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Convenient Conversation

Exploring support for initiating mobile communication

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Abstract

Office workers are today often faced with the dilemma of being focused on the present activity and yet available for incoming calls on their mobile phone. Current technology does not support this situation. Many intrusive calls seem to occur as consequence of the lack of information about the recipient's context. The focus of this thesis is the initiation of mobile communication via mobile phones, in work-related settings. The purpose of the study was, first, to identify shortcomings in today's practice, and secondly, to explore how contextual information about the recipient could be utilised in the initiation process. A qualitative study was conducted during March – April 2001 on experienced mobile phone users in the IT and telecommunications businesses. The results from this study illustrate how the lack of contextual information leads to intrusive and inconvenient communication, from the perspective of the recipient as well as the initiator. Design recommendations are discussed from three aspects: *smooth initiation of conversations*, *appropriate means of communication*, and *utilising context awareness*. Finally, some specific design issues are highlighted.

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1. INTRODUCTION

The widespread use of mobile phones since the late 90:ties has affected social aspects of office work. With the mobile phone at hand, office workers can be mobile and yet accessible. Various business matters are dealt with in different mobile situations during a day; calling a colleague in the car on the way to the office, receiving a call from the boss in the middle of lunch, or from a customer in the middle of an internal information meeting, and so on. And as work today is highly co-operative and customer oriented, people become mobile in order to meet physically (Dahlbom and Ljungberg 1998). The mobile phones have thus supported a work environment where we are more mobile, talk more, and meet physically more often with other people.

Teleconversation in the "old" office, ten years ago or so, was more stationary than the situation described above. Then, if you needed to talk to someone outside the office, you may have made a phone call. The person you were calling might be away, but if she was answering you knew that she was in her office, probably sitting in front of the PC working on her own, as the only place where she can answer her working phone is in her office room. If she had been on her way home, at lunch, in a meeting, or somewhere else outside her office, she would not have answered the phone. So, when she answers her phone you could be quite sure that your call was not inconvenient. You had some information about her context; you might even been able to imagine her office room quite well.

Context awareness is essential in all human conversations and becomes a problem in mobile communication (Rahlff et al. 1999). When initiating a mobile communication via a mobile phone, the initiator typically has little or no knowledge about the recipient's current situation. And this lack of knowledge often causes inconvenience for the recipient (e.g. Ljungberg 1997, Milewski and Smith 2000). At the same time, the initiator is "highly motivated to bring closure to or complete a communication sequence" (Straub and Karahanna 1998, p. 171). In this thesis, I assume that, when a mobile communication is initiated, both the initiator and the recipient benefit from that the initiator is provided with some information about the *recipient's context*. Context is here used in a wide meaning, referring to any information that could be used to characterise the situation of the recipient (Dey and Abowd 2000).

The focus of this study is on the *initiation of mobile communication, using a mobile phone*, with the context of the recipient as the main issue. The *use* of the mobile phone does therefore not primarily refer to the initiator, but instead the recipient's use; the initiator may call from a stationary phone, but the recipient is always a mobile phone. The major way to use the mobile phone is for talking, i.e. synchronous communication. But sending a text message or leaving a voice mail message - i.e. asynchronous communication - is also considered here. The *initiation process* is therefore more than merely "making a phone call"; rather it starts with the idea in the initiator's mind to contact the recipient, via her mobile phone.

1.1 Purpose of the study

Already in 1997, Ljungberg (1997, p. 457) pointed at the lack of technology support for initiating mobile communications via mobile phones:

" … callers are not provided with much information about the receiver's activities; if they are accessible, etc., and they have therefore difficulties to know if their calls are appropriate or not. Poor mechanisms for handling the initiation of conversations seems to be the main reason why inappropriate conversations occur, or, form the receiver's point of view, that they reluctantly become involved in synchronous communication."

In this thesis I will analyse these "inappropriate conversations" and explore how contextual information, provided by the recipient, could support the initiation of mobile communications via mobile phones. How would, for instance, the initiator act if she, before she makes the call, gets the information: "meeting with customer", or "having lunch", or "driving"?

The general purpose of this study is to analyse today's practice in office work of the initiation of mobile communication via mobile phones, from the perspective of the initiator as well as the recipient. More specifically, the purpose is, first, to identify shortcomings in today's practice, and, secondly, to explore how explicit contextual information could be utilised in the initiation process.

1.2 Related work

The lack of context awareness in mobile communication has become an important topic in the field of CSCW (Computer Supported Collaborative Work). Researchers in this field are generally interested in filling the awareness-gap between people in distributed work situations, and the increased mobility in office work has intensified the efforts to develop technologies aimed at this problem (Pedersen 2001). One perspective on this problem is to design systems that automatically deliver messages in an unintrusive way, i.e. at the right time by the right means, to the recipient "wherever" she is (e.g. Schmandt et al. 2000). Another perspective seeks to support the initiator with information about the recipient's context. The two examples below represent research that relate to this study, as their principal idea is to improve the initiation of communication by letting the recipient express her present situation for the initiator.

The live addressbook (Milewski and Smith 2000) is a web-based application aimed at supporting "more informed telephone calls". The user can update her Personal Presence Information via a web browser, in terms of: *Availability, Location,* and an optional *Message*. There are four different status of availability: *Available, Urgent Only, Away (leave a message), and Do Not Disturb*. Location refers to the telephone number and can be given any name the user chooses (e.g. "home", "office", "mobile", etc.). Message is an optional entry in which the user can describe her present situation briefly. The evaluation of the *live addressbook* project reported that the test users found the system useful and convenient. The usage of the system was quite low, however, and the users did not update their personal profiles very often.

Calls.calm (Pedersen 2001) is another web-based system in which the main design idea is to let the recipient present key information about her situation. Unlike *the live addressbook*, however, it is designed to facilitate "ongoing interaction" between the mobile phone users. Hence, the information that is presented does not focus on *how available* the recipient is, but rather describes her situation in a personalised way. The key information contains four separate components: a personalised greeting ("Tomas says, Hi Elin"), situational information ("I am here but in a meeting"), continuity information ("Did you see my [message]"), and a set of available communication channels ("1. Direct call; 2. Alerted text message;

3. Text message; 4. Voice message"). The main principle in *Calls.calm* is to trust callers to make a reasonable choice of time and means of communication.

The basic idea in this study is similar to the main design idea in *Calls.calm*. The differences, however, regard the "ongoing interaction" feature and the amount of information presented in the *Calls.calm* system. The focus of this study is the *initiation* of mobile communication, and the basic assumption is that *any information* that characterise the context of the recipient might improve the initiation process considerably.

1.3 Outline of the thesis

The structure of this thesis is quite straightforward. The next section is aimed at building the theoretical framework that constitutes the starting point for this study. Then, in the third section, the used methods are discussed, as well as their implementation in the research process. The results from the study are presented in the fourth section, and discussed, on the basis of the theory, in section five. Finally, in section six, I draw conclusions from the study.

2. THEORY

This section aims at building the theoretical framework for this study. It is divided into three interrelated parts. First, the initiation of communication is discussed. The focus here is on the information richness of different media, such as face-to-face, e-mail and phone. Secondly, the drivers for the increased mobility in office work, and its consequences are highlighted. Finally, the need for and use of context awareness in mobile communication is discussed.

