Association for Information Systems
AIS Electronic Library (AISeL)

BLED 2004 Proceedings | BLED Proceedings

12-31-2004

The Transition From E- To M-Business Chances And Challenges For Enterprises

Katarina Stanoevska-Slabeva
The University of St.Gallen

Follow this and additional works at: http://aisel.aisnet.org/bled2004

Recommended Citation
Stanoevska-Slabeva, Katarina, "The Transition From E- To M-Business Chances And Challenges For Enterprises" (2004). *BLED 2004 Proceedings.* Paper 48.
http://aisel.aisnet.org/bled2004/48

This material is brought to you by the BLED Proceedings at AIS Electronic Library (AISeL). It has been accepted for inclusion in BLED 2004 Proceedings by an authorized administrator of AIS Electronic Library (AISeL). For more information, please contact elibrary@aisnet.org.

17th Bled Electronic Commerce Conference

eGlobal

Bled, Slovenia, June 21 - 23, 2004

The Transition From E- To M-Business Chances And Challenges For Enterprises

Katarina Stanoevska-Slabeva

The University of St. Gallen, Switzerland
Katarina.Stanoevksa@unisg.ch

Abstract

Mobile technologies and m-business are considered as the next innovation potential for organizations. They provide an additional communication and transaction channel, that can be applied to enhance existing e-Business applications. However, while during the mobile hype in the years 1999-2000 there were many visions how mobile technologies can provide benefits to companies, the challenges and necessary prerequisites related to the application of mobile technologies have been hardly addressed in literature. This paper tries to contribute to fill the gap and provides, an overview of application areas and challenges of m-business for organizations. The overview is created based on a broad literature review of published essays, cases and experiences.

1 Introduction

With the introduction and maturing of both ubiquitous computing and broadband wireless technologies such as (Universal Mobile Telecommunications Systems) UMTS and Wireless local area networks (WLAN) the Digital Economy is expected to be enriched with a new data communication and transaction channel. Mobile technologies are extending the reach of Internet to a true "anywhere, anytime, anyone" and even anything communication channel. This is enabled by the convergence of wired and wireless technology as well as through the specific features of mobile technology as for example the personal character of mobile devices, the ability to localize users wherever they are, and the ability to extend communication to objects and machines.

Given the described innovative features of mobile technologies, they are considered as the next innovation potential for organizations. They enable efficient processes, creation of new, innovative products and the establishment of new communication channels to customers and business partners.

However, while during the mobile hype in the years 1999-2000 there were many visions how mobile technologies can provide benefits to companies, the challenges and necessary prerequisites related to the application of mobile technologies have been hardly addressed in literature. Similar to the beginning of e-business there are a lot of questions that need to be answered in order to assure a successful implementation of mobile technologies. Examples of such questions are: How might the mobile communication channel both influence and coexist with already existing channels? What are the necessary prerequisites to apply mobile technologies, i.e. how can the readiness for mobile applications be assessed? Concepts, guidelines and methodologies for a structured development of answers to such questions are not available yet.

This paper tries to contribute to fill the gap and provides, an overview of application areas and challenges of m-business for organizations. The overview is created based on a broad literature review of published essays, cases and experiences.

The content of the paper is structured as follows: First in section two mobile technologies are defined, classified and their distinguishing features are described. In section three the term m-business is defined and its components are identified. In section four the potentials and challenges of mobile technologies are described. Section five provides an overall summary of the challenges to enterprises.

2 Mobile Technologies - Definition, Classification And Features

Under the term mobile technologies we intuitively understand wireless communication and mobile end devices. In literature in many cases under the umbrella term mobile technologies, different kind of technologies and applications are discussed such as for example mobile communication, mobile data services, ubiquitous computing etc. In general all the terms refer to one common feature - wireless communication. Likewise, the term mobile technologies is defined in this paper as any kind of basic technology that enables wireless communication.

Basic components of mobile technologies are: wireless transmission technologies and protocols, such as Bluetooth, UMTS, WLAN, and different kind of end-devices specifically designed for wireless communication. Such end-devices are for example mobile phones or personal digital assistants (PDA) and in the case of machine-to-machine communication this could be any object equipped with special chips enabling wireless communication. Well known examples of such chips are Remote Frequency Identification (RFID) tags. RFID tags are small chips capable of recording and storing data and of communicating with other networked objects. Things equipped with RFID tags are called intelligent things or products. Under the term mobile technologies therefore, also ubiquitous computing, i.e. environments where objects are able to communicate with other networked objects and are able to store information (Norman 1998), is subsumed.

