

## On Mobility and Context of Work: Exploring Mobile Police Work

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### Abstract

*This article aims to propose some elements for a theory of mobility. Mobility is the structural attribute of an age that heavily relies on information and mobile devices as identified by observed, cross-contextual research. It pervades most work and social organizations in various cultural and institutional expressions. Organizational structures rely heavily on the relationships of construction and utilization of information and on the context of interaction of the various actors. This paper explores issues of mobility within work activities of two distinct roles in a police force in the UK. Departing from the concept of mobility as interaction, this article seeks to put forth a more comprehensive theory of how to study the phenomenon of mobility within work organizations and across various roles. It advances the idea that mobility is linked strongly to work conditions and that in order to increase such state within organizations, we must use a triangulated analysis to understand both the relation with the environment of work as well as the relation with information.*

### 1. Introduction

As organizations are increasingly introducing personal mobile devices to support work, the need for understanding the dynamics between mobile devices, organizations and individual's work assumes a privileged position in information systems research. In fact, both academia and industry research efforts focus

on maximizing the interaction between individuals and mobile devices. This is based on the idea that personal mobile devices will bring about fluid work organizations to sustain a post-modern era of efficient and ad-hoc services available 'anytime, anywhere' through the increased mobility and connectivity of professionals. However, planning and implementing a mobile enterprise strategy can be puzzling. For mobile devices to be a success, these must meet the various needs of the end-users (Olshavsky, 2002). Achieving this goal is not easy in part because of the novel state of mobile systems' studies. Johnson (1998) states that the conventional methods of human-computer interaction (HCI) need to be reconsidered because they are not sufficient to address the changing contexts and interactions that mobility establishes.

We are interested in the mobility of information and its relation with increasingly demanding and idiosyncratic (since the workforce is being more geographically mobilized) work environments. We bring forward discussions on task-technology fit in mobile environments. What most of the previous research has failed to investigate in depth is how we can effectively categorize work within the strict frame of mobile devices and information. The aim of this paper is to explore the under researched area of *the relationship between the context of work activities and mobile information usage*. This means understanding how *individuals* center their job on mobile devices to communicate with the organization. In short, how can we categorize work in a way that is conducive to an informed implementation of mobile devices?

This paper offers an analysis and a discussion of the changing nature of working practices in organizations presenting as a particular case the police. The police are one of the archetypical examples of mobile organizations. Historically, technology has transformed police practices. From the introduction of the telegraph in the late 1800's to the usage of two-way radios and computer-aided dispatching during the 1900's (Standage 1998; Agar 2003), information technologies have radically changed the organization of police work and, with it, the expectations of various police services. The potential benefits of mobile systems for the police are great. From a decision-making viewpoint, incidents and activity data can be stored automatically. This would enable performance monitoring and costing. From an end-user viewpoint (e.g. a police officer), the availability of multi-medial information can aid in crime investigation. These are only a few of the many benefits mobile data can offer (e.g. coordination efforts). There is, therefore, every reason to expect that the latest round of technological change, the mobile information technology revolution with increasingly context aware services, will have a dramatic impact on policing. The analysis points towards the importance of analyzing the particular characteristics of mobile devices in relation to the context of use. It highlights the following two defining aspects of mobile device interaction in context: *active versus passive environments and structured versus unstructured work*.

The structure of this paper is as follows. We start the paper by briefly looking at the method of research. We then address the specific characteristics of mobile devices from a general viewpoint. In section 4 we define what mobility is within the context of work organizations. Following, in section 5 we present the case study. In section 6 we develop a model for understanding the relationship between work activities and mobile devices and analyze the case study. Finally, in section 7 we present concluding remarks and future areas of research.