2.1 Initiating communication

Effective interpersonal communication is basically the ability to interact well with others (Putnis and Petelin 1996). An effective communicator has to deal appropriately with various aspects of interpersonal communication. One such important aspect is to know the rules that apply in particular situations. A way of communicating that is entirely appropriate in one situation could be viewed as totally inappropriate in another. For example, the way you respond to and make statements in a casual conversation would not be acceptable in a church service, where the pattern of statements and responses is largely laid down. "One needs to be sensitive to the fact that different situations have different rules. Awareness of such rules is a necessary component of communicative competence" (p. 4).

Situational rules are essential in the initiation of a communication. In a face-to-face communication, the initiator typically checks the situation of the other person before she decides *if* and then *how* she will initiate a conversation. If a conversation is inappropriate for the other person, due to her current situation, the initiator may wait a moment. But she may also chose to interrupt for example a meeting. How she chooses to initiate the conversation in this latter situation is highly dependent on the situation; she strives to make the interruption as smooth as possible, thus following the rules of that particular situation. (e.g. Kristoffersen and Ljungberg 1999)

Face-to-face communication is very rich in information, which is essential for the initiation of communication. The verbal language is complemented with non-verbal signals, such as body language. Furthermore, artefacts in the environment play an essential role as carriers of information. Naturally, artefacts can support the communication directly, such as a book when discussing its content. But they could also provide some further information to the situation.

Kristoffersen and Ljungberg (1999) discuss how artefacts "are given meaning by operation and explanation" and therefore "regulate the interaction" (p. 6) depending on the circumstances in the situation (see also Suchman 1987, pp.5). A shut door to a meeting room, for example, communicates something to a person that is supposed to attend the meeting, and something else to a person who is not but who wants to speak to someone attending the meeting. The former may think: "Oh, they've already started, I'd better enter", whereas the latter may think: "Oh, they are in a meeting, I'd better not disturb her now". Together with other contextual information, such as knowledge about the recipient and third parties, artefacts can contribute considerably to the rich context information in face-to-face communication. Kristoffersen and Ljungberg argue that this rich contextual information facilitates a smooth initiation of communication, as "an awareness of the desire to communicate is itself communicated and acknowledged, before the session [communication act] actually starts" (p. 6).

The rich contextual information in face-to-face communication is naturally lacking in distributed communication, such as e-mail and phone. But the recipient's context is still very important for the initiator, using these distributed communication media. Straub and Karahanna (1998) have studied how initiators of communication choose media on the basis of recipient availability and social presence. They base their study on extensive prior research on media choice, which emphasise different "determinants" of the type of medium selected, such as: task, medium, task-medium fit, or social environment. A general, and common, claim by these prior researches is that new electronic media reduce activity losses (through "instantaneous" transmission, transmission confirmation etc.), which is a major consideration for initiators of communication. Straub and Karahanna do not take issue with these prior claims, but emphasise other more essential factors for media choice. They argue that *recipient availability* is "not simply *another variable* in explaining media choice, but, rather, along with its interaction with task SP [social presence], *a central, critical variable* in communicators' selection process" (p. 163). The recipient's situation, her availability and readiness to receive a message, is the main determinant for the initiator when considering the choice of media.

Straub and Karahanna view communication from the initiator's perspective. They conclude that the recipient's situation determines the choice of media. The initiator's main consideration is not the recipient, however, but her own motivation to "bring closure" to her task, or complete a communication sequence. When an asynchronous medium is used, such as

e-mail and voice-mail, this closure is normally fulfilled as the message is sent; the initiator has completed her task when the message is sent, and is not left with a feeling of incompleteness. When a synchronous medium is preferable, however, such as phone or face-to-face, the recipient's availability and social presence are critical for the initiator. Straub and Karahanna's findings suggest that an inability to bring closure to a task results in increased stress for message initiators. These findings also emphasise the established fact that people feel stress and anxiety when they have no or little control over their work. Thus the initiator chooses a medium that enables her to control the communication act.

Although it may be most effective for the initiator to use a rich synchronous communication media, such as phone, it may be inappropriate for the recipient. The time and topic are convenient for the initiator, but not necessarily for the recipient (Nardi et al. 2000). The recipient may be present, but in a meeting with others or focused on intellectual work that is more important than the incoming call (Ljungberg 1997). In fact, the use of synchronous media is generally for the benefit of the initiator with the recipient having little control of the situation (O'Conaill and Frohlich 1995). As for the initiator, little control over the communication act causes stress and frustration for the recipient. A phone call is perceived to be especially intrusive in an inappropriate situation, as the interaction with the caller is relatively rich, and the recipient typically do not know the topic of the call, if it is urgent or not (Nardi et al. 2000). A strategy to avoid being intrusively interrupted is of course to make oneself unavailable for phone calls. But this strategy is normally ineffective, as people increasingly need to be accessible and often benefit from being interrupted (e.g. O'Conaill and Frohlich 1995, Pedersen 2001). Instead, the overall requirement suggested by this problem is "more sophisticated mechanisms for senders and receivers to *manage the initiation of conversations*" (Ljungberg 1997, p. 461).

2.2 Mobility

Mobility is an increasing phenomenon in office work today. Supported by mobile IT, office workers perform an increasing part of their main tasks outside their office rooms. These tasks typically include communication and collaboration with others; talking on the phone while travelling to work, or during the lunch brake, and meetings with colleagues, customers or other collaborators. The silent work alone in the office room as the typical working situation has been replaced by communicative work in various mobile settings. (e.g. Dahlbom 1999, Bergqvist et al. 1999, Kopomaa 2000)

Why has mobility increased? Dahlbom and Ljungberg (1998) point at three driving factors: increased *co-operation* and *service work*, and the adoption of *mobile phones*. Whereas the idea behind the old bureaucratic organisation was to reduce the need for co-operation, the modern organisation is designed to promote co-operation. Individuals work together in project teams to accomplish complex work. Co-operation leads to increased use of IT that bridges distance, such as e-mail, but it also leads to mobility: people travel to meet physically. Consistent with the modern project-oriented organisation is the dominance of service work. Service work differs from manufacturing in many ways. Manufacturing takes place where the machinery is, in the factory, whereas service work takes place where the customer is. Therefore, in order to meet the customer, the service worker becomes mobile. The adoption of mobile phones is another important factor for increased mobility. The use of mobile phones has facilitated new ways of working. With the mobile phone at hand you can be mobile and yet accessible, which enables you to maintain many of your working activities at distance, while mobile.

What consequences does mobility have for office work? In general, the drivers for mobility support each other. And the mobile phone seems to have a key role here. When you are not bound to a specific place (your office) and always accessible and ready to communicate, you can provide and receive service anytime and arrange meetings in an informal way with short notice (e.g. Kopomaa 2000, Dahlbom 1999). The consequences of mobility for office work are thus that people both talk more using the mobile phone and meet physically more often with other people.

