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## Mobile Informatics

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The use of information technology (IT) is now expanding into all dimensions of society. As a consequence, informatics with its general focus on IT use will develop into many different sub-disciplines. Here we introduce one such discipline, *mobile informatics*, exploring services and concepts of mobile IT use. We outline the foundations of mobile informatics and give examples from ongoing research projects at the Viktoria Institute.

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### **1. From Desktop Computing to Mobile Work**

At first, computer technology seemed to support rather than change the ways of living and working in industrial socie-

ties. When computers were introduced in the factories, they helped speed up automation, and in the offices they made automatic what used to be manual data processing. Eventually, people understood that they had misconceived the nature of this new technology. They thought that it would only automate office work, when in addition to doing so it was the major force in expanding such work.

The early uses of computer technology led to an increase in document production. With computing machinery, information systems and, especially word processing, you can produce paper printouts, which then go directly to the copying machine to be copied and distributed in the organization. And with document management systems it became possible to distribute documents electronically through the organization, for each to

print out on the local laser printer. Office work became administrative paper work.

When the focus of IT use now shifts to Internet and mobile phones, then the focus of work seems to shift from paper work to customer relations, from document management to sales and services. A rapidly increasing use of electronic mail, more adequate telephone services like voice mail and mobile phones quickly change the conditions of work. You are no longer tied to your office and, with increasing communicative interaction, the pace of work increases. There is a shift from bureaucratic document management to the bustle of the market with its many meetings. The old factories for office work, education, research, and health care may very well disintegrate and be replaced by meeting places for mobile service exchange.

## 2. From Information Systems to Mobile Informatics

If we look at the development of computer technology use, it is easy to see that our discipline was born in, and for a long time defined by, the early use of computers as information systems. When personal computing and human-computer interaction was all the rage in the mid-1980s, people in information systems went on thinking and talking about their discipline in terms of systems development, extending the notion of information system to pay lip service to other forms of computer technology use, such as word processing, desktop publishing, and communication.

The pioneering programmers with knowledge about numerical methods, algorithms and data types, who had ac-

quired competence in systems analysis, design and development, never really learned interface design, human-computer interaction, and user modeling. Instead, it was psychologists who entered the field, performing experiments and doing usability tests. The large systems development projects gave way for mass produced software, graphical user interfaces, and new ways of interacting with computers. But the information systems profession kept defending their mainframes and character screens all through the 1980s. It was really only when client-server networks were introduced towards the late 1980s that the information systems specialists finally accepted the personal computer.

When most of the departments of information systems in Sweden, decided, in 1993-1995, to change their name to "informatics" it signified the end of a commitment to early computer technology use. If those departments missed the personal computing stage, they wanted to make sure to be the *avant garde* of the Internet era. In the 1990s they have rather quickly begun to direct their attention to information technology, to networks, Internet, and now mobile technologies. Rather than going on about "developing information systems" they are defining their discipline in terms of "using information technology," and when that use is focusing more and more on mobile IT support, they find themselves doing "mobile informatics."

## 3. Mobile IT Use

Once IT support for mobile work is brought into focus as an important subject matter of informatics, the 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 the 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 conditions 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?

Why has mobility increased? In the context of work, one main reason is that most work in the modern company is *co-operative*. As long as work in most organizations was designed according to the principles of the bureaucracy, the idea was to reduce the need for cooperation. Today's project and team-based organizations are designed to promote cooperation. Cooperation leads to increased use of IT that bridges distance, such as email, but it also leads to mobility: people travel to meet physically.

Another important factor is the emergence of service work as the main occupation in the Western society. Since the beginning of the 1960s, manufacturing has decreased and service work has increased continuously. Service work differs from manufacturing in many ways. Manufacturing takes place where the machinery is, in the factory. Service work is often performed where the customer is, which differs from time to time. Therefore, many service workers are mo-

bile. The increased amount of service work has made society more mobile.

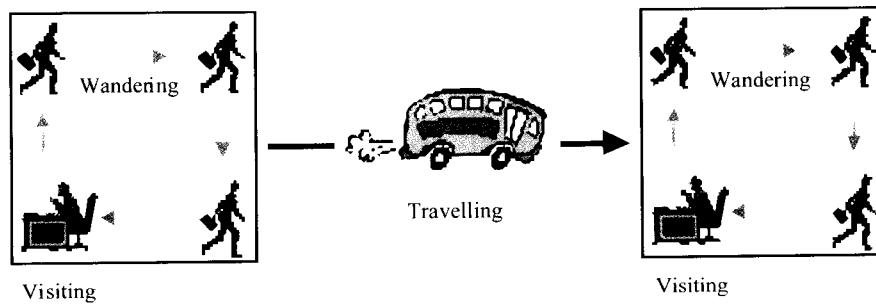
Yet another important explanation for increased mobility is the adoption of mobile phones. Mobile phones enable people to be mobile and yet accessible. As people have become accessible independent of place, new ways of working has emerged in many organizations.