## 2. Method

In order to answer the research question laid out in the previous section we set out a theoretically guided inquiry in the problem domain. We start by trying to understand the main characteristics of mobility and the relation between work and increased mobility. This serves the purpose of both narrowing down the multifaceted character of mobility and building a possible framework for studying such phenomenon. The concepts emerging from these discussions were used both to design the execution of the case study as

well as analyze the result in a hermeneutical cycle. Inspired by new socio-technical theories (Berger and Luckmann 1966; Orlikowski 1992; Dahlbom 1996; Bijker 1997), our analysis puts context at the center stage by looking not at technology as a self-contained entity but rather as a highly contextualized tool which is affected by the social setting in which it is deployed and which in turn affects the social setting. Consequently, central to this research is the belief that technology is never an isolated body in a de-contextualized space, nor is it self-contained. Technology is significant as much for its functional qualities as for the degree to which it is part of a persuasive narrative that binds the object and the viewer together in a shared system of beliefs. No technology exists for its own sake, alone, or alienated; rather, it is interwoven in the very historical fabric of the society it has been appropriated in.

Following these beliefs, the case study itself consisted of two intense days of observations (2 half day observation of the actual work performed by the police officers), interviews (3 in-depth interviews) and focus groups (2 two-hour focus groups with 4-6 people) with police members from forensics science and community services. The methodology consisted of two complimentary interpretive research techniques that produced qualitative data:

- Interviews aimed at understanding both the actual work practices together with the usage of mobile technologies and the perceived needs of various police roles and,
- Observations (where possible) of the actual work and subsequent usage of mobile technologies.

## 3. Main Properties of Mobile Devices

The step we take in this section is to uncover the main characteristics of mobile devices as used in social activities and in particular in work activities. It is clear that these characteristics are generalizations that can be debated with counter-examples. However, given recent empirical researches on mobile devices and the organization of work, we can confidently advance two general characteristics mobile devices display when studied within social and work contexts. These are not to be regarded as negative or positive aspects of current technologies but rather as properties of mobile systems in action. In addition, we use a vague separation between work and leisure contexts because the lines dividing the two is blurring.

To start with, it is important to reconnect us to the history of the communication technologies in general and of the telephone in particular. From it we discover that one of the main properties of mobile devices is that of creating a virtual environment of interaction. Thus, the mobile phone, for instance, is a device that allows us to transport a spatially distant, or absent, reality containing people and objects and to interact with it (Kakihara and Sørensen 2002). Of interest to us is the absent present, an oxymoron which draws attention to the way a sense of ‘belonging to a place’ can be altered and redefined by new technologies (Fortunati 2000). We can ‘belong’ to a communicative network rather than (or at the same time as) a physical space. In effect, the importance of physical environment/situation diminishes when we are able to enter an abstract environment that, on some level, substitutes for what might be the empty room from which one is communicating. The emotional elements that have vanished in relation to physical location are moved to a social level; ‘that is the sense of identification, familiarity, stability and security (Fortunati 2000)’ Many social theorists have tried to define this kind of reality as a virtual one in that we cannot apprehend it in physical terms (Anderson 1983; Graham 1999).

In order to understand virtuality we must understand how it came about. With the advent of literacy (and, later, of print and electronics) our attention began to shift away from natural, face to face, communication (Ong 1988). We arrived at a point of *modularization* where only one or two of the human senses are predominant (Kallinikos 1996; Kallinikos 2001; Kallinikos 2002). In a sense, we become a big

ear or a big eye because the symbol system demands largely only one or at most two of our senses. And so, for instance, we learned to answer a phone call interrupting a ‘physical’ interaction with someone. *This act illustrates how we are forced to divert attention from interpersonal physical communication to a virtual conversation.*

The physical environment affects our usage of mobile equipment (Perry, O’Hara et al. 1999; Dix 2000; Brown and O’Hara 2001). Various studies point out that the physical environment can constrain various work activities to the point where the use of mobile devices is impossible. In addition, as highlighted by (Ljungstrand 2000), there are many social conventions that determine the ways in which we initiate interaction. Thus, the real environment has the potential to restrict or to increase our interaction with the virtual. Luff and Heath (1998), in fact, suggest that *individual orientations toward objects are continually shifting and being transformed with respect to the ongoing interaction and activities.* The mobile device, by allowing us to interact with virtual rituals, makes us act in different ways within our real environments.