Kristoffersen and Ljungberg (1998) have identified three varieties of mobility, or modalities, which they call *wandering*, *travelling*, and *visiting*. Virtually all activities of office work involve mobility of some kind. Wandering refers to local mobility, such as short trips to the coffee machine or copiers. Travelling is moving from one place to another in a vehicle. An example of travelling is driving a car, e.g. from home to the office or to a customer. Visiting is spending some time in an external organisation, typically a consultant or a salesman visiting a customer. Furthermore, Kristoffersen and Ljungberg have observed that mobile users still are very influenced by traditional stationary IT use; they use mobile IT as if it was stationary, for example by searching a table to put the mobile computer on.

2.3 Expressing context in mobile communication

The general stationary legacy of mobile IT use is obvious in mobile phone use. Nevertheless, the stationary and the mobile phone are fundamentally different. Stationary phones are associated with places, mobile phones are associated with persons (Ljungstrand 2000). The fundamental difference is not the "association" as such, however. Instead, the essential difference lies in the *recipient's context*. When you make a call to a stationary phone you normally know quite a lot about the recipient's context. For example, you know the time of the day, and you can assume that the placement of the phone is convenient for the recipient. If the call is to a working phone in an office you can trust that the recipient is prepared to talk about work-related matters. Such assumptions are not possible to make if your call is to a mobile phone; before you make a phone call to a mobile phone your information about the recipient's context is normally close to zero (e.g. Rahlff et al. 1999, Milewski and Smith 2000, Pedersen 2001).

Rahlff et al. (1999) discuss the importance of *situational feedback* in human conversations. The situational feedback is rich in face-to-face conversations but generally lacking in phone conversations. To compensate for this lack of contextual information, people tend to inform the caller verbally about their context, typically as part of the initiation of the call (e.g. Kopomaa 2000). This contextual information is typically quite brief. It is common to inform the caller if you are driving a car, in a meeting, or the like (Lungstrand 2000). These expressions (e.g. "driving" or "in a meeting") are rich in meaning, however. Suchman (1987) discuss the *indexicality of language*, i.e. that expressions go beyond their literal meaning

because of their "situated significance" (p. 58). She argues that the significance of an expression always exceeds the meaning of what actually gets said, because of the unspoken situation of its use. Thus, a brief expression can be very informative in terms of availability to communicate.

Nardi et al. (2000) discuss how users of Instant Messaging (IM) systems are able to "negotiate conversational availability" before they call each other. Sending a quick IM to check the recipient's conversational availability, like "are you there and available?", is perceived to be much less intrusive than a phone call. IM also facilitates a *feeling of awareness* of the others. This feeling of awareness allows the recipient more control over her conversation, and seems to be essential for the initiation of a potential phone call. "Instead of conversations taking place at the convenience of the initiator, IM allows genuine social negotiation about whether and when to talk" (p. 84).

To summarise, people tend to compensate for the lack of contextual feedback in mobile communication, by brief expressions that characterise their situation. These expressions are quite rich in meaning, however, and seem to be used to negotiate conversational availability.

3. METHOD

The methods used in this study are a within two broad qualitative methods: ethnography and qualitative interviews. In this section, I will discuss how ethnography and qualitative interviews are appropriate methods in this study, and thereafter describe how they have been implemented in the research process.

3.1 Qualitative methods to inform systems design

Ethnography is a qualitative method that is concerned with describing a situation, as seen from the people involved. The objective of ethnography is to get a detailed and rich picture of the situation, and an ethnographic study is traditionally carried out during an extended period of time, typically between a couple of days up to several years (Hammersey and Atkinsson 1995).

Ethnography has become a popular method in CSCW systems design. Hughes et al. (1994) point at two trends that has motivated the importance of ethnography in systems design: first, the need for an understanding of the *social context* of work when designing systems, and secondly, the increased *collaborative character* of work and its activities. However, the use of ethnography in systems design is limited, mainly because it then is confined to small-scale settings and highly focused activities (Hughes et al. 1994, see also Shapiro 1994). Whereas ethnography is directed toward a detailed portrayal that is only properly understood within the appropriate social context, the *designer* is directed toward *abstraction* and *critical features* in the situation; she wants to *simplify* the complex social situation (Hughes et al. 1997). Therefore, the richness of ethnography should be utilisede to *influence* systems design. Hughes et al. (1994) emphasise the combination with other qualitative methods.

Qualitative interviews are characterised by openness and flexibility, aiming at a holistic comprehension of the situation (Backman 1998). The researcher takes an active role, as the interviewer, but let the interviewed person be the one in charge. Ideally the interview takes place within a context in which the interviewee is familiar. (Holme and Solvang 1997) Thus the objective of qualitative interviewing is to access the perspective of the person being

interviewed, and to find out from them things that we cannot directly observe, such as: feelings, thoughts, and intentions (Patton 1990).

The objective of this study in not to give a detailed portrayal of a specific social situation, but rather to generate new design ideas (Dahlbom 1997). The ethnographic method is therefore utilised because of its advantages in terms of understanding a *social context* and its *collaborative activities*. But ethnography is not the single method used in this study. Qualitative interviews are used for two purposes; first, to identify and explore *critical features* in the situation, which are difficult to recognise by plain observation (Patton 1990, p. 278), and second, to obtain the users' experience of the original design idea which is an important design consideration (Norman 1998).

3.2 Research sites

The focus of this study is mobile communication in office work via mobile phones. This focus has been guiding when deciding on the users in the study. Consequently, the appropriate user is an office worker who is mobile in her work, typically by driving to customers, and who is talking frequently in her mobile phone.

The main users in this study consists of four office workers from three different companies in the IT and telecommunications industries. Prior to the study, a feasibility study was conducted at each company, in order to get an overview of the users' working situation in general, and more specifically how they use their mobile phone in mobile situations, i.e. when not in their office room (Kristoffersen and Ljungberg 1999).

The fifth research site consists of train commuters between Stockholm and Uppsala. The typical traveller on this train is a person on her way to/from work; she lives in Uppsala and works in Stockholm. This site was chosen in order to study this particular mobile situation, i.e. travelling on the train to/from work.

3.3 Participant observation

The results reported in this thesis are mainly based on close participant observations. One of the researcher's challenges in participant observation is to take part as intimately as possible in life and activities, and yet be able to make observations (Patton 1990). Field notes were taken continuously, with the focus of the study in mind; i.e. any situation that entailed any kind of communication was documented as detailed as possible. The users had been asked to think aloud in these communicating situations, in order to get a richer picture of the situation. When necessary, I asked simple questions to clarify who was calling, what the matter was about etc. For each user, I spent one day (about eight hours) of participant observation, i.e. approximately 30 hours in total.

The fifth case, with the train commuters, differs from the other four main cases, regarding the participant observation. In this case the circumstances for observation were different. Nor were the users carefully selected, as above, neither did I observe particular individual users during the whole period. Instead, the observed users changed from day to day; they were the ones that happen to sit close to me on the train. As a consequence of this, my *participation* was quite limited. Instead, I acted more as what Patton (1990, pp. 216) would describe as an *onlooker*, i.e. observation by an outsider. Also, I did not ask brief questions, as in the main cases described above. Consequently, the results from the observations of the train commuters are not as rich as for the other observations. However, the amount of time should weigh up to this shortcoming; I spent about 15 hours in total of active observation on the train between Uppsala and Stockholm. Furthermore, the aim of the observations in this case was to study one specific mobile situation, i.e. travelling by train. Therefore, considering the weaknesses in terms of participation in this case, the results are still considered to be evident.

