Mobile Technology Use Landscape— Convergence of the Organisation and Personal Context

Helana Scheepers
School of Information Management and Systems, Monash University, Australia
Tel: +61 3 9904 4374, Fax: +61 3 9903 2005, helana.scheepers@sims.monash.edu.au

ABSTRACT

The media hype surrounding mobile devices promises ubiquity and pervasive computing. This paper reports on an explorative study of individual mobile workers experiences with the use of mobile devices in the context of mobile computing within an organisation. Two overlapping contexts for the use of mobile technology can be identified– the organisational and personal context. These two contexts influence one another on work practice as well as on the attitude of mobile workers towards information technology. Mobile technology seems to suggest a significant departure from traditional technology use within an organisation in which the organisation can harness the personal interest of the worker for use purposes. Given this context the paper report on a case study in one particular organisational context where mobile devices have been introduced. A number of issues are highlighted which implementers of mobile devices need to take into account in similar situations.

INTRODUCTION

The use of the mobile devices (mobile phones, personal digital assistants and other handheld devices) is described as the third wave of the computer revolution, ubiquitous computing (Weiser, 1998). This expectation is further fuelled by media hype describing the possibilities and an expectation for endless applications that will be available on mobile devices. Figures of the penetration of these devices for personal use show that the devices are hugely popular. According to and IDC report (Flisi, 2001) 95% of all personal devices bought in 2000 was by individual buyers. Early studies suggest that organisations are slow to adopt and use these devices (Flisi, 2001) as part of their enterprise systems.

Marketing of the mobile devices has mostly been targeted towards individual users. This trend is slowly changing as organizations realise that mobile devices and systems available on mobile devices form part of the suite of information technology infrastructure of an organisation. This is evident in the number of vendors developing services to allow organizations to use mobile devices. Examples of the use of Palm Pilots for organisational use are: AMR - emergency medical services use of hand held devices (Palm 2001), Frontline Now – customer relationship management by sales representatives (Palm, 2001). Other vendors such as IBM, Hewlett Packard and Microsoft have also realised the market for the use of mobile devices and have developed strategies for providing services to take advantage of this market.

Research in this area is dominated by technical attributes such as personal communication systems (Bejerano and Cidon, 1998), wireless connections (Forman and Zahorjan, 1994; Powell and Lima, 2000), and caching metrics (Satanarayanan, 1996) to name a few. A number of research efforts are now targeted towards studying mobile devices from social perspectives (Dryer et al., 1999; Mark, 1999). Furthermore, research efforts are also focused on the development of new applications for handheld devices in a specific context (for example (Dahlberg et al., 2000)). An area that has received less attention is the use of mobile devices within an organization. Addressing such issues as why organizations adopt mobile devices, what effect mobile devices have on the tasks being performed and the changes in working behaviour because of mobile devices.

This paper reports on an explorative study of individual mobile workers experiences with the use of mobile devices in the context of mobile computing within an organisation. Two overlapping contexts for the use of mobile technology can be identified– the organisational and personal context. These two contexts influence one another on work practice level as well as on the attitude of mobile workers towards information technology. Mobile technology seems to suggest a significant departure from traditional technology use within an organisation in which the organisation can harness the personal interest of the worker for use purposes. Given this context the paper report on a case study in one particular organisational context where mobile devices have been introduced. A number of issues are highlighted which implementers of mobile devices need to take into account in similar situations.

THE LANDSCAPE OF THE USE OF MOBILE TECHNOLOGY BY MOBILE WORKERS

One way of conceptualising the mobile technology use landscape is by viewing it as two intersecting domains of use. This is illustrated in Figure 1. The two domains for the use of mobile devices are: The personal context and the organisational context. In the personal context the mobile device can be used for keeping notes, diary, accessing the web, games/leisure and m-commerce. In the organisational context provision should be made for a static and mobile infrastructure and specific services should be developed for mobile users.