It is thus important to look at issues of interruption and availability, what recent research has defined as interaction overload. However, with our discussion we extend the meaning of interruption and availability not only from a person-to-person interaction but also mainly in the relation between mobile devices, humans and their work environment. Thus, as shown in the next figure, we must look at the fit between these three dimensions.

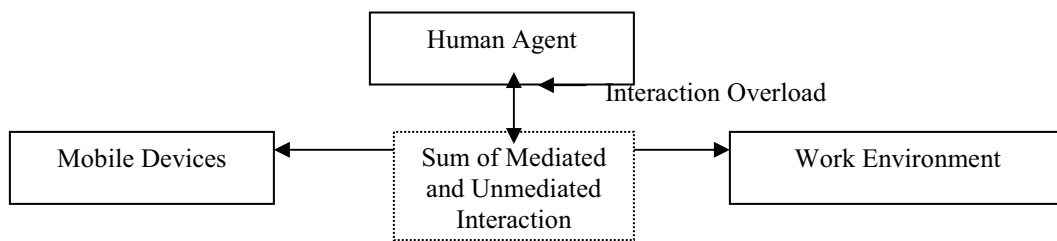


Figure 1: A Schematic View of the New Work Environment

Having understood this we can move on with our analysis to uncover the second salient characteristic of mobile devices. The diminishment in natural communication has permitted the emptying of physical presence in space (Fortunati 2000) and thus a weakening of the link between content and context in favor of a precise symbol system (Kallinikos 2001).

This modularization has many effects. Firstly, there is a stress on individuality (for example the reading of a book requires our complete visual attention and a non-oral environment); secondly, there is a *de-contextualization* of being. While primary orality was context-bound, the initial virtuality, by separating the author from the text (in the case of the book), creates

an abstract and fixed space (Ong 1988). This abstract and fixed space requires a *standardized infrastructure* in order to enable mobility of symbols, words and the ideas represented by them (Kallinikos 2001). Out of this arises the concept of *cross-contextuality*. In order for information to be transmitted across contexts we need a form of standardized codification. The standardization itself is separated from the context-embedded action of individuals. This is necessary for mobility. The abstraction itself is needed for objects (etc.) to be transferred across contexts. As Aristotle pointed out, in fact, it is money that allows us to act on the desire to travel across time and space. This tells us, as suggested by Kallinikos (2001), that technology cannot be locally constructed, that the specificity or flexibility of technology depends upon its ability to cross contexts. In addition, *cross-contextuality*, since it relies on an infrastructure, has a strong *self-referential* character. This is evident when we look at the historicity of technological artifacts and how they inherit the functional and symbolic characteristic of older technologies (Bolter and Grusin 2000). In the end, mobile devices by virtue of being a system force a user to a greater or lesser extent to conform to a set of guidelines and bring them across contexts. To sum up the two main properties of mobility are:

- Mixture between virtual and real environments
- Higher de-contextualization of information because of a precise symbol system

#### 4. On Mobility and Work

*'There is no absolute state of mobility, nor of stasis...What I treasure about mobility are the moments of stillness suspended thirty thousand feet above the air, the voice of my loved one as I sit in an anonymous conference center in Madrid, the architecture I love because it catches all the motion in one fact.'*

(Gerritzen and Lovink 2002)

Looking at new mobile information technologies, in particular in the mobile phone case, we discovered that mobility is not anymore constrained geographically (or locationally). Mobility assumes the character of a bridge that makes a distant and absent reality again present. This is not to be confused with omnipresence in the religious sense (a utopia which is often used in marketing schemes) but it is a new form of mediation that allows the shrinking of space and time. The encounters we have during normal days are a mixture of mediated and unmediated interactions. This new mediated interaction allows for the mobility of communicative networks and with them symbols, images and data.

The new mobility can be closely associated with a change in the cognition and thus interaction with location. Mobile devices by their capacity of transporting data and a particular system for organizing data create new kinds of mobility (see Figure 2). These are operational and interactional mobility. These three aspects will be the ground from which we will look at mobility, a multi-facet one. This tells us that we are influenced in three ways by mobile devices. Table 1 below briefly outlines the three kinds of mobility.

