. For example, when Sheller & Urry (2000) describes the fragmentation and disintegration caused by traffic and how drivers interrupt pedestrian interaction, or when Beckmann (2001) describes driving by referring to Adorno & Horkheimer, stating that, "Men travel on rubber in complete isolation from each other" (p. 601).

A study, which combines the collaborative act of driving simultaneously as performing other type of work, is the one on the snow sweeping group at Arlanda airport (Juhlin & Weilenmann, 2001). The participants interact with each other locally, as well as with a remote control centre. The local interaction concerns the collaboration with snow-sweepers in visual sight of each other. As

with the occupations described in this chapter, the snow crew is undertaking a job where they are almost constantly on the move. The work can be termed truly mobile work (Sherry & Salvador, 2001). Movement is the purpose of their work and not only as means to reach a workplace. The ongoing mobility is visible in how they communicate and the system supporting work, as well as in the rules surrounding their tasks. For them, the positioning of their co-workers is under constant negotiation.

## **Physical Environment as a Resource in Mobile Collaborative Work**

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Among researchers focusing on mobile work, the physical space that one, while mobile, passes through have become somewhat ignored. As when Urry (2000) writes that the road users are seated in “a place of dwelling that insulates them from the environment that they pass through... The environment beyond the windscreen is an alien other, to be kept at bay” (p. 63). This is not the case in the field of architecture and city planning. In writings by, e.g., Lynch (1990), Appleyard et al. (1964) and Venturi et al. (1977), the visual qualities of roads, roadsides and buildings along the roads are taken into serious consideration. By conducting field trials, where the researcher and the subjects walked a pre-defined tour around a block, the conversations and a follow-up interview was recorded and analyzed. Lynch (1990) found that:

*“there was apparently a drive to organize the environmental impressions into meaningful patterns... Since the city environment is complex and fluid, this is a difficult operation... Certain elements seem particularly important in furnishing distinctions for area classifications in the city, such as people and activity; land use; and general physical form, spatial form in particular” (p 198-199).*

The environment perceived through motion is organized into meaningful patterns that are not only cognitive, but also interactional. “Cognition is an individual process but its concepts are social creations. We learn to see as we communicate with other people” (Lynch, 1990, p. 233). The communication and use of locations, as one pass them, is thus part of the social character of

work. Even the conversations on places involve a level of membership analysis (Schegloff, 1972). Thus:

*“The diverse ways in which different groups see the same place are important... from similarities in the nature of the social relations within groups which at first glance may seem wildly dissimilar. Similarities of cognition are particularly useful... They are essential if people are to communicate and cooperate with one another” (Lynch, 1990, p. 236).*

In the continuation of the chapter we elaborate on how the mobile workers have a workplace, which is wider than the confinement of the vehicle. Further, we discuss how the roadside beyond the windscreen plays an important part in the interaction between mobile workgroups (Juhlin & Vesterlind, 2001; Esbjörnsson & Juhlin, 2002).

## Method

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Many road users conduct different forms of work as they drive along the roads. This is severely constrained by the activity of being in traffic. As with many other studies “making co-operative work visible” (Crabtree, 2003), we have adopted ethnographic methods to study how mobile-workers “put together” their work and organization. Ethnography was originally developed within the area of anthropology and sociology as a method to gain insight into the cultural practices of societies (Prus, 1996). In addition to interviews, ethnography relies on observations where the researcher follows the work process as it unfolds. The activity of being in traffic poses challenges also for the researcher when observing collaborative work. For example, the informants move around while being studied. Hence, the ethnographer has to participate in the vehicles. Some of the methodological problems are general for research on mobile activities (see, e.g., Weilenman, 2003).

We have studied two occupational groups as they travel through their environment, conducting their everyday tasks (Juhlin & Vesterlind, 2001; Esbjörnsson & Juhlin, 2002). In the winter of 1999-2000, we followed the bus drivers for three weeks, sitting in the front seat on the right side of the driver. In a similar

manner, we participated in the road inspectors' daily work, during two weeks, in the summer of 2000. We took extensive field notes, which were transcribed. The transcriptions were analyzed, and a set of themes was identified. A few themes and representative sequences are presented in this chapter.

## **Road Inspectors**

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Road use relies on passable roads, which is the main responsibility of the road inspectors. They take care of objects and defects that can disturb the traffic. A pre-condition to be able to stop and repair the defects is to observe and identify possible defects simultaneously as driving. Consequently, each inspector spends most of his working day alone inside the cabin of the truck (Esbjörnsson & Juhlin, 2002).

The inspector is surrounded with a large palette of equipment inside the cabin of the truck, including an FM radio, communication radio (UHF), a handheld computer, and a mobile phone equipped with hands-free. The *ProData* system, consisting of the mobile computer connected to a GPS-receiver, is the main tool for gathering information during inspection. All defects reported are coded and linked to the geographic location. The codes are based on a contract with the orderer, described in a document placed in each vehicle. The log created by *ProData* will then verify that the roads have been properly inspected. Mobile phones are used to inform colleagues about local contingencies and to delegate tasks. It is also necessary to communicate with colleagues to stay updated on the status of the road network and to share joint information regarding their tasks.

### **Performing Road Inspection in a Vast Working Area**

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The inspector patrols the road network according to a predetermined schedule. The frequency of the inspections on each road type is determined by traffic flow and road size. Main roads in the region are inspected every other day. Consequently, the minor roads are inspected less frequently. The inspection tours lasts around seven hours and takes the inspector 150 to 250 kilometers. The field note on the top of the following page illustrates the importance of the physical objects situated along the predefined inspection routes.

*Observation 1. A broken reflection pole*

01	When turning into the Vallentuna-exit Jacob discover the loss of one
02	reflection-pole. When in place of the lost pole, we can see it lying in the
03	ditch. He stops the car and starts to look in the list of available defect-
04	codes. He selects a code, and enters a text where he describes the exact
05	position, despite the position given by GPS. He justifies it with the
06	argument that he wants to make it obvious that the pole was placed in the
07	curve of the exit. This is done without leaving the vehicle. He leaves the
08	pole until he comes back to take care of the defect. He memorizes that he
09	has to bring some extra poles, since the top is broken on several others.
10	He does not take notes on this.

Implicitly from this field note, and the introduction to the road inspectors, the vast setting of the inspection tours plays an important role in their work. The performance of the working tasks does not only take place inside the cabin of the truck, thus the inspector has to divide his focus between driving and inspecting the environment outside. The inspection area is vast, containing amounts of objects that all possibly could cause working tasks. However, as in the case presented above, it is the lack of a physical object (line 1-2) that causes action.

Furthermore, the way he deliberately leaves the broken reflection-pole (line 7-8) as a visual clue, even though he could have loaded it on the truck, indicates the importance of the physical objects. The reflection-pole now fulfills an additional purpose, as a physical object defining the location and the task connected to it. The location is of importance seeing that he has to take care of the identified defect at a later occasion. This example illustrates how the road inspectors associate understandings to locations. The *ProData* system is supposed to be the main tool when reporting and managing identified defects along the roads. Nevertheless it has its shortcomings; it appears not to be strong enough alone to define a location. The inspector specifies the location by a textual geographical description, in addition to the one supplied by the GPS. However, this annotation is done in combination with the left reflection pole. This could be due to the fact that the reported data is not accessible while being out in the car.

## **Public Transport**

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The primary task of public transport is to pick up, transport, and drop off passengers. For this distributed and mobile activity, the busses are coordinated

to move in a somewhat organized fashion. Bus drivers rely on formal plans to provide the service in a predictable and reliable manner. They have pre-defined routes, available on maps, to follow at given times, available in the timetable. The bus drivers also try to maneuver the busses so that they follow a predictable rhythm on the road. Through several drivers' movement, an intricate network of coordinated public transport is created. However, this coordinated network depends on each driver's ability to maneuver according to the pre-described timetable. Inconsistencies can be handled by shifting to active collaboration by using communication support available in the bus (Juhlin & Vesterlind, 2001). This consists of a radio communication systems that is provided and monitored by the contractors, however the drivers' private mobile phones are also used for that purpose. Further, the route is ascribed with a number displayed on each vehicle.

## **Using Bus Stops to Coordinate Reinforcement Traffic**

Bus stops along the route play an important role in public transport. These are spatial arrangements (Crabtree, 2000), i.e., the poles or booths are visible and constructed for their visibility, but also that they are commonly known for passengers and bus drivers and signalize a location where passengers can board or disembark from public transport. As pickup and drop off locations for passengers, bus stops are an important part of the drivers' workplace.

### *Observation 2. Reinforced public transport, dividing bus stops and route between two bus drivers*

01	<b>Joseph:</b> [Passing a bus stop] there is a passenger standing there but I
02	won't pick him up, a bus behind me will. I will start picking up passengers
03	at "ICA Långhem." By the way, this is called reinforcement traffic. I'll
04	drive into the village of Limmared while the other bus drives straight pass
05	that village. I'll pick up the passengers on road 27 as well.
06	[Shortly thereafter, as he stops at the bus stop by "ICA Långhem" he says]
07	<b>Joseph:</b> See, here comes the other bus behind us.
08	[He continues the route in front of the other bus without stopping at any
09	bus stops even though there are many passengers waiting there. After the
10	third bus stop from "ICA Långhem" he says]
11	<b>Joseph:</b> I'll pick the passengers going to Limmared that stands on this bus
12	stop. [The bus driver looks at the waiting passengers while he slows down
13	the bus. Then he suddenly speeds up again and drives off without stopping.]
14	<b>Joseph:</b> Well, they didn't stand there. There are usually two guys standing
15	there that go to Limmared. But they weren't here. Of course if someone
16	doesn't know how we drive then he has to go into Limmared as well or he
17	might call me up on the com-radio. We have tested our way through in order
18	to be able to get into Tranemo in time, and I think the way we drive now
19	works fairly well.
20	<b>Researcher:</b> How have you realized that this way of managing is good?
21	<b>Joseph:</b> We have tried driving in different ways. Once we took every second
22	bus stop but then we got so delayed with the ordinary bus route and it
23	didn't work with those that were going to Limmared.

Bus stops are important in the coordination between passengers and bus drivers, but they are also a resource when drivers actively coordinate their movements in relation to each other. As in the following excerpt when the bus drivers are involved in reinforcement traffic. Sometimes one bus is not enough when there are too many passengers waiting along the route. By reinforcing a route with an extra bus, public transport can temporarily increase the local passenger capacity. (See Observation 2.)

This is an example of how bus drivers handle reinforcement traffic where two busses collaborate on the same route. Joseph's first comment (line 1-2) can be understood as a reflection on a formal task plan associated to bus stops, i.e., when a passenger stands at a bus stop the bus should stop.<sup>2</sup> Joseph continues by providing an explanation to why he is not stopping to pick up the passenger since he is participating in reinforcement traffic. Reinforcement traffic is defined (line 2-5) as an exception from the rule where two busses share the same route simultaneously. To conduct reinforcement traffic within the times of the timetable the drivers divided the bus stops between each other. Joseph says that this division of bus stops was agreed upon after a period of trial and error (line 21-23); the bus drivers tested different ways of reinforcement traffic (e.g., stopping at every other bus stop). Testing different ways of reinforcement traffic shows (line 14-19 & 21-23) that the division of bus stops is not only dependent on picking up passengers, equally important is that bus stops are used for passengers to disembark from public transport. The drivers therefore have to coordinate their division of bus stops to the expected travel plans of their passengers and this is rarely available for the bus drivers in advance. However, in this example Joseph knew the expected travel plans of some of the passengers (line 11-15). The expected travel plan of "the two guys" is part of the division of bus stops that the two bus drivers agreed upon. When the driver can see that the two guys "didn't stand there" (line 14) he decides to continue driving without stopping at that particular bus stop. The view of the bus stop is thus equally part of how the driver maneuvers his bus, and the absence of the two guys makes him alter the agreement of how reinforcement traffic is performed.

The coordination between the two drivers was smoothly performed without any communication. This could be due to their agreement of how to divide the bus stops between each other, but equally important was what they both could see beyond their windshield. They could follow or alter their division of work depending on what they saw in relation to what they knew about the passengers standing (or not standing) at the bus stop. The bus stops, as places, were an

important part of their workplace particularly when collaborating with each other.

## Traveling Through: Coordinating an Organization

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The physical environment is part of the mobile workplace, seeing that road inspectors and bus drivers relate to their colleagues by referring to locations along the road. As in the following observation where the researcher is traveling with a bus driver that is supposed to meet another driver at a pre-defined meeting-place:

### *Observation 3. The driver informs about his present location*

01	<b>James</b> [Driver in loudspeaker]: John over?
02	<b>John</b> [Driver whom researcher travels with]: Yes John speaking. You were the
03	one who tried to reach me just a moment ago? Over.
04	<b>James</b> : Yes. I am turning into Lockryd a bit late; we are just passing the
05	railway in Aplared. Over.
06	<b>John</b> : Good, then I don't need to call and tell that I'm late.
07	[After the conversation the driver turns to the researcher.]
08	<b>John</b> : In these cases, when informing the connection bus, the communication
09	radio works well.
10	<b>Researcher</b> : He told you where he was, why?
11	<b>John</b> : It's better to say so, that he is passing the railway and then I know
12	exactly where he is, and then I know how he drives and so forth. It's also
13	easier for me to know when he is coming.

First, this illustrates that the bus drivers communicate with each other. James contacts John since he is late to their rendezvous at a designated bus stop. This exemplifies the collaboration and how they communicate to provide a predictable public transport; they repair the delay by informing each other. Second, the conversation shows how the bus drivers talk about time. They refer to the delay by relating to the physical location of the bus that is running late instead of estimating a time when James will be at the meeting bus stop. John describes this way of talking about time as the preferred way (line 11-13). John explains that, when knowing where James is, he can know how James drive and thus, in his mind follow the movement of James (line 11-13), i.e., John visualizes the movement of James bus through the physical environment towards the chosen bus stop. Third, the observation show that there are locations, apart from the



bus and the bus stops that the bus drivers incorporate into their collaborative work activities and hence incorporate into their workplace. The conversation illustrates how drivers use locations along the route to relate the work that they conduct themselves with the work of the colleagues.

Another example of collaboration with colleagues illustrates the importance of the availability of visual details. This becomes apparent by the differences in recalling distant locations and locations in the proximity.

#### *Observation 4. Photos of the object in question*

01	Robert calls Kevin who is sitting in the other road inspectors' truck. He
02	recalled that he forgot to tell Kevin about the red Ford Orion which is
03	located along road 76. Robert reported it the last week, so Kevin does not
04	need to do it once again. Unfortunately Kevin has already done his report
05	and he has to erase his input in the system. During the conversation Robert
06	passes <i>Krukan</i> (a pottery and a café). The amount of signs along the road is
07	increasing, and placed in the borderland of what is allowed. Kevin and
08	Robert agree that the people back at the office have to take a look at
09	this. Robert takes the chance to tell Kevin about another car along his
10	section, but he cannot recall the specific location.
11	Later the same day, Robert fetched newly developed photos. There were
12	pictures on the Ford Orion, which he called Kevin about earlier today.
13	Additionally there are some pictures on the other car. He calls Kevin
14	immediately and tells him where it was.

The observation is initiated with Robert calling his colleague (line 1) to inform about upcoming local contingencies on the inspection route, i.e., an abandoned car. Robert drove the route last week, and took care of reporting the defect. He calls with the purpose of facilitating the work Kevin currently is doing. This illustrates the collaborative aspects of being a road inspector. Despite the fact that they are traveling alone in each truck there are certain tasks that are shared, in this case a road section. During the conversation, the topic changes from the abandoned car to illegal road signs at a nearby café (line 5-9). The change in topic is presumably influenced by the fact that Robert is passing the café. The environment that passes by is brought into collaborative tasks. The discussion illustrates another aspect of collaboration, i.e., how they share a common understanding on the rules, and whose responsibility it is. However, the excerpt also exemplifies the complexity in recalling remote locations when discussing the abandoned cars (line 9-10). It is apparent that the locations are weak despite details about circumstances and the understanding of the location is obvious. Robert remembers the car, but he cannot define its location. However, Robert can recall the location of the other car with the visual aid of the

photography and the temporal proximity to the discussion on the location as he fetches the newly developed photos (line 11-14).

## **Mobile Collaborative Work in a Vast Setting**

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The work performed by bus drivers and road inspectors is conducted in a vast setting. The mobile workers drive their vehicles separated from their colleagues. Similar to Schultze & Borland (2000) and Brown & Perry (2002), there is a tension between space-like and place-like features of mobile work, which becomes apparent when collaborating. To accomplish the collaborative tasks, the bus drivers and road inspectors make use of formal resources with space-like characteristics, such as bus stops, timetables, maps, reporting systems, inspection routes, etc. However, to solve their tasks they also refer to locations other than the formal ones. To benefit from this plethora of resources, they ascribe them place-like characteristics, e.g., in the reporting system, the road inspectors specify the locations as part of their reporting and repairing work. The bus drivers refer to certain locations when coordinating routes with their colleagues.

Driving their vehicles and following their route to inspect is a solitary work. Still the participants actively attend to collaborative activities, e.g., when inspecting the same sections of the road, rendezvous at bus stops so that passengers can shift bus routes, sharing the same route simultaneously or when articulating rules and responsibilities of the organization. In this collaborative work they communicate and relate to each other as members of a social space – a workplace. Unlike the related studies (Bradram & Bossen, 2003; Belotti & Bly, 1996; Bertelsson & Bødker, 2001), the bus drivers and road inspectors move around in a vast setting, without any fixed locations where work is conducted.

As in other studies conducted on people working in their vehicles (Laurier, 2001; Esbjörnsson & Juhlin, 2003), the road inspectors and bus drivers perform their tasks while driving. Often mobile workers do not have to consider the roadside as part of their work since they are only passing through. However, this is different when looking at bus drivers and road inspectors. Here we can see that the physical environment plays an important role in the performance of their occupational tasks. Thereby the bus drivers and road inspectors do not only drive through an environment, they move through their workplace. Juhlin

& Weilenmann (2001) found that the view beyond the windscreen was important for the mobile workers when they were in each other's proximity. Similarly we found that the view of the environment supported collaboration even when the distance between the mobile workers varied. The collaborative mobile work is dependent on the use of locations as a resource to coordinate tasks, e.g., it can be used to talk about time (delays in traffic) or they can divide their responsibilities in work by splitting up the locations between them.