Mobile computing is growing rapidly, but the technology has a long way to go yet. Mobile phones, personal digital assistants (PDAs), mobile information appliances, and wearable computers are developed and marketed, but their functionality is still rudimentary except for making telephone calls, playing games, and managing time.

So far, traditional stationary computing has had a strong influence on mobile computing. The operating systems of dominating PDAs (Psion, Palm, and Windows CE based palm tops) are all based on the "desktop metaphor." Many applications for Palmtops, such as PocketWord and PocketExcel, are miniature versions of traditional office applications. As long as mobile IT users switch between stationary and mobile IT use, using the best terminal at hand, the office applications will survive. But if the nature of service work undergoes substantial changes as people leave their offices and become mobile, we will abandon models developed for stationary computing when designing mobile computing. In the way the mainframe was replaced by the personal computer, mobile information appliances may replace the PC.

When designing IT support for mobile work, we need a clear understanding of the conditions of such work. So far, we have been stuck in desktop thinking and thus stationary work, and this means

FIGURE 1. Three modalities of mobile IT use



that there is a huge ethnographic and conceptual task ahead focusing on mobility. To begin with we shall have to identify, describe, and conceptualize the many varieties of mobile use of IT, in order to bring some structure to this new field. Here is a first, quick attempt at such conceptualization, distinguishing three varieties of mobility, with examples of IT use, called wandering, travelling, and visiting (Kristoffersen and Ljungberg 1998).

Virtually all activities involve mobility of some kind. Traditional office work, for instance, is often described as stationary. Nevertheless, office work often involves local mobility such as short trips to the coffee-machine or copiers, visits to offices, etc. We call this kind of mobility *wandering*. A mobile IT support worker making a new entry in her to-do list on a PDA, while servicing PC users in their offices, is an example of IT use when wandering.

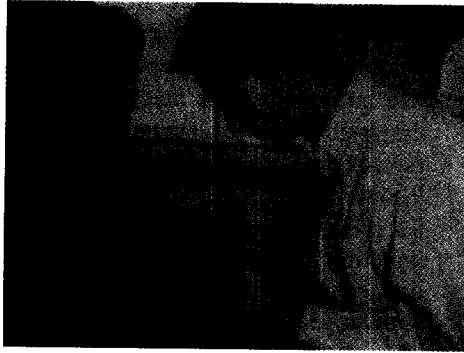
Driving a car is a typical example of mobility. We call this kind of mobility *travelling*. Travelling is moving from one place to another in a vehicle. An example of IT use while travelling is a re-

porter at Radio Sweden, talking to someone on the mobile phone while driving to a place from which to report.

Another type of mobility is *visiting*. A consultant, who spends a few days in a client organization, using a PC there is a typical example. She is mobile in the sense of being away from her office. Another example of visiting is a surveyor on a supertanker outside the coast of Africa, following a checklist on a palm computer to verify the ship safety certificates. Perhaps we should define "teleworking," as it is understood today, as a form of visiting.

People moving in and between these modalities often find themselves in a changing and unpredictable use context. For example, the use context of the train commuter is very different when she can sit down and place the laptop on a table compared to when the train is full and she has to stand up; the mobile phone connection can be lost as the train moves into new areas, and so on. In general, we have observed that mobile users try to re-configure the mobile use context into a stationary one, by for example sitting down and placing the mobile computer

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**FIGURE 2. Mobile IT use**


on a flat surface. In some cases, such as in travelling by train (see figure 2, left), this is relatively easy, while in other cases, e.g., when checking email on the run between two meetings (see figure 2, right), it does not work very well.

Now that mobile IT has been introduced, it will remain important as long as our physical environment remains computer free. If we define mobile computing as the use of technology that you bring with you as you move, then ubiquitous computing will mean the end of mobile computing. When the world itself becomes computerized, we no longer have to bring our own IT, but that won't happen for quite a while yet.

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#### 4. Informatics Research Methods

Informatics is the design-oriented study of information technology use (Dahlbom 1996). In informatics we study the use of IT with the ambition to come up with new ideas for such use (for a more de-

tailed description of our approach to informatics, see Ljungberg *et al.* 1998). Informatics research typically begins with ethnographic studies of human activities, such as work, education, health care, or entertainment, with a focus on actual and possible use of IT. The aim of such studies is diagnostic, trying to identify possibilities for improvement both in technology, the way it is used, and the way the use is organized. On the basis of such studies, use suggestions are made, application prototypes are designed and developed, organizational change is initiated. This is the heart of informatics research, the idea generation phase. It can be followed by implementation and evaluation studies, testing the ideas, but such testing is of secondary interest only.

Thus, informatics research is focused on creative idea generation. It is bordered on two sides by more traditional research approaches: the initial phase of ethnographic, descriptive studies and the final phase of positivistic hypothesis testing. It has to defend its more unorthodox

creative orientation against these two, avoiding both falling into the trap of endlessly careful work practice descriptions, or methodologically impressive testing of well known ideas with obvious outcome. Being a discipline that is tracking (leading?) the development of new technology, informatics is uninterested both in careful description and testing for its own sake, rather than as means to further idea generation. Why, unless you are a historian, describe in detail a work practice that will soon be replaced due to new technology? And why evaluate with great care an artifact that soon will be replaced by something very different in a very different organization of use? Both ethnography and positivism suffer from the natural science syndrome of taking the world for granted as it is. In informatics we are interested, not in nature, but in the artificial world and we are interested in improving its future, not documenting its past. Our approach requires ethnographic studies, conceptual work, documentation, and other more traditional academic tasks, but these activities are only secondary to the overall aim of innovation.

From a slightly different perspective, the innovative orientation of informatics research may not seem radical at all, since it brings to mind the systems development methods of the old discipline information systems. In the typical waterfall method they used to analyze, design, implement, and test. And so do we. But this only goes to show that on a slightly more abstract level we carry on the tradition. But on a concrete level, the differences are substantial. A few examples from current research in mobile informatics will illustrate this.

## 5. Mobile Informatics Research Projects

At the Viktoria Institute, in cooperation with industry, we have defined and launched a joint research program in mobile informatics. The main objective of the program is to explore new IT services for mobile personnel. To achieve the objective, we combine ethnographic studies, scenario planning, and technological tinkering, in an attempt to take the practice of work seriously (ethnography), without getting stuck in the current state of affairs (scenario planning and IT tinkering).

The MobiLinq project, carried out in cooperation with Linq Systems, explores IT support for meetings between mobile workers. People are mobile to meet each other, but current support is not designed for such meetings; it presupposes meetings in dedicated places, with a formal sequence that does not make sense in short but frequent, and often ad hoc meetings. The project has so far resulted in new concepts such as "the mobile meeting," which highlights how the new, networking way of working differs from work as it used to be. The project has also resulted in new services, e.g., "dynamic to do lists" sensitive to the proximity of people involved, and the principle of "aggressive caching" to fill (commonly not full) PDAs with information that is potentially useful in mobile meetings.

The IPAD project (Inter-personal device) explores the idea of an "awareable computer," i.e., "a wearable computer that is aware of its surroundings, or provides support for the user's awareness of others, thus augmenting human communication and information processing" (Holmquist *et al.* 1998). The IPAD idea

has been realized in the Hummingbird prototype. A Hummingbird is a Nintendo Gameboy with a transceiver. It is an information appliance, in Norman's (1988) sense, in that its functionality is dedicated to one simple task, that of recognizing other Hummingbirds, making people aware of each other. The Hummingbirds have been tested in contexts such as the Roskilde rock festival and the SigGraph conference, but also in office environments. The IPAD project does not begin with ethnographic studies, but with an idea of a new service—awareness support for mobile people—which is realized and tested in real settings.

*Biennial Participatory Design Conference*, ACM Press, pp. 203-210.  
 Norman, D., (1998). *The invisible computer*. Cambridge, MA., MIT Press.

## References

- Dahlbom, B., (1996). The New Informatics. *Scandinavian Journal of Information Systems*, Vol. 8, No 2, pp. 29-48.
- Holmquist, L.-E., J. Wigström and J. Falk, (1998). The Hummingbird: Mobile Support for Group Awareness. In *Supplements of the ACM 1998 Conference on Computer Supported Cooperative Work*, Demonstration.
- Kristoffersen, S. and F. Ljungberg, (1998). MobiCom: Networking Dispersed Groups. *Interacting with Computers*, Vol. 10, pp. 45-65.
- Kristoffersen, S. and F. Ljungberg, (1998). Representing modalities in mobile computing. In B. Urban, T. Kirste and R. Ide (eds) *Proceedings of Interactive applications of mobile computing*, Fraunhofer Institute for Computer Graphics, Germany.
- Ljungberg, F., B. Dahlbom, H. Fagrell, M. Bergquist and P. Ljungstrand, (1998). Innovation of New IT Use: Combining Approaches and Perspectives in R&D projects. In R. H. Chatfield, S. Kuhn and M. Muller (eds) *Proceedings of The Fifth*