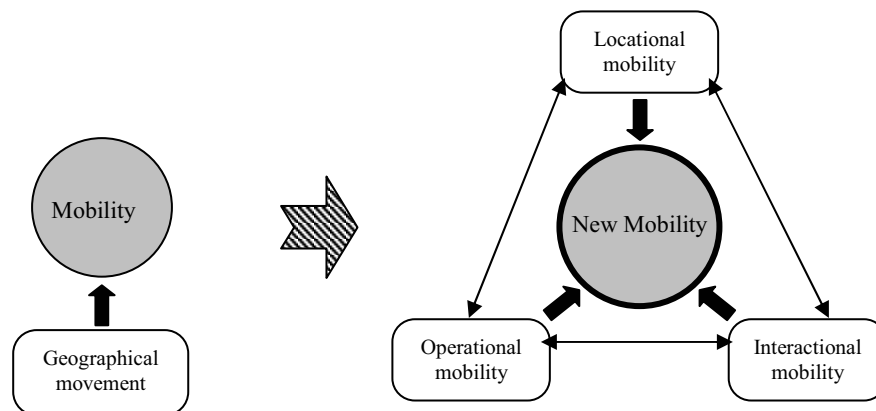


Figure 2: Re-conceptualization of mobility  
Adapted from (Kakihara 2003)

<b>Locational</b>	<b>Operational</b>	<b>Interactional</b>
Extensive geographical movement with the mobile device	Flexible coordination of daily operations through the mobile device	Intense interaction with diverse people and data through the mobile device

Table 1: Locational, Operational and Interactional mobilities

While it can be argued that these kinds of mobility existed much before the introduction of digital mobile technologies, mobile devices have rendered these kinds of mobility interactive in geographical movement (e.g. sending an SMS while on the go). Interactivity, in fact, can be viewed as the enabling object of the new mobility. However, because of their synchronicity they have at times negative relations.

To illustrate the relation among and the synchronicity of the three kinds of mobility we can use an example. The mobile phone, arguably the most used mobile technology, is a case in point. Its usage varies across different cultural contexts and it absorbs the characteristic of the urban layout and also opens up new forms of contacts (Katz and Aakhus 2002). These contacts represent a new fluid ad-hoc configuration of social encounters, which when compared with more archaic forms of society take a shorter time and are more independent of location. As an example we could use recent research on how social encounters are produced and maintained. The various books describing the phenomenon of SMS, for instance, make us understand that a new middle way of communicating, which relies on non-invasive asynchronous textual communication and which creates weak networks (which can be looked at as a degrading of the technology, but that in their simplicity captures a 'naturally' mobile communication service), has emerged (Feenberg 1997; Buckingham 2000; Economist 2000; Vittore 2001; Wickham 2001). These new forms of communication enable more fluid (or ad-hoc) ways of *organizing*. A typical example is contained in the way teenagers make appointments on the spur of the moment.

However, we must not forget the element of time contained in the action. The speed of communication is the base upon which services gain success. More complex operations require a rebuilding of the traditional office space and thus a longer time segment (Green 2001). This does not lead only to reflections on the interaction between humans and mobile technologies, which could be ameliorated to accommodate a range of more complex activities, but

also to the very nature of what is being exchanged within a situation. The increasingly composite urban life requires a continuously reshaped network relationship. The increased reliance on public infrastructures (underground, buses, roads, receivers etc.) and the multitasked environments (doing many things at the same time and on the move) produce a climate that extensively relies on ad-hoc meetings (Pica and Kakihara 2003).

As pointed out in section 3, the virtual environment has the potential to divert attention from the physical space of interaction as well as helping it. Therefore, work in relation to mobile devices can be both, for analytical convenience, composed of passive and active environment of both physical and virtual interaction. We can use here a parallelism with theories of information push and pull. The relation between the virtual environment high active interaction and the physical environment high active interaction is generally a negative one. In terms of the way in which we see mobility, this means that there is a negative relation between locational and interactional mobility (more will be explored in section 6).