On an infrastructure level a clear distinction can be made between the traditional provision of resources for static technology such as PC's and mobile infrastructure (Jing, 1999). In the traditional envi-

Figure 1: Landscape of the use of mobile devices by mobile workers
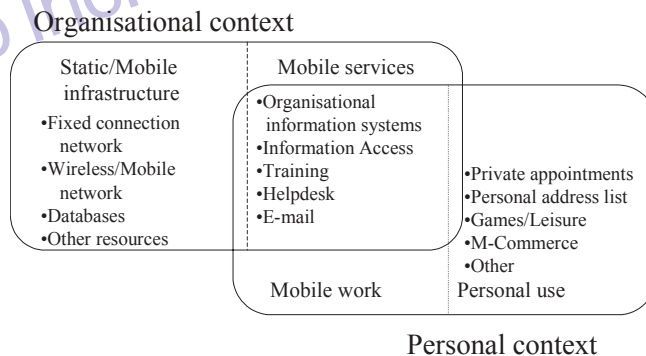
ronment the personal use of technology and the workplace use of the technology do not intersect. In the case where the worker dislikes the technology available at the workplace he/she can buy a different technology for home use. In contrast to the classical fixed information technology, mobile devices are taken home by users and enter the personal domain, typically with the blessing of the organisation. This spawns a number of implications for mobile devices in the organisation such as the use and the effectiveness of the use of the mobile technology and the applications available on the mobile device that will be discussed in the case study below.

THE MEDITRIM CASE STUDY

The case study below describes the implementation of the use of a mobile device not for personal productivity use, but for the use as a transaction processing system for the organization. The case study emphasises the departure from the traditional technology use and emphasises the influence between the personal and organisational contexts.

Meditrim is an organisation based in Melbourne, Australia specialising in weight loss. Meditrim's aim is to provide doctors with a weight loss program that allows them to retain a supervisory role over each patient's weight loss program. The doctor is able to delegate time intensive peer education instruction tasks (such as cooking, shopping and exercise instruction) to Meditrim. At the same time, Meditrim supports the client who wants to loose weight by way of a healthy program based on nutrition education.

Consultants are nomadic workers as she uses her home as base, but travels to the client's home for consultation. A consultant would occasionally use his or her own home or a medical practitioner's office for consultation. They need to bring all files, diary, scale and other products such as vitamin supplements with them to the clients' home.

Data Collection

The research was conducted during the period July 2000 until Feb 2001. It mainly consisted of interviews with 6 consultants, 3 employees from head office and the managing director (the champion for the project). Three of the consultants were interviewed before the implementation of the Palm M100 and all six was interviewed after they have used the Palm for a few weeks. The interviews with the employees from head office were after implementation, as the employees themselves are not using the mobile device. However, their work was influenced by the implementation of the mobile device

Three questionnaires was developed for this purpose:
- The **factsheet** determined the present information technology situation and the plans for the mobile device.
- The **before implementation interview guide** attempted to determine consultants' expectations for the new mobile device. The questionnaire also questioned how they believed the mobile device would change their work patterns.
- The **post implementation guide** questioned the consultants about their experience with the mobile device.

A period of approximately 2 months elapsed between the before implementation interview and the post implementation interview. The managing director was interviewed 3 times: during May 2000 to get an understanding of the project, in July 2000 and again in December 2000. The second interview was to get the information as outlined in the factsheet and the last interview was to gain some understanding of his experience of the implementation process. No interview guidelines were used for the first and last interview. During the implementation process the researcher contacted the champion via phone on a regular basis. All interviews and communications have been transcribed. All interviews with the consultants have been audio taped and transcribed.

The average age of consultants is 45 years of age. The youngest consultant was 23 and the oldest was 71 years of age. All consultants are female and most of them are computer illiterate. To use the words of the champion: *"we are taking middle aged house wife's and mak-*

ing them computer literate". His comments allude to the huge learning curve most of them went through.

The Mobile use Scenario

Meditrim is a small organization that consists of a head office in Melbourne with 55 franchisees. The franchisees are also called consultants and from the clients perspective they form part of Meditrim. A franchisee thus works for herself, but has a close relationship with head office that provides training, know-how and business support. Because of this close relationship between Meditrim and the franchisees the term consultant and franchisee is used interchangeable.

Figure 2: Activities performed by consultants
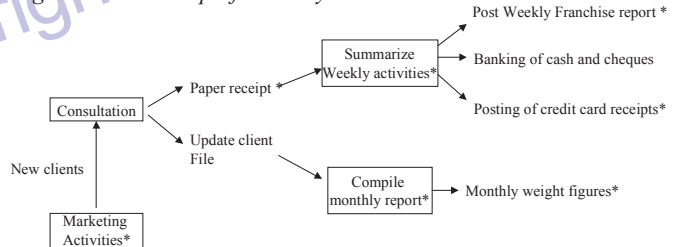
In 1999 Meditrim embarked on a computerisation strategy that involved the issuing of Palm M100s to all consultants. The paper based system that was in place required that the consultant use a paper receipt book to record all transactions. Each consultant had weekly and monthly actions to perform in terms of recording their activities and sending head office information. The monthly and weekly activities are outlined in figure 2.

Boxes highlight activities in figure 2 and the result of the activities is without boxes. An asterisk indicates a change in the activities and paper-based results because of the use of the PDA. Before implementation it was estimated that it takes a consultant about 2 hours per week to generate the weekly franchisee statement. All transactions would be recorded on the mobile device, which also eliminated the credit card vouchers. The new system on the PDA indicated the amount that should be banked in cash and cheques. To report on the weekly marketing activities a phone call was made on a Friday afternoon. The phone call caused a lot of frustration as all 55 consultants had to contact one specific employee at head office. The Friday afternoon phone call was replaced by e-mail. The data on the Palm M100 of each consultant was down loaded through a 'hot sync' process on a daily basis. The monthly report called the 'Monthly weight loss report' identified the weight loss for each individual client of a consultant. This report was also replaced by the system provided on the mobile device.

Observations

Despite some early problems with the system the process can be considered successful. All consultants except 1 are using the Palm M100. After the first two weeks of problems the process is running smoothly with all transactions recorded on the Palm. Problems with the implementation can be categorised as follows: individual computer literacy problems, device related problems, individual change management problems and application related problems. From a mobile computing perspective the device related problems would be highlighted in the following paragraphs.

The small size of the handheld intimidated most consultants. Consultants were worried that they would physically break the mobile device. Even though they were told that the devices are very durable and that all mistakes can be corrected, they were still apprehensive.

Three of the older consultants had enormous problems with the use of the mobile device. Most of their problems related to the size of

the screen and the graffiti. One or two of them wrote in copperplate and found the graffiti extremely problematic. The consultants that could not read the screen were asked to update their reading glasses. To overcome the problem with graffiti the consultants were taught to use the on screen keyboard. The problems with text entry on handheld devices by older users are sustained by empirical studies done by Wright et al (2000). A small keyboard was purchased, but by the time it arrived the consultant's got used to the onscreen keyboard and decided not to use it. The study done by Wright et al (2000) indicates that older users prefer to use a physical keyboard rather than the onscreen keyboard.

The size of the screen also leads to problems with the use of the transaction software. Consultants need to identify whether the transaction is cash, cheque or credit card. The pop-up window for this choice is very small and consultants can easily make a mistake. Such an error will affect the accuracy of the banking information that they use to calculate the payment of cash into the bank account. This mistake also influence the accounting personnel at head office who would be expecting the wrong amount to be banked or the number of credit card transactions.

Another problem related to the screen size is with entering the credit card number of a client. A credit card number consists of 16 digits and on the screen there is no space for delimiters after every 4 digits. It is thus easy to make a mistake when entering credit card numbers. Again some practical procedural changes on the side of the consultant overcame this problem.

As can be seen from other research related to handheld devices and use issues these problems and the effect it has on data input is an inherent problem with such a small device. The strategy followed by the organisation in this case was not to try and redevelop the user interface, but to place other procedures into action to combat problems.

The ease of the acceptance of the mobile device by the consultants can be categorised into three distinct classes: users that learn to use the mobile device with ease, users that have difficulty with the handheld and users that reject the use of the handheld totally. In the case of Meditrim 4 out of the 55 consultants accepted the handheld with ease, the large majority (50) needed some to a great deal of help and encouragement in becoming confident in the use of the handheld and 1 quite her job because of the handheld. The ease of adoption can be expressed into the following ratio: 7:91:2.

In all cases the consultants reported that they saved time in preparing the weekly franchise report. They furthermore identified that the lead follow-up phone call that was replaced with e-mail was a huge stress reliever on a Friday. Some of the consultants indicated that the phone call also provided them with motivation especially in difficult times. All the consultants consider the person that they called on a Friday as their mentor, and just by talking to her made a difference on a psychological level. This psychological boost was now not available to them on a regular Friday basis.

DISCUSSION

The case study above describes the implementation of the use of a mobile device not for personal productivity use, but for the use as a transaction processing system for the organization. The characteristics that makes the case study interesting is that the mobile device is used in a similar way as a PC would be used in an organization without mobile workers. In the case study described the users (consultants) of the mobile device do not have personal contact with anyone from Meditrim's head office. Each of the consultant's is a business on her own. Previously their contact with head office was through a weekly phone call and the posting of information. The current system links each consultant on a daily basis via hot sync to the organization for transaction purposes.

During the interviews with the consultants it became apparent that they considered the handheld their own property and that the handheld was used for both organisational and personal use. One

consultant said that: *At this time it hasn't saved me any time, because I play around with it too much. It has saved me time in the week. It has definitely saved me bookkeeping time. It saves me a couple of hours on the weekend. But during the week I find I enjoy setting it up. I find I like to separate the appointments and things I have to do personally by a couple of lines.* Another consultant who was considering going on pension had the following to say: *I love it* (the handheld). *I would hate to give it up. I will replace it with something else in which I can keep all my addresses.* Another consultant related how her husband would tease her about whether she has her Palm even if they go out on social occasions. The specific consultant indicated that she does not leave the house without her Palm and that all information about her personal life and business could be found on the Palm. Even such mundane activities such as replacing the water filter or regular personal appointments can be found in her diary. All the consultants indicated that they would at all times know where their Palm was as it formed a mayor part of their lives – organisational as well as personal. The managing director sanctioned this personal use of the handheld. He conducted the training session and instructed the consultants to practice using the diary and address book by recording personal information.

Personalisation and ownership of the handheld was observed within a few days. All consultants received their device in the same box. The only difference was that each device had the owners name engraved on the back. Within a few days consultants' started to individualise and personalise their handheld through different covers such as hot passion pink or leopard skin covers.

This finding spawns a number of implications for mobile technology in the organisation. Organisations would be able to piggyback the adoption of mobile devices on personal use. Organisations can encourage and leverage the personal use of mobile technology for organisational purposes. A further factor that will potentially make the adoption of mobile devices quicker is the idea of ownership. The users will feel that the mobile device is their property as they will take it everywhere with them and the device also has their personal information recorded.

A further implication of this overlapping of the two contexts could be that the organisation does not need expensive and elaborate training for the use of handheld devices such as mobile phones and palm pilots. Another aspect of the use of handheld devices by users is on the support structures an organisation should provide for mobile workers using mobile devices. The one important difference between the adoption of the mobile device and other technology is that the support structure for a lone mobile worker might not be in place. In the case of problems the mobile worker should have enough knowledge to know how to help him/herself or should be able to get the necessary information from someone. In an office environment co-workers and the official support staff would be on hand to give help. In the case of a mobile worker their only help might be in the form of a telephone call, that creates its own problems. The provision of a help desk or similar resources specifically geared towards mobile support might be very important. But this also impacts on the type of training the mobile user will require, because an understanding of the device as a whole is more acute for a mobile worker.

Infrastructure support for the use of mobile devices will be an issue. Standardisation on the type of device that will be supported by the organization is advised in order to save on supporting a diverse number of devices (Gold, 2000). The personal relationship that a user develops with their handheld might be of such a nature that an organisation will have to support a number of different devices in order to foster use of these devices. Although standardisation on the type of device was not an issue in Meditrim the software that should be available was an issue. The champion of the system has determined that no software will be loaded on the handheld devices without his permission. The reason for this was the synchronisation of data, as Meditrim cannot provide for all different types of applications. Furthermore the risk of virus infection exists which might impact on all other users of the system.

CONCLUSION

Mobile devices promise ubiquitous and pervasive computing to all. The reality is that these promises are not available today. Organisations need to use the mobile devices that are available currently. These devices are very powerful compared to the previous generation of handheld devices, but the detractors still play an important role. The Meditrim case study has identified that a small organization can effectively implement a mobile device. One aspect that was used extensively in their case was the 'carrot' (term used by the champion of the system) of time saving for all consultants.

One of the issues that make the adoption of mobile devices different from other traditional information technology use is the overlapping of two contexts of mobile technology use - organisational and personal context. These findings create a number of implications for mobile technology use that will impact the organisation on an implementation, training, support and infrastructure level. In order to support the personal relationship that a user develops with the handheld device an organisation might have to support various devices.

A user that has technical or application problems in the field and do not have the necessary knowledge to help themselves they might be in bigger trouble than their counterpart in the office. For this reason the type of training mobile users receive should be extensive. Furthermore, the fear of not being able to use the mobile device might be an inhibitor in the adoption of mobile devices. The ineffective use of the mobile device might also diminish the knowledge power base a mobile worker needs in order to perform their duties.

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