3.4 User feedback

The user feedback in this study consists of two types: feedback on the idea of providing contextual information, and feedback on the results from the participant observation.

The aim with the first type of feedback is to get a rough idea of the researcher's original ideas (Norman 1998, pp. 185) of the use of contextual information when initiating mobile

communication. This feedback was only required for certain situations, that were selected by me. The principal question that the users were asked to think about was: *Had this situation been any different if the initiator of the communication had been provided with some information about the recipient's present situation?* (This question was expressed in more natural English, and applied to the specific situation at hand. Thus, the "initiator" was normally the caller, or the sender of a text message, and so on.) As the aim was to access the perspective of the interviewed user, I tried to let the user be in charge of the discussion. When necessary, I asked brief further questions to clarify matters or otherwise invite the user to develop his thoughts. In order to interfere as little as possible with the user's activities, these brief discussion were held when convenient, such as during lunch, and at the end of the day when the observations during the day were summarised together with the user.

The aim of the second type of feedback was primarily the validity of the study, i.e. that the study measures what it is actually aimed to measure (e.g. Patton 1990, p. 14). The users were provided, by email, with the results from the observations, which thereafter were discussed with me over the phone. The users were now asked to comment the situations in terms of how they had been presented and interpreted. This second feedback situation was also utilised to receive further feedback on the idea of providing contextual information.

4. RESULTS

In this section, the results from the study will be presented. Each case is described separately, and is introduced with a presentation of the general work situation, followed by a summary of the general observations. The field notes from the participant observations are thereafter illustrated as selected excerpts. Each of the four main cases ends with a user feedback section that is based on the qualitative interviews. The fifth and final case (4.5) contains no user feedback section.

4.1 Case one – Clas[1], KAM at a telecom company

Clas is working as a Key Account Manager at a company in the telecommunication industry. The company has a few large customers. Clas is responsible for one of these customers, including a number of retailers and distributors. His daily work entails a lot of phone conversations and meetings with customers as well as various internal meetings. The customer meetings are normally at the customer's office but sometimes at Clas' office or at a lunch restaurant. Clas travels by car to work and when meeting customers in the Stockholm area. Occasionally, he travels by aeroplane to meet a customer in Karlskrona or Malmö.

4.1.1 General observations

In terms of phone conversations in mobile situations, this day was quite calm. Clas talked quite a lot on the phone during the day, but mostly in his office sitting in front of the PC. During the lunch brake he turned his mobile phone off. He made 20 phone calls and received 9. No incoming phone calls seemed to disturb Clas' present situation. But some of the phone calls Clas made were slightly problematic.

4.1.2 Excerpts

The following excerpts show a typical situation during this day. Clas is in his office trying to get hold of a person ("Nils") via various telephone numbers at different times.

[1] All names in the study are assumed.

[8.30 am, arriving to the office] Calling Nils at the office – no answer.
[8.32 am, in the office] Calling Nils' mobile phone – no answer, Clas leaves a voice mail message.
…
[10.55 am, in the office] Calling Nils via the switchboard – no information about Nils, Clas leaves a message to the switchboard operator.
…
[1.15 pm, in the office] Calling Nils via the switchboard – contact! Nils has been "busy the whole morning". Clas has four different matters that he wants to discuss with Nils. …

This example illustrates how Clas tries to contact Nils via different phone media (stationary, mobile, and switchboard) at different times. Clas does not seem to be satisfied by leaving messages on Nils' voice mail and at the switchboard. Instead, he keeps on calling Nils and at last, five hours later, he succeeds to talk to Nils.

In the example above, Clas has problems to get hold of a specific person. But when he finally does, the initiation of the conversation is unproblematic. The excerpt below shows, instead, a situation where the person Clas wants to talk to ("Kent", a supplier) is accessible, but the situation he is in seems to bother Clas.

[1.54 pm, in the office] Calling Kent's mobile phone. Kent is in Nice with his wife. Clas says that he is sorry and that he "doesn't want to disturb". Kent seems willing to talk, however. Clas briefly describes an apparently complicated customer complain. But he quickly suggests that he should discuss this with "Torsten" (a colleague of Kent) instead, as Kent is "on vacation". The conversation carries on, however.

This example illustrates how Clas wants to talk to a supplier about a complicated customer complain. Kent does not seem to be the only person that can deal with this matter at the supplier company. That Kent is "on vacation" in Nice with his wife is unexpected by Clas, and this affects the initiation of the conversation.

4.1.3 User feedback

In the first situation, when he is trying to get hold of Nils, Clas is not convinced that some contextual information, provided by Nils on his mobile phone, would improve the situation that much. Clas means that he had still left a voice mail message; the matter was not too urgent. When I ask why he then chose to call the switchboard, he gives two reasons: first, Nils might have forgotten to turn his mobile phone on, and second, the switchboard operator might have some information about where Nils is, what he is doing etc.

In the second situation, when he happens to disturb Kent with his wife in Nice, he believes that this information [e.g. "on vacation"] would prevent him to call Kent; with that information he would have called Kent's colleague, Torsten, instead. However, he is not sure that Kent would have chosen to make himself less available in such a way, as Clas is such an important customer. When I ask how Kent then should be able to enjoy his vacation, Clas has no real solution but he points at the current functionality in his mobile phone to filter incoming calls so that only certain people can come through. [I do not argue about the contradiction in these two arguments.]

4.2 Case two - Mattias, KAM at a telecom company

Mattias is working at the same company as Clas and in the same position, as Key Account Manager for one of the main customers. His working situation is thus similar to Clas', with a lot of customer contacts. Mattias characterises his job as "very much about developing relationships". Mattias travels by car to work and when meeting customers in the Stockholm area. Occasionally, he travels by aeroplane to meet a customer in Göteborg.

4.2.1 General observations

In terms of phone conversations in mobile situations, this day was moderately intensive. Mattias had two booked meetings this day, one internal morning meeting and one meeting with a "partner/customer". Both meetings involved mobile communication. During the lunch brake, he kept his mobile phone on and received a call in the middle of his lunch. In general,

Mattias was fairly mobile during the day, locally that is, walking in to colleagues' rooms to discuss various matters, chatting with people at the coffee machine, and so on. He made 5 phone calls and received 6. Many of these calls were interesting from an initiating perspective, both when Mattias was the recipient and when he was the initiator of the communication.

4.2.2 Excerpts

In the following excerpts I am arriving when Mattias' morning meeting already has started.

[9.15 am, in internal meeting] I arrive to the company and register at the reception. The receptionist calls Mattias but he does not answer. The receptionist then informs me that she sends a text message (SMS) to Mattias: "Visitor in the reception".
[9.18 am, reception] Mattias meets me in the reception. He explains that he had the mobile phone on at the meeting, but on "silent mode" which was why he missed the call.
…
[9.45 am, in internal meeting] Mattias looks at his mobile phone to see if he has received any messages or missed any calls. No messages or missed calls.
…
[9.58 am, finishing the meeting] Mattias checks his voice mail. Two people had called and left messages.