## 5. Two Police Work Roles

During the case study we concentrated on two differing and in some way contrasting roles within the police: the Scenes Of Crime Officer (SOCO) and the Community Security Officer (CSO). Informed by the previously developed theoretical discussion, we did not look strictly at issues of design or ergonomics but instead focused on issues of interaction in locus, thus what Suchman (1987) would define as *situated action*. We concentrated on constructing a picture of the typical work activities these two roles within the police accomplish in their daily work. In particular we aimed at documenting the officers' information management activities and the relation of these activities to various mobile technologies. We explicitly abstained from considering issues of organizational power and hierarchies in this initial study. It could be argued that these issues gender heterogeneous and complex issues that we have chosen to explore further in future

research. Here, we would need to understand the complex balance of privacy advocates arguing that mobile technologies are instruments of control against proponents of the technologies as instruments of liberation from the boundaries of the home or the office.

## 5.2 SOCO's Work

A Scenes Of Crime Officer (SOCO) collects, documents, records and lends authority to forensic evidence at crime scenes. As a profession, SOCOs generally hold postgraduate degrees in relevant subjects such as chemistry or forensic biology. Initially, in order to become a SOCO, a graduate will enrol in nine weeks intensive formal training in for example photography, pure forensics such as finding DNA and carpet fibres, fingerprints analysis and assessment through the creation of scene of crimes scenarios.

During their subsequent daily work, a SOCO typically spends half of the time at the police station he or she access various information systems, here chemical treatment is carried out, and 'informal information' is shared. The other half of the typical working day is spent in the field collecting evidence. The SOCO is arguably a group within the police force who will benefit from information technologies in general and mobile information in particular. Their work is mostly 'information work'. In the constabulary we studied, all SOCOs were provided with a GSM enabled laptop connecting to the police network. However, despite many claims of mobile technologies enabling the mobilisation of information 'anytime and anywhere,' location and in particular the replication of an office environment, such as a garage, is still important for this particular role. The job of a SOCO generally emerges during the day. They respond to new crime incidents logged in the Crime Information System (CIS) either from the office, or when they are on the move from their laptop or through telephone calls. Generally, the CIS was not user friendly to access when on the move since it tended to lock out the user, with a restart time of around 5 minutes, which in the daily rhythm of a SOCO was considered a substantial disruption. As a result, the laptops were only rarely used in the car. For security reasons and due to respect for the victims of crime, the laptop was not used within scenes of crime. Furthermore, once at the scene of crime, the SOCO needed to divert all their attention immediately towards obtaining a proper overview of the situation.

Printouts from the CIS forms the most typical tasking activity. The primary aspect of SOCO work is gathering proof related to the crime. SOCOs also gather intelligence through aggregating and processing information. The way in which a SOCO obtains information about the crime scene relies on the reports generated by the police officer filing the crime and on the conversations with the victims of crime. The daily work of a SOCO generally consists of codifying observations, evidence and conjectures according to a complex classification structure that recently had been formalised and computerised in a bespoke application supporting SOCO work as well as the management of workflow processes related to evidence collected. An average of five jobs are completed per day, and this includes a substantial number of phone calls to coordinate and transportation from site to site. After completing the jobs, a significant amount of time is spent documenting and storing exhibits as well as writing up reports. The reporting is done on a paper-sheet at the crime scene. The exhibits are supposed to be packaged at the scene but they are generally packaged at the office. It takes about 10 minutes for each job to update the system and two hours total to finish up the days office work. This is during day-shifts generally done between 2 and pm, which represents a significant proportion of a working day.

In terms of the types of crime SOCOs attend, burglaries and theft account for around 85% of the cases and 10% are minor theft and vandalism. 5% are the major crimes such as murder. The success rate of a SOCO is constructed according to the number of arrests made as a result of the evidence collected. Obviously, as often the sole representative of the police force at the scene of crime, the SOCO will engage in the emotional support of victims in extreme situations. This implies that SOCH representatives often will engage in Public Relations on behalf of the Department. A significant proportion of the police work classified as "small crime" will not be solved because of lack of evidence or because of low priority given the scarcity of resources. Summarising, SOCO work entails 3 major elements:

- Proof Gathering (for which they are trained)
- Reassuring victims
- Intelligence gathering (for which they are not trained)

Only around 10% of their work is conducted through informal information systems.

