

MOBILE INTRANET FOR SMALL AND MIDDLE SIZED ENTERPRISES

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Abstract. This paper describes the human, organizational context and technology design concepts for mobile communication in small and middle sized enterprises. This paper addresses the need for using the smart phone for mobile supported cooperative work and also focuses on the advantages of mobile intranet for the small and middle sized enterprise. This paper not only helps us to broaden our perspective of collaboration to include work practices, managerial and organizational issues and expands the examination of groupware of purpose-built applications with simple groupware functionality but also to understand implementation issues of collaborative technologies.

1. Introduction

In recent years, small screen devices, such as cellular phones or Personal Digital Assistants (PDAs), enjoy exceptional popularity. Therefore original device manufacturers in handheld device industry segment tried to increase the functionality of handheld devices while merging the cellular phone into PDAs. Smart phone is one popular example of such a merger, which contains the features of a wireless handheld device and has the flexibility of a personal digital assistant (PDA) in a single device (Frost and Sullivan, 2005). Trigger before developing a smart phone was to comprehend that these smart devices can be used to complement traditional computing systems to access information beyond the usage as digital organizers.

These smart phones were primarily used by small segment of peoples especially business folks and the cellular phone was used as a communication tool connecting individuals with individuals. In spite of thick penetration of cellular phones among the common users, it has attracted relatively less attraction of the researchers. However, much researches have being done on computation centric devices [e.g. Computer Supported Cooperative Work (CSCW)] over decades, but relatively less effort had been made to explore if

‘communication’ centric devices can be effectively exploited for collaborative work.

Gellersen et al. (2005) have investigated various fields of work that involve mobile workers such as sales representatives and repair technicians and observed that Cellular phones were have had a significant influence on task organization and the structure of communication in those fields of work.

We have selected small and middle sized enterprises (SMEs) for our research study especially those where workers are mostly mobile to execute their jobs. There was a good reason to select SMEs as they are the backbone of German economy as they produce 51.1% of the gross national product and contribute to 43.6% of the net investments. These facts strengthen the position of SMEs for their contribution to the economy and their role in emerging new technology and tools.

The objective of our research was to evaluate whether mobile intranet applications:

- can be used to optimize organizational work processes
- can support collaborative work in a group
- can provide work related technical support
- can introduce innovative groupware solution and technology

2. RESEARCH MODEL, RATIONAL AND RESONANCE

Work and organization psychologists researched extensively earlier to understand the phenomenon of effective work design and work processes (Ullich, 1993). The concept presented here does not refer predominantly to the changed quality of human data processing for the regulation of socio-technical consequences of the information and communication technology and further its effect to cognitive structures of human communication and the man-machine-organization. It deals with the possibility of introducing such technology in an organization for the humans working there in particular kind of task, in a way that all the three essential elements (man, technology and organization) might be profited largely. Here, it should not be forgotten that human beings have certain perception, technology limits itself by its capacity and organization has predefined goal to achieve making use of technology and their employee. We believe that it is a value addition to study and understand the interaction aspects of any technology which is used by humans within organizational work environment. Henceforth, We cannot overlook that telecommunication industry is ready for the evolution towards 3G (3rd Generation) & 4G mobile systems such as the Universal Mobile Telecommunication System (UMTS) which will offer much greater access and inter-working flexibility than the current networks.

UMTS will offer much better support for a range of multimedia services and applications for mobile users and end systems.

We conducted a series of intensive sessions with planners and workers separately to capture their views on the use of smart phone at their work place, and to know if it could be useful in different contextual work settings. During our sessions, while demonstrating the features made available in Motorola's Accompli 008 smart phone like drawing pad, note pad and option for downloading application, workers and planners were interested to have application that could be customized according to their needs, such as personal planning, equipment allocation and contract processing to aid efficient working in mobile virtual organization. To achieve this we have selected 10 SMEs, whose typical work processes are illustrated as in figure 1, and proposed alternative mode of executing their daily job while using smart phone connected in mobile intranet.



Figure 1. SMEs Work process.

Listed below are few examples of work process that can be accomplished efficiently using mobile supported collaborative work by a worker:

- Push 'contact list' into worker's mobile phones instead of the worker driving to the central office and collecting the contact list manually. (Benefit - saving time and driving stress)
- Post task completion, worker has the facility to fill the status report at the customer site and send it back to the planner (Benefit: less paper work. Planner will have instant status of work and can plan the resource availability for other tasks)
- Knowing the availability of special equipment needed at the customer site, query for availability, and finally reservation. (Benefit: efficient resource planning)

It was assumed that, all this will help the SME worker in group interaction, minimize the time loss in traveling and enhance planner's

efficiency and effectiveness by ensuring that he has the latest information at all times thus enabling fast, flexible decision-making.