Mobile technologies enable three types of wireless communication:

- person-to-person communication, which could be mobile voice or data communication,
- person-to-machine (object) communication, which refers to the wireless communication of persons either to servers in order to retrieve and store data or to other intelligent things, and

- machine-to-machine, i.e. object-to-object communication that is also known under the term ubiquitous computing.

Compared to the Internet, mobile technologies at the current stage of development have some disadvantages and some advantages (see also Kannan et al. 2001). The disadvantages result on the one hand from the small screens and keypads of mobile devices, on the other hand from their limited memory and computing power. The specific features of mobile end devices limit the size of information that can be displayed on the mobile screen, make data input difficult and uncomfortable, and do not allow for complicated processing on the client side.

The disadvantages of mobile technology described above are balanced by the following unique advantages compared to wired Internet (see also Müller-Varese 1999; Lehnert 2002):

- *Ubiquity* – The small size of end devices allows users to carry these with them always at any place. This applies also for things with attached or embedded RFID tags.
- *Identification* - Each person or thing capable of wireless communication can be identified either based on the registration with the mobile operator or through the information of the attached RFID tag.
- *Localization* – Each mobile device or intelligent object can be located by mobile operators or by using other positioning technology (see for example Kaasinen 2003 or Dao et. al. 2003). This feature offers unprecedented possibilities for innovative location-based services.
- *Immediacy* - The ubiquitous availability of communication allows for spontaneous action and reaction to arising requests and needs.

In summary, mobile technologies have compared to Internet less richness and expression possibilities but a greater reach (see also Vihinen and Tuunainen 2002). For example existing online electronic product catalogs present products extensively in multimdial and interactive form. When represented on mobile devices only a small portion of the same online catalog can be displayed. Then again a wired personal computer is required to access online catalogs, while to access mobile condensed catalogs a mobile phone is sufficient. Compared to a personal computer, the mobile phone is cheaper and enables access from everywhere. The example shows that, mobile technology and Internet can complement and enrich each other. The limited expressiveness of mobile technology can be lowered through complementary Internet applications that could set the broader context for the mobile application. At the same time an additional mobile channel for existing Internet applications could increase their reach to a real "anytime, anywhere, anyone and anything" communication.

2.1 Mobile Business - Definition And Classification

The specific relationship of mobile and Internet technology described above can be observed also on the application level among e- and m-business. Many companies have already established e-business applications and the mobile communication channel is seen as an additional channel that needs to be positioned in relation to the existing channels. Against this background, in literature m-business is defined basically in analogy to e-business (Kemper and Wolf 2002).

The prevailing definition for e-business defines it, as the integration of systems, processes, organizations, value chains, and entire markets using Internet-based and related technologies and concepts. Correspondingly m-business is defined as a collection of mobile technologies and applications used to support processes, value chains and entire markets using wireless technology (see also Lehner 2002).

Existing applications in e-Business can furthermore provide a starting point for the identification of the components of m-business. According to Shaw (2000) "*The core of an e-business are three-fold: supply-chain management, back-office support and customer relationship management. These three main lines of functions are integrated and coordinated through infrastructure management, knowledge management and channel management*". The backbone of e-business is the enterprise resource planning (ERP) system, which integrates business processes and enables enterprises to quickly respond to customer orders, consumer demand and market opportunities (Shaw 2000). Correspondingly the main components of m-business can be identified as follows (c.f. 1) (see also Berger et al. 2002):