The SOCO information flow can be characterised as follows. The SOCO takes notes from CIS printouts. Often they will need more information from the officer

that has entered information about the crime into the CIS as the level of detail and the selection of information often will not match the need of the SOCO. Following they talk to the victim and make notes while they examine the crime scene and collect the physical evidence that will be sent back to the laboratory for examination. On their report sheet they document text, diagrams, sketches of shoe marks and pictures. The latter is seen as the richest kind of proof gathering.

Each item of evidence is sealed in either in a plastic bag or otherwise wrapped up and the bag or packaging is sealed off using labels that are signed and tamper-proof. The SOCO will bring along various cartons and wrapping and will often be required to be creative in order to package and seal oddly-shaped evidence collected. They generate an ID for each evidence item collected and record the item on a list with the matching ID. The white label containing the ID is signed and each subsequent person using the evidence will sign and date the label. The documentation is kept in the office and the original receipt is kept by the SOCO. After processing 2-3 scenes of crime the SOCO would typically return to the office, where they submit paperwork. Even if SOCO work seems highly geographically mobile there is still the need for an office for two reasons: to hand over the physical evidence to storage and signed documentation and to finish paperwork, in the form of transcribing every note taken at the crime scene. After returning evidence to the station, the laboratory carries out tests on DNA and fingerprints.

SOCOs interviewed voiced the desire to be as much as possible in the field, be mobile, and basically only needing to go back to the station to put recorded evidence into storage. The SOCO cars have a fridge to keep fragile evidence fresh until they reach the station. A decentralised solution where they would be able to drop off evidence at several stations would minimise travelling time, and allow for more flexible working, but it would at the same time create a big problem of tracking evidence something that was deemed a great risk. Generally, it is the responsibility of the collecting SOCO to be able to produce the evidence for the courts. The short term improvement of SOCO work would be to employ an expert administrator that could assist in doing the administrative work of documenting the findings in the system and also help coordinate jobs better between individual SOCOs. In the long term there is a need for the introduction of mobile technology that will minimize the replication of information and that at the same time does not get in the context of interaction. As an example was

mentioned TabletPCs as a means for supporting the recording of information, with the additional requirement of a ruggedised version since fingerprints primarily are lifted using aluminium powder, which is highly destructive to computer technology.

### 5.3 CSO Work

The Community Security Officer (CSO) is a highly localized police officer acting as a bridge between a local community and the police force. A CSO generally patrolled the community by foot or on bicycle and had a personal relation with a significant proportion of the community. The CSO generally considered the car as alienating; it was seen as essential to be in the field and have extensive local mobility. The CSOs generally perceived the job as a continuous involvement with the community. Any formalized system could endanger the information losing the local flavour. The way in which they entered information into the system was seen as crucial for the following investigations by other police roles. In a way, the information by being so localized was not suitable for sharing in a large-scale community. As one CSO put it, the information was good for an insurance claim but not for community building — the main job of a CSO.

The CSO had extensive and continuous contact with many community institution and generally also volunteers at local schools. They built their own information gateways for the communities through e-mail and web pages. The information CSO looked at and shared within the organization were with: colleagues over a cup of coffee in the same office (in order to share information about an area; LIO (Local Intelligence Office – which according to the CSO were the most likely to get a positive ID on a criminal); Domestic violence team; dog team; ID2 (Intelligence Surveillance Team in plain clothes who used the information from CSO to survey people and make arrests); and the press office which helped community awareness and good publicity. In addition the CSO had an extensive network outside the organization such as the local council, housing associations, schools and social services. Some of the members of the public had the mobile phone numbers of their local CSOs.

The CSO would typically during the day, either initially or towards the end log to the computer to check the crime information system for incidents in this or her area, as well as make and receive phone calls on the mobile. A lot of coordination was conducted through and information is passed over the mobile phone. Sometimes this information was ‘unofficial.’ The CSO also kept in contact by e-mail with relevant members of the community, for example

students at the University and families in the community. One of the CSOs sent bulletin e-mails to targeted members of the community to keep them updated about recent events, and also receives anonymous information about drugs and fights.