The visual overview of the location is important when the mobile workers are close to it. What they see can even change how they choose to work collaboratively. Seeing that the visual overview of the location, and not only tasks associated to the place, is important can explain why distant locations are weak but also why the locations can be "strengthened" by using visual representations such as photos. This illustrates that, like the architects (Appleyard et al., 1964; Lynch, 1990), we have to take the visual qualities of the roadside into careful consideration when studying mobile work.

Thus, the workplace for the mobile workers is the seat in the vehicle, the garage, roads, crossings, bus stops, beautiful views, industrial zones and passengers – everything that they associate with the activity of corporal mobility as they conduct their work. Places and objects on the road and at the roadside, such as reflection poles and passengers, and objects that the people carry, such as post-it notes and photographs, are resources for the collaborative work between the mobile workers. Taken together, this chapter illustrates how this space is not confined to the vehicle, it is rather the physical environment "beyond the windscreen" that is an integral part of their workplace.

## **Designing Mobile Position-Based Services**

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We find, in line with Brown & Perry (2002), that there is still much to be studied regarding the *geographical* issue of making technology useful. The mobile workers we followed were equipped with several tools ranging from timetables, watches and post-it notes to mobile phones, radio-communication systems and positioning systems. However, the relational aspect of locations and the bridging between general and localized aspects of work was poorly supported despite all tools and timetables. This inhibited the collaboration

between the mobile workers. The success of mobile position-based services are not only dependent on the ability to mark locations, but on how people currently use locations as part of their work.

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## References

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- Appelyard, D., Lynch, K., & Myer, J. (1964). *The view from the road*. Cambridge, MA: MIT Press.
- Bardram, J. E., & Bossen, C. (2003). Moving to get aHead: Local mobility and collaborative work. In *Proceedings of ECSCW'03* (pp. 355-374). Dordrecht: Kluwer Academic Publishers.
- Beckmann, J. (2001) Automobility: A social problem and theoretical concept. *Environment and Planning D: Society and Space*, 19, 593-607.
- Bellotti, V., & Bly, S. (1996). Walking away from the desktop computer: Distributed collaboration and mobility in a product design team. In *Proceedings of CSCW'96* (pp. 209-218). New York: ACM Press.
- Bertelsen, O. W., & Bødker, S. (2001). Cooperation in a massively distributed information space. In *Proceedings of ECSCW'01* (pp. 1-18). Dordrecht: Kluwer Academic Publishers.
- Brown, B., & O'Hara, K. (2002). Place as a practical concern of mobile workers. *Journal of Environment and Planning A*, 35, 1565-1587.
- Brown, B., & Perry, M. (2002). Of maps and guidebooks: Designing geographical technologies. In *Proceedings of Designing Interactive Systems'02* (pp. 246-254). New York: ACM Press.

- Crabtree, A. (2000). Remarks on the social organisation of space and place. *Journal of Mundane Behavior*, 1 (1), 25-44.
- Crabtree, A. (2003). *Designing Collaborative Systems: A practical guide to ethnography*. Berlin: Springer.
- Esbjörnsson, M., & Juhlin, O. (2002). PlaceMemo: Supporting articulation in a vast working area through position based information. In *Proceedings of ECIS'02* (pp. 1185-1196).
- Esbjörnsson, M., & Juhlin, O. (2003). Combining mobile phone conversations and driving: Studying a mundane activity in its naturalistic setting. In *Proceedings of ITS2003*.
- Harrison, S., & Dourish, P. (1996). Re-Place-ing space: The roles of place and space in collaborative systems. In *Proceedings of CSCW'96* (pp. 67-76). ACM Press.
- Hine, C. (2000). *Virtual ethnography*. London: Sage.
- Juhlin, O., & Vesterlind, D. (2001). Supporting bus driver collaboration: New services for public transport management. In *Proceedings of 8th ITS World Congress*.
- Juhlin, O., & Weilenmann, A. (2001). *Decentralizing the control room: Mobile work and institutional order*. In *Proceedings of ECSCW'01* (pp. 379-398). Dordrecht: Kluwer Academic Publishers.
- Julin, O., Normark, D., & Sjöberg, L. E. (2000). Road talk informatics: Informatics for local collaboration along the roads. In *Proceedings of the 7th ITS World Congress*.
- Laurier, E. (2001, November). Notes on dividing the attention of a car driver. *Team Ethno Online*, (1).
- Laurier, E. (2002). The region as a socio-technical accomplishment. In B. Brown, N. Green, & R. Harper (eds.), *Wireless World: Social and Interactional Aspects of the Mobile Age* (pp. 46-61). Berlin: Springer Verlag.
- Luff, P., & Heath, C. (1998). Mobility in collaboration. In *Proceedings CSCW'98* (pp. 305-314). New York: ACM Press.
- Lynch, K. (1990). In T. Banerjee & M. Southworth (eds.), *City sense and city design: Writings and Projects of Kevin Lynch*. Cambridge, MA: The MIT Press.

- Miller, D., & Slater, C. (2000). *The Internet: An ethnographic approach*. Berg.
- Orr, J. (1996). *Talking about machines: An ethnography of a modern job*. Cornell: ILR Press.
- Prus, R. (1996). *Symbolic interaction and ethnographic research: Intersubjectivity and the study of human lived experience*. State University of New York Press.
- Schegloff, E. (1972). Notes on a conversational practice: Formulating place. In D. Sudnow (ed.), *Studies of Social Interaction*. Free Press.
- Schultze, U., & Boland, R. J. (2000). Place, space and knowledge work: A study of outsourced computer system administrators. *Accounting Management and Information Technologies*, 10, 187-219.
- Sheller, & Urry, J. (2000). The city and the car. *International Journal of Urban and Regional Research*, 24 (4), 737-757.
- Sherry, J., & Salvador, T. (2001). Running and grimacing: The struggle for balance in mobile work. In B. Brown, N. Green, & R. Harper (eds.), *Wireless World: Social and Interactional Aspects of the Mobile Age* (pp. 108-120). Springer Verlag.
- Urry, J. (2000). *Sociology beyond societies: Motilities for the Twenty-First Century*. Routledge.
- Venturi, R., Brown, D. S., & Izenour, S. (1977). *Learning from Las Vegas*. (Rev. Ed.) Cambridge, MA: MIT Press.
- Weilenmann, A. (2003, June). *Doing mobility*. (Ph. D. thesis). Gothenburg Studies in Informatics, Report 28. Sweden.
- Wiberg, M. (2001). *In between mobile meetings: Exploring seamless ongoing interaction support for mobile CSCW*. (Ph. D. Thesis). Umeå University, Dept. of Informatics, Sweden.
- Wiberg, M., & Ljungberg, F. (1999). Exploring the vision of anytime, anywhere in the context of mobile work, In Y. Malhotra (ed.), *Knowledge Management and Virtual Organizations*. The BizTech Network.

## Endnotes

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- <sup>1</sup> However this approach (of spaceless places) have become questioned. Miller & Slater (2000) for example take a critical stance against the ways in which Internet (cyberspace or virtuality) have been examined. They mean that one has to understand the Internet media as continuous with and embedded in other spaces, that they happen within mundane social structures and relations that they may transform but that they cannot escape into a self-enclosed cyberian apartness (see also Brown & Perry, 2002). Similarly Hine (2000) provides accounts of how space and place are brought in to activities taking place on the Internet, as ways of structuring trust, importance, reliance etc.
- <sup>2</sup> Standing at a bus stop does not necessarily mean that the people want to embark onto the bus. A subtle negotiation between passengers and bus driver is needed to handle the understanding of the location and to verify a shared notion of it. As one driver described: “People show their intentions. They walk forward if they want to get on the bus. They get up from the bench. They return into the booth and sit down or turn their backs to the bus if they don’t want to board... They can also wave to show that they don’t want to get on the bus.” Similar negotiation, and uncertainty, occurs when a passenger wants to disembark public transport. The bus stop is also negotiable and passengers and drivers can agree on stopping at other locations than those that are marked.

## Chapter XI

# Spectator Information Support: Exploring the Context of Distributed Events

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### **Abstract**

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*In the context of temporary, distributed events such as music festivals and sports, the event is divided in several parts held at different geographical locations at the same time or in a sequence. Thus, the conventional technology used can only provide limited support at portions of the event. This research focuses on the challenges for design concerning information support in the context of distributed events. The chapter reports from three empirical studies and applies two perspectives on context as a background to the fieldwork findings. Within the results, three main contextual requirements are presented that need to be considered when*



*designing information support for spectators in situ. The chapter contributes to existing research in terms of providing descriptions of the interplay between actors, context and the event itself. Among the conclusions regarding design, we find that technology should be shaped to behave and act according to how, where and with whom spectators are situated.*

## **Introduction**

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Much research has been conducted on different aspects of computers and their relation to work. For instance, the systems development profession (Mathiasen, 1998), the user (worker) involvement through participatory design (Ehn, 1988), and computer supported cooperative work (Bannon, 1993; Hughes, Randall & Shapiro, 1992). During late 1990s, when mobile computing started to attract the interest of the research community, *work* continued to dominate the research agenda. There was a transfer “from desktop computing to mobile work” (Dahlbom & Ljungberg, 1998). Recently, other areas than work and mobile information technology (IT) have received interest. Research has started to explore the use of mobile IT in the leisure<sup>1</sup> domain; for instance, tour guides (Abowd, Atkeson, Hong, Long, Kooper, & Pinkerton, 1997; Cheverst, Davies, Mitchell, & Friday, 2000), electronic guidebooks for exhibitions (Aoki, Grinter, Hurst, Szymanski, Thornton, & Woodruff, 2002) and Internet-based mobile guides for museum visitors (Oppermann, Specht, & Jaceniak, 1999). The cell phone has received particular interest as a technology changing everyday life (Kopomaa, 2000), and especially for teenagers (Weilenman, 2001). Little research has been conducted on supporting spectators in the context of sporting events. A couple of contributions have focused on various visual enhancements for the TV audience, especially for digital TV (e.g., Cavallaro, 1997; Rafey, Gibbs, Hoch, Le Van Gong, & Wang, 2001). Perhaps the closest related project to this research is the *Arena Project*<sup>2</sup> by the Mäkitalo Research Centre. This project provides spectators with event specific data through the use of handheld computers. The context where this technology has been introduced is focused at arena-based events, i.e., basketball and ice hockey. Spectators can watch the game live with supplementary information such as statistics. The technology developed enables the spectators to view the heart rates and breathing of the players via the handheld computers. In addition, the spectators can also see replays of goals and penalty situations

from the player's field of view. One of the goals in the project has been to investigate how event specific information can be broadcasted to people outside of the arena, as opposed to spectators *in situ*.

The research on mobile IT in the work domain and in the leisure domain is often different in terms of, for instance, research approach, unit of analysis, theoretical foundation, etc. However, in most mobile IT research, despite domain, there is an interest in the context where the IT is used, or is to be used. The context places limitations on how IT can be used and the context is often a prerequisite for the use. We refer to this as *contextual requirements*. To shed light upon this, the chapter reviews and applies two different views on context, first, the notion of *formative context* (Ciborra & Lanzara, 1994) and secondly, the Situated Action approach (Suchman, 1987). From the view of formative context we attempt to elucidate distributed events as a phenomenon, such as norms and established ways of how they actually run and take place. Moreover, the Situated Action approach is used as a background to investigate the individual behavior of actors within these contexts.

The aim of this chapter is to provide a set of *contextual requirements* to help designers develop new concepts and to understand how IT can be used as information support for spectators at distributed events.

## Background

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This chapter empirically explores the context of three distributed events: the Swedish International Rally, the Roskilde music festival, and the Swedish Match Cup ocean sailing. Distributed events are those divided in several parts held at different geographical locations at the same time or in a sequence with one part of the event followed by the next. Distributed events are also when the spectators can only view portions of the event taking place. Conventional arena events, such as ice hockey, track and field, and soccer make use of large screens for close-ups, replays and text-based information such as results and split-times. However, at distributed events taking place outside the conventional arena it is more difficult to provide spectator information support. At many distributed events, media channels, such as local broadcasts via loud-speaker systems and large screens, are used to inform the audience. These channels are located at hot spots of the event where many spectators are located, for instance at the start and at the finish line. But a large number of

spectators are not at the critical spots and they thereby miss event information. To deal with this, some spectators bring radio receivers; this of course only when the event is radio broadcasted. With this background the following research question is to be further elaborated in this chapter: *What are the contextual requirements for the design of spectator information support at distributed events?*

Field studies of the three events were conducted. The collected data were analyzed in relation to related research. Drawing upon these findings, three main contextual requirements are outlined. Further, based on the requirements, the main challenges concerning the support of spectators are discussed. Following this, suggestions and implications for design to meet these challenges are presented.

The remainder of the chapter is structured as follows: The first section reviews and applies two perspectives on context as a theoretical background. The second section describes the methods applied in this research. Next we report on the fieldwork. We then turn to an analysis, which discusses our findings from the three studies, before the chapter concludes and outlines future work.

## **The Understanding and Use of Context**

The literature provides a number of ways of understanding and studying context, with perspectives departing from the interplay between individuals, organizations, and environments, and how these aspects influence the design of technology and its use. Regardless of which starting point, particular circumstances and aspects within the context of interest have direct influence on how IT is used or can be used. Some approaches to context have viewed and analyzed it in terms of describing the interplay between individuals and the surrounding organizational structure, some has put the emphasis on what role technology can play to accommodate and facilitate interaction with regard to the surrounding environment, i.e., context-aware computing. Burrell (2000) propose a model of context-aware computing with social navigation. This is used to make earlier user experiences visible to add relevance to physical space and tasks. Schilit (1994) provides a set of important aspects regarding context: where you are, whom you are with, and what resources are nearby. In addition, a model of context-aware software dimensions is presented (Schilit, 1994). Abowd & Dey (2000) claim that users should not be confronted with

expressing all the information relevant to a given situation. Further, they claim that it is likely that users cannot formulate which information is relevant. Instead, the context-aware application should collect contextual information and, based on choices made by the designer, the application should provide relevant information to the user.

*“Context is any information that can be used to characterize the situation of an entity. An entity is a person, or object that is considered relevant to the interaction between a user and an application, including the user and applications themselves” (Abowd & Dey, 2000, p.3).*

Pascoe (1998) describes a set of context-aware capabilities to be able to describe context-awareness independently of functionality or interface. The capabilities emphasize on how to strengthen the link between contextual data and the resulting behavior and execution of applications.

*“Context is a subjective concept that is defined by the entity that perceives it. For example, one entity may conceive of its context as location whereas another may view it from a temporal perspective. It could also be a more ethereal construct, e.g. the emotional state of a person. Therefore, context could be generally described as the subset of physical and conceptual states of interest to a particular entity” (Pascoe, 1998).*

These definitions are useful on a general level. To a large extent these views on context put the emphasis on how to make technology feature a sense of context in its operation and execution. In this research we are interested in understanding distributed events as a phenomenon, i.e., its basic structure and execution. Moreover, the interest also concerns the fundamental behavioral patterns among the spectators, such as norms, needs and general practice. With this as background we have chosen to apply two different perspectives on context in order to shed light on these two instances of the events. First, Formative Context (Ciborra & Lanzara, 1994) is used to support our understanding of distributed events and its fundamental properties. Secondly, the Situated Action approach (Suchman, 1987) is applied to elucidate the practice and behavior of the actors, i.e., the spectators *in situ*. The two general constructs

of the views on context have been used as a lens to guide our general understanding of empirical phenomena and to shed additional light upon derived findings. The approaches towards context will be described in more detail below.

Ciborra & Lanzara (1994) describe context from an organizational perspective. They introduce the notion of *formative context* in order to interpret empirical findings from a study of a software development company. They argue that:

*“The outcome of a formative context in a work setting is a texture of routines, roles and tasks that come to possess an ‘aura of naturalness’ for those who daily execute the routines in that context” (Ciborra & Lanzara, 1994, p. 70).*

The daily work practice, established in the organization and between individuals, preserves and maintains the formative context, enacted by the actors. They also claim that the “aura of naturalness” is often conceived as inescapable. However, the formative context is under a negotiated evolvement:

*“Formative contexts show a pasted-up nature, and a makeshift one, where old and new routines are tested, discarded, retrieved, collated, and combined along a main stream of sense” (Ciborra & Lanzara, 1994, p. 71).*

And, as organizations are confronted with new major tasks, for which new organizational structures are formed, the formative context is actively developed to better accommodate the challenges brought by new projects:

*“...when developing a system like the software factory, the object of design and construction – be it deliberate or unintended – does not only consist of new organizational routines, programs, procedures, databases and flows but, more importantly, of a new formative context” (Ciborra & Lanzara, 1994, p. 71).*

The concept of context is here used in its transactional meaning, enacted in a situation of action, where formative contexts are expressions of social cognition

that transcends the individual (Ciborra & Lanzara, 1994). The meaning of context herein stems from the cyclic flow from established norms and values of practice to how new tasks and challenges imply changes to the *formative context*, thus having direct influence on how work is coordinated and conducted. The social and organizational impact on the formative context can thus maintain, reinforce or alter it in various ways.

Another view on context has been made by Suchman (1987) and her Situated Action approach. Suchman is primarily concerned with the interaction between people and systems that are based on some notion of anticipating the users' needs and how they go about deciding what to do, i.e., trying to understand the user's goal to take the appropriate action. Further, Suchman discusses the cognitive science perspective, i.e., the planning model, which suggests that human action inevitably stems from some kind of predefined plan. Thus, systems that are intended to accommodate this perspective are designed to identify these plans to act and interact in a purposeful way. Suchman (1987) provides insights from a study of such a system, which indicate weaknesses of this approach when human action tends to deviate from the implemented plan in the system (Suchman, 1987, pp. 121-170).