3. Research set-up

We have identified that Apache and Tomcat server along with SQL server could be used to handle the query between smart phones whereas J2ME as programming language for phone interfaces. We have used MySQL database tool and server for building mobile intranet. A typical mobile intranet architecture is displayed in figure 2.

A web based application for head of the unit has been developed and deployed at their respective offices. It contained the following details:

1. Customers and work plan detail,
2. Task allocation and
3. Equipment reservation.

After filling out the customer details, the head of the unit was able to push it to the mobile interface of the worker, who was allocated to perform the respective task.

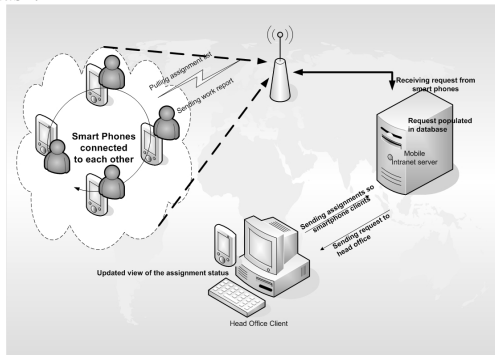


Figure 2. Mobile intranet architecture.

Status of the job was shown in different color and head of the unit was able to plan the workers task immediately based on their availability. Once the workers completed the job, they could enter the task completion details and take consent from customers on the smart phone screen, which they could send back to the planner. Similarly, in case of immediate need of special equipments, workers were able to pull the data showing the place and time of that particular equipment.

4. Ethnographic study

In Flensburg region, there are 24,132 SMEs with 120,000 workers involved in services such as, plumbing, painting, electrical installation and welding. The mode of work is often decentralized, that means, the workers generally perform the duties at customer's site.

Daily routine (SME worker):

- Drive every morning to the respective head office
- Collect a list of task (jobs for customers) for the day
- Driving to the customers site to execute the allocated job
- Report the jobs executed for the day

Dependency: Head of the unit (planner) changes the work plan for the SME worker - he calls the respective worker on mobile phone and informs about changed work plan.

4.1. MOBILE PHONE USE AT WORK

In our survey of 10 SMEs and 120 respondents of Flensburg, we found that typically SMEs in this region have 6 to 100 workers.

On-an-average 360 calls per month per worker are registered in a Small sized enterprise.

- 41% mobile worker using their mobile phone at work where as 44 % were using for both professional and personal use.
- On-an-average 11.40 man days were spent on communication. 91.25 (SD= 18.95) hours spent by caller and receiver in talking with each other on their work related matters.

4.2. DAILY WORK PROCESSES AT SMES

In a typical Small Enterprise, it is a common practice to have about 10 workers. The workers operate in close cooperation with local chamber of small enterprise referred as Handwerkskammer (HWK) (eng. Chamber of craftsman). These workers are trained at the HWK training school in various branches such as, welding, white washing, and plumbing.

For our research, we used ethnographic study to get insight of the daily work routine of the SME worker. Predominantly it was found that:

- The workers are scattered geographically. A few of them live in the CBD/central city, while most of them live in nearby villages.
- Every enterprise has a 'central office' to collect the contracts or to handle the customers query.
- All the workers drive every morning to these central offices to collect the work sheet and then drive to the customer's site to execute the work allotted to them.

- On-an-average a worker commutes for 22.3 km (N=120, SD= 13.5) on work. (Time taken to reach central office and then back home)
- The workers spend an average of 2 hours and 30 minutes (N=120, SD=40.3) on driving from one customer to other customer and spend an average of 4 hours and 21 minutes (N=120, SD= 32.7) in executing their tasks.
- Mostly at customer' site, the workers realize that they require special equipment or machine to perform their tasks. He has to spend time commuting back to the central office and procuring the equipment and then coming back to the customer's site to complete the allocated task. This results in unproductive usage of workers time.
- During our research we noticed that every morning, once the work plans were distributed to the workers, the head of the unit head cannot control the schedules/activities of the workers.

In our discussion with SMEs we found that the introduction of modern information technology tools presents the opportunity for head of the unit (planner) to redefine the work process via mobile or smart phones. Our research focused on the diffusion of mobile telecommunication into the professional life of the worker. We have tried to see the effect of using smart/mobile phones at work place with the emphasis on what effect it has on the organizational decision making process, inter-personal interaction, productivity of work, resource optimization and time management.

From our research, we found that:

- Mobile intranet for 'worker on move' will bring business advantage in their daily work process (e.g. time saving or less paper work).
- Their work task will be easier to perform on smart phone screen (e.g. create work detail and send it to the central office via mobile intranet).

A smartphone can play a key role in:

- Driving employee productivity, by enabling workers to use their time away from the desk and the office more effectively.
- Significantly accelerating workflow by shortening the internal decision process and allowing employees to respond to internal email, voice calls, and voice mail faster
- Enhancing customer satisfaction by shortening the response time to customer inquiries.
- Achieving additional cost savings by reducing or eliminating the need to spend on other hardware devices such as laptops, PDAs or 12-key cell phones
- Moreover, a smartphone brand offering support for open interfaces and a variety of email infrastructures that can be instrumental in enabling third-party developers to create applications that can increase productivity (such as Field Force Management) and offer avenues for new revenues (such as Field Staff Automation) (Neubert et..al., 2001).

The objective of our research was to find answers for the two main questions related to 'experiences' with the mobile intranet applications that supports group/organizational processes i.e.

1. Will the mobile intranet for mobile worker bring advantage in their daily work process? (e.g. time saving or less paper work).
2. Will their work tasks be easier to perform in smart phone screen?

To answer the first question we adopted qualitative analysis technique while asking the participants about their reason of preference. 39 % respondents liked it because it helps them to save time (driving to job and back home, task execution time). 27 % have given preference as it required less paper (almost no paper work) from the workers. 22% were in opinion that it speeds up the whole process from start to completion of the tasks. 12 respondents were found to be inconclusive regarding the use of mobile intranet at work place.

To answer the second question on work task on smart phone screen we tested an application with 3 tasks to be performed. Time taken to complete the task on phone and error committed was recorded for analysis.

A comparison has been made with standard task of non work specific character. We found that workers have taken less time ($M=113$ mins. $SD=17.0$, $N=120$) in completing the task which were designed to represent their work as compared to ($M=156.8$ mins., $SD=18.9$, $N=120$) to the standard tasks performed in smart phone.

Similarly error committed during performing the tasks were less ($M=4$, $SD=1.15$, $N=120$) as compared to standard tasks ($M=7$, $SD=1.7$, $N=120$) performed on smart phone.

5. Conclusion

In our discussion with SMEs we found that the introduction of modern information technology tools presents the opportunity for head of the unit (planner) to redefine the work process via mobile or smart phones.

Our research focused on the diffusion of mobile telecommunication into the professional life of the worker. We evaluated the effect of use of smart/mobile phones at work place with the emphasis on the effect it has on the organizational decision making process, inter-personal interaction, productivity of work, resource optimization and time management. From our research, we found that:

- Mobile intranet for 'worker on move' will bring business advantage in their daily work process (e.g. time saving or less paper work).
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In our research we found that the workers (with a few exceptions like car mechanics) liked the concept of building a collaborative network via mobile virtual organization. Electrical installation and plumbing enterprises have shown great interest in this research idea.

More interestingly we were able to study the interrelationship between Human (as worker), Technology (e.g. smartphone as tool) and organisation (kind of contextual setting) and to identify the change in interaction mode. These elements define a new situation of group interaction where a device which was primarily used for personal leisure, could also be explored at work place with altered objectivity.

We can conclude that adoption of Smartphone as a business tool and Mobile intranet resulted in enhanced productivity at work, better resource optimization, time management and fast and flexible decision making process.

References

- Daten, Zahlen, Fakten: 2006, *Kurz und Kompakt*, [online] at <http://www.hwk-flensburg.de> (retrieved on 13.12.2006)
- Europäische Kommission: 1995, *KMU und Beschäftigung*, in Panorama der EU-Industrie 95–96, Luxemburg 1995, pp. 187.
- Frost and Sullivan: 2005, Treo smartphones drive productivity gains of mobile workers in organizations, yielding quantifiable benefits, White paper on the business benefits of Trio smart phone.
- H. Gellersen et. al. (eds): 2005, in *ECSCW 2005: Proceedings of the Ninth European Conference on Computer-Supported Cooperative Work*, 18-22 September 2005, Paris, France, pp. 247–264.
- Neubert, R., Langer, O., Görlitz, O., and Benn, W.: 2001, Virtual enterprises: challenges from a database perspective, in Proceedings of the Workshop on information Technology for Virtual Enterprises, ITVE, 13, *IEEE Computer Society*, Washington, pp.98-106.
- Ulich, E.: 1993, CIM- eine integrative Gestaltungsaufgabe im Spannungsfeld von Mensch, Technik und Organisation, in G. Cyranek and E. Ulich (Ed.), CIM- Herausforderung an Mensch, Technik, Organisation, VDF Verlag, Zurich
- Smythe, J. S. (ed.): 1990, *Applications of Artificial Intelligence to Communication*, CMP and Springer-Verlag, Berlin, pp.29-43,