As far as the structuring of the job was concerned, the CSO were self-tasking, and they decided what to do depending on the perceived urgency of the situation. The CSO wanted to be seen, be in the field. When a CSO reported a crime they usually did it through the phone or the airwaves. The local information gained by the CSO was put into the local system. However, some of it was only used personally and kept in a non-networked file. This meant that other officers did not have the benefit to access it. One of the concerns of CSOs were that through the increased computerization and formalization of information system their job would shift towards being mostly clerical as opposed to centred in the field.

As one CSO put it, he was ‘tasked by the public.’ For them in fact timeliness was critical in solving problems. Differently than the SOCOS, the CSO would feel comfortable networking their computer in the victims’ houses or sites. The CSO would like a tailored version of CIS that would filter out irrelevant information — for instance getting only local area CIS. It was claimed that this would save time and maybe enable a higher degree of mobility. No large-scale mobile technology implementation was in place. However, the CSO felt the need of having both laptops and PDAs. Given the *street nature* of the job such solutions were being described as difficult to implement. In addition it was noted that the confidence in the system was less than in the case of SOCO maybe because of the highly localized nature of the CSO’s job.

## 6. Building the Analytical Model

The most important theme that seems to arise from the above case study is that as the degree of mobility increases, the degree of decontextualization increases. That means that we find the paradox of mobility. Given the mediating functions relying on modularization and abstraction mobile devices separate the actor from the physical scene of action or rather make the actor interact with such scene in a virtual way. This virtual way represent a transformation of the situation in one in which we become a big ear or a big eye.

This again is reflected by the dual nature of consequences brought by mobile devices on an organizational level. The conflict between the role of mobile devices as an agent of liberation and an agent of control is evident. However, this distinction is generally also depending on the nature of the job. As stated before, by virtue of being a system the flexibility of action is decreased. However, if mobile devices are used for a support function (communicating versus structuring of work) as in the case of community officers, it permits a higher flexibility in the daily organization. Thus while the SOCO need more of a synchronization function which structures their work, the CSO needs real time access to information and to communicate with different parts of the organization.

We reconnect ourselves to the wider debate concerning mobility. It is important to understand, when implementing mobile devices, what kind of mobility we seek to support. The mode of interaction is crucial in understanding whether or not a mobile device will serve the role of an efficient supporter of mobile work. The mobility of information restricts geographical mobility in a two folded matter: first, by forcing the user to divert attention from the space of interaction; second, by forcing the user to conform to an established infrastructure. These two need not to be seen as two obstacles but rather as two properties of mobility. Taking this into consideration we propose a more detailed understanding of mobility.

In addition, as previously mentioned, time plays an important part when looking at mobility. If we take an information view of the police we can argue that the two explored roles are at the two ends of information creation and utilization. While the CSO uses or could use mobile devices to create information retrieved from the environment of work for the organization, the SOCO depends on that information to generate intelligence when *feeding it* back into the environment. This, as it will be explained below, creates the distinction between active and passive environments of work.

Given the case study and the previous theoretical discussion, one central question still remains: what kind of mobility do we wish to support or can we support within a given work context? This question can be answered only if we understand what kind of work is performed. Work can be generally divided into two distinct categories: structured – one which required a high degree of routinized steps and a low degree of complexity or simplicity – and unstructured – one which requires a high degree of improvisation (Ciborra 1999) and has a high degree of complexity (Mathiassen



and Stage 1990). Our contention is therefore that the nature of work is the one that determines the successful or unsuccessful usage of mobile devices.

Mobile devices influence the way information is gathered generated and used. This means that it is important to consider how data (we use data in a loose sense to look at voice, images and text transmissions) flows, is accessed and interacts with the environment of use. The previous two sections help direct us to important issues to be considered when studying mobile devices. That is the reshaping of the relation with the work environment. Within this we will focus on the relation between environment and mobile devices by using the dimensions explored, namely issues concerning availability and structuring of work. To sum up the main points from the previous two sections and connecting them:

Firstly, there is a mixture between virtual and real environments; thus, it is important to look at the work relation with the environment. This can be active or passive. An active relation can be characterized as one that requires constant attention to the physical space of interaction. The physical space is the one dictating the line of action to be followed by the worker. Thus it is full of emergent details. Example of such work can be ones that involve either physical attention (e.g. a telephone engineer), visual attention (e.g. a policemen walking across a high crime area) or a mixture of both. The success of mobile devices in active work environments is thus limited. For instance, we can argue that only voice-supported services can be adopted.

Secondly, there is a higher de-contextualization of information because of a precise symbol system. This

precise symbol system can influence work in positive or negative ways depending on the nature of the task. Work task can be loosely categorized as structured or unstructured. A structured work task can be defined as one that has a repetitive character in its information access for problem resolution. An unstructured task is one that has to be supported by a dynamic access to information through multiple channels. For instance, a directory assistance operator performs mostly structured information gathering while a market analyst relies on multiple channels of information that are dynamically changing.

Mobile devices are not an over-arching solution. There are situations in which their usage is inappropriate or in which it can be ameliorated by changing the way in which they are used. This is to say that time does play an important part when looking at technology. The shrinking in the time it takes to configure resources questions the basis on which these decisions are made. This is a case in which quantity translate into quality. To conclude with we propose a matrix that encapsulates a triangular relation of workers with both mobile devices and the environment based upon the ideas of active and passive environments and structured and unstructured work tasks. In this table we can locate the two roles analyzed in the case study. The SOCOS would be located in the Passive/Structured cell. The success of mobile applications in this cell is potentially high because it is mostly related to data access. The CSOS would be located in the Active/Unstructured cell. The adoption of mobile applications in this cell is high. However, the supported applications should mostly be voice enabled because of the active environment of work.

MOBILE DEVICE INTERACTION		
ENVIRONMENT TASKING	<i>STRUCTURED</i> (Routine Access to Information)	<i>UNSTRUCTURED</i> (Ad-hoc Access to Information)
<i>ACTIVE</i> (Environment tasking)	<ul style="list-style-type: none"> <li>• High Usage for Voice Services on the go*</li> <li>• Low Data Usage on the go</li> <li>• Concentrate on exchange rather than processing of information</li> </ul>	<ul style="list-style-type: none"> <li>• Limited Usage of Mobile Services while on the go</li> <li>• Mostly Voice Services</li> <li>• Concentrate on routing and filtering of information</li> </ul>
<i>PASSIVE</i> (Technology Tasking)	<ul style="list-style-type: none"> <li>• High usage of both voice and data services while on the go</li> <li>• Need for added intermediaries</li> </ul>	<ul style="list-style-type: none"> <li>• High usage of both voice and data service while on the go</li> <li>• High need for information and interaction filtering</li> <li>• Hybrid environments of stationary and mobile equipment</li> </ul>

\*'On the go' refers to usage of mobile device while performing mobile work

## RE-CONTEXTUALIZING MOBILE WORK

### 7. Conclusion

We have in this paper conducted a theoretical discussion of the relationship between work activities, the use of mobile devices and the work context. This discussion was subsequently illustrated by a field study of two roles within the UK police force, Scenes of Crime Officers obtaining and recoding forensic evidence, and Community Security Officers providing valuable policing of localized districts. The aim of the analysis has been to further extend the theoretical discussion on mobility, mobile technology use and work processes. The paper critically links the tasking of the environment and the structure of the mobile device interaction, and shows that the use of mobile devices can not be analyzed separately from the work context. This becomes apparent when considering police work where some roles are critical tasked by the environment and others are not. Similarly, some police roles will critically rely on structured information systems serving as a stable source of work process documentation and information. Other roles will need more ad-hoc access to a variety of information sources. This paper marks an initial step in the investigation of the relationship between mobile devices and the context of work, and we strongly believe that such analyses are necessary for further understanding of the value of mobile technologies. In conclusion, the usability of mobile and wireless devices cannot be understood by considering the technical functions alone.

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