*“The coherence of situated action is tied in essential ways not to individual predispositions or conventional rules but to local interactions contingent on the actor’s particular circumstances” (Suchman, 1987, pp. 27-28).*

This implies that circumstances, as Suchman (1987) puts it, or context specific aspects in a particular situation, vary on the situation at hand and in ways that are difficult to predict. In addition, these circumstances can be constituted by either social or material aspects. She further argues:

*“In fact, because the relation of the intent to accomplish some goal to the actual course of situated action is enormously contingent, a statement of intent generally says very little about the action that follows. It is precisely because our plans are inherently vague – because we can state our intentions without having to describe the actual course that our actions will take – that an intentional vocabulary is so useful for our everyday affairs” (Suchman, 1987, p. 38).*

Due to the unpredictability of the chosen course of action, the underlying intent and so on, there is no recognition algorithm to identify or anticipate behavior without considering the prevalent context.

The two different perspectives on context concerning actors, action and interaction provide us with a general tool to interpret and analyze our data. These interpretations along with some theoretical considerations are presented at the end of our discussion. Next, the methods applied in this research are described.

## Research Approach

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Field studies are common in IT research. It has to a large extent been applied in the field of computer supported cooperative work (cf., Belotti & Bly, 1996; Hughes, Randall, & Shapiro, 1992; Hughes, King, Rodden, & Andersen, 1994) to inform the design and implementation of systems that support the sociality of work, complex actions and interactions. It has also commonly been used in previous work within interactive systems and human computer interaction ethnomethodologically inspired studies to guide the design of systems. To a large extent the focus of this approach has been on work related settings (e.g., Belotti & Bly, 1996; Belotti & Smith, 2000), but the scope has been broadened to also concern situations outside the workplace (e.g., O'Brien, Rodden, Rouncefield, & Hughes, 1999).

This research has conducted three ethnographically inspired field studies to explore three different distributed events. The distributed events studied are relatively short and last for around three days, which makes a longer study in the authentic setting impossible. Therefore, it is rather challenging to investigate highly dynamic contexts during such a short span of time. However, this research does not attempt to conduct a deeper analysis of distributed events as such; rather our leading objective is to acquire a general understanding of how this type of event actually takes place and the fundamental aspects of its actors *in situ*, namely the spectators. This corresponds to a basic understanding of the context and its actors to provide inspiration and pointers for design. These aspects are constituted by spatial, temporal and social parameters that play a significant role in shaping the context of where things take place, thus being relevant for designing novel concepts.

## **Data Collection and Analysis**

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The two main methods that have been used for data collection are observations conducted at each event and interviews of spectators in each study. The underlying intention with observational data was to capture the spatial behavior of spectators while experiencing the events, and also to see how they interacted with existing information support. Interviews were conducted to collect spectator opinions concerning what matters, what is considered as problematic, and how they go about doing the things they do. These two methods served as supplementing for each other in order to shed light on spectator practice. In addition to field notes and interview data, we used a video camera, providing two hours of live footage. This was used to complement the main methods in terms of providing a general view on the different settings where people interacted with both each other and artifacts. The observations were conducted without the consent from the spectators. However, the crowded places where the events took place are considered public. Therefore, we do not see any ethical issues with the research conducted.

Around a total of 40 hours of observations in the field were recorded by taking field notes, which later were categorized and analyzed. In the study of the Swedish Rally, two pairs of researchers conducted the observations at different locations, whereas in the Roskilde and Swedish Match Cup studies, one researcher was present. The field data was broken down and categorized into smaller units relevant for the purpose of this research, i.e., contextual requirements put on design of novel IT support. The categories were created by indentifying relevant topics concerning spectator activity.

Fifteen spectators were interviewed at the end of the Rally event, using open-ended questions and lasting approximately 45 minutes. In the Swedish Match Cup and the Roskilde Festival case, our goal was to interview the spectators during the event, involving approximately the same number of people as of the Rally. All interviewees were spectators that attended the event for its whole duration. The interviews were transcribed and analyzed in order to capture underlying patterns. The data was also repeatedly examined to categorize these patterns.

The combination of observational and interview data enabled us to capture a general description of spectator behavior and the interplay within the context itself in order to investigate the contextual requirements. The two different concepts on context, i.e., formative context and situated action were used as



supporting mindsets to guide the analysis further. This part of the analysis is further elaborated in the final subsection of our discussion (theoretical considerations). Next we report on the fieldwork.

## **Empirical Results**

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This section presents the results from fieldwork. The main findings consist of three main contextual requirements that concern the design challenges of spectator support at distributed events:

- Technology should be a supplement to the event.
- Technology should support spectator mobility.
- Technology should provide situated content.

First, the studies suggest that event information serves as a supplement to the event experience, the primary focus lies on the live action *in situ*. Secondly, the events are divided in several parts held at different locations, requiring mobility from the spectators. Thirdly, the spectators face many different situations depending on where they currently are located, with whom they are with, and the situation at hand of the event.

These three main requirements were derived from the fieldwork. The set of requirements are put into context by using excerpts<sup>3</sup> from each study. There is one major study of the Swedish International Rally, and two smaller studies of the Roskilde Festival and the Swedish Match Cup. The majority of the field data was collected in the Rally study, which involved four researchers during the whole event, whereas the two other studies involved one researcher. Each event is introduced with a general description followed by elaborations on the set of requirements.

### **The Swedish Rally**

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This is an annual event in Sweden. It is part of the World Championship, which also includes the Safari Rally in Kenya and the Monte Carlo Rally. The three-day event attracts close to half a million spectators every year. The Rally covers

an area of around 8,000 square miles. It is covered by the Swedish national public radio (SR) through radio broadcasts, digital radio broadcast and the Internet. The event takes place in vast woodland during mid-winter in Sweden. The competitors race against the clock on narrow roads in the woods at extreme speeds, struggling with gravel and snow to keep the vehicle on the road. This event attracts enthusiasts that have no problems of enduring the darkness and the cold. The event consists of several special stages and the only way for spectators to alter their position during a stage is to walk. The spectators wander around during the race to vary their view. Besides watching the rally, people engage in discussions about the competition, to socialize and interact.

Most spectators travel for hours to reach their favorite spots during the rally. The rally consists of 17 special stages, which are held at different locations within the area. During each stage, the spectators are scattered from the starting point all the way to the finish line, surrounding the roadway. Race officials are placed in a chain throughout the course equipped with whistles. When one official picks up the colleague's signal nearby he looks for the approaching car, which is announced by the whistle tone. When the official gets visual contact he blows the whistle to alert people in the vicinity including the next official in the chain, whom repeats the same action and so on. Hearing the signals the spectators take a few steps back, standing clear from the approaching car.

### *Supplement to the Event*

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Onsite spectators attend the Rally to experience it live in action. Coming into close contact with the racing competitors is a thrilling experience. Event information on the other hand becomes of secondary interest; it is a supplement to the event experience. Access to event information, such as race times, schedules and overall standings, enables the spectators to get an overview of how the event evolves. It also helps them to sort out on what to direct their attention. However, spectators engage in other activities in parallel to watching the races, for instance social interaction with other people. The excerpt below illustrates how event information can come into conflict with spectators' attention and thus cause interruptions in sessions of social interaction.

*Greg standing at the start of stage five: I find the radio broadcasts very useful, it gives a strong feeling of presence and you can bring the*

*radio with you everywhere. However, it is often hard to hear what they are talking about because of all the background noise from the cars and the people around you. It is difficult to know when important information is about to be announced when you are focusing on something completely different, for instance talking to a friend next to you. When it does, you are often unprepared since it isn't always your primary concern.*

Cheering fellow spectators and loud noise from passing competitors makes the broadcast incoherent for the spectators listening to the reports. The result is losing important parts of information since the chance of reports being repeated later is negligible. The portable radio follows the spectators everywhere but they have little chance of knowing when the broadcast covers important information. Their attention is also somewhat divided since they engage in social interaction besides watching the race and picking up event information from the broadcast.

### *Spectator Mobility*

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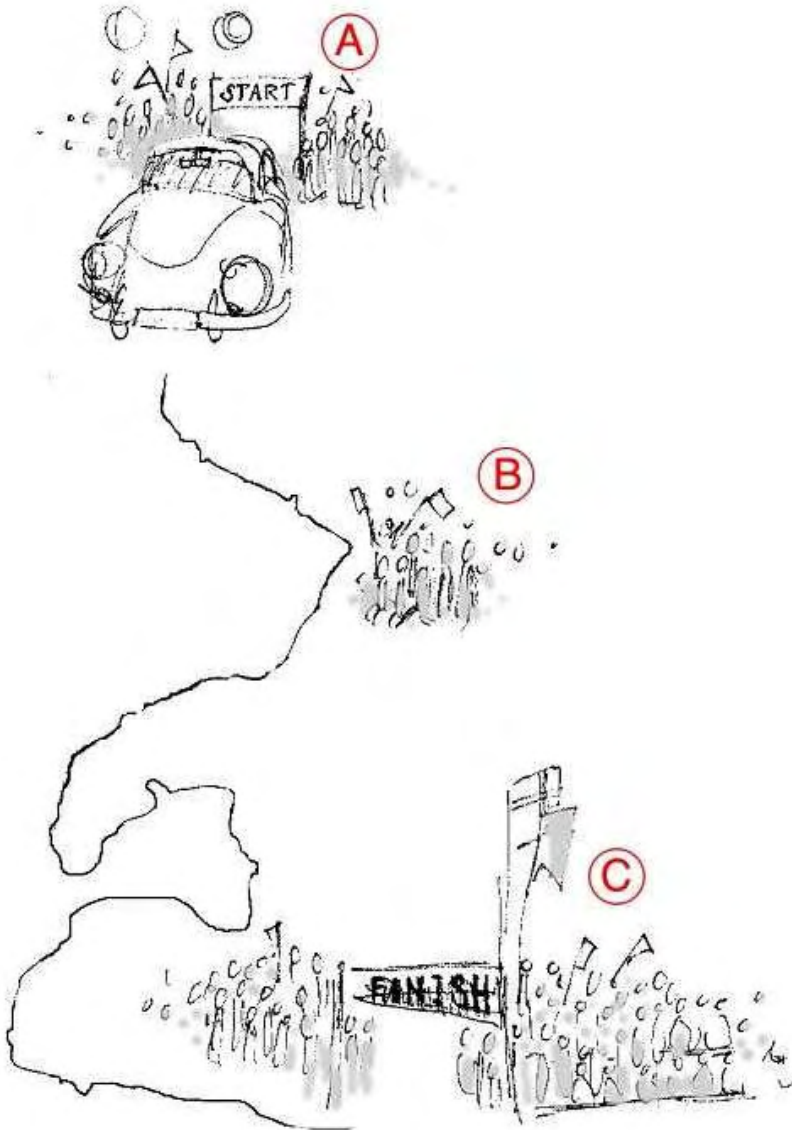
When the spectators arrive at the course, the first thing to do is to find a place that offers a good visual view of the rally. The start and finish line are the two main hot spots attracting a large crowd. Those who wish to receive information from the organizers *in situ* prefer these two places since loudspeakers keep them informed. Many spectators find positions throughout the stages to be more exciting in terms of watching competitors approach at a distance and dart by at high speeds. As a result they locate themselves at the side of the road (see Figure 1B).

Figure 1, Location B provides limited access to information updates about the race, compared to the start and finish line areas. The spectators have to rely on the radio broadcast while being mobile. During each stage the spectators continuously wander along the course to alter their position. The excerpt below illustrates this situation.

*Sara at one of the parking lots after the race: I was at the race together with my dad and he didn't have a radio, so each time they said something important, I had to tell him what was going on. This was also troublesome since you aren't really always in each other's*

*exact proximity. If you aren't equipped with a radio receiver, you have no clue on what's going on. Mostly we were located throughout the stages, besides the broadcast there wasn't much information to go on.*

*Figure 1. Sketch model describing the distributed spectator locations from A, the starting point, B, throughout the stage and C, at the finishing line*



This excerpt indicates the importance of field support and the lack of onsite information sources. Spectators not equipped with mobile support have to rely on information available through word of mouth from fellow spectators. While being mobile and away from available announcements it is difficult for the spectators to access the correct information at the right time.

### *Situated Content*

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Each car's race time is clocked several times during a stage. The race times are repeatedly reported in the radio broadcasts with a main focus on the top competitors. Some of them use the printed program to get an overview of passing competitors, although it is hard to use in the dark. Some use radio receivers to listen to the status of the race, or a combination of these two sources of information. The following excerpt reflects upon the existing information support.

*Catherine at one of special stages: The radio receiver is generally good, but they seldom mention the overall ratings and times. And when they do, it's rather difficult to grasp all of what they are saying, due to the high pace. Another drawback is when they broadcast a four minute long interview with a foreign driver; in that case I prefer the race information only. I think it's kind of the wrong way round when you get lots of timestamps on competitors passing the finish line when you actually are standing at the middle of the course.*

The broadcasts lack a continuous general overview regarding how the race evolves. Further, reporting journalists have to transfer information to the listeners almost as fast as the events in the field. Therefore, the pace of the information transfers varies upon the intensity of the event and arrives at intervals. The result is that users picking up the broadcast run the risk of losing important information. The example also shows that the spectator is not fully satisfied with the content of the broadcast. Still, spectators have no influence on the broadcasted content, or when it is broadcasted. Several observations were made of how spectators equipped with radios informed other spectators. The excerpts also show that the possibility of being updated decreases when away from the start and finish lines. The radio broadcast, as the only existing

mobile support, cannot address shifting demands of information content. Next, the study of the Roskilde Festival is described.

## **The Roskilde Festival**

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The Roskilde Festival is an annual four-day music festival with a 30-year history. The number of participants during 2000 was around 100,000. The Roskilde Festival is an established and popular festival in Scandinavia and attracts a lot of young people. Fans from various countries attend the festival to experience the concerts of their favorite stars. The vast festival field turns slowly into mud, littered with paper programs and thousands of spectators stomping around. Various concerts go on until early morning. People continuously walk between different stages, tents and accommodation areas. It is a place for experiencing the bands and to socialize with friends and other people. Attending spectators feast on beer and have a good time together, stumbling around within the event area.

The festival is held on a vast, flat field. The spectators camp on the enclosed, pre-prepared camping sites in tents or in campers, although some stay in hotels in the vicinity. The festival area is fenced and accessed only through controlled gates. There are eight different stages with different musical focus. During the festival it is possible to access the Internet (www) through a small number of terminals placed in bars and at gates. There is also a daily festival newspaper available. These sources serve as information support regarding, for instance, the festival program during the event.

### *Supplement to the Event*

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The attention of the spectators in the festival is different from the Rally. It still has a periodic nature, but there are no two-minute intervals. The intervals are exclusively defined individually, as a result of each person focusing on different things. The happenings of the event do not set the same explicit rules for visual attention among the spectators as of the Rally. The concerts on stage are defined in time in line with the festival program. The experience of the concerts is also less dependent on continuous visual attention — it is music. The attention of the spectator varies on the concert on stage and social interaction with others. During a concert there is no obvious need for continuous information in comparison to the Rally. Event information becomes of interest between the

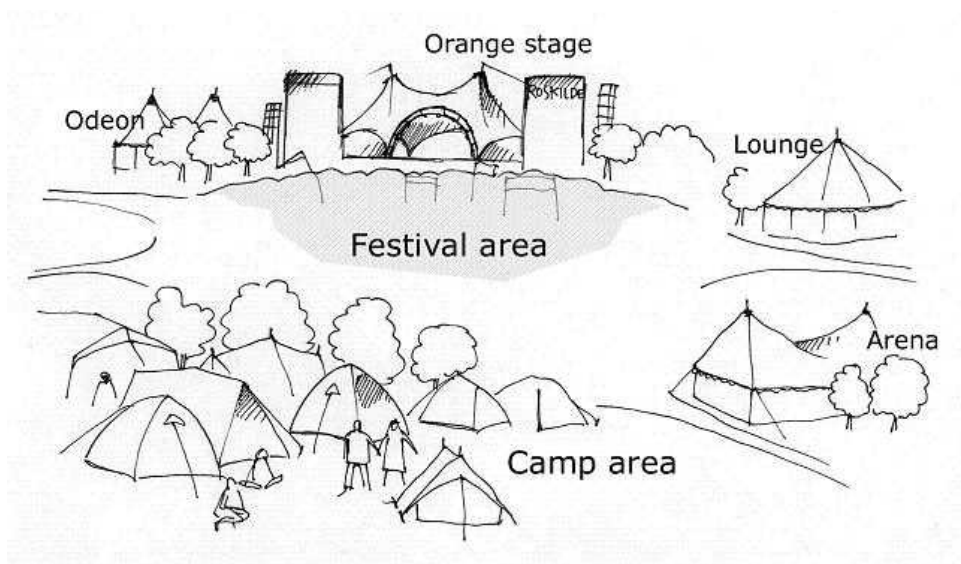
items in the festival schedule in order to plan the day. Observations suggest that event information is mostly used to schedule concerts and other activities and to handle deviations from the program, as a basis for how spectators go about their decision-making. As opposed to the Rally, the spectators at Roskilde are not as interested in background information about the artists participating in the event. Their main purpose is to experience the festival and its belonging concerts together with friends and other people as a social event. Therefore, event information plays a subordinate role, as a facilitator of these activities.

### *Spectator Mobility*

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The spectators' search for suitable locations to watch from depends exclusively on individual and group preferences on which concert to attend. Many spectators come in groups and there are different outcomes of their discussions on which concerts to attend. The result can either be that the group decides to unanimously attend a specific concert or split up to later reunite again. Depending on each spectator's decision, the spectators are scattered over eight stages (see Figure 2). When the concert ends, the groups reunite at

*Figure 2. Sketch over the festival area showing the performance areas consisting of stages, tents and spectator accommodations at the other end of the vast field*



locations agreed upon. All concerts offer a large standing room for the spectators, in which a good crowd is drawn.

People have to attend most concerts as early as possible to get a good spot. Many spectators remain in the accommodation area until the time comes for an interesting concert. The distance between the performance area and accommodation is up to a 20-minute walk. As a result, the spectators walk this distance to attend a concert, and seldom for a spontaneous stroll. During their stay within the accommodation area they engage in other activities, such as social interaction with friends and other spectators.

The excerpt below illustrates the relation between spectator mobility and existing information sources, situated at fixed locations.

*Gil standing in line for a terminal: When the concerts are later in the evening at 10 and lasts until 2 in the morning they follow a tight schedule. There is a constant flow of spectators between different stages and performance tents that feature different artists. They make a lot of changes to the program and the updates seldom match between the available forums, for instance the program and announcement boards. The terminals in the area seem pretty well updated, but it is often long lines to get to use them. Since the area is so heavily crowded it is hard to reach places where you can get the latest festival information, for instance the concert schedule. Walking several hundred meters through a crowd of thousands of spectators is simply not worth the effort to get hold of it.*

The excerpt shows that there are inconsistencies regarding information from the different sources, which include changes to the festival program. Similarly to the Rally case, the spectators have much left to wish for when being located away from existing sources of information. The only information that is fairly fresh is available at certain locations, provided by interactive terminals and announcement boards. Since the spectators to a large extent are mobile during the evening it is often troublesome to reach the locations where information can be obtained. As a result, it becomes difficult to find sufficient information to make a schedule for the evening. Moreover, due to inconsistency between different sources of information it is hard for the spectators to determine the validity of each source to rely on. The excerpt also indicates that spectators are likely to,



at times, give up the effort of trying to reach locations where information can be obtained due the crowd of people combined with being remotely situated.

### *Situated Content*

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Festivals do often have to deal with a lot of changes to the pre-determined schedule. Some visitors plan their visit long in advance using the official Internet site to sort out artists of their interest. They access the online program and some bring printouts of it to the festival. Information from the organizer is often broadcasted in conjunction to concerts. There is some redundancy between the terminals and the announcement boards. The printed program is of course impossible to keep up-to-date and consequently announcement boards, terminals and public announcements constitute the sources of information when it comes to fresh updates. The spectators are situated at many different locations during the event and the need for information and time for access depends a lot on what kind of situation they are currently in. The excerpt below shows the situation of how spectators are having difficulties in establishing whether they are up to date with the latest information depending on where they are currently situated.

Nick waiting in the accommodation area: *The initial program works as a rough summary of the schedule since it is continuously changed. I mean we have a general idea of which concerts that are going to take place but the time when things are going to start is the uncertain part of it. Mostly my friends and I remain here between the concerts. When we return from a concert to the accommodation area we often try to get hold of information concerning the next concert before we head off to the tents. The bad thing is when we leave and they change the schedule after you left the announcement boards. Of course you can ask other people but it's tiresome to constantly hunt the latest updates all the time.*

This example indicates that spectators try to stay up-to-date with the changes of the festival schedule by either checking available sources before leaving the performance area or by talking to other spectators that might have learned the latest changes. When the spectators are located away from the performance area, it is difficult for them to get hold of the latest information. This also

generally applies since the spectators are not aware when the content changes and if there are updates available. When spectators await upcoming concerts within the accommodation area, they have to rely on other spectators that arrive after they left the available information sources. This way the search for valid information also comes into conflict with other activities that the spectators occupy themselves with.

## **The Swedish Match Cup**

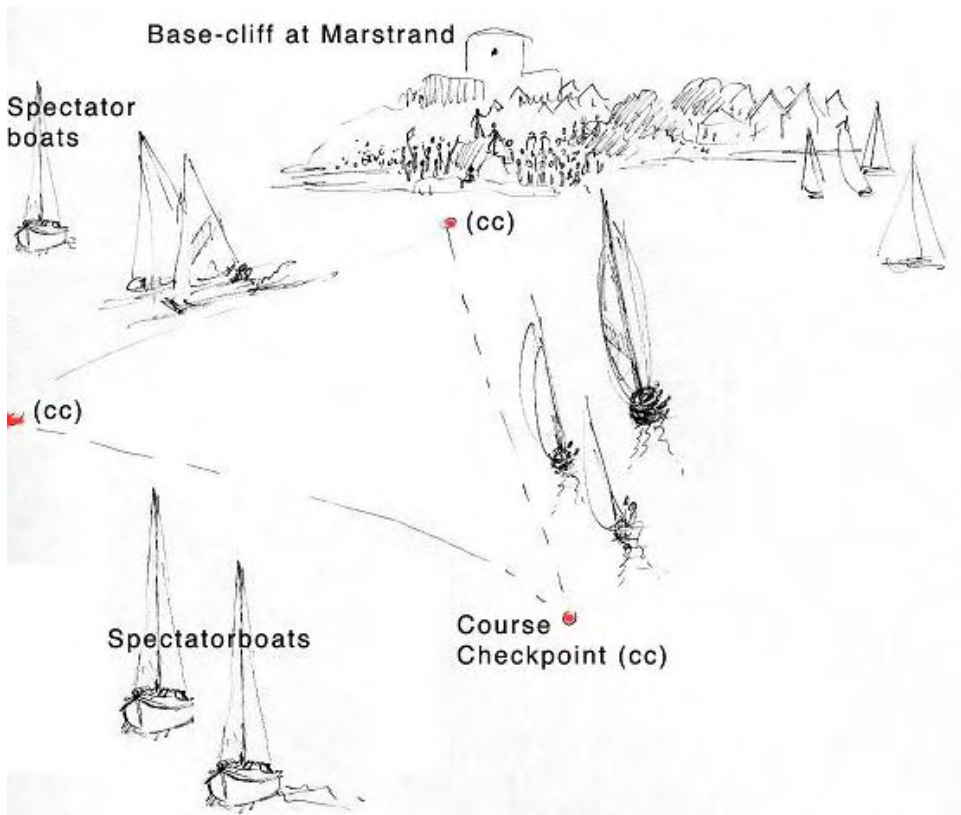
In mid-June, the Island of Marstrand on the Swedish West Coast becomes the focal point for sailing enthusiasts. For a week, the Swedish Match Cup dominates the waters around the island. The sailing form is match racing where two boats in each heat sail against each other for about 30 minutes on a relatively small course defined by three placed buoys — checkpoints. This event has returned annually for ten years and includes 80 heats, which attracts around 150,000 fans. The positions of the buoys are only altered when there are severe changes in the weather. The Cup is unique in the way that the spectators can follow the race from the shore, from boats or from any of the small islands surrounding the course. In a way, the setting is shaped as an arena (see Figure 3). The media content providers were volunteers working for the organizer of the Swedish Match Cup. Race officials are located in a tower at the shore and got constant updates and information from the race control, on the top of the tower. Information concerning the event was published on the Internet site and in local newspapers. Live video from the match cup was also broadcasted via the Internet.

### *Supplement to the Event*

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The Swedish Match Cup attracts a varied audience. People attend the event to enjoy the weather, the races and to socialize with friends sharing the interest of sailing. Between the stages, people spend time in restaurants and other facilities offering spectator services. It is a social event, which attracts the upper class of people. The main purpose is to take part of the live event. Certain event information facilitates a fundamental understanding of the different heats taking place, such as rules of the competition, overall standings and ranking lists. However, event information is somewhat of a secondary matter for the spectators. The live event and the social value of it come in first-hand. Similar

*Figure 3. Sketch over spectators located on the base cliff at the site of the Swedish Match Cup, the race checkpoints and surrounding spectator boats*



to the study of the Roskilde Festival, event information serves mainly as an add-on value. The information gives the spectators knowledge about what is going to take place in the competition.

### *Spectator Mobility*

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In their search for a good spot, the spectators at the Swedish Match Cup have a few alternatives available. The race is held close to the shore and enables the

spectators to find different places, such as the base cliff, to locate themselves prior to the race starts. Several placed lighters at the shore of the base cliff are also popular spots. The terrain is very open and enables the spectators to see competitors approach at a distance, arrive and pass them by from the shore or the provided lighters. Some spectators are more mobile during the race, and watch the heats from small boats in the vicinity of the competition course. The spectators equipped with boats vary their position for a more exciting view of the Cup (Figure 3). Spectators without boats do not have the same opportunity of altering their position. The majority of the spectators were located at the cliffs in the vicinity of the race and the provided lighters placed at the shore. Spectators situated at the shore and on lighters are locally mobile between the spots from where they are spectating, restaurants and other facilities. People frequently move within these areas depending on the highlights of the event.

### *Situated Content*

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Unlike the two earlier studies, the spectators at this event are not forced to make priorities regarding information updates and their geographical position, since a loudspeaker system is strategically placed throughout the area, covering almost the whole course surroundings. The spectators can make use of the local broadcast and at the same time get a clear overview of the action taking place, due to the open field of vision. Sound travels easily over water, which increased the coverage of the area supported by the speaker broadcasts. Large screens were also placed in the area at pre-defined places to display various updates. The locations of the screens were decided by estimating where larger parts of the audience would be situated. To get the essentials of the event experience, an understanding of the competition rules is needed. This information is, however, not communicated by the local broadcast or in other public forms available. Some spectators prepared themselves prior to the event by looking up competition rules on the official website of the Cup. For most people, it is difficult to determine which of the races that was really of high interest and importance. In a way, the Swedish Match Cup resembles the Rally study. The spectators' focus of visual attention hovers between the race and social interaction with other spectators. When spectators leave for lunch for instance, they have no contact with how the race evolves or when the next race is up. Many spectators claimed to be alerted mostly by the speaker broadcasts. The speaker announces something, which alerts the spectators that something is about to happen. As a result of this situation, they leave the restaurant area and

head towards the shore again, resuming their attention to the race, as the following excerpt describes.

Warrick at the base cliff: *There are highlights of the race that just turns up. The chance of knowing when things are going to happen is really small. Sometimes you actively watch from the shore, and at times more passively, like, you do other things with your friends waiting for things to happen. On some occasions the crowd cheered outside and we went out there to check out if anything interesting was about to happen. We could also overhear the speaker broadcast, which was another way of knowing upcoming things.*

This example shows that the somewhat long intervals between highlights of the event lead to spectators engaging in other activities alongside the race. It also suggests a deficient awareness among the spectators when interesting events are going to take place. As a result, spectators run the risk of missing important parts of the race while being located away from the course of events. To facilitate a limited awareness, spectators rely on alerts made by the speaker or signs of activity from other spectators. In order for the speaker broadcast to provide sufficient support, it is required that the spectators to some extent are situated within earshot. At times, the spectators located away from the race can get an idea of potential upcoming activity through passively listening to the broadcast, although without catching what it is about.

## Discussion

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This section discusses the contextual requirements. Further, the main challenges for design are described. Moreover, we discuss the use of theory, i.e., the background perspectives concerning the notions of context that previously have mostly been used in work related settings. The section ends with an outline of implications for the design of IT support of spectators at distributed events.

## **Supplement to the Event**

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General event information often becomes of secondary interest. Detailed and more specific information on the other hand, serves to enhance the event experience. The Swedish Rally and the Swedish Match Cup are events with an increased emphasis on competition. From that point of view, event information complements the understanding of how the event evolves and plays a more active part of the event experience in comparison to the Roskilde Festival. In the Roskilde study, event information plays a different role. Most importantly, the information is used to plan activities of the day. The experience of the festival consists of the concerts, as well as social interaction with friends (sharing reactions). These two aspects of the event get intertwined, which results in a lot of planning and negotiating among the spectators. This is a continuous activity, which calls for easy and instant access to event information regardless of the situation at hand or current location.

- Users are often involved in other activities besides listening to information broadcasts; they seldom exclusively direct their attention to it.
- General event information becomes of secondary interest, while more detailed, specific information is a supplement that enhances the event experience.

Spectators are often engaged in the action of the event or interaction with others, which indicates that the user should initiate the interaction with the system.

## **Spectator Mobility**

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The spectators face different kinds of mobile situations, often varying within a single event. For example, spectators at the Swedish Rally continuously change location. Often they walk to a point of the stage where neither visual nor sound information sources are available. At this location they are able to get close to the action, but at the same time, their information support gets diminished. Similarly with Roskilde, spectators experienced on repeated occasions that there was much left to wish for when it came to festival program updates. This information also proved to be difficult to get hold of depending on where the

information sources were situated. The Swedish Match Cup study indicates that spectators tried to maintain some kind of awareness of the highlights of the event while being mobile and engaged in other activities during the intervals between races. All three studies indicate the problem of missing information when spectators are out of range from information sources.

- Spectators' location varies extensively throughout the course of events, as opposed to spectators in a conventional arena setting.
- Existing sources of information are situated at fixed locations. Spectators continuously move around at the event, which results in insufficient information support while being mobile.

## **Situated Content**

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Radio broadcasts of events aim to satisfy a broad audience and are produced for listeners not located at the event. Thus this source of information continuously broadcasts information regardless of the situation of the spectators. The effect is that spectators have to adjust their attention to what is broadcasted, and at the same time what is taking place in the field. The conventional sources of information cannot adjust to in which situation the spectator is currently in, both in terms of information content and when it is a suitable time for information transfer. The different use situations call for system functionality that can be controlled by the user. This comprises the control on when information should be pushed as opposed to actively pulled. In addition, the results suggest that the users differ in their opinion about information relevancy. Thus the system has to allow the users to have influence on the content and be able to interact with it.

- Spectators' attention varies, it changes over time depending on the situation at hand. It mainly alternates between social interactions with fellow spectators and observing what is happening in the event.
- The need for specific event information varies on an individual level based on interest and when and where you are situated.

## **Design Challenges**

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In this section the main challenges for the design of spectator support are discussed. Spectators reported little interest in accessing event information during the highest points of action in the field. However, within the intervals between highlights there is room in time for a general overview and current standings, etc. Further, one of the most important issues for design is to avoid disruption and interference between spectator mobility and access of event information. Therefore, one challenge is to offer mobile access to the event information, which enables spectators to get updates without remaining in relatively close proximity of fixed information hot spots.

To interact with a spectator information support system demands sufficient time to withdraw the attention from the action in the field. Events like the Rally do not leave much room for sustained system interaction. This finding became rather evident due to high demand of visual attention and short delays between passing competitors. The Swedish Match Cup and Roskilde required less focus on the visual action and provided the spectators with considerably more time to interact with both people and technology. This was due to the lower pace of the event itself. Still, spectators' attention within all three studies resembled a periodic nature regarding their visual attention.

As evidence from the three studies have suggested, spectators at the three different events face many different situations depending on where they currently are, when and with whom they are with. Ultimately, this will shape which information content that will be asked for. Further, the intensity in the current surrounding context will also act as an important factor of, for instance, if and to what extent the spectator is "open" to receive or actively collect event information. Another important aspect of getting information to fit into context is to design access so that event information is linked together with what spectators currently are watching. This is one thing that existing technologies have not yet accounted for.

## **Implications For Design**

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The results from the fieldwork indicate that the spectators face many different situations as a result of the constantly changing context. We have established that the demand for specific event information content is therefore heavily dependent on the momentary context viewed from the individual spectator.



Accordingly, how the system behaves in terms of how and when information is to be transferred should be based on users' own preferences, which could be implemented by using real-time interaction with personal profiles. The manner in which information is transferred should allow users to define it to broadcast event information obtrusively, and also unobtrusively allow the user to actively collect information as well. An unobtrusive system feature would therefore avoid interruptions in, for instance, social interaction or a focused visual attention on the action in the field. In addition, end users should, in conjunction to this, be able to influence the cues for interaction that the system will use to notify the user. In other words, obtrusive cues could be constituted by vibrations from the artifact being used when information arrive. The unobtrusive method could, on the other hand, simply use graphical cues such as interface blinkers to allow interaction when the user initiates it (simply because the user will not learn that new information is available until he/she looks at the screen).

One strategy to bring a system closer to situated content could be to implement certain context-aware features (cf., Abowd & Dey, 2000; Pascoe, 1998; Schilit, Adams, & Want, 1994), which several contributions in the literature have been concerned with (e.g. Aoki, Grinter, Hurst, Szymanski, Thornton, & Woodruff, 2002; Pascoe, 1997). For example, in the case of the Roskilde festival and the Swedish Match Cup, positioning technology could be used to make the system more location-aware, which could offer situated information content based on where spectators are located and link "appropriate" information to specific locations. However, the Swedish Rally is the event that stretches over the largest geographical area. It would be a rather expensive challenge to cover if a fixed network would be required. From that point of view, the setting of the Rally would benefit more from a wireless infrastructure that could rely on, for instance, cellular network connectivity. Still, it needs to be argued, that simply adding context-aware features for the users will not eliminate or "resolve" context variety. Context-aware capabilities have the potential to bring spectator support *closer* to situated information access and content. However, to make event information fit into context requires that users also can influence information depth (level of detail), specific content, time of transfer, form and how the system notifies the user. This implies that the system should feature a hierarchical structure of information, which is dynamically updated and can be accessed at will.

Based on the three studies, and with the main contextual requirements in mind, an application that seeks to continuously support spectators *in situ* could rely on a hand-held computer, for instance a PDA (Personal Digital Assistant),

which would provide further interaction capabilities. Additionally, this would require a roaming, wireless network to be implemented.

## **Theoretical Considerations**

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In this section we discuss and sum up on to what extent background constructs within theory have served in this research and to which extent these mindsets have been used.

The guidance and help gained in this research from looking into concepts, such as formative context and situated action, mainly consists of general constructs as support for thought when it comes to understanding how distributed events actually take place. Further, it has also been useful concerning the understanding of the interdependencies between different parts of the events, actors, activities and how the current setting is shaped by contextualized and situated properties. The three studies share many contextual properties and are very similar in nature, i.e., the underlying concept, purpose, geographical setting and requirements put on spectators.

When it comes to formative context and applying ideas that originate from organizational settings, it incorporates a stance towards an underlying structure, where this structure is represented by norms, routines, procedure, conduct, form or ways for collaboration to name a few. Further, these aspects of structure are, as described by Ciborra & Lanzara (1994), re-enforced by the enactment of them. However, the very same enactment shapes the formative context when new incitements are integrated into practice.

When seeing distributed events as a formative context, i.e., its fundamental concept and layout, we have paid attention to basic arrangements by organizers and the cognitive imageries that repeatedly are enacted by the spectators. The formative context finds expression in, first, the spatial layout of the event and existing sources of information support within this space. Secondly, another expression concerns the established notion among spectators that they are, to some extent, responsible for designing their own experience, that is, they have choices, yet limited, on how to take part of the event. Further, many of the spectators share and communicate a basic, common understanding of what information support to expect. This knowledge is enacted and moulds the formative context.

Spectator mobility appears to follow an established pattern, resembling the notion of *formative context* (Ciborra & Lanzara, 1994); moving around is the

action originating from the interest driven aspiration to benefit as much of the live experience as possible and is an evident activity to all attending spectators. Thus, mobility is required to actively take part of the event. In this context, there is no consensus needed for practice, nor incitements on how things *should* be handled to be in line with other actors' actions. Instead, action, and accordingly mobility, is negotiated inside small social constellations, i.e., groups or pairs of individuals, on where to go, what to see, etc. Still, the basic structure of the event serves as a framework and shapes the range of activity.

Our claim, as this chapter has strived to put forward, is to design information support that breaks up mechanisms fostering the establishment of a formative context, and instead make way for and liberate situated enactment of the event experience. Moreover, with a notion of formative context as a general construct and mindset, distributed events can be viewed as having, to some extent, a fundamental structure, which has been described above. However, what does lack structure is how spectators enact and go about their activities at the event. The decision-making concerning focus of the event and where this spatially is to be experienced is socially negotiated and situated among spectators (Suchman, 1987). How spectators go about experiencing the event depends on how they perceive it, i.e., what catches their main interest for the moment. To benefit as much as possible from the experience of the event has, from our perspective as researchers, been viewed as the basic course of action and plan. Since spectators continuously re-negotiate what and where to observe, both enactment and setting becomes the target for highly situated, interest-driven action. As a result, the different context-specific circumstances around the spectators are utterly difficult to anticipate. For example, it is a rather demanding task to predict what the spectator is currently interested to know about, the current social context (for instance, if broadcasted information is interrupting social interaction), or recent, local events that call for specific detailed information. To apply a work-related framework in contexts of leisure could seem problematic. However, this research does not apply formative context and situated action in its most unyielding sense; rather it has served as an instrument in the qualitative analysis of empirical data. For instance, when applying the notion of formative context, we interpret and use the instance of structure in a less organized sense. Thus, structure, or describing it roughly as the heart of norms and common practice, becomes relevant when looking at how boundaries at distributed events shape spectator action. The notion of situated action has been treated similarly, although we find it reasonable to recognize situated action to permeate *a major part of human activity*. To sum this up, we

perceive the use of situated action in this research as *considering the uncertainty of what course of action spectators will undertake* whilst taking part of the event. In addition, the use of formative context becomes a means of identifying the boundaries put on the possible range of activity or action for spectators.

## Conclusions

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This chapter reports on empirical research investigating the contextual requirements concerning distributed event support for attending spectators. Thus the research question raised was:

*What are the contextual requirements for the design of spectator information support at distributed events?*

The studies indicate that information support is a supplement to the event experience and of secondary interest for spectators *in situ*, as opposed to those not located at the event. Spectators are likely to move between different kinds of situations and modalities of mobility. In addition, there is a diversity regarding in what activities spectators engage in. The following pointers are contextual requirements and identified situations that need to be considered for the design of support for the spectators:

- Supplement to the event
  - Users are often involved in other activities besides listening to information broadcasts; they seldom exclusively direct their attention to it.
  - General event information becomes of secondary interest, while more detailed, specific information is a supplement that enhances the event experience.
- Spectator mobility
  - Spectators' location varies extensively throughout the course of events, as opposed to spectators in a conventional arena setting.

- Existing sources of information are situated at fixed locations. Spectators continuously move around at the event, which results in insufficient information support while being mobile.
- Situated content
  - Spectators' attention varies, it changes over time depending on the situation at hand. It mainly alternates between social interactions with fellow spectators and observing what is happening in the event.
  - The need for specific event information varies on an individual level based on interest and when and where you are situated.

Results suggest that seamless access to event information has the potential of facilitating support throughout the event without spectators being forced to recreate the conditions to make use of available information. Based on our results, we have presented implications for design concerning future design efforts. Context-aware capabilities can bring spectator support closer to situated information access and content. Still, users must be allowed to have influence on the system behavior in terms of how certain information should be linked to the current use context. These features should not act blindly in an automated fashion.

Distributed events are a rather novel target for field studies. It is yet a very dynamic environment, both from the perspective of the events and the context of the spectators. We suggest that this domain have the potential of contributing to research into design for mobile IT support from a research, method and technology point-of-view, with implications for both academia and the industry.

## **Future Work**

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The next step of this research is to further investigate the design of support for spectators at sporting events. For instance, we are interested in conducting empirical research on arena events, as opposed to distributed events, as well as evaluating the effects of technology in use. Moreover, to study technology in use yields research potential to explore how this affects and influence spectators' use of space, i.e., activity within the spatial layout, and opportunity

for interaction, as well as the study of technology-supported situated enactment.

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## References

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- Abowd, G., & Dey, A. (2000). Towards a better understanding of context and context-awareness. In *Proceedings of the Workshop on The What, Who, Where, When, and How of Context-Awareness* (Part of the 2000 Conference on Human Factors in Computing Systems).
- Abowd, G., Atkeson, C., Hong, J., Long, S., Kooper, R., & Pinkerton, M. (1997). Cyberguide: A mobile context-aware tour guide. *Wireless Networks*, 3 (5), 421-433.
- Aoki, P., Grinter, R., Hurst, A., Szymanski, M., Thornton, J., & Woodruff, A. (2002). Sotto Voce: Exploring the interplay of conversation and mobile audio spaces. In *Proceedings of Conference on Computer Human Interaction* (pp. 431-438).
- Bannon, L. (1993). CSCW: An initial exploration. *Scandinavian Journal of Information Systems*, 5, 3-21.
- Belotti, V., & Bly, S. (1996). Walking away from the desktop computer: Distributed collaboration and mobility in a product design team. *Proceedings of the Conference on Computer Supported Cooperative Work* (pp. 209-218). ACM Press.

- Bellotti, V., & Smith, I. (2000). Informing the design of an information management system with iterative fieldwork. In *Proceedings of the conference on Designing Interactive Systems* (pp. 227-237). ACM Press.
- Burrell, J., Treadwell, P., & Gay, G. (2000). Designing for context: Usability in a ubiquitous environment. In *Proceedings on the Conference on Universal Usability* (pp. 80-84). ACM Press.
- Cavallaro, R. (1997). The FoxTrax hockey puck tracking system. In *Proceedings of IEEE Computer Graphics and Applications*, 17 (2), 6-12.
- Cheverst, K., Davies, N., Mitchell, K., & Friday, A. (2000). Experiences of developing and deploying a context-aware tourist guide: The GUIDE Project. In *Proceedings of the sixth International Conference on Mobile Computing and Networking* (pp. 20-31). ACM Press.
- Ciborra, C., & Lanzara, G. F. (1994). Formative contexts and information technology: Understanding the dynamics of innovation in organizations. *Accounting, Management and Information Technologies*, 4 (2), 61-86.
- Dahlbom, B., & Ljungberg, F. (1998). Mobile informatics. *Scandinavian Journal of Information Systems*, 10 (1 & 2), 227-233.
- Ehn, P. (1988). *Work-oriented design of computer artifacts*. Stockholm, Arbetslivscentrum.
- Hughes, J., King, V., Rodden, T., & Andersen, H. (1994). Moving out from the control room: Ethnography in systems design. In *Proceedings of Conference on Computer Supported Cooperative Work* (pp. 429-439). ACM Press.
- Hughes, J., Randall, D., & Shapiro, D. (1992). Faltering from ethnography to design. In *Proceedings of Conference of Computer Supported Cooperative Work* (pp. 115-122). ACM Press.
- Kopomaa, T. (2000). *The city in your pocket: Birth of the mobile information society*. Gaudeamus, Helsinki.
- Luff, P., & Heath, C. (1998). Mobility in collaboration. In *Proceedings of Conference on Computer Supported Cooperative Work* (pp. 305-314). ACM Press.
- Mathiassen, L. (1998). Reflective systems development. *Scandinavian Journal of Information Systems*, 10 (1&2), 67-118.

- O'Brien J., Rodden T., Rouncefield M., & Hughes, J. (1999). At home with the technology: An ethnographic study of a set-top-box trial. *ACM Transactions on Computer-Human Interaction*, 6 (3), 282-308.
- Oppermann, R., Specht, M., & Jaceniak, I. (1999). HIPPIE: A nomadic information system. In *Proceedings of the first International Symposium Handheld and Ubiquitous Computing* (pp. 330-333). Berlin: Springer Verlag.
- Pascoe, J. (1997). The stick-e note architecture: Extending the interface beyond the user. In *Proceedings of the Second International Conference on Intelligent User Interfaces* (pp. 261-264). ACM Press.
- Pascoe, J. (1998). Adding generic contextual capabilities to wearable computers. In *Proceedings of the International Symposium on Wearable Computers* (pp. 92-99).
- Rafey, R.A., Gibbs, S., Hoch, M., Le Van Gong, H., & Wang, S. (2001). Enabling custom enhancements in digital sports broadcasts. In *Proceedings of WEB3D Symposium* (pp. 101-107).
- Schilit, B., Adams, N., & Want, R. (1994). Context-aware computing applications. In *Proceedings of the workshop on Mobile Computing Systems and Applications, IEEE Computer Society* (pp. 85-90).
- Suchman, L. (1987). *Plans and situated action*. Cambridge University Press.
- Weilenmann, A., & Larsson, C. (2001). Local use and sharing of mobile phones. In B. Brown, N. Green & R. Harper (eds.), *Wireless World: Social and Interactional Aspects of the Mobile Age* (pp. 99-115). Godalming and Hiedleburg: Springer-Verlag.

## Endnotes

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- 1 The term leisure is used as a contrast to work. This distinction is more complex, but such discussion is beyond the scope of this chapter.
- 2 For more details see [www.makitaloresearch.com](http://www.makitaloresearch.com)
- 3 The spectator names are fictitious.



## Chapter XII

# SeamlessTalk: User-Controlled Session Management for Sustained Car Conversations

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## **Abstract**

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*This chapter approaches sustained car conversations across mobile phones and in-car phone resources as a session management problem. Addressing this problem, the chapter outlines a session management model for user-controlled media switches during ongoing phone conversations. The model makes a distinction between the user and the infrastructure levels of session management. To illustrate and validate the rationale of the model, the chapter presents an in-car mobile phone*

*hands-free system, SeamlessTalk, developed to support sustained car conversations. The user-controlled session management model contributes to current research on session management by addressing the explicit/implicit session management dichotomy in multiple media situations.*

## **Introduction**

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A considerable portion of all mobile phone calls is made in car contexts (Koslowski, 2002). While the car context involves novel session management considerations, little has been done to specifically support sustained car conversations. We refer to sustained car conversations as telephone calls supported by whichever phone resource suitable for the ongoing activity of approaching, driving, or leaving the car.

Even though previous empirical studies acknowledge the ongoing nature of conversations (Whitaker et al., 1997; Wiberg, 2001a) and the frequency of media switches during these ongoing conversations (Nardi et al., 2000), however, media switches between mobile phones (brought into or out of the car) and in-car resources are poorly supported by current in-car conversation systems. This is both a convenience and a safety problem. First, considerable overhead work is required for transferring a call to the in-car phone resources when entering the car for driving. In order to use the in-car phone resources (such as in-car screens and dashboard buttons for phone manipulation), the call must be ended and restored using the in-car phone. Second, as Salvucci (2001) outlines, the car is a perceptually demanding and dynamic place. Secondary tasks, such as talking on the phone, must be subordinated the primary task of driving the car. The safety hazards of mobile phone use are widely reported (Brookhuis et al., 1991; Redelmeier & Tibshirani, 1997), and it can be suggested that the lack of support for media switches is part of that problem.

In this chapter, we approach seamless car conversations across media platforms (i.e., mobile phones and in-car resources) as a session management problem. Session management within CSCW refers to the process of starting, stopping, joining, leaving, and browsing collaborative situations (Edwards, 1994; Kristoffersen & Ljungberg, 1999; Wiberg, 2001a). While this research focuses on session management on single media platforms (e.g., Edwards, 1994), however, it does not address sustained media switches during ongoing sessions.

To address this problem, we have developed a session management model for supporting user-controlled media switches during ongoing phone conversations. The model is illustrated and validated by a car conversation system prototype, SeamlessTalk, designed to increase convenience and safety. Based on a use case developed according to Carroll's (2000) task-artifact cycle, we demonstrate how SeamlessTalk addresses the convenience and safety problems of car conversations. The user-controlled session management model contributes to current research on session management by addressing the explicit/implicit session management dichotomy in multiple media situations.

## **Session Management**

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### **Single-Media Session Management**

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The research on session management ranges from empirical work studies (e.g., Kristoffersen & Ljungberg, 1999) to the implementation of new session management mechanisms (e.g., Patterson et al., 1990). The majority of the development-oriented research on the topic aims at reducing, and ultimately removing, the work required by users to handle sessions as such. Edwards (1994), for instance, notes that many collaborative systems are application-centered rather than environment-centered [See Kristoffersen (1998) for a review of session management in collaborative systems research]. This fact typically leads to non-standardized and inflexible session management causing a significant amount of overhead work for the user. While this overhead work can pay off in situations where there is a certain degree of formality, Edwards argues that it can be detrimental to more informal, spontaneous, or lightweight collaboration. Addressing this problem, Edwards presents a session management model, referred to as implicit session management, for convenient establishment of new sessions in serendipitous collaboration. Using so-called activity information, a session management service is designed to automatically detect potential collaborative situations and take appropriate action.

As illustrated above, session management is typically viewed as a question of automation. According to the empirical studies on the topic, however, this is not necessarily applicable in practice, simply because there are so many situations where users do not want to join together with another person accessing the same document or entering the same place. Collaborative systems such as

Montage (Tang & Rua, 1994) and the Interaction Manager (Ljungberg, 1999) provide session management mechanisms that seek to reproduce how people establish interaction in the real world. In the case of Montage, for instance, the user can set a door icon to indicate the desirable accessibility (Tang & Rua, 1994). If the door is shut, then the user is busy, and so on. The idea is simply that the user, when busy, could close the door icon, thereby reducing the risk of being interrupted by less important sessions. The door icon is, of course, a simplification that may not entirely be based on the valid assumptions of how people set up collaboration in real life (Kristoffersen & Ljungberg, 1999). Nevertheless, it reflects the ambition to provide session management mechanisms controlled by the users, as opposed to the systems.

## **Multiple-Media Session Management**

While the automatic view on session management is the dominating rationale for single-media applications, this view is even stronger when it comes to media switches during ongoing sessions (e.g., American National Standard for Telecommunications, 2001). The standard approach to media switches is to let a system automatically hand over a session from one platform to another (Buford et al., 1998). As implemented in mobile phone networks, for instance, handovers are executed automatically when the phone receives a better signal from another station (sometimes denoted as ABC or “always best connected”). In what follows, we illustrate how the automation view in multiple-media session management can be increasingly problematic on the user level. Consider the following examples:

Example 1: Within a few years, people are likely to subscribe to several wireless networks such as W-LAN, W-CDMA and GSM. W-LANs cover “hotspots,” W-CDMA the entire city, while GSM may be the only network available in the countryside. In part, these networks will cover the same areas. For example, users will be able to use GSM in the city. In such a situation, they will probably not want the mobile terminal to select network connections automatically. If the GSM network has enough bandwidth for your phone call, then why use the more expensive W-CDMA? Most people would probably want to continue the phone conversation using the (less expensive) GSM network.

**Example 2:** It is increasingly common to use W-LANs in the office, which opens up new possibilities to have mobile Internet access. For example, it simplifies the task to provide handheld computers with useful content. Consider that you are in the office and start to download MP3 files. In this situation, the question is whether you want your handheld computer to continue to download music using the GSM or W-CDMA networks when leaving the office (recall the ABC principle)? Probably not, since it would cost you or your employer too much. Thus, you probably want the download to interrupt when leaving the office. Likewise, you may want the download to resume when you get back to the office, because then you have inexpensive wireless network access again. It is important to note, however, that in other situations (perhaps when important and time-critical documents are downloaded) you might want the download to continue using the GSM or W-CDMA networks when leaving the area with inexpensive network access.

As these examples show, automatic session management is problematic in that it is difficult for designers to implement rules that apply to all use situations. Whereas automatic media switches can be convenient in terms of the limited overhead work required, they can also be ill suited to the specific situations in which users find themselves.

## **Research Method**

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The research presented in this chapter was conducted as a collaboration project involving academics at the Viktoria Institute and practitioners at a car manufacturer (Saab Automobile), a mobile telecommunications network company (Vodafone), and a systems integrator (Mecel). We used the principles of the “task-artifact cycle” (Carroll, 2000). Intended to be a mediating structure between development processes and technology-in-use, the task-artifact cycle helps generating the requirements that can seed system design. More specifically, the rationale of this cycle is to capture and structure user requirements of a system by identifying the use cases and detailing all the scenarios that users will perform (within these use cases). A use case can therefore be described as a collection of possible sequences of interactions between the system and its potential users.

# Session Management for Car Conversations

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## A Car Conversation Use Case

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In order to reach an understanding of the proposed use context, we have developed the following use case based on Carroll's (2000) task-artifact cycle. The actors involved in the use case are a driver and a passenger.

*The driver and a friend enter the car while the driver has an ongoing call on his mobile phone. While seated the driver transfers the call to the in-car phone system for convenience and safety reasons. They start driving, and after a while the driver's conversation shifts to a discussion about personal matters. Due to privacy reasons, the driver transfers the call from the hands-free system to the mobile phone. After a couple of minutes he terminates the call. A few minutes later, the driver initiates a new call using the in-car phone system. They finally reach their destination, but the driver wants to sustain the conversation. While leaving the car, the driver transfers the on-going call to the mobile phone.*

As illustrated above, the situated nature of a mobile phone conversation can be handled by user-controlled media switches. In the use case, we can see how media switches between the mobile phone and in-car resources can facilitate both safe driving and convenient context switching. Existing in-car conversation systems cannot do both. Either the user (approaching the car) must terminate the call on the mobile phone and restore the conversation using the in-car phone, or he must face the danger involved in sustaining the call on the mobile phone while starting to drive the car. Moreover, media switches can support privacy by allowing switches initiated by the user in view of changing conversation topics.

## **Introducing a User-Controlled Session Management Model**

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Based on the literature review and the use case, we below propose a user-controlled session management model for supporting human conversation that includes several media switches. The central idea of our session management model is to distinguish between the user and the infrastructure levels. Automatic handovers between platforms on the infrastructure level are important for supporting interoperability and interconnectivity. On the user level, however, we argue that it is crucial that the user controls how and when a media switch takes place. We thus introduce the concept of user-controlled service handover to conceptualize how a user could transfer a session (e.g., a telephone conversion) from one media to another. The model consists of two levels:

- On the infrastructure level, the model follows the automatic view of session management by establishing the underlying communication (e.g., authentication, handshaking, and so on) across the different platforms automatically as soon as the devices are within range of each other.
- To enable sustained car conversations, we introduce the concept of user-controlled service hand over as the process by which a user transfers a session in its current state to another media resource. Here, redundancy across media might be required to ensure that the user misses nothing of importance when shifting from one platform to another.

## **Requirements for Sustained Car Conversations**

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Applying the user-controlled session management model, the following design requirements can be determined for car conversation systems:

- Support user-controlled service hand over between phone resources.
- Support automatic transfer of sessions on the infrastructure level.
- Support redundancy across platforms. (In situations where users switch media during an ongoing activity, redundancy helps in ensuring that users have full control.)

The next section describes the design of a car conversation system prototype called SeamlessTalk, which implements the proposed user-controlled session management model.

## Implementation of SeamlessTalk

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### Application

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SeamlessTalk is an in-car mobile phone hands-free system intended to manage sustained car conversations. The prototype system was developed as a component of the infotainment system of the new Saab 9-3 car (see Figure 1 and Figure 2).

SeamlessTalk consists of four main components (see Figure 3): A Bluetooth enabled mobile phone, an in-car phone resource system, a service layer, and an infrastructure layer.

First, the system requires a Bluetooth equipped mobile phone. In its current version, the system supports the Nokia 6310i and Nokia 6550 (a 3G terminal). Second, the system includes an in-car phone resource system intended to provide the resources needed for enhancing the convenience and safety of car conversations. It consists of four components: dashboard control buttons, a 5.8

*Figure 1. The dashboard of a Saab 9-3 equipped with the infotainment system*







system. This access point is necessary to establish ad hoc connections to paired mobile phones. The prototype uses the standard Bluetooth ad hoc networking protocol with the service discovery protocol and the hands-free profile.

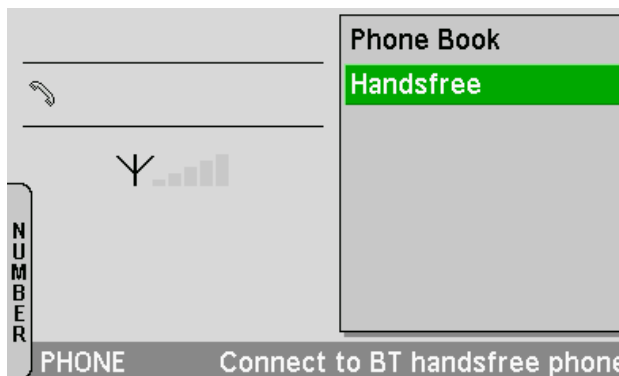
## SeamlessTalk in Use

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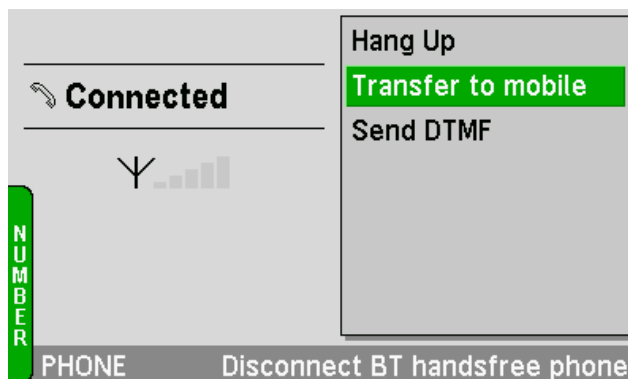
With the SeamlessTalk functionality, the driver can manage car conversations in the following way:

While seated in the car, the driver can initiate a call by either using the dial pad on the dashboard or the address book stored in the infotainment system. The mobile phone sets up the outgoing call and initiates the audio connection between the mobile phone and the in-car audio system. In the case of entering the car with an ongoing call on the mobile phone, the driver selects the telephone option from the main menu of the infotainment system and then uses the hands-free option (see Figure 4) to establish an audio connection between the mobile phone and the in-car audio system. The ongoing call can then be terminated from the infotainment system or from the mobile phone. When leaving the car with an ongoing call or for privacy reasons, the audio output can be transferred from the in-car audio system to the mobile phone by selecting the “transfer to mobile” option of the infotainment system (see Figure 5).

*Figure 4. Audio output of the call can be transferred from the mobile phone brought into the car to the in-car audio system*



*Figure 5. Audio output can be transferred from the in-car audio system to the mobile phone*



## Discussion

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### Alternative Approaches

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Another example of user-controlled session management is aftermarket systems with a mobile phone docking cradle mounted on the car's dashboard. Besides enabling a direct and tangible way to use the in-car resources, such systems also support phone battery charging while driving. However, the docking cradle approach, with its unique cradle, is a single-user solution (except the case of all users having exactly the same device). Since cars often have many users and that family members, for instance, seldom have the same telephone model, this solution is at odds with convenient and safe car conversations for multiple users. Moreover, as highlighted by Towers (2002), there are three other downsides of the docking cradle approach. First, this approach is time-sensitive in that the cradle mounted on the dashboard must be replaced with a new one once the mobile phone becomes dated. Second, although aftermarket systems are typically less expensive, they suffer from poor performance and also require holes to be made in the dashboard to attach the docking cradle. Third, a Bluetooth solution enhances safety by enabling the use of dashboard buttons for initiation and termination of calls. In addition, it does not require the user to have the phone within range from the driver's seat in case of an incoming call.

At a first glance, the overall problem of supporting sustained car conversations can be appreciated as a lightweight resource management issue (i.e., connecting and disconnecting various external input/output units to the mobile phone). However, there are two main reasons why this might not be an appropriate solution to the problem in focus here. First, current implementations of lightweight resource management do not consider conversations as ongoing (Whittaker et al., 1997). Rather, current implementations rather realize resource management by focusing on separated sessions running on separated platforms only. Second, session management models are always concerned with questions of available resources in terms of input/output devices, as well as underlying infrastructures and protocols.

## **Related Work**

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There exists a significant body of research related to the work reported in this chapter. First, Trevor et al. (1998), for example, present work on session management models to enable the representation of a user in a session to be transferred from one isolated environment to another. Our chapter contributes to their efforts in that the SeamlessTalk prototype supports not only the transfer of representations of users, but also the transfer of entire sessions between different media platforms during car conversations.

Second, the work presented in this chapter also adds more generally to current research on session management models for supporting ongoing and dynamic sessions (e.g., Edwards, 1994; Kristoffersen, 1998; Wiberg, 2001b). This chapter contributes to this research area by presenting a session management model that acknowledges the importance of supporting media switches during ongoing conversations in the car context.

Third, there has been a recent trend to move away from traditional and explicit session management models (see, e.g., Edwards, 1994) towards more implicit and automatic models (e.g., automatic handover between different radio stations, mobile ad-hoc networks, etc.). This chapter questions this trend. The main argument here is that automatic session management might not appear as seamless to the user. Therefore, this chapter introduces the concept of user-controlled service handover to address the issue of how to let the user easily manage media switches whenever suitable given the situation at hand.

Fourth, Sluis et al. (2001) present an in-house audio system to support freedom of movement while listening to a continuous audio stream across different platforms at different locations in a house, i.e., “the uncoupling of devices and

functionality” (Sluis et al., 2001). In their case, platform switches are explicitly handled with both physical and virtual icons. Expressed differently, they acknowledge the importance of separating issues related to management of switches on the user level from technical issues related to the underlying infrastructure. In the implementation of their system, there are some similarities with the SeamlessTalk system in that they also leave the switching control to the user instead of making the switches automatic as the user moves around the house. However, in their research they neither consider the session management implications of this approach, nor do they consider how to handle media switches with a minimum of required user perception.

## Conclusions

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This chapter explores how to enable sustained car conversations across different platforms including mobile phones and in-car phone resources. This research adds to current work on session management models for sustained and dynamic interaction by presenting a user-controlled session management model that addresses the explicit/implicit session management dichotomy in multiple media situations. The model is illustrated with a car conversation system prototype – SeamlessTalk.

The user-controlled session management model developed is yet to be evaluated in real use, however. Considering the complex and situated nature of mobility, empirical evaluations of the usefulness of SeamlessTalk would advance this work further. The next step of the study is to equip a number of cars with SeamlessTalk for assessing user-controlled session management in the everyday life of work and leisure of users.

## References

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- American National Standard for Telecommunications. (2001). T1.523-2001. Retrieved from the World Wide Web: <http://www.atis.org/tg2k/>.
- Brookhuis, K. A., De Vries, G., & De Waard, D. (1991). The effects of mobile telephoning on driving performance. *Accident Analysis & Prevention*, 23, 309-316.

- Buford J., Hefter J., & Matheus, C. (1998). Mobile technology in telecommunications operations. In *Proceedings of IMC '98, International Workshop on Interactive Applications on Mobile Computing* (pp. 24-25). Rostock, Germany, November.
- Carroll, J.M. (2000). *Making use: Scenario based design of human computer interactions*. Cambridge, MA: MIT Press.
- Edwards, K. (1994). Session management for collaborative applications. In *Proceedings of the Conference on Computer Supported Cooperative Work* (pp. 323-330).
- Koslowski, T. (2002). *Accelerate your telematics strategy* (Telematics Presentation). Gartner Group Automotive.
- Kristoffersen, S. (1998). *Developing collaborative multimedia: The MEDIATE Toolkit* (Ph.D. Thesis). Norway: Norwegian Computing Center.
- Kristoffersen, S., & Ljungberg, F. (1999). An empirical study of how people establish interaction: Implications for CSCW session management models. In *Proceedings of ACM 1999 Conference on Human Factors in Computing Systems (CHI'99)*. ACM Press.
- Ljungberg, F. (1999). Exploring CSCW mechanisms to realize constant accessibility without inappropriate interaction. *Scandinavian Journal of Information Systems*, 11, 115-136.
- May, P. (2001). *Mobile commerce: Opportunities, applications, and technologies of wireless business*. Cambridge: Cambridge University Press.
- Nardi, B., Whittaker, S., & Bradner, E. (2000). Interaction and outeraction: Instant messaging in action. In *Proceedings of Conference on Computer Supported Cooperative Work* (pp. 79-88). New York: ACM Press.
- Patterson, J. F., Hill, R. D., Rohall, S. L., & Meeks, W. S. (1990). Rendezvous: An architecture for synchronous multi-user applications. In *Proceedings of Conference on Computer Supported Cooperative Work* (pp. 317-328). New York: ACM Press.
- Redelmeier, D. A., & Tibshirani, R. J. (1997). Association between cellular-telephone calls and motor vehicle collisions. *The New England Journal of Medicine*, 336, 453-458.
- Salvucci, D. D. (2001). Predicting the effects of in-car interface use on driver performance: An integrated model approach. *International Journal of Human-Computer Studies*, 55, 85-107.

- Sluis, R., Eggen, B., Jansen, J., & Kohar, H. (2001). User Interface for an In-Home Environment. In M. Hirose (ed.), *Proceedings of Interact 2001 Conference on Human-Computer Interaction*. IOS Press, IFIP 2001.
- Tang, J. C., & Rua, M. (1994) Montage: Providing teleproximity for distributed groups. In *Proceedings of the ACM 1994 Conference on Computer Supported Cooperative Work* (pp. 23-34).
- Towers, M. (2002, December/January). Is 2003 the Year for Bluetooth in the Car? *Telematics Update Magazine*, Issue 19.
- Trevor, J., Rodden, T., & Smith, G. (1998). Out of this world: An extensible session architecture for heterogeneous electronic landscapes. In *Proceedings of the ACM 1998 Conference on Computer Supported Cooperative Work*.
- Whittaker, S., Swanson, J., Kucan, J., & Sidner, C. (1997). TeleNotes managing lightweight interactions in the desktop. *ACM Transaction of Computer-Human Interaction*, 4 (2), 137-168.
- Wiberg, M. (2001a). *In between mobile meetings: Exploring seamless ongoing interaction support for mobile CSCW* (Ph.D. thesis). Department of Informatics, Umeå University, Umeå, Sweden.
- Wiberg, M. (2001b). Modeling mobility: Exploring the design space for enabling seamless ongoing interaction for mobile CSCW. In *Proceedings of HCI International 2001*, New Orleans, USA.

## Chapter XIII

# Guiding Design for Waiting

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## Abstract

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*This chapter presents a number of suggestions for design of information technology (IT) to be used in public places. The design implications given are based on an exploratory field study conducted in public places where people wait to travel. The study shows that the use of technology must be negotiable and adaptable to support use in different ways, in different contexts and to produce a possibility for others to understand this use. The findings are arranged in three areas: creating privacy (how people act to establish privacy in the public place), adapting to change (how people adapt to social, spatial and temporal changes in the environment), and appearance and activity (how people make efforts to communicate activities to others present in the public place). Each of these areas has aspects that affect the use of IT. Thus they should also influence the design of IT. Based on these findings, we derive implications for design of IT to be used in public places.*



## **Introduction**

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People live mobile lives, spending time in diverse places and moving between and through different settings, both for vocational and private purposes. One such public setting is places for waiting. We queue at the store, we wait for the bus, and we wait at the train station. This paper focuses upon that subset of public behavior, and investigates people's activities and their relation to technology when waiting to travel.

Despite the amount of time that people spend in public places and the fact that IT is something that we find in most public environments nowadays, few studies have been concerned with what people do while waiting and how this potentially could guide the design of IT. Technologies such as wireless telecommunication networks, and small, powerful handheld devices give mobile people new possibilities to communicate and, by that, altering the availability for interaction with others and access data and information. This motivates research within this area.

Waiting to travel has characteristics that need to be explored in order to be able to create valid designs for use in this context. We are interested in behavior in public places and how this could give insights to the design of technology.

## **Waiting and Places for Waiting**

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In this section the basic characteristics of waiting and places created for people to wait are discussed. Places for waiting are generally designed for waiting and this frames people's activity spatially and temporally in these spaces. These features interrelate with the social interaction among travelers within this space. This means that the social interaction shapes the spatial and temporal frames and vice versa, as we will show in this chapter.

People in these places are not a homogenous group; they have diverse reasons for being there. This is important because the reason for being present shapes the activities that they engage in. For example one issue that differentiates people is that we can assume that some people are traveling to, from or in their work, and hence waiting in close conjunction to their vocation, while others are about to, or just have, traveled for private reasons.

Studying people in public places is different from studying people working. One of the main differences is that workers usually perform certain specified actions and have certain goals. In this case people do not have well defined goals and the possible activities to engage are numerous. Waiting to travel is something that happens “between” other activities, it isn’t something that people strive to do and the waiting is not in itself an achievement. This intermediacy of waiting makes various activities acceptable to engage in while waiting, as we will show later in the chapter. Waiting to travel is also something one does among strangers: you are surrounded by people that you do not have, and neither will have, any lasting relationship with. The other people just happen to be waiting there at the same time.

In most cases waiting to travel has a clearly defined time span (although trains and planes sometimes are late). This also makes this particular type of waiting specific compared to waiting for someone to call or waiting in line at the supermarket. The time spent waiting to travel usually is set by the time that is estimated as “long enough,” since travelers most often decide themselves how long before departure they choose to arrive at the station or airport.

Areas for waiting to travel are created for people waiting for some form of transportation. In most instances a person has access to more facilities at the area for waiting than they have while starting their actual travel. Many times the waiting area is an indoor public place, equipped with benches, wastebaskets, public phones, visual and voice travel information and restrooms. It usually offers such services as stores, cafés and restaurants.

We are interested in the activity in public places, in what activities people choose to engage, constrained by a space, a social context and an estimated time. These spatial, temporal and social constraints are important and interesting for design. Despite this, few studies have been concerned with informing design of mobile technology used in public places. The research questions posed in this chapter are: *How do people act in public places for waiting, and how can this behavior guide the design of IT?* This paper reports on an exploratory field study conducted in two public places where people wait to travel: an airport and a train station. We present pointers for design based on the empirical findings from these studies.

The remainder of this chapter is organized as follows: a background describing studies of people waiting, a brief introduction to ethnomethodological work that guides the analysis and, after this, studies concerning the relation between fieldwork and design. The background is followed by a brief description of the data collection and the analysis. The findings and the design implications are

presented together, since the design implications relate directly to the findings. The chapter is concluded with a discussion of our findings.

## **Related Work**

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We have studied interaction in places where people wait to travel. The empirical field, interaction when waiting to travel, relates to studies of behavior in public places, and studies of waiting. However, previous studies of waiting are mainly based within the field of customer management, and do not directly focus on behavior. Since this chapter aims to inform design, another branch of related work is studies of design implications based on ethnographic studies.

Waiting in public places has been previously investigated, but in other contexts. Experience of public waiting as a means to reach customer satisfaction has been explored in management literature. These studies differ from the one presented in this chapter as they focus on experience rather than behavior. However, certain findings are valuable, since they can be related to the behavior of people waiting, such as interaction among people waiting and the temporality of waiting, as will be discussed later in the chapter. Maister (1985) points to aspects that affect the experience of waiting. These include: activities while waiting, certainty of the waiting period, knowledge of the cause of waiting, and accompanied waiting. These aspects all make the waiting seem shorter. Anxiety and unfairness in the queuing makes waiting seem longer (Maister, 1985). Davies & Heineke (1998) point to the fact that the perception of waiting rather than the actual time is crucial for the experience. Pruyn & Smidts (1999) found that waiting with someone made the waiting more tolerable. As noticed in this short summary, management research tends to address waiting as something negative for the persons involved. It should also be pointed out that generally the waiting discussed in the management research is when waiting in line for your turn, so the waiting is sequential. In the case of waiting to travel, large groups are waiting for the same thing (such as for the moment that the train or air plane can be boarded), meaning that the time that the waiting ends are often the same.

In management literature there are also examples of introducing technology in order to alter the experience of waiting. Katz, Larson, & Larson (1991) explore how an electronic news board and a clock affect the perception of waiting time. Hui, Dube, & Chebat (1997) find that music has positive effects

for people waiting, especially if it is perceived as enjoyable. Kumar, Kalwani, & Dada (1997) examine waiting time guarantee and find that if expectations are not met customers are less satisfied than customers waiting the same amount of time without the guarantee. However, all these technological innovations are based on an understanding of waiting as something negative that has to be improved or eliminated. Or, in other words, the focus of these studies has not been on how people engage in activities while waiting and in what activities they engage.

The analysis in this study is also influenced by insights from ethnomethodological research concerning everyday activities as accomplishments, which are usually taken for granted. In this tradition, social life is studied in order to examine how people go about doing whatever they do. Ethnomethodological research has focused on talk in interaction (Heath, 1986; Goodwin, 1997b), and sometimes on work in interaction (Bredmar & Linell, 1999; Goodwin, 1997a; Heath & Luff, 2000). One way to reveal what people do is to point at moments when they don't manage, i.e., breakdowns. Robillard (1999) describes how his handicap, a condition called motor neuron disease which results in paralysis, has helped him understand how intricate normal interaction really is, how glances, slowing down when passing, etc., helps coordinate and orchestrate human communication. Of interest are foremost studies of behavior in public places and interaction within these places — e.g., Goffman (1963) and Sudnow (1972). Although these studies are not focused on the design of IT they inspired our analysis of non-verbal communication and social organization in public places. The issue of togetherness in public places has been examined by Ryave & Schenkein (1974). Togetherness is, in this chapter, used in the analysis of how people are using direction and conversation in displaying their relation in a crowded context.

## **Fieldwork and Design**

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Fieldwork can identify new possibilities for design of IT as well as provide an understanding of the context one is designing for (Bly, 1997). The use of ethnographic field studies in the design of IT is typically devoted to work settings such as offices (Bellotti & Smith, 2000; Bellotti & Bly, 1996; Suchman & Wynn, 1984), police work (Ackroyd, Harper, Hughes, Shapiro & Soothill, 1992), control rooms (Hughes, King, Rodden & Anderssen, 1994), and public organizations (Simonsen & Kensing, 1997). In this chapter the focus is on settings where work in some cases is being accomplished, but the main activity

or the “purpose” of the environment is not work. The use of ethnographically inspired studies informing design within a mundane context is, for example, precedent in the work of Crabtree, Twidale, O’Brien & Nichols (1997) where a library helpdesk is studied, working with the design of IT for use in the home (O’Brien, Rodden, Rouncefield & Hughes, 1999), understanding how teenagers use mobile phones (Weilenmann, 2003), and how tourists solve problems (Brown & Chalmers, 2003). The use of IT has moved out of the control rooms and the offices and therefore design implications must be sought in these new places of IT use.

There have been discussions concerning the value of using field studies as the basis for design (Schmidt, 1998) There is a basic difficulty concerning whether the result of an ethnographical field study (detailed ethnographies describing human activity) is useful and applicable for a designer, “Given the multiple constraints and deadlines that many have to work to, most designers are likely to prefer the translation work to be done for them, by using easily available ‘cookbooks’ containing step-by-step recipes for incorporating social aspects” (Plowman, Rogers & Ramage, 1995, p. 321). We chose to give general design implications as suggested in Plowman et al. (1995). Button & Dourish (1996) bring up the issue of designing new innovative systems on the basis of studies of current activities within a context. There is a logical paradox in the acquiring of input for future use in descriptions of past activities. In this chapter we claim that the design of IT to be used in places for waiting has to take into account the frames for use that these environments set up today. This position is further elaborated in the discussion section of this chapter.

In this chapter we provide general design pointers and give the “boundaries” for design, rather than to give specific implications for construction. By doing this we also address the problem of transferring contextually situated findings from our field study to other domains. It is often difficult to draw unambiguous conclusions for design from fieldwork since the fieldwork is conducted in a specific context with specific physical, social and temporal aspects. Rather than providing input on “what” should be constructed and implemented, the implications for design presented in this chapter aim at giving frames and guidelines to be used in the design process.

## Method

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This is an exploratory study, meant to be an initial exploration of the field and a means to think about design in a transitional public place. The spatial, temporal and social consequences of mobility can be ethnographically studied by focusing on an environment in order to understand how this place both affords and constrains activities. The station (and to a certain degree also the airport) is a public place, which is available to anyone and where people engage in all sorts of activities.

The observation was made covert; we did not ask the people we observed for consent. We have found it reasonable to study people without their consent, since behavior in public places is always open for observation. People are aware of being seen when being in public places, and we, as researchers, are able to observe just the same as others. Furthermore we have not focused on anybody in particular, but rather on activities, so the people being observed doing things are not recognizable in our data. Being in the public place also makes us and hence our actions as researchers, observing and taking notes, visible to others. Therefore we find it ethically acceptable to observe people in public places. In the public place we instantaneously become social actors interacting by just being present in the environment, making our own actions tools in the field study. This was evident at several occasions, one example is when one of us looked intensively at a person and then took a note. This was reproached by a long look, which shows that we are actors in this environment on the same conditions as every other actor. However, we did not intentionally and actively explore the social rules in the context by interacting with others.

## Data Collection

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Observations were conducted in two public places where people wait to travel, at an airport and at a train station. We spent approximately 30 hours taking field notes in these environments. The observations were conducted during a six-month period. Each observation included two researchers observing and taking detailed notes. The duration varied from one to three hours at a time. The observation also covered different days of the week as well as different times of the day. The purpose was to be able to understand how the activity changed during the day and the week. Two researchers collected the data at the same time, but in different physical locations within the same locality. To observe the

same environment from two separate perspectives enabled a richer understanding of the activities in a mobile setting (Weilenmann, 2003). After each observational setting the field notes were discussed. These discussions provided a possibility to question each other's assumptions and preconceptions, and hence see how we should proceed with our observations. Since we focused on a crowded and lively place the field notes sometimes tended to be somewhat fragmentary. However, occasionally our field notes concerned the same person observed at different times or the same event observed from different angles and this gave us the possibility to better understand certain situations.

A total of one hour of video was recorded at the train station. This video is mainly used as a further resource, a means to validate and give further understanding of what was seen in the field notes.

## **Analysis**

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In the analysis the data was discussed and we listed interesting topics from our field notes focusing on the activities of the observed peoples. We found four themes that seemed fruitful as means to think about design for public places. In a complex environment focusing on activities is one way to break down the setting to lesser units and analyze the aspects of interest for the study, in our case the design of IT. The main connection to design is that activities can be supported by or are at least almost always affected by the use of artifacts. For further discussions on the world as constituted by man-made artifacts see for example Dahlbom & Mathiassen (1993) and Wertch (1998). One aim with this study is to give design implications, showing how IT designs could improve by considering what frames and shapes action and use in a setting. Therefore, we present design implications that point at salient aspects affecting the use of IT. In the next section excerpts from the field notes (in italics) are used to illustrate instances of behaviors observed.

The video recordings were used in order to gain a deeper understanding of social interaction and the micro mobility in use of artifacts. Certain activities, such as being together and using artifacts, were videotaped to be able to analyze the activities from a micro mobility perspective. Micro mobility is the way people use the mobility of objects, usually in interaction (Luff & Heath, 1998).

In the analysis we used the categories “single persons” and “people in company.” This is something that people usually show by position, direction, physical proximity, and body alignment (Ryave & Schenkein, 1974). We were mistaken a few times, for example when we saw two men walking at the same pace and the same direction next to each other, but then suddenly split up and enter a train in different cars without saying goodbye. What is important here is to understand that people that to us would appear as being single or as being part of a group would also appear similarly to other people in the same context. It should be noted that this was used as an analytical tool for understanding how people is interpreted as being together.

## **Findings and Implications for Design**

Our main finding concerns how the behavior of people in public places for waiting is framed by the place, the time spent in the environment and the social need to behave appropriately. The waiting area is in some aspects changeable; the behavior of people affects it and frames the setting. It changes according to temporal cycles, during the day, the week and the year. Some hours the place is more crowded and others more vacated. This affects how people position themselves in the place; for example, how close to each other they sit. Another variance can be noted in pace; during rush hour people tend to walk faster and head more directly than during midday and evening. The amount of people and the tempo affects the passability, the interaction and, consequently, also people’s activities.

Being in a public place means being exposed to other people. People interact and form their actions aware of others sharing the same public place. In the following three sections we describe how people establish private spaces and adjust to the public space, how they adapt to change and finally how actions are visible and how this shape activities. In each of the sections we also show how the findings can and should influence the design of IT.

### **Creating Privacy**

One main aspect of being in a public place is that strangers can observe your actions. Being in an environment surrounded by unknown and not yet trusted



people might call for sheltering some activities from observation, creating a private space in the otherwise public place. Private space, in this case, means that one specific individual, having a privileged access to this space, occupies some of the public space (physically, visually or acoustically). This is accomplished by indicating to others that this space is “taken.” The alteration from public to private was evident in the use of artifacts, including public artifacts such as cash disposals and travel information displays as well as private artifacts such as cash cards and bags.

Creating a private space means changing the social setting for the activity, adapting oneself to the environment by lowering voice while on the phone, indicating activity but not revealing any content of the conversation, like turning away from a group while getting an incoming call or leaving a bench when the phone rings. It can also mean using artifacts to physically change the room. Two different situations presented below exemplify two ways of creating a private space: a woman sheltering her belongings and thereby creating a secluded private space and a man spreading his belongings and creating an area in which others are not supposed to enter.

This excerpt shows sheltering:

*A woman walks by. She's got her purse in front of her and somewhat to her left side. She's covering the opening of the purse with her gloves in her left hand and with the arm. She picks something out of the purse with her right hand and looks at it, still covering it with her left arm and gloves.*

Her behavior is an indication that she is aware of the possibility of being observed. She is protective of something, her property per se, or something that might be revealed if someone saw it. She shapes her artifacts to a shelter by hiding the purse with hand and gloves. She creates a small, secluded area, a private sphere in the public space. Her behavior shows an awareness of the features of publicness, of the possibility of being watched.

Another way to create a private space is to rearrange the physical room. One thing that was observed was how luggage was used as a point of reference. People place luggage around themselves, not piled, neither leaning against each other, but dispersed with space between. This enlarges the traveler's private physical space while waiting. This is exemplified with this young man.

*During rush hour a young man with a lot of luggage is standing in an open area outside the station near the platforms. He is standing in the area that people use to walk in and out of the station, but he isn't close to a corner or keeping out of the way, he is standing in an open area. The placement of the bags makes him appear to stand on a calm island while people around him are moving.*

When he puts down his luggage he alters the social and physical setting. The placement of the bags means that he enlarges his private space. The bypassers are obliged to allow him more space than they give each other; they are closer to one another than any of them are to him. The bags become a means to communicate his decision to stand still in an area designed for walking from the trains to the other people passing by. The others accept the altered place; he is not run into by anyone. Instead the flow of people changes direction. He manages to communicate his intention to stand there to the people observing him. In essence he creates a personal space for himself in the larger public space of the station.

### *Design Implications*

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As described above the need to establish privacy in a public place is salient and has to be considered in the design of IT. From the observations it is clear that people are making an effort to conceal some of their actions from the public. A user of an artifact should be able to adjust the publicness of her use, thereby making it possible to exclude other people present. This could conflict with another need for privacy, the need to be left alone without being looked upon as strange or offensive.

- A user of an artifact should be able to adjust the publicness of her use; it should be possible to display use without revealing the content of the activity.

People also attempt to create private areas in the public place. These areas need to be visible to others, to be understood as private spaces. IT could enhance the possibilities for communicating this will to create a private space. Because of the need to communicate activities, IT use should be visible and

interpretable to others so that the users will be allowed sufficient private space to engage in the use. For example, a person reading a book is recognized as someone being busy and inattentive to what is going on in the public place (e.g., Goffman, 1963). This in turn leads to that this person is treated with certain consideration; the inattentiveness of the reader is an accepted excuse to not involve in the physical and social negotiations going on. The use of IT has to be as visible as reading a book to be able to establish this same respect. The best would be if it should be possible to display activity without revealing the content of the activity. The possibility of being attentive in the space while focusing on a private activity would also be a field that would be valuable to explore.

- IT use should be visible and interpretable to others so that the users will be allowed sufficient private space to engage in the use.
- IT could include the possibility of being attentive to what is going on in the public place while focusing on a private activity.

## **Adapting to Change**

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Conditions for waiting change, and people have to adapt to these changes. In our observations adaptation was accomplished by using artifacts in different ways, or by changing the level of attention paid to an activity. In this section the main attention will be given adaptation to temporal and social change.

When waiting to travel, altered temporal circumstances means differences between expected, real and experienced time as described earlier in the chapter. It might also mean actual changes in timetables. One example of how this affects the behavior of people can be seen below. The excerpt is taken from the airport, where many people brought laptops, but usually did not bother to take them out of their bags:

*A loudspeaker call informs the people waiting that their plane is an hour delayed. The call makes a lot of people engage in activities. A man opens his laptop. There are no tables in this part of the hall. Two people dig out a book each from their bags, and start reading. A second man takes up his newspaper. A third man starts to look at paper copies of a Power Point presentation. He is in company with another man who then starts to use his Palm Pilot.*

The increased activity shows that people had made the estimation that the time remaining before boarding was too short to engage in any time-consuming activity. With a whole hour they can do things such as work with their laptops, look over a presentation, read a book. The “extra” hour makes it unnecessary to be paying much attention to the environment, and being prepared to board. The changing temporal element alters the prerequisites for waiting and shapes the activities.

Social change also creates a need for adaptation. Being alone or being together affects the way people act and how they are understood in a public place. Persons in company were usually less engaged in individual activities, and tended to focus less on artifacts. This excerpt shows one difference between being together and being alone. The woman’s way of acting is clearly more active when alone than when together with the man.

*A woman and a man in their twenties, with a hotdog each, approach the travel information display and stop near it. He looks at the monitor, and she looks at him. Then he turns his head towards her, but they keep standing towards the monitor. They eat their hotdogs and talk to each other. Then the man walks away, and the woman is standing alone. She turns, picks her hair, turns her entire body and looks at a wastepaper basket, and then she walks towards it. After throwing something she returns to her “spot,” and arranges her hair in a ponytail. She walks towards the platforms, her company returns and they continue past the platform towards the square.*

She is standing quite still while he is with her, she holds her position and focuses upon her company. When he leaves she immediately starts to engage in different activities, minding her hair, throwing away trash, etcetera. Her primary focus while alone is probably her activities, but an effect of her actions is that she appears busy to others. She is in constant motion while alone, and displaying her activities to the public, using the wastebasket and her hair ribbon as tools that help communicate that she is busy.

Being together in a public place also means displaying that togetherness by physical direction and conversation. This can be difficult since it can interfere with other important things such as showing respect towards the accompanying person when he/she is busy with something that doesn’t concern the together-

ness, i.e., if someone in company has to attend to a matter of more private character. Being together is a mutual accomplishment that requires an effort. This is evident sometimes when one person receives a phone call, or attends to something more or less private. When someone with company engages in a private activity, the social situation changes for the other person. The other person(s) usually helps their company to establish privacy for the activity and usually engage in an activity themselves. The excerpt below exemplifies this in an interaction between a man and a woman:

*Woman and man in their thirties walk side by side at the same pace. He is talking on a mobile phone. They stop and he is still talking. She is facing away from him on and off. She looks around. Shifts her weight from one leg to the other. Arranges her clothes. She starts to walk and he comes along with her, side by side.*

She is not looking at him all the time, but appears busy attending her own business, doing different activities. Her behavior is similar to the behavior of the woman left alone by her company — she is physically very busy. The difference is that she does have company, and is attentive to him. This makes it easier for them to accomplish “togetherness” again when he finishes the phone call.

### *Design Implications*

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The situation can easily change while waiting; people sit down next to you, your company attends to a phone call and your train can be delayed. These changes are important in the use of artifacts as well as in social encounters, and must therefore be considered in design. As described in the case of people at the airport, an estimation of the waiting time is made before choosing what activities to engage in. IT supported activities should be suitable for different spatial, temporal and social contexts so that the user can choose what would be an appropriate activity depending on the current situation. For example, five minutes waiting while standing up allows a phone conversation but does not suit working with a laptop. However, the findings presented also suggest that the use of artifacts should be designed so that they are adaptable to changes, not only supporting a variety of suitable activities.

- IT should be suitable for different spatial, temporal and social contexts.
- IT should also be designed so that it is adaptable to changes, not only supporting a variety of suitable activities.

One main activity as a group is being together and interacting. However it is accepted for a member of a group to attend to a private activity that excludes others in the group. When this happened the other parties displayed that they have something else to do too, besides waiting for the “busy” party. Examples of such things observed are: picking up your own phone if someone else in the group gets a call, starting to read if someone else starts to read. However, the common activity when in a group is to engage in interaction. Implications in this case could be that services or devices are given the ability to be shared within the group [as Weilenmann (2003) also suggests], or by making joint activities able to adapt into single activities when one of the actors is unable to proceed.

- IT services or devices should be designed to be shared within groups and should ease the transition between common and individual activities and use.

It seems also as if it is important that the use of artifacts can easily be discontinued and then just as easily resumed. Places for waiting are vivid and you are easily distracted from any activity that you might engage in. It is also an environment where many people want to, and choose to be aware of what is happening around them. This in turn suggests that artifacts designed for such environments should support the resumption of use after interruption.

- The use of IT should be easy to discontinue and then just as easily resumed.

## **Appearance and Activity**

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Even though people sometimes seem to be going out of their way to appear “busy,” it is common and accepted to just be still and look around while waiting. However, many of your actions are visible to others. Meaning that the other actors within the context will interpret every activity that is observed. The

visibility of activities is a useful outcome for the people waiting, or even that the interpretation might be of more interest than the actual activity engaged in; this since many people tend to display their activities clearly to the others present. This means that not only the activities themselves but also the interpretations that observers make of these activities are important.

Many people in places for waiting do things that at a glance looks like they are active doing something, but when studied for an extended period we found that the displayed activity might not be the focus of the person. Such things are: looking at tickets for an extended time or reading the same page of a paper over and over again while looking at people passing by. Sometimes people are making an effort to make an active appearance at stations and airports. This is most evident with people who are alone. Sitting down can facilitate the active appearance since many activities are easier to do when seated. Being interpreted as occupied with something might serve several functions in the public place for waiting. Doing things can prevent people from making contact with you since you are visibly busy. However, no claim is made that activities in the public place mainly focus on the appearance. We have no reason to believe that the interpretations of most activities are the main reason for engaging in activities, but they are an outcome that seems to be appreciated. The three excerpts below show how artifacts frame the interpretation of activity as well as how the outcome of activities can be understood as positive to the actor. This first excerpt displays a sequence where the focus of the actor goes from reading her paper to other activities but still providing the visual cues to be understood as someone reading a paper.

*Woman in her early twenties is reading a newspaper. She puts it down and looks at people instead. She seems to pretend to read; she looks at the same spot on the same page in her paper for a long time, and doesn't turn pages. She bites her fingernails, and wiggles her foot. Then she turns three or four pages in a row. She looks at the advertisements for movies, and is more focused on the paper, appears to be more interested. Three men in her age line up for the cash dispenser, and she stops looking in the newspaper and starts observing the three men.*

The woman is holding her paper as if she is reading it; it is the activity that she, to a by-passer, is engaging in since the by-passer only will observe her activities

for a short period of time. However, not turning pages, biting her fingernails, and looking at men, shows that it might not be what she is focusing on. The newspaper makes her appear more engaged in an activity than she actually is. She would probably not care of appearance if she were in a more secluded space. This indicates that her actual goal with the activity is to provide any possible observer with specific input for interpretation.

It is not only focus, but also temporality that indicate the possibility of “willfully” appearing busy. The next excerpt shows how the interpretation of activity changes depending on the temporal extension of it.

*A man, approximately thirty years old, is reading a magazine. He picks up his train tickets. He looks at them for almost ten minutes, turning them and watching them closely.*

For an observer this man is busy studying his tickets, and for certain this is the only visible activity that he is engaging in. Engaging in the activity indicates to a bystander that this is a person about to travel and that he is busy preparing for his travel, which leads to him being less available for interaction. What is specifically interesting with the excerpt is that the interpretation of the activity is highly dependent of temporal aspects. What is understood when observing a persons activity is, as shown, highly dependent on how long the person is observed. In the context of places for waiting, the case often is that observers are passing by. This means that they will only be able to observe the activity of each other for short periods of time.

In the excerpt below, spatial direction becomes the tool for interpreting the activity of this man.

*A middle-aged man with a rucksack and a plastic bag is appearing to study the travel information; his face is directed towards the travel information display. He is however still standing in the same spot after three minutes.*

The man is looking at the information display for several minutes. During this time no information is updated and there is only information on the arrival and departure of five trains. This indicates that the need for information isn't the only cause for him to stand there. The spatial direction frames his activity showing



a by-passer that he is doing something (checking the train times), making his activity socially acceptable. Activity can be a strategy to appear busy to other people. The travel information displays are not only used to check departures and arrivals, but also to have something to physically relate to, a place to stand and something to read, a place of reference.

### *Design Implications*

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As mentioned above, the use of artifacts will be interpreted in places for waiting. When someone is holding a ticket and looking at it, people will interpret this as someone checking their ticket, and therefore being a traveler preparing for traveling. In places for waiting all your visible activities in some way means interaction with others; people are observed and they are aware of this. This in turn means that others will interpret any visible use of IT and that this interpretation is important to the user. From a design perspective it is important to make the use of artifacts visible and that the usage is displayed to others present.

However, as discussed above, the impression given is sometimes something else than the actual activity. This implies that artifacts are used as tools both for engaging in specific activities but also for communicating a certain activity to others. In the case of IT design the possibility to “hide” or change the interpretation of a user’s actual activity should be explored by giving the user the possibility to use IT-support to alter the interpretations that can be made of a user’s activity.

- IT should both support engaging in certain activities but also support communicating a certain activity to others. These two need not be the same.

### **Summary of Design Implications**

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In this subsection the design implications derived from the findings presented above are summarized.

### *Creating Privacy*

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- A user of an artifact should be able to adjust the publicness of her use; it should be possible to display use without revealing the content of the activity.
- IT use should be visible and interpretable to others so that the users will be allowed sufficient private space to engage in the use.
- IT could include the possibility of being attentive to what is going on in the public place while focusing on a private activity.

### *Adapting to Change*

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- IT should be suitable for different spatial, temporal and social contexts.
- IT should also be designed so that it is adaptable to changes, not only supporting a variety of suitable activities.
- IT services or devices should be designed to be shared within groups and should ease the transition between common and individual activities and use.
- The use of IT should be easy to discontinue and then just as easily resumed.

### *Appearance and Activity*

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- IT should support both the engaging in certain activities and communicating a certain activity to others. These two need not be the same.

## **Discussion**

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Spatial, temporal and social aspects always influence human action and thus also affect and are affected by the use of artifacts. This means that the design of IT must be informed by an understanding of these aspects. Studying a setting, in this case a public place where people wait to travel, points to the greater problem of understanding the frames for action. The aim of this chapter was to

identify the behaviors of people, observing what it is they do in places for waiting. In this chapter we describe how behavior is influenced by spatial, temporal and social frames and how this affects use and thereby can, and should affect, the design of IT. In our study of how people do what they do while waiting to travel we have highlighted some of the interactional meanings that spatial, temporal and social frames can have in a setting. We claim that these meanings are important, and will most likely continue to be important for the behavior of people in these types of settings. People interact with others in public settings and the “rules” for public behavior are fairly persistent. This means that our findings are interesting for future design, since acceptable behavior changes gradually, and at a slow pace.

Waiting to travel means being in an environment where distractions are common. The environment does not frame the sub-activities of waiting in the same way as the store frames shopping (picking up things and putting them in a trolley), or as the playground frames certain play-related activities. Waiting does not mean doing certain preset things. Waiting is a preliminary state; it is not something that people do for its own sake. Nevertheless people often organize their waiting, use their time to sit down, read a paper, and make a phone call, etcetera. These activities are usually not meant to last for an extended period of time. Most activities that people choose to engage in are easily managed, and require few preparations. This makes it possible to be attentive to what is going on in the surroundings, something that is important in a public place where people wait to travel. Since the environment might distract, we have pointed to the need for artifacts that helps the user to resume earlier activities. The use of artifacts in the studied contexts tends to be constrained to things that can be accessed instantly, such as a paper, a book, a mobile phone or paper documents. This can be due to one certain problem with many of the IT devices of today, they are not as adaptable as they could be, and they are foremost developed for continuous stationary work, not for short intervals of use (e.g., Kristoffersen & Ljungberg, 1998). Concerning the observations of the creation of private spaces, this is something that might be difficult to enhance with IT, but it would be worthwhile exploring the possibility of enlarging and decreasing individuals’ private space. One aspect of how activity affects design is that the use of artifacts should be visible and easily interpretable so that onlookers can understand what someone is doing in the span of a glance. This is not always possible when new technology is introduced in a new setting. The people present are not acquainted with the new artifacts and can therefore not have an understanding of the use. After a while the

technology and associated behavior is more commonly known and thus more understandable.

We have made observations of people engaging in work activities in the study. Instances of this are the use of mobile phones for making business calls or reading work-related documents among other things. To design for doing work while waiting to travel, we suggest that the implications presented in this chapter are taken into account. However, to be able to support work activities the designers have to look more closely at the actual practice that the support is designed for. By doing this it can be determined which activities should be supported, and how to create valid support for use in new contexts.

Time spent waiting is in a manner of speaking “free time,” it doesn’t require very much of the traveler and in most cases not much is expected of you to accomplish when waiting. A person waiting for a train doesn’t have to accomplish anything in particular while waiting; one could for example sit still and look at the bypassers without being reproached by angry looks. We see it as a possible sanctuary for reflection and rest and it does not necessarily have to be filled with effective and productive work. When studying people waiting to travel it has become evident that they engage in activities frequently and do not seem very discontent with waiting.

The main contribution of this chapter is descriptions of how people create privacy in the public place, how they adapt to spatial, temporal and social change, and how appearance and activity interrelate. In each of these descriptions we also point to the use of artifacts and how this can affect design of IT. One main design conclusion is that the use of technology must be possible to negotiate or adapt to support use in different ways, in different contexts and to produce a possibility to understand this use.

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## References

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- Ackroyd, S., Harper, R., Hughes, J. A., Shapiro, D., & Soothill, K. (1992). *New technology and practical police work*. Milton Keynes, UK: Open University Press.
- Belotti, V., & Bly, S. (1996). Walking away from the desktop computer: Distributed collaboration and mobility in a product design team. In *Proceedings of the CSCW 96 Conference* (pp. 209-218). Cambridge, MA: ACM.
- Bellotti, V., & Smith, I. (2000). Informing the design of an information management system with iterative fieldwork. In *Proceedings of the DIS'00 Conference* (pp. 227-237). Brooklyn, New York: ACM.
- Bly, S. (1997). Field work: Is it product work? *Interactions*, 4 (1), 25-30.
- Bredmar, M., & Linell, P. (1999). Reconfirming normality: The constitution of reassurance in talks between midwives and expectant mothers. In S. Sarangi & C. Roberts (eds.), *Talk, Work and Institutional Order: Discourse in Medical, Mediation and Management Settings* (pp. 237-270). Berlin, New York: Mouton de Gruyter.
- Brown, B., & Chalmers, M. (2003). Tourism and mobile technology. *Proceedings of CSCW2003 Conference* (pp. 335-355), Helsinki, Finland. ACM.
- Button, G., & Dourish, P. (1996). Technomethodology: Paradoxes and possibilities. In *Proceedings of the CHI' 96 Conference* (pp. 227-237) Vancouver, Canada. ACM.
- Crabtree, A., Twidale, M. B, O'Brien, J., & Nichols, D. M. (1997). Talking in the library: Implications for the design of digital libraries. In *Proceedings of the DL 97 Conference* (pp. 221-228). Philadelphia, PA: ACM.
- Davies, M., & Heineke, J. (1998). How disconfirmation, perception and actual waiting times impact customer satisfaction. *International Journal of Service Industry Management*, 9 (1).
- Goffman, E. (1963). *Behavior in public places: Notes on the social organization of gatherings*. New York: The Free Press.
- Goodwin, C. (1997). The blackness of black: Color categories as situated practice. In L. B. Resnick, R. Säljö, C. Pontecorvo & B. Burge (eds.),

- Discourse, Tools and Reasoning: Essays on Situated Cognition* (pp. 111-140). Berlin, Heidelberg, New York: Springer.
- Goodwin, M. (1997). By-Play: Negotiating evaluation in story-telling. In G.R. Guy, C. Feagin, D. Schriffin & J. Baugh (eds.), *Towards a Social Science of Language: Papers in Honor of William Labov 2: Social Interaction and Discourse Structures* (pp.77-102). Amsterdam & Philadelphia: John Benjamins.
- Heath, C. (1986). *Body movement and speech in medical interaction*. Cambridge: Cambridge University Press.
- Heath, C., & Luff, P. (2000). *Technology in action*. Cambridge: Cambridge University Press.
- Hughes, J., King, V., Rodden, T., & Andersen, H. (1994). Moving out of the control room: Ethnography in systems design. In *Proceedings of the CSCW 94 Conference* (pp 429-439). Chapel Hill, NC: ACM.
- Hui, M., Dube, L., & Chebat, J. (1997). The impact of music on consumers' reactions to waiting for service. *Journal of Retailing*, 73 (1), 87-104.
- Katz, K., Larson, B., & Larson, R. (1991). Prescription for the waiting-in-line blues: Entertain, enlighten, and engage. *Sloan Management Review*, 44.
- Kristoffersen, S., & Ljungberg, F. (1998). Representing modalities in mobile computing. In B. Urban et al. (eds.), *Proceedings of Interactive Applications of Mobile Computing*. Fraunhofer Institute for Computer Graphics.
- Kumar, P., Kalwani, M.U., & Dada, M. (1997). The impact of waiting time guarantees on customers' waiting experience. *Marketing Science* 16(4).
- Luff, P., & Heath, C. (1998). Mobility in collaboration. In *Proceedings of CSCW'98* (pp. 305-314). Seattle, WA: ACM.
- Maister, D. (1985). The psychology of waiting lines. In J. A. Czepiel, M. R. Solomon, & C. F. Suprenant (eds.), *The Service Encounter* (pp. 176-183). Lexington, MA: Lexington Books, DC. Heath and Company.
- O'Brien, J., Rodden, T., Rouncefield, M., & Hughes, J. (1999). At home with the technology: An ethnographic study of a set-top-box trial. *ACM Transactions on Computer-Human Interaction (TOCHI)*, 6 (3), 282-308.

- Plowman, L., Rogers, Y., & Ramage, M. (1995). What Are workplace studies for? In H. Marmolin, Y. Sundblad, & K. Schmidt (eds.), *Proceedings of the ECSCW 95 Conference* (pp. 309-324). Chapel Hill, NC: ACM.
- Pruyn, A., & Smidts, A. (1999). Customers' reactions to waiting: Effects of the presence of 'fellow sufferers' in the waiting room. *Advances in Consumer Research*, 26, 211-216.
- Robillard, A. (1999). *Meaning of disability: The lived experience of paralysis*. Philadelphia: Temple University Press.
- Ryave, A. L., & Schenkein, J. N. (1974). Notes on the art of walking. In R. Turner (ed.), *Ethnomethodology, selected readings* (pp. 265-278). Penguin Education.
- Schmidt, K. (1999). The critical role of workplace studies in CSCW. In C. Heath, J. Hindmarsh, & P. Luff (eds.), *Workplace Studies: Recovering Work Practice and Informing Design*. Cambridge: Cambridge University Press.
- Simonsen, J., & Kensing, F. (1997). Using ethnography in contextual design. *Communications of the ACM*, 40 (7), 82-88.
- Suchman, L., & Wynn, E. (1984). Procedures and problems in the office. *Office Technology and People*, 2 (2), 133-154.
- Sudnov, D. (1972). Temporal parameters of interpersonal observation. In D. Sudnov (ed.), *Studies in Social Interaction*. New York: Free Press.
- Weilenmann, A. (2003). *Doing mobility*. Doctoral Thesis. Gothenburg Studies in Informatics, (28).
- Wertsch, J. (1998). *Mind as action*. Oxford: Oxford University Press.

# Concluding Remarks

## Interaction: To be continued...

In the end, what conclusions might be derived on a general level from this book? Well, I believe that one conclusion is that *interaction* is something fundamental to us as human beings and therefore a natural and sometimes necessary part of many of our everyday activities. Due to this necessity of being able to communicate with “anyone, anytime, anywhere” it is not a surprise to see that the different chapters in this book span across so many seemingly disparate settings. Rather, interaction is ubiquitous and a core aspect of us as humans and, as such, it is easy to understand why so many current attempts on supporting interaction rely on the two most widespread and established technological infrastructures of the modern society as mentioned in the introduction to this book, i.e., the Internet and the global mobile phone network because, as of today, a lot of social interaction takes place on the Internet in different online forums, chat rooms, bulletin boards, communities, news groups, discussion lists, via email discussions, or maybe as instant messaging conversations, and on the other hand, one of the most widely adopted technologies to support human interaction “in the wild,” i.e., outside the computer, is the mobile phone, which makes sense since another core aspect of us as human beings, besides our needs and willingness to interact, is that we are *mobile*, sometimes in motion and some other times just located at some place waiting to catch a bus, or standing maybe in a line to a rock concert. A final conclusion that might be drawn from this book has to do with the importance of understanding the temporal aspects of the interaction landscape that these new technologies enable. Conversations with others do not exist in a vacuum having a clear starting and stopping point. Rather, conversations are ongoing and typically multithreaded and have both a history and a future. This continuity aspect of social interaction should therefore always be a focal issue when designing new technologies for the Interaction Society and a core focus in



any analysis of what is going on out there. This book is therefore not a book that has tried to summarize the Interaction Society and put it all together in a nice box. Rather, this book is an attempt to highlight an evolving process that is in the making literally as we speak, and by doing so it should hopefully enable us to understand what this new paradigm of computerization can do for us, and what it does to us, not solely on a cognitive level this time, but rather in relation to our fundamental social needs. While the computer of yesterday was about getting things done as quickly as possible, this book has hopefully shown that ideally, the computer of tomorrow will help us to prolong, sustain and develop the things we care about the most, i.e., our ongoing interactions with others.

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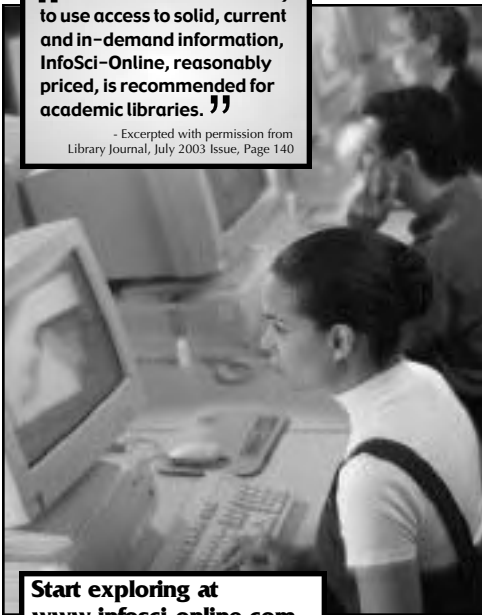
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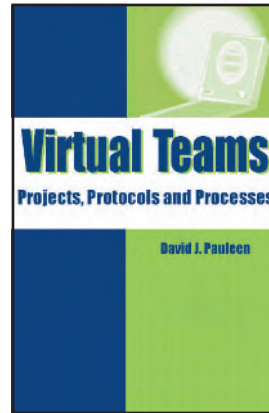
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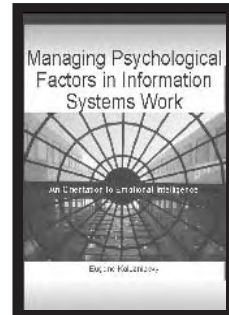
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