These situations illustrate how Mattias handles an apparent dilemma of being busy in a meeting but yet accessible. He keeps his mobile phone on but on "silent mode", obviously not to disturb the meeting. In the first case, when I arrive, he does not recognise the call. But still, he benefits from having the mobile phone on, as he then is able to recognise the text message "Visitor in the reception". In the second case, however, he does not seem to benefit from having the mobile phone on at all. He did not recognise any of the calls when they came, and thus was not able to respond to them immediately (such as leaving the meeting and answer a call that he found very important, for example). Instead, the two people who called were welcomed by Mattias' standard greeting, and they left their messages probably not thinking that Mattias had his mobile phone on "silent mode".

In the next excerpt, Mattias is calling the Development Manager ("Pekka") in Finland. Mattias is in his office and prepared to talk, but the recipient is not.

[10.33 am, in the office] Calling Pekka in Finland. Mattias introduces himself. Pekka responds quickly that he is standing in the lunch line and asks to call back later [notice the time difference, 11.33 am in Finland]. Mattias hangs up, smiles for himself, and comments the situation. He does not know Pekka that well, and it is obvious that he feels a bit uncomfortable by the abrupt conversation.

This situation illustrates how the time and place for a conversation is convenient for the initiator but not for the recipient. It is obvious that the Pekka does not appreciate a call from Mattias at this very moment, standing in the lunch-line. And, also, Mattias does not seem to feel very well about his intrusive call.

In the excerpt below, Mattias receives a call from a business partner ("Lukas") in the middle of his lunch.

[12.15 am, having lunch] Mattias receives a call from Lukas (Mattias has tried to reach Lukas earlier this morning, and left a voice mail message on Lukas' mobile phone). Lukas starts by asking if Mattias is having lunch [notice the time]. Mattias says yes, and Lukas says that he calls back later.

This illustrates yet another situation where the only information that is exchanged is that a conversation is not convenient for the recipient, and that the initiator therefore will call back later.

In the next excerpt, Mattias is trying to arrange the lunch, in the company restaurant, with his nearest colleagues. Clas is there and willing to join for lunch, but he cannot find Tom. So he calls Tom's mobile phone.

[11.37 am, in the office] Mattias calls Tom to ask if he wants to joint for lunch. Tom answers and says that he is at a customer (i.e. not available for lunch).

It is obvious that if Mattias had been aware of that Tom was at a customer, he had not bothered calling him.

4.2.3 User feedback

Mattias is generally very positive to the idea that the recipient provides some information about her situation; he believes that this would improve the initiation of most calls, and also that some calls never have to be made. In the first situation, however, when he is busy in the internal meeting but still wants to be accessible, he is not sure that this information would be helpful. He means that being available for his customers is more important that this internal meeting. Therefore, he would probably not want show this information [e.g. "in a meeting"] for his customers. Instead, he believes that having the mobile phone on, but on "silent mode", is a good solution. When I point to the fact that this strategy was not very helpful in this situation, he says (laughing): "the two calls I missed were not very important".

In the two lunch situations, Mattias believes that this situational information [e.g. "having lunch"] could be helpful for the initiator of the call. In the first situation, when Mattias is initiating the call, he would have called an hour later, probably without even leaving a voice mail message. In the second situation, when Mattias receives a call in the middle of his lunch, he, again, thinks that this kind of situational information would have been useful. But in this case he is only moderately positive, meaning that he does not really mind being interrupted by a call when having lunch. And he emphasises, again, that he prioritises being available for his customers. When I suggest that he could include that information [e.g. "having lunch, but do not mind talking"], and that this might make the initiation of the call smoother, he agrees that this would be a good solution.

In the last situation, when Tom is at a customer and thus not available for lunch, Mattias means that this information [e.g. "at a customer"] would have been very useful; then he had not even made the call. However, he does not think that one will remember to update this information as regularly as this would require. There is therefore an apparent risk that the provided information is invalid.

4.3 Case three - Nils, editor in chief at a magazine

Nils is working as the editor in chief at a monthly magazine. The magazine tests and writes about newly launched products in the mobile communication business. The customers are consumers only; there are no business customers (advertisers are not treated as customers, mainly because of the loyalty concern). Nils is responsible for the daily work at the magazine, including a lot of co-ordination of writers, testing persons, photographers and the like. He spends most of his time at his office, working at the PC and talking on the phone. But he is also a lot outside the office, typically at a press conference for a newly launched product, or in another form of meeting with a company. Nils normally travels by train to work. Sometimes he travels by car, when he needs his car for a meeting during the day. Occasionally he travels by aeroplane or train to some activity outside the Stockholm area.

4.3.1 General observations

During this day Nils was in a few mobile situations and in many phone conversations in his office. He had two short internal meetings during the day, one more formal meeting with the management of the magazine, and one informal with a colleague. During the lunch brake, he kept his mobile phone on but received no calls or text messages. Nils spent most time of the day in his office, intensively talking on both the stationary and the mobile phone. He made 32 calls and received 12. The incoming calls were generally unproblematic, but some of the outgoing calls were not very successful. In 16 of these calls there was no answer or the line was busy. And several other calls seemed to be inconvenient for the other party, the recipient.

4.3.2 Excerpts

The following two excerpts are examples when Nils calls people that seem to be busy or otherwise unwilling to talk.

[8.34 am, in the office] Nils calls Stefan at his stationary working phone – no answer. He then calls Stefan's mobile phone. Stefan answers. Nils: "Are you busy? …I called on your direct line but there

was no answer, are you "out running"? … ok, then I won't disturb anymore … carry on your meeting" They hang up.

…

[13.45 am, in the office] Nils calls Filip. Nils: "Hi Filip, are you busy? …Ok, then I can call you later" Then they briefly discuss Nils' matter and agree upon Nils calling again later.

Nils seems to be uncertain whether to carry on the conversation, due to the situation of the recipient. He tries to find out whether the recipient is able and willing to talk or not. In the first example, it is obvious that the call is inconvenient for Stefan, and Nils finishes the call quickly. In the second example, Nils "offers" Filip to call later, but still the conversation proceeds for a short while.

The following excerpts illustrate a situation in which Nils is impatient to get hold of a freelance writer ("Patrik"), due to the urgency of the task. Note that the second call is made just after the first call.

[9.42 am, in the office] Nils calls Patrik's mobile phone. He leaves a voice mail message, briefly describing the matter (a text that Patrik is working on that must be finished the next day) and asking Patrik to call back as soon as possible.

…

[9.43 am, in the office] Nils calls Patrik at home and talks to his partner, Ulla. Ulla informs Nils that Patrik is ill and lying in the bed. Nils expresses sympathy for the situation and then asks Ulla to "ask Patrik to do what he can [i.e. deliver the finished text]"

…

[10.01 am, in the office] Patrik calls back. They briefly discuss Patrik's disease, and then carry on to discuss the text that Patrik should complete and deliver.