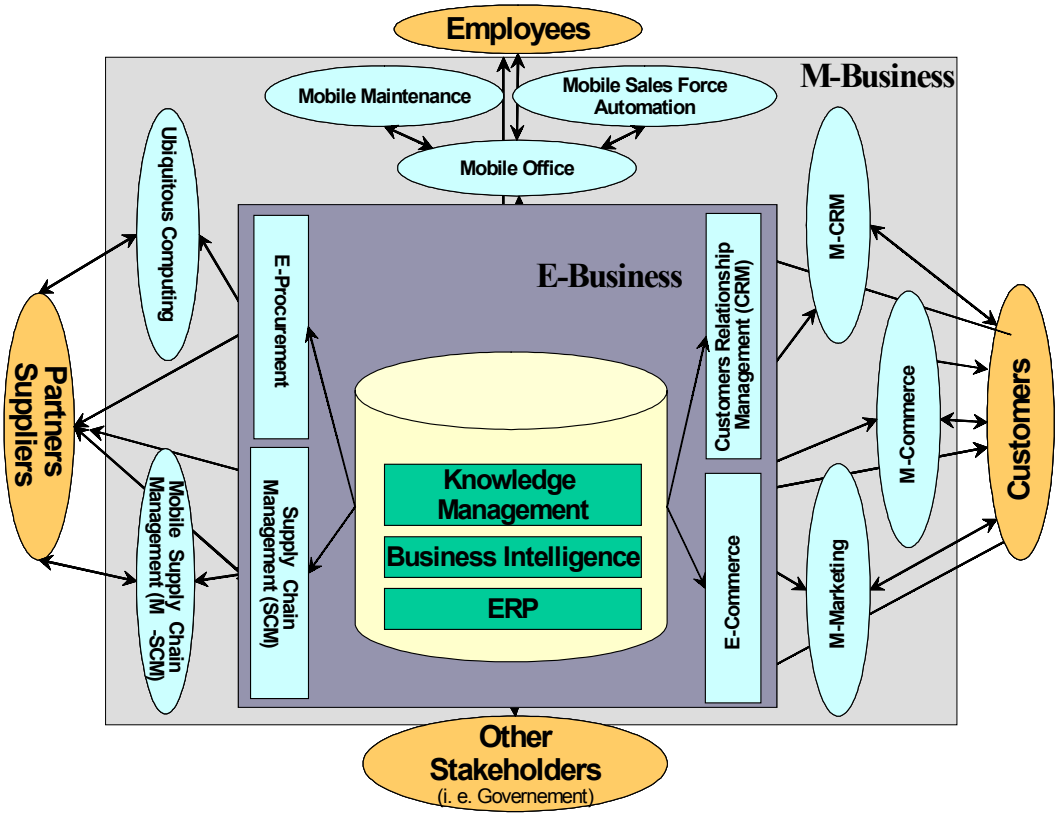

Figure 1: *Overview Of Possible Application Areas For Mobile Technologies In Enterprises And Their Relationships Eo E-Business Applications*

- Mobile Supply Channel Management (SCM),
- Mobile Customer Relationship Management (CRM),
- Mobile Commerce (m-commerce),
- Mobile Applications for employees.

In summary we can say that m-business can be viewed as an additional channel for e-business. However, this does not mean that approaches to the development of e-business

applications can be applied to the development of m-business applications without adaptation (Shih and Shim 2002; Zhang and Yuan 2002). Even though m-business can draw on experiences made in e-business it requires special treatment and guidelines due to its unique and differentiating features, which are the source for specific challenges to organizations. In the next section the potentials and challenges of each component of m-business will be described.

3 Challenges Of M-Business For Enterprises

This chapter provides an overview of chances and challenges of mobile technologies for different parts of m-business.

3.1 Challenges Of Mobile Supply Chain Management

"Supply chain management is the integration of the key business processes from suppliers through to the end user that provides products, services and information that add value. Inter- and intra-organizational communication and cooperation focused on a specific set of customer-centered activities, designed to enhance success for all chain members are at its center." (Tracey and Smith-Doerflein 2001). SCM in particular involves customer-oriented coordination of material, information, and financial flows among participating enterprises in a supply network (Kalakota and Robinson 2001).

The concept of supply chain management evolved as an answer to the increased pressure of the market on companies for customer orientation and individualized products. In accordance with (Kärrkäinen and Holmström 2002), the requirements upon supply chain management can be summarized as follows:

- fast and efficient handling of differentiated material, information and financial flows,
- efficient customization, i.e. ability to effectively produce and deliver products that meet customers' individual needs,
- control of production and logistics accurately and flexibly across multi-company networks.

Supply chain management is therefore required to support the transition of supply networks from a capacity-based production planning and control to a sense- and -response model that concentrates on respond to customer orders and market demands and tries to force them through the whole supply network (Shaw 2000).

Internet-based SCM applications have enabled a coordination of processes in particular by speeding up the information flow and enabling collaborative planning and knowledge exchange beyond company borders. However, in many cases SCM just automated exchange of already available information, but many physical activities part of the supply chain that are related to handling of products and parts remained manual and needed physical entrance of data into the SCM system (Chris and Fleisch 2004). For example the arrival of a track send by the supplier to his partner can then be recorded in the system and made available as information for all companies involved, when the load of the track is checked, counted and recorded manually. The physical activities result in media-breaks and time consuming processes. In addition, the granularity of the exchanged information

remained in many cases suitable for mass products and did not allow an individual handling and tracking of products and parts, which would be a necessary prerequisite for the provision of individualized products.

Mobile technologies can be applied to overcome some of the drawbacks of current SCM. WLANs can be used to cover all office and storage spaces with a seamless communication infrastructure. Employees responsible for handling of incoming parts can furthermore be equipped with mobile devices enabling wireless digital recording from everywhere in the company. Such an approach will certainly result in saved time and greater efficiency, but the manual handling and the high level of aggregation of data will remain. Greater innovation potential is expected from ubiquitous computing and RFID technology. The RFID technology enables efficient item level supply chain management by attaching the control information to the product and by enabling an automated and wireless identification of products or parts without physical handling (Kärkkäinen and Holmström 2002). Thus, RFID technologies automate information collection and can speed up the management and flow of information. The resulting benefits are faster and more accurate processes with respect to the information involved.

The great potential of RFID technologies is faced with great challenges for their successful implementation. The application of RFID tags requires considerable changes in the involved processes on the technical and conceptual level. The major challenges on the technical level are (see also Woods 2004):

- RFID tags are still widely an unknown and immature technology. There are little larger scale applications and projects in practice yet and thus very little practical experience is available.
- Missing standards, i.e. different classes of tags and different standards for object identification make investment decisions difficult and risky.
- Existing processes of data collection and distribution need to be adjusted so that they can incorporate activities related to automatic wireless data collection from objects. Data models, the processing of data as well as the dissemination of data need to be adjusted towards input data with greater granularity. New procedures related to tag writing and reading need to be built-in into the information processing activities.
- The interfaces of RFID to the remaining part of the enterprises' information infrastructure need to be clearly defined. For example in order for suppliers to be able to individually mark products, they need additional information to which order each part relates, so that they can mark the part or product in a right way and that during composing of individual products the respective individual parts can be identified. The same information might furthermore be relevant for CRM and for employees responsible for maintenance of the product.

On the managerial and conceptual level the following challenges arise (see also Kärkkäinen and Holmström 2002; Woods 2004):

- Existing processes need to be redesigned and adjusted so that physical activities can be replaced by automated data entry and management.
- RFID technology might change the division of tasks within processes among the involved companies. RFID based processes might require a redefinition of responsibilities and an identification of new interdependencies on information from each other. Closely related to these problems is also the question of division of the high investments among the involved companies.

- Powerful suppliers can dominate and determine the market, i.e. they can determine proprietary standards, but this may not be favorable for the remaining partners in the supply network.
- Identification of relationships and interfaces to other systems of the involved companies in the supply network as for example collaborative planning or the CRM systems of the involved companies.

3.2 Challenges Of Mobile Customer-Oriented Applications

There are many different definitions for Customer Relationship Management in literature. In most cases it is considered as a business strategy and management approach for an integrated and active management of relationships with customers (Kalakota and Robinson 2001; Gebert et al. 2003). CRM is enabled through enterprise-wide applications that allow companies to store and process knowledge related to every aspect of their relationship with customers. The stored customer knowledge is used to serve the customer in an individual way and to build lasting relationships. Among others CRM systems support campaign management, lead management, offer management, complaint management, service management, and opportunity management (Gebert et al. 2003).

Mobile technologies add an additional channel for communication with the customer that enhances existing communication channels. A particular advantage of the mobile channel is the individual character of mobile devices, the possibility to localize customers anywhere, and to provide information at the point of need and consumption. These advantages enable innovative alerting services and mobile marketing.

Main innovation based on mobile technologies are expected in the area of marketing. In fact a new type of marketing is emerging through the mobile communication channel which is called mobile marketing. "Mobile Marketing means in a broad sense the delivery of promotional advertising based on mobile messaging." (Kavassalis et al. 2003). The main advantages of mobile marketing are: high-speed message delivery, interactivity, individual customer reach and according to first experiences a high response rate - higher than direct mail and other direct marketing activities (Kavassalis et al. 2003).

First published experiences about mobile communication and available customers surveys revealed the following challenges:

- Mobile marketing is basically a complementary channel to other channels. In many cases a traditional medium is needed to set the context for the mobile marketing activities. This could be an Internet application, a paper-based medium or even the product itself containing an invitation for participation. Companies need to carefully design the relationship among such applications and to define cross-media communication and marketing strategy.
- Up until now there is little knowledge about the user's behavior and the users' receptiveness to mobile advertising. It is likely to be influenced by their location, time of day, day of week, week of year, and so on (Barnes and Scornavacca 2003). While response rates are higher compared to traditional direct marketing

[1] This table has been compiled in April 2003 using WISPs web sites (www.air2web.ch, www.monzoon.ch, www.swisscom-mobile.ch, wlan.thenet.ch, www.myotis.ch) and hotspot directories (e.g. www.hotspot-locations.com, www.swisshotspots.ch and www.802-11b.ch).

[2] Interview with Philippe Noth, person in charge for medical applications,www.chuv.ch

activities in the first marketing campaign - little is known about the reaction of the user on repeated campaigns and upon reception of the same messages several times.

- Another unknown fact related to mobile marketing is the privacy sensitivity of customers and the number of messages that is considered as acceptable by customers.
- A special challenge is the necessity to adjust messages to the limited possibilities of mobile devices. For example how can an individual and compelling message be defined within a limit of 160 characters available in one SMS?
- Due to the individual character of mobile devices, a high degree of personalization is an important critical success factor (Barns and Scornavacca 2003).

In summary first experiences show that there is great potential for mobile communication, but the mobile communication channel imposes in general new challenges on the management of customer knowledge. On the one hand additional customer knowledge is required starting from the obvious need to collect the mobile phone numbers of existing customers up to acquiring and storing knowledge about the different contexts in which customers are receptive for messages. On the other hand a careful recording of already provided messages and contacts needs to be established. The tracking of the customer through different media and contexts will be a major challenge to CRM as well. The tracking of both individual orders and the specific products and parts related to them across the supply chain poses another challenge.

In the future, with increased maturity of ubiquitous computing it might be expected, that communication towards customers will be extended to products and intelligent customer environments. For example an advertising poster might in the future include a RFID tag providing additional information or for example the product number with which the product can be easier ordered with a mobile device. Another example might be intelligent products, that take over part of the communication with the customer for example by reporting problems automatically. In general all this means that the concept of "customer contact" and "customer relationship" is changing. It does not only involve person-to-person communication but also any kind of object-to-person and object-to-object communication. Customer relationship management will evolve to customer and product management with many more elements compared to current solutions.

3.3 Potential And Challenges Of Mobile Commerce

M-commerce was the application area of mobile technologies, that attracted most attention in literature. In analogy to e-commerce (see for example Kalakota and Whinston 1996) it *"...denotes the transaction oriented part of mobile business towards the end customer"* (Lehner 2002), and is defined as buying and selling of information products and services over wireless networks.

The potentials of mobile commerce have been broadly published in the literature (Müller-Varese 1999; Balasumbramanian et al. 2002; Kannan et al. 2001; Stafford and Gillenson2003) and can be summarized as follows:

[3] Interview with Mathias Berger, currently responsible for WLAN at Zurich Airport

- Location and context-based services (Dao et al. 2002),
- Potential to individual pricing,
- Provision of buying opportunities at the place of need and consumption,
- Support for spontaneous buys from everywhere.

Despite of the potentials, first experiences and consumer surveys showed that there are considerable differences compared to e-commerce (see also Akhgar et al. 2002):

- Due to the specific features of mobile technology, different patterns of usage of the mobile communication channel can be observed. According to (Zobel 2001; Baldi and Pyu-Pyu Thaung 2001) the differences concerning Internet access and usage can be summarized as follows: the typical usage of mobile applications is short and lasts often less then 5 minutes, and the usage is performed in niche times in many cases with the aim to kill unproductive time (for example during waiting for a bus). Given this only those m-commerce applications can be successful that provide immediate access to relevant information and immediate added value. Consequently such usage patterns require efficient buying processes, the so called "3-click-processes" (Stanoevska-Slabeva 2003).
- The limited expressiveness of the technology requires highly personalized offerings up to the specific individual needs.
- The mobile transaction channel is in competition to already existing off- and on-line transaction channels. M-commerce can therefore mainly be successful in situations where it provides clear added value compared to the competing more convenient and familiar transaction channels. Such specific situations where mobile buying provides added value compared to off-line and online selling channels can be summarized according to (Acker and D'Incau 2002) as follows: time critical situations, spontaneous decisions and needs, entertainment needs and efficiency increase compared to the other channels.

The specific features of m-commerce result in considerable challenges to enterprises on the managerial and technical level. On the managerial level the following challenges can be identified:

- Companies need a right understanding of the potentials and specific features of mobile technologies, so that visions for innovative solutions can be developed and assessed.
- Identification of the processes and products that provide added value to the customer when offered through the mobile channel and their relationship to existing applications.
- Definition of a clear multi-channel strategy and provision of a clear answer to the question how the mobile channel relates to the existing channels.
- Management furthermore needs to understand the relationship and implications of m-commerce to the remaining information processing infrastructure as for example CRM and SCM.

On the technical level the following challenges can be identified:

- identification of interfaces of m-commerce and other applications in the company on the technical level,
- adaptation of content to different types of end devices,

- enhancement of the existing infrastructure with a mobile middleware and gateway,
- development of special know-how related to usability (Sun 2003) and interface design for mobile applications,

development of security concepts for mobile access to the enterprise information infrastructure.

3.4 Challenges Of Mobile Applications For Employees

E-Business components as Intranets and knowledge management have paved the way to empowerment of employees with knