

# WORK/PLACE: Mobile technologies and arenas of activity

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## ABSTRACT

Wireless, portable communication devices continue to promise newer and better ways of being constantly available and in touch with information and with other people. In tandem with developments in wireless, mobile access, dreams of refashioning the world of work are woven: if we are to believe the rhetoric, work activities and communications can now take place anytime, anywhere. In this short paper, we raise a number of issues that have been appearing in common discourses of the impact of wireless technologies on the world of work, and consider the relationship of these discourses to ideas of the design of the workplace. Further, we present a summary of papers that appear in this special issue. As the papers were initially presented at a workshop held at ECSCW in Bonn in September of 2001, we present in addition an overview of the comments and discussions that took place at the workshop.

## Keywords

Mobility, office, wireless, CSCW, workplace, field work

## WORK/PLACE: AN INTRODUCTION

Changes over the last ten years have led to revision of commonly held conceptions of the workplace. Such revision has been led in part by technological changes, with developments in networked communication and information technologies and the increasing market penetration of networked, wireless, mobile devices (see [10]). For example, the number of cellular, GSM and PCS subscribers worldwide has increased from 140 million in 1996 to 300 million in 1999, and predictions were for over 650 million by 2001.

Mobile communication devices include laptops, mobile phones and Personal Digital Assistants (PDAs). In addition to these bread-and-butter technologies, hybrid devices have also arisen, crossing technology categories, converging in interesting ways and gaining more and more functionality. Such devices can work together easily and flexibly through the creation of networks through wireless LANs (e.g. Airport, infra-red and Bluetooth) and GSM. There is no doubt that the next 5-10 years will yield further technological advances in different directions which will enable devices not only to communicate in

various ways with each other, but also with devices which are embedded in the fabric of the workspace, and between work and leisure spaces, e.g. on high streets, in journey places' e.g., service stations for those on the road, etc. UMTS technologies such as third generation (3G) mobile phones (or other devices) that incorporate much higher bandwidth will also come online soon.

Changes in work and society are also impinging on the places where we work, and how work gets done. With the reengineering of business, a number of changes are to be observed. Firstly, new types of physical workplace are coming to the fore (e.g. call-centres). Secondly, the increasingly international nature of work has led to a growing amount of travel despite the use of advanced collaboration technologies. Finally, it has been argued that many more people are experiencing a blurring of the division between 'home' and 'work' domains as different forms of work become possible within the physical space of the home.

## DESIGN CHALLENGES

To date, many field studies in the area of workplace studies have generally (and for very good reasons) tended to look at fixed, fairly immutable domains, focusing on people who are predominantly located in a single place of work and who are using static information and communication technologies. More recently, studies in the area of CSCW have begun to address different forms of mobile working, some bringing to the fore the notion that many work practices that have been traditionally seen as static in fact involve considerable amounts of *local mobility*, e.g. [1].

As this corpus of work evolves, it is increasingly being noted that the different threads of work, mobility, architecture and management are meshed in complex ways. For designers, technologists and sociologists, many questions are of interest. For example, how are wireless technologies changing the physical spaces in which we work? What is the relationship between developments in mobile and wireless technologies, and innovations in the field of ubiquitous computing? How do devices as well as people best exploit the ever-increasing access to digital data? What are appropriate applications and interfaces for these novel devices? How can devices flexibly fit into the

changeable and unpredictable environments in which they will be used?

Central to these questions is consideration of the ways in which novel innovations in wireless, mobile communication and “knowledge work” technologies are altering the places and ways in which work gets done, and changing patterns of interaction through increased communication within groups and organizations. These might well alter conceptions of work and non-work and transform the ways in which work “accounting” is done [4].

In the next section we will offer some observations we have been exploring in regard to these questions. Our observations are informal, derived in part from discussions and in part from fieldwork interviews with mobile professionals and users of mobile, wireless technologies (for more details see [4]; for some excellent papers see [2]). Fieldwork interviews took two approaches: first, a technology-centric approach was taken, where users of mobile phones in the UK were approached. In this scenario, eleven cell phone users in the UK, including a district (community) nurse, an ice cream store manager, a school head mistress, a tax consultant, and a freelance photographer were interviewed. Secondly a work-centred approach was taken and interviews with the sales force staff of a large copier company were conducted at two locations.

It is worth noting at this point that many studies of mobility focus on “white collar” workers. However, when looking at the ‘archeology’ of mobile work, some of the first adopting groups were in fact “blue collar” workers (removals companies, maintenance staff, plumbers, locksmiths) and not white collar “knowledge workers”. Blue collar workers such as the police and the army were the first adopters of wireless technology after its invention by Marconi. We must be careful that we do not unthinkingly adopt received tropes of mobile work as being only the province of a certain type of worker (such as the white-collar executive). We would argue that there is the possibility of fruitful historical/sociological work in this direction, perhaps bringing to this field some historical case studies of the effects on these organisations and workpatterns of this introduction which might well teach some valuable lessons (also see the papers by Christensen and by Brodie and Perry in this special issue).

## **SOME OBSERVATIONS**

*There are many different ways of being mobile:* Fieldwork interviews revealed hugely varying use of wireless, mobile technologies. A crucial distinction can be made between workers who are themselves mobile between several fixed locations where technologies are stable and available for use, and workers who carry technologies and hope to (or are expected to) get work done in structurally unpredictable locations, where resources may be unreliably available (e.g. an airport) or unfamiliar (e.g.

“hotelling”). Somewhere in between are people who are on the road and who use their cars as mobile offices.

*Successful access to others and to data while on the road often requires backup:* Most individuals who are highly mobile rely on stable technical and social infrastructures to get their daily work done. If the network is down or there are problems with connectivity, getting access to people, to email and to data files from remote locations becomes problematic. Socially, this notion is often talked about as work being made up of “pitchers and catchers”. Pitchers are more mobile, while catchers represent the stable infrastructure in the workplace. For example, a highly mobile tax consultant relies on his secretary who sits at desk back at the main office to coordinate his activities and to field calls he is unable to take. In terms of infrastructures for basic resources, the rise of chains like Kinko’s and Staples suggests that much revenue is to be generated from providing access to items formerly associated with the office, e.g. paper, photocopying, faxes, etc.

*Discussions about the workplace often take place in relation to some idealized notion of the office:* Many knowledge workers’ discussions about the workplace tend to be in reference to some idealized notion of the workplace-as-office. Indeed, for many interviewees, (and apparently for the target audience of most mobile technology advertising), the ‘workplace’ is synonymous with a stereotyped notion of the “office”. Of course on closer analysis, the office as a container for work is itself not fixed. Frank Lloyd Wright’s Larkin Building was in many people’s opinion the epitome of the concept of the office. Built in 1904, it represented the state of the art in special-purpose, designed spaces for knowledge workers. The space was laid out efficiently as an *assembly line of the document*. In this setting workers were not mobile, not even locally. Documents were mobile and mobility of the worker was confined to supervisors. Somewhat later, in the 1960’s Robert Probst proposed the Action Office, offering workers ‘power over the walls’, where office interiors could be redesigned by moving walls and furniture as needs arose. Similarly, the 60’s in Germany saw the Schnelle brothers introduce *Burolandschaft*, offering movable furniture of the landscape office with information flow that led in the 70’s to cubicle culture and cube farms. In the 1990’s “hotdesking” arrived: furniture once again became immobile, but its “ownership” was highly mobile, with people and personal artifacts barely ‘touching the ground’.

Although a popular concept, interviews and observations revealed a number of cases where people appropriated desks by leaving photos and files, even in locations where hotdesking was the official policy (Figure 1). When asked why, the response was that it made the office environment “friendlier”, and that time was saved because there was no need to spend time setting things up. Of course, different jobs rely on different artifacts: for the tax consultant files and folders are central, for the sales person a bag of

brochures and client files are transported (Figure 2), the district nurse carries medical equipment and medications and the chef carries only her cell phone and calendar, the tools of her trade being only useful in the context of the kitchen.



Figure 1: Resistance: Personal items transform a 'hotdesking' environment



Figure 2: A salesperson's bag of brochures and documents

*Work often takes place 'out of the office':* Much work takes place in other non-official locations. Some people had home offices, while others talked of appropriating space in an ad hoc manner. An example is 'the corner of the kitchen table', a location that feminist designers have long noted represents a place where the domestic zone (the home) becomes an economic zone (a place of work). For example, Hermanuz notes that contemporary Western culture promotes "the belief that most women become part of society's "productive forces" by stealing time away from the domestic environment" and working on the "corner of the kitchen table" (page 67, [5]). Of course, home and work spaces have not always been separated (e.g. the medieval workshop in front of the home ([5]).

*Unpredictability is a big issue:* Where work takes place in public places, a central issue that arises is the unpredictability of the environment. While it is easy to predict having space and power for mobile devices in business class cabins of aircraft, this is far less predictable in the increasingly limited space of economy class where there may be less ability to use laptops or even read and

annotate documents. What this reveals to us is that the entire environment in which work is taking place is in fact the interface to the use of mobile technologies. We as designers often focus on those aspects over which we have most control (such as the interface to the device itself). However, for most consumers of the technologies, the main issues involved in getting access to others and to data through these technologies might well be quite different. They might well be more involved in avoiding screen glare, finding a comfortable place to sit, being able to hear what is being said, finding a location where private information is not being inadvertently shown to others, than on interacting with the interface in the narrowest sense.

*A major issue that often goes uninvestigated concerns worker health and safety:* For professions where mobility is central (e.g. the district nurse) procedures and processes for worker safety while mobile have been under discussion for some time. By contrast, for professionals whose work has more traditionally not been possible while out of the office, in many instances workers' health and safety on the road has not been considered. One manifestation of the growing awareness of this problem relates to the use of cell phones while driving. Increasingly, we see legislation about the use of cell phones in cars, and companies asking employees to sign waivers regarding the use of cell phones when driving. And this is despite the fact that workers are often expected to be "always" available and accessible to management, and to clients. For some workers the only time they are available for calls is when they are in their cars.

Finally and more as a point of research methodology when considering the impact of wireless technologies on the design of the work landscape, it is worth noting explicitly that *patterns of communication and the way in which work gets done are always affected by the introduction of technologies*. Technologies like the elevator affected the structure of the workplace, making the now familiar skyscraper possible and making for greater concentrations of workers in one place. Further, innovations such as lighting and air conditioning affected the hours people were able to work effectively and comfortably. Communication technologies have affected the landscape of interaction, making communications between distant locations possible, and recently mobile technologies and networked infrastructures have taken work out of the single place and into multiple spaces. A central point here is that these processes of change should not be viewed as historically completely new, and that lessons can be learnt by reviewing changes for example in working practices after the introduction of the landline telephone, after the invention of the photocopier, after the invention of the fax, or with the increased availability of motor vehicles [9]. Although this may not help us directly in designing specific technologies, such an analysis can broaden design discussions. In the spirit of such a broadening, we now present a review of the workshop at ECSCW.

## ECSCW 2001 WORKSHOP OVERVIEW

The workshop was held at the European Conference on Computer Supported Cooperative Work in Bonn in 2001 and consisted of nine presentations and discussion around this topic. Prior to the workshop itself, papers and more detail were shared via the workshop website.

Discussion at the workshop ranged widely around a number of different aspects of the topic, which can be outlined in the following questions:

1. What novel conceptualisations of work, of place and of 'the workplace' are being developed, and how can we distinguish rhetoric from practice?
2. How do people construct and maintain their availability to others when work is no longer associated with a single location?
3. Is the singular physical place of work (the iconic 'office', of so many work studies) being contested (and why is it)?
4. How are places of work changing to reflect the relative mobility of people and their artifacts (e.g. "hotelling", "hot desking", etc), and how are other places (airline lounges, trains) gradually changing to become more 'work-friendly'?
5. How are people keeping in touch with each other when they can no longer rely on being in the same place at a regular time?
6. Related to (5), what issues do people face when maintaining contact when working in this way?

Discussion unsurprisingly focused a great deal on issues that are arising as a result of the introduction of mobile technologies. Considerable amount of discussion was generated including issues of power (who owns the technology and what control do they exert over its use), issues of accountability and of surveillance (when the mobile device has the possibility of being a tagging device), and the issues and problems involved in the maintenance of ongoing relationships. The concept of 'mobility' comes under question time and again. The concept of *local mobility* [1, 2] makes it clear that we don't need to be out of the office to be mobile. Is mobility in the work context always to be defined as "relatively unavailable"? It also emerged in the course of the workshop that 'mobile workers' come in many shapes and sizes and do not all have the same technologies or stable infrastructures for support of their mobile activities .

On the other side of the coin, the notion of workplace was problematised, but not in the ways we had originally envisaged. Indeed, we unleashed a veritable wave of support and dissent of Harrison and Dourish's [6] paper on the definition of space and place. Many of these issues are raised in the papers that follow in this special issue so

we will not reiterate them here. But suffice to say that the notion of 'workplace' in terms of environmental features and affordances (better or worse for the activity at hand) were addressed briefly. Much more was discussed in terms of the ad-hoc, on the hop, creation of work in the context of mobility. This was perhaps more in line with the notion of space not as an independent 'thing' but rather an ongoing phenomenon produced through the active interaction of people, space and the artefacts in that space. Of course, that said, a place as a setting can have various good or bad features regarding the staging of an activity [7].

Another way to think about the mobile 'workplace' is in terms of the different affordances of the physical world of the car, the restaurant, the business lounge or the customer site, and the virtual world of the conference call, the shared virtual environment, or some layering of these. There are clear interactions between the physical world and the virtual worlds that are being simultaneously inhabited. This creates challenges and issues that are yet to be fully explored.

The approach of this workshop was both theoretical and empirical. Some papers dealt with the aforementioned 'archeology' of mobile work, pointing out that some of the earliest adopters of mobile technologies were not the usual white collar professionals featured endlessly in advertisements for mobile technology (see [4]), but rather blue collar occupations such as plumbers, locksmiths, plasterers and the like. A number of papers looked at the experiences of blue collar workers in their different 'workplaces' with regard to the sometimes seasonal or periodic nature of their jobs, employing loose constellations of people who might come together for specific jobs or seasons. This is interesting to think about in the light of Toffler's concept of 'ad-hocracy', where people bring specific skills together in ad hoc teams [8].

Other papers looked at experiences of telecommuting, ranging from the bureaucratic issues one faces, to issues of the maintenance of one's work identity while working remotely, in fact, the work which makes mobile work work. Further, some ask if there is an overhead to this kind of work which in the end presents overwhelming barriers.

These papers raised a number of issues, in addition to the discussion noted above: Do we need to have defined 'pitchers' and 'catchers'? That is, as one paper pointed out, as some jobs have become more explicitly nomadic, have a number of support systems, both social and institutional, also disappeared?

We must remember that mobility is not just about spatial mobility- it may also be *temporal* and *contextual*. A mobile worker may well not be able to be synchronous with others' work schedules and may rely on asynchronous media. This immediately has issues for a whole range of technology. To use but one example, video

conferencing, much vaunted only a decade ago as a solution to distributed work, would be of no use without synchronous contact. Some technologies therefore infer certain types of scheduling. We must remember that mobility needs a constant shift of context- for example, between the situation of the permanent office with all information around, and the laptop and phone in the airport café, with perhaps only a partial access to infrastructure which is taken for granted. The mobile technologies we use to keep in touch afford only a subset of what we are used to in copresent interaction, and the subset that is available with any particular technologies shape our interactions.

The papers remind us that there are also issues of local and national culture, of class and of gender which of course come into play. When we talk about our generic conceptions of mobility and stability we often forget the extent to which people's experiences of being mobile vary widely, experiences of some aspects of mobile work and business travel in particular being sometimes diametrically different across gender lines. One could note, in passing, the specialised literature for the 'woman traveler' for example, where issues like unwelcome attention, ways of dressing and sexual harassment are treated at length.

Issues of methodology arose in addition, issues that are very familiar to ethnographers. The question was posed about 'authenticity' and getting at the 'real' mobile experience as "What happens when the hotel door closes?" Just how do you 'hang around' a 'mobile workplace'. It was acknowledged that these questions raise not only methodological issues, but also ethical ones. We are still at the early stages of opening the door on mobile work.

## THE PAPERS IN THIS ISSUE

There are 7 papers in this special issue, including this one. A number of the papers present observations about mobile and distributed work, and problematise standard notions of the office, of "the worker". Some try to suggest some frameworks which we might use in conceptualising mobility.

In the first of the papers, Tom Erickson offers us a glimpse into the life and times of a perennial telecommuter. He raises a number of issues that can be generalized to others' experiences. Living and working from his home office in Minneapolis, he is affiliated to a workgroup in New York state, and is registered as working in Chicago. First, there are the familiar anecdotes of issues and problems with a different presence that is accorded when one is the only person on a teleconference. Second there are issues of availability, accessibility and accountability. Thirdly there are issues of literal accounting: there are inherent assumptions within the working practices of organisations in the way they handle their staff that people live and work in one state, and that they divide home and work along particular lines. Our

bureaucratic infrastructures are less fluid than our work demands. The first of the authors of this introduction, as a British citizen living the United States, can identify with the sense of multiple bureaucratic selves one needs to maintain. Erickson's chapter ends with a nice description of a lightweight, social technology that allows for what Churchill and Bly have called "permeable boundaries" between physical places [3].

Ulrik Christensen presents a fascinating introduction to an organization called American Picnic whose remit is to arrange large company events, specifically finding locations, catering and events. The group arranges family games, running rides and fairground-style outdoor activities. A company of about 200 employees during events, the central core team is 15 people. The work is necessarily distributed over a large area, and each new location can present new design and maintenance issues. The study illustrates how people are highly mobile in their work even when in the office, and how the physical environment is used to leave messages, as a coordination centre for activities. Examples include post it notes and notes on filing cabinets in places where people are expected to be. He also talks about the impromptu meetings that take place. In this example as in others that are cited, technologies are mobile, people are mobile, events related stuff is mobile. And there are stable procedures and places for proving the infrastructure to support all this mobility. The study also demonstrates clearly the importance of people who act as coordinators. As anyone who has tried to carry out fieldwork on mobility knows, actually getting a sense of people's activities as they move through physical and social spaces is a nightmare. The paper ends with an intriguing description of the technologies that are being used in the research itself, including a head-mounted camera for recording interviews and people's activities.

Brodie and Perry describe mobile technology use in the context of blue-collar workers in the UK. They are particularly interested in people who use their technologies to maintain work that has not traditionally been considered knowledge work, and point out that many technologies are designed with the 'business' notion of what knowledge needs to be supported. They present preliminary results from interviews with mobile business professional and with blue-collar workers. Participants include an electrician, a telecommunications engineers and a mobile hairdresser. Although currently ongoing, the authors offer a number of initial observations. In general their interviewees have been heavy users of mobile telephones in giving them access to others and to sources of information (e.g. the hairdresser calls a product company to find out how to repair a situation that has gone awry with the use of a product), offering evidence of just-in-time information rendered more easily accessible by the availability of her cell phone. The authors offer some ideas for technology design from these preliminary

results. They raise issues of control and access, who has the power and how to divide work and home contacts.

Using a similar ethnographic approach, Brown and Perry offer a rethinking of the notions of space and place as discussed in the aforementioned paper by Harrison and Dourish [6]. They offer a conceptual consideration of how we interact with the physical environment and how we might think about the relationship of environment to technology. They state that Harrison and Dourish, while offering some nice insights, simplify the “important issues of how technology comes to be used in the course of practical, everyday action”. They offer an alternative, stating that space and place are very general concepts that highlight geography and action. Drawing on human cultural geography, they offer initial observations from two studies of tourists using maps and guidebooks to navigate through the social and physical spaces of the city, and outline how these are used in interaction in tourist offices. They demonstrate how knowledge that has been called abstract and physical are triangulated to generate understandings for wayfinding. They emphasise that is beyond symbolic and abstract.

In keeping with many of the discussions above, Masao Kakiyama and Carsten Sorensen in their paper argue we should move away from corporeal notions of mobility and start to see *interaction between people* as being the thing that is most mobile. They call for readers to go beyond conceptions of mobility as “humans’ independency from geographical constraints”, and discuss three types of mobility: spatial, temporal and contextual mobility. They claim that these three aspects of human interaction have been altered significantly by communication technologies. Spatial mobility considers the flux of objects (e.g. laptops), symbols (e.g. broadcast images), and space itself (e.g. online virtual spaces where physical space becomes irrelevant to the ongoing interaction). Temporal mobility refers to the ways in which technologies shift how time gets allocated and used by people, and ultimately how they therefore affect the way in which we plan our activities. Finally, contextual mobility refers to the set of ways in which can interact. For example, we can move between different modalities of interaction selected following some principles of appropriateness.

Finally, Matthew Chalmers’ paper draws on semiology. Observing that people’s understanding of their activity and the writing of Wittgenstein. He points out that it has long been known that, when people’s tasks are the focus, it is obvious that they cut across different technologies and as such that those technologies are not singular or independent. From this, he argues for increasing the interdependence and interconnection between technologies. He discusses the phenomenon of *hybrid spaces*- spaces with both a physical and virtual component. However, he argues it is actually difficult to find spaces which are *not* hybrid- all have components of many different media. Ubiquitous technologies, in this

view, are one media amongst many others (such as sound and text). He discusses the ‘City’ part of the ‘Equator’ project which studies and addresses people’s paths through the cultural and physical city of Glasgow. The project is concerned with the building of a central information resource that will be accessible via a variety of media and devices, and stores the paths that people take. The intention of this work is to allow people access to information *in their activity context* via constellations of static and mobile information sources and devices.

## FINAL REMARKS

Mobile technologies are changing the way people think and talk about work, the workplace, and the technologies which support it; practices of mobile work that have always existed are becoming more visible and therefore in some ways more accountable. Conceptions of the work place have always been mutable and are always changing. People have been working in “unusual” locations all the while, but these issues are now becoming more visible. As well as the mobility coming to the fore, it becomes clear that we need to consider the ways in which stable infrastructures underpin mobile ones.

By locating our understanding of work in this historical context and by resorting to understandings of local practices we have been trying to understand how we can best address the issues involved here, whether societal, social, or practical, and the design issues which emerge from them.

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