In this situation it is obvious that Nils wants to talk to Patrik immediately. He does not even wait a while after he has left a message on Patrik's voice mail. Just after he tries to get hold of Patrik at home. And not even the information that Patrik is ill and lying in bed seems to make him change strategy; the text is urgent and Patrik seems to be the only person to complete this task.

4.3.3 User feedback

Nils is generally positive to the idea that the initiator can receive information about the recipient's situation, before she makes the call. He believes that the most important aspect of this information would be that the initiator better could predict when and how the recipient, if she were busy, would be able to respond.

In the first two situations, when the recipients are busy and Nils is uncertain whether to carry on the conversation or not, he believes that this information [e.g. "in a meeting" or just "busy"] would have been helpful. With this information, Nils would have left a voice mail message, and waited for them to call back. I point to the fact that Nils was very stationary this day, working alone in front of the PC, and therefore available for most incoming calls. Had it made any difference if he had been busy in various meetings or other collaborative activities during the rest of the day? Nils says that it might have made him less motivated to just leave a voice mail message, generally, but in the situations above had still not called through.

In the second situation, when he is impatient to get hold of the freelance writer who is ill at home, Nils thinks this information [e.g. "ill at home"] would have been very useful. Nils says that if he had received this information it had satisfied him as he then knew why Patrik did not answer. Although the matter was very important for Nils, he had still not called through with this information, but only left a voice mail message. I mention that, in this situation, he *did leave* a voice mail message, but this was obviously not enough as he just after called Patrik at home. To this Nils replies that he felt a strong desire to know *why* Patrik did not answer, and with the information "ill at home" this second call had not been necessary.

4.4 Case four - Mike, salesman at an IT company

Mike is a salesman at an IT company that specialises in administrative computer systems. His customers are in two categories: old customers who want to upgrade or buy new products (systems) and new customers who buy for the first time. Mike spends most of his time at customers, demonstrating and discussing the products. Internal meetings are rare. On a typical day he has two customer meetings, one in the morning and one in the afternoon, lasting up to two hours each. One day a week is set aside for administrative work at the office. Mike travels

by car to work and to most customers. Occasionally he travels by train to meet a customer outside the Stockholm area.

4.4.1 General observations

This was a typical working day for Mike. He had two customer meetings, one in the morning and one in the afternoon. In between these meetings he spent some time at the office, doing some administrative work and talking to colleagues. During the lunch brake, he kept his mobile phone on but received no calls or text messages. The two meetings were both in Stockholm and he spent about 30 minutes to get to each, i.e. about two hours in total in the car. He made 8 phone calls and received 7. Most phone calls were made from the office, but a majority of the incoming calls occurred while he was driving, or walking between the car and the meeting.

4.4.2 Excerpts

The following excerpts illustrate how Mike tries to manage incoming communication while driving.

[11.35 am, driving] Mike operates his mobile phone to check if he has received any messages. No messages.
…
[1.45 pm, driving] Mike receives a call from a customer, who wants to settle a date for a meeting. Mike says that he is driving and asks if he can call back when he has his agenda in front of him. The customer gives Mike the numbers where he can be reached. I have to assist Mike writing the numbers down on a piece of paper.
…
[2.00 pm, driving] Mike recognises an incoming text message (by the beep) on his mobile phone. He starts to operate the mobile phone and reads the message. It is from the customer he is going to meet, who gives information for how to enter the office.
[2.05 am, driving] Mikes recognises an incoming text message again. This time he pulls over and parks the car at the sidewalk. It is the same message as before!

The first situation is interesting as it shows how Mike wants to update himself with possibly received messages, although he is in a bad mode, while driving, for operating a mobile phone and reading messages on such a small display. The second situation illustrates a phone call, which is an appropriate means of communication while driving. At the end of the conversation, however, he has to write some phone numbers down, which normally is a bit problematic while driving. The last situation illustrates how inappropriate text messages can be while you are driving; the information would be easier to receive as voice, preferably as talk (synchronously) or otherwise as a voice mail.

The next excerpts demonstrate a meeting that is continuously interrupted by ringing on a mobile phone. The mobile phone belongs to the managing director ("Alex") of the company that Mike is visiting to demonstrate a product.

[2.20 pm, customer meeting] Alex receives a call on his mobile phone. He checks on the display who is calling, and rejects the call.
…
[2.31 pm, customer meeting] Alex receives another call on his mobile phone. He checks on the display who is calling, and rejects the call, again.
[2.35 pm, customer meeting] Alex receives a call for the third time, and handles it as above.
[2.37 pm, customer meeting] Alex receives a call for the fourth time, and handles it as above.
[2.42 pm, customer meeting] Alex receives a call for the fifth time. He checks on the display who is calling, excuses himself and asks Mike and the other person at the meeting if it is OK that he answers the call. Alex answers "Hi", and tells the caller that he is in a meeting and what type of meeting it is. Then they start to discuss an upcoming meeting with a customer. The conversation lasts for about four minutes. Alex hangs up, excuses himself again, and shifts his focus back to the meeting.

In this situation, Alex chooses to keep his mobile phone on, although the meeting is continuously disturbed by the incoming calls. Alex seems to be awaiting an important call, the fifth call, which is the only call he answers. However, the following discussion does not seem to be very urgent or important to discuss at that very moment; it could probably wait an hour or so. Instead, it seems to be so that this is the only time that is appropriate for the caller, which Alex is aware of, and therefore he keeps his mobile phone on.

4.4.3 User feedback

Mike is enthusiastic about the idea to provide information about your current situation, to facilitate smoother initiation of mobile phone conversations. Although he does not experience any major problems today, he believes that this functionality would support the two main mobile situations that he is in during a working day: driving and customer meeting.

In the situation when Mike receives a call from a customer while driving, he believes that this information [e.g. "driving"] had been useful. Although he is in a quite good mode for talking in the mobile phone, Mike still thinks that it had been good if the initiator of the call (the customer in this case) was provided with this information before he made the call. Mike sees two positive effects of providing this information. First, it would improve the actual initiation of the call mainly as the information "driving" would function as a starting point for the conversation. Secondly, it would let the initiator of the call interpret the conditions for the conversation, i.e. that the driver is in a quite good mode for talking but that he also needs to concentrate on the driving. Mike mentions that some callers feel that they are disturbing when Mike tells them that he is driving, which is not the case; Mike prefers to use the time in the car for phone calls.

Mike believes that the information "driving" would have been useful also in the next situation, when he receives text messages on his mobile phone. If the sender of the message had known that Mike was driving, she might have made a call instead. However, Mike does not think a short text message is inappropriate while driving; if the message is short it could even be preferable to talk as you then skip the "unnecessary phrases" that a phone conversation typically entails. But, when he receives the same text message for the second time and has to stop the car, Mike feels a bit irritated. In that situation it is obvious that a call had been more convenient.

In the final situation, Mike's customer, Alex, is the interesting user. Alex is the managing director of the security company that Mike is visiting. He says that it is very important that he is available for his employees, in case of any type of emergencies or for other complicated matters. This does not mean that he keeps his phone on *always*, but in this situation he is awaiting a call from an employee that is going to join him at a meeting with an important customer. Therefore, he keeps his phone on during the meeting, to be sure not to miss this

important conversation. However, this important conversation is preceded by four calls from other employees, which Alex chooses to reject. I ask Alex if it had been helpful if he had been able to provide some information about his current situation [e.g. "meeting"]. Alex is moderately positive to this idea, but is doubtful that this had helped in this situation as the "important" employee then still had to leave a message. He emphasises, again, the importance of that his employees are able to reach him in case of emergencies and the like.

4.5 Case five – Train commuters Uppsala – Stockholm

The typical train commuters between Uppsala and Stockholm lives in Uppsala and works in Stockholm. The majority travel to Stockholm in the morning between 7 and 8 am, and back to Uppsala in the afternoon between 4 and 6 pm. During these rush hours the trains are normally full and a couple of people have to stand up. The journey takes from 35 to 45 minutes, depending on number of stops along the way (some departures do not stop, others make one, two, or three stops).

4.5.1 General observations

In the morning, it is normally fairly quiet on the train; many people fall a sleep and the train staff behave quite discreet (by not calling out the stations loudly, for example). But there are also people talking, to each other or on the mobile phone. In the afternoon, it is normally a little noisier, although most people are silent and a few fall a sleep.

In general, people do not make many phone calls on the train. On a typical journey, approximately 20 people (which is about the number of people that you can listen in) make some 2-3 calls. These calls are normally quite short and about some arrangement that is important, such as telling your colleagues/family that you will be late. Some people talk loud, but most seem to keep their voice down.

The majority of the phone calls are incoming. The ways to handle incoming calls differ; some react nervously to the ringing signal and others do not, some have to search for the phone and others have it conveniently at hand, some answers loudly and others keep their voice down etc. The initiation of the conversation is quite the same, however. The recipient's second

phrase is normally “I’m on the train”, or “No, I haven’t arrived yet [to the office], I’m on the train” or the like.

4.5.2 Excerpts

The following excerpt illustrates a typical call that is made by a person on the train. This person, a woman in her late 20ies, is travelling from Stockholm to Uppsala in the afternoon.

[5.35 pm, on the train] “Hi, it’s me… yes, I’m on the train… hm… OK… see you soon… bye”. The woman keeps her voice down and she does not seem very willing to talk more than necessary. The call lasts for about 15 seconds.

The woman seems to be calling home. It is hard to tell what kind of information she gets from the person at home, the recipient, but it does not seem to be anything very important. The only essential information she gives is that she is “on the train”. This seems to be satisfying for the recipient; she does not say anything about when she will arrive or the like.

The next excerpt is typical for a call that is made to a person on the train. This person, a middle-aged man, is travelling in the morning, from Uppsala to Stockholm.

[8.45 am, on the train] The man answers: “Hi, Johan… no, not yet, I’m on the train… “. The conversation lasts for a couple of minutes.

The caller seems to be asking if the man has arrived to a certain place [the office, maybe] as the man replies: “no, not yet, I’m on the train”. However, as the conversation carries on, this does not seem to be a problem. Instead, the caller’s initial question seems to be more of an opening phrase, or a polite question to check whether a phone conversation is appropriate or not.

5. DISCUSSION

This section consists of two parts. Below, I will discuss the observations from the study, in terms of shortcomings in the initiation of mobile communications. In the second part, I will discuss how contextual information could support the initiation process, and be utilised further. The second part serves as recommendations for systems design.

5.1 Initiating mobile communication via mobile phones

The general observations in this study indicate some *differences between stationary and mobile communication*. Case one (see 4.1.1) and case three (see 4.3.1) represent mainly stationary communication, and case two (see 4.2.1) and case four (see 4.4.1) represent mainly mobile communication. The stationary communicators spend most of their time in their office rooms while communicating. They make a lot of phone calls (20 and 32, respectively), and the initiation of the incoming calls is unproblematic. The mobile communicators, instead, spend most of their time outside their office rooms while communicating, in meetings, at lunch, and driving a car. They make significantly fewer calls (5 and 8, respectively), and the initiations of the incoming calls do always entail some discussion about conversational availability.

The *consequences of intrusive calls* affect both the recipient and the initiator of the call. The lack of contextual information makes it difficult for the initiator to follow the rules that apply in the current situation of the recipient. The second situation in case four (see 4.4.2) gives a typical illustration of this problem, where the *recipient* is affected. In this situation, the meeting is continuously disturbed by obviously unimportant incoming calls. Each time, the recipient has to shift focus from the present activity, look at his mobile phone and check whether he should answer or not, reject the incoming call and then resume the meeting. This procedure does not only disturb the recipient of the call, but also the other participants at the meeting.

The negative consequences of intrusive calls are of course most evident from the recipient's perspective. But the results from this study also show how the *initiator* may be affected negatively by making an intrusive call. These situations occur when the recipient is not really

willing to talk, but still answers his phone. A typical example of this problem is when the recipient is having lunch, as in the two lunch situations in case two (see 4.2.2). The first two situations in case three (see 4.3.2) is another example where the initiator feels unsure whether his call is inconvenient for the recipient or not. A result of these calls is that the initiator feels uncomfortable by disturbing, although he could possibly not be aware of the context of the recipient.

When choosing means of communication, it is obvious that the initiator's primary interest is to *bring closure to the communication act*. This interest is sometimes fulfilled by leaving a voice mail message (see 4.2.2) or sending a text message (see 4.4.2). But quite often the initiator seems to struggle to actually get in contact with the recipient, and then an asynchronous media, such as SMS or voice mail, is not enough. This struggle is obvious when the task is urgent or otherwise important, as in the case when the initiator calls the recipient at home (see 4.3.2). In that situation the recipient felt a strong desire to get in contact with the recipient as the task had to be finished the next day. But in the first situation in case one (see 4.1.2), the task urgency argument is not appropriate. In this situation the initiator tries to reach the recipient via three different phone numbers, and leaves both a voice mail message and a message to the switchboard operator. The mere information "busy" or "unavailable" does not satisfy the initiator. When he finally gets in touch with the recipient, at the fourth attempt only five hours later, the matter he wants to discuss is not very urgent. Instead, his struggle to get in touch with the recipient is driven by a desire to know that the recipient is available and socially present, "where Nils is, what he is doing etc.". The phone is chosen neither because the task is very urgent nor because a rich medium is necessary. Instead, the desire to quickly close the communication act drives the choice of media. And the fact that phone is an available medium, that the recipient has a mobile phone, seems to be a decisive factor.

When the recipient leaves his office room and becomes mobile in any way, he seems to be faced with the *recipient's dilemma* of being focused on the present situation and yet available for incoming calls. A mobile situation does typically involve other people, such as a meeting or a lunch with a customer or a colleague. Most situations in this study are relevant for this recipient dilemma, but some situations illustrate it particularly well. In the first situation in case two (see 4.2.2), the recipient has his mobile phone on but on "silent mode", in order not to disturb an internal meeting but still be available for customers or other important calls. The consequences of this strategy, however, are that he misses two calls. The only benefit is that

he is able to recognise one text message, which was important. The meeting in the first situation in case four (see 4.3.2) and the two lunch situations in case two (see 4.2.2) are yet other examples of this dilemma; the recipient is not really ready to talk, but still not busy enough with another activity to turn his mobile phone off. The second situation in case four (see 4.4.2) represents a slightly different type of this dilemma. In this situation the recipient does not keep his mobile phone on because he wants to be available in general. Instead, he is focused on the important meeting at hand but feels a need to keep his phone on for a specific important call. This situation illustrates the dilemma of being busy in a mobile setting but still available for urgent or otherwise very important calls.

The initiations of the conversations in this study illustrate how people behave to *compensate for the lack of contextual information* in mobile communication via mobile phones. When a call is made to a stationary phone, the initiation phase does not regard the context of the recipient (as in the first situation in 4.1.2 and the second situation in 4.3.2). But when a call is made to a mobile phone, the initiation phase always consider the context of the recipient, in one way or another. The typical situation is that the initiator asks if the recipient is "busy", as in the first two situations in case three (see 4.3.2). When the initiator has more relevant prior contextual information, he can be more precise in his question, such as: "are you having lunch" (see 4.2.2) or "are you at the office" (see 4.5.2). In these situations, the initiation seems to run quite smooth, as the "lacking" contextual information is quite distinctive. In other cases, when the context of the recipient is unexpected by the initiator, the initiation is more problematic. In the situation when the recipient is on vacation with his wife in Nice (see 4.1.2), for example, this unexpected situation affects a considerable part of the conversation. If the initiator had been aware of this context of the recipient, he had obviously not called him at all.

5.2 Providing contextual information

The results of this study show that the lack of contextual information about the recipient affects the initiation of mobile communication negatively. Below I will discuss the possible positive effects of providing contextual information. There seem to be three design aspects to consider: *smooth initiation of conversations*, *using the appropriate means of communication*, and *utilising context awareness*. At the end, some critical design issues are highlighted.

Smooth initiation of conversations. There are many situations in this study in which the recipient is busy in a mobile situation, but still wants to be available for phone calls. These situations are typically "having lunch" and "on the train", but can also be "meeting" (see 4.2.2). "Driving" seems to be a mobile situation in which the recipient actually prefers to talk. The results also show that the initiation phase differ in these situations; it seems to be both a matter of the recipients' individual preferences and the initiator's matter. The common feature of these initiations, however, is that they all entail a brief discussion about the recipient's context. If this context, instead, would be presented to the initiator prior to the call, he would be able to initiate the conversation in a smooth way; for example: "Sorry to interrupt your lunch, but I just wanted to inform you that …" or "So, you're on the train. Can you talk now or should I call you later at the office?" etc.

In the situations above, the initiator decides to call through and initiate the conversation, as he believes that to be an appropriate behaviour. But there are of course other situations in which this contextual information would prevent her to initiate a conversation. In those situations the contextual information would support the use of an *appropriate means of communication*. The most obvious situation that illustrates this aspect is "meeting", in which the recipient strives not to disturb the present meeting (see 4.2.2 and 4.4.2). The situation "driving", on the other hand, indicates that a phone conversation is more convenient than a text message (see 4.4.2).

In addition to the aspects of smoother initiation and appropriate means of communication, the contextual information could facilitate *utilising context awareness*. The results of this study indicate that people use the mobile phone to manage co-ordination (see the third situation in 4.2.2 and the first situation in 4.5.2, for example). Here, the indexical meaning of these expressions is important. The contextual information "on the train" in case five (see 4.5), for

example, communicates more than this mere activity (sitting on the train) to the initiators that are aware of the recipient's working situation. Depending on the time of the day, the initiator will be able to interpret the contextual information "on the train" as that the recipient is on her way home or to the office, which might be relevant for the matter. Similarly, the contextual information "meeting" will communicate something to a person who does not want to disturb and something else to a person that is going to attend the meeting (see the example with the "open door" in 2.1). The latter might call through and ask the recipient not to wait for him but to start the meeting, for example. The contextual information "having lunch" could be utilised in the similar way; if you are looking for a lunch mate, you might call through to check whether you can join the lunch.

Finally, the observations and the user feedback in this study point at some *design issues* that need some extra attention:

1. *Entering and updating contextual profiles*. In this thesis, I have discussed explicit contextual information, entered manually by the recipient. The user feedback in this study (see e.g. 4.2.3) point at the obvious problem that the user might forget to enter and update her contextual profiles. This problem has also been experienced in prior research, such as *The live adressbook* (see 1.2). Therefore, some form of automatic sensing (Ljungstrand 2000) would probably be necessary as a complement to manual input, typically as reminding the user to enter and update a contextual profile.

2. *Availability.* This study indicates that contextual information about the recipient is useful for different reasons (smooth initiation of conversations, appropriate means of communication, and utilising context awareness). In some situations, incoming calls are appropriate, and in some they are not. However, the contextual information is useful also when a call is appropriate. Therefore, when the recipient wants to be available for calls (e.g. "driving" or "having lunch"), the initiator should still be given the option to obtain this contextual profile (by text), in order to make a smooth initiation of the conversation (or otherwise to utilise this context awareness, see above). And when the recipient does not want to be disturbed by incoming calls (e.g. "meeting"), the initiator should be "stopped" by the contextual profile (as today when the phone is off).

3. *Urgent or otherwise very important calls*. One situation in this study (see 4.4.2) illustrates how the recipient keeps his mobile phone on, although he is busy in an important meeting, because he expects an important call. In this situation, the recipient was aware of this important call, but, generally, it is not reasonable to let the recipient be responsible for being available for every possible urgent or otherwise very important incoming call. Instead, the initiator should be empowered with the option to enforce a call if she considers the matter enough important. (It is reasonable to assume that the initiation of the conversation still will be quite smooth in these situations, similar to how people interrupt a very important meeting, or call someone at home in the middle of the night.)

These three issues should be critical considerations when designing a mobile communications system in which the mobile phone users are able to provide information about their present situation.

6. CONCLUSIONS

The general purpose of this study was to analyse today's practice in office work regarding the initiation of mobile communication via mobile phones. This study clearly shows that the lack of contextual information in the initiation process is the main source for various shortcomings. The recipient is faced with the dilemma of being focused on the present situation and yet available for incoming calls. The initiator, on the other hand, seems to prefer communication via mobile phones because of its advantage to bring closure to the communication act. The general consequence is that intrusive calls occur, for the inconvenience of the recipient as well as the initiator. The way the users behave to compensate for the lack of contextual information illustrates the need for providing contextual information.

A second purpose of this study was to explore how explicit contextual information could be utilised in the initiation process. There seems to be three positive effects of providing contextual information in mobile communication. First, *smoother initiation of conversations* as the contextual information would provide a starting point for the phone conversation. Secondly, the use of an *appropriate means of communication*, as the contextual information would guide the initiator whether to send a text message, leave a voice mail message, or to initiate a phone conversation. Thirdly, the initiator would be able to *utilise context awareness*, because of the extended meaning of a contextual expression in a specific situation. These three aspects serve as guidelines for systems design. Finally, some specific design issues are highlighted:

- There is a need for technology support when entering and updating contextual profiles;
- The recipient should be able to present a contextual profile although she is available for incoming calls; and when not, the profile should "stop" incoming calls;
- It should be possible for the initiator to enforce a call, in case of urgent or otherwise very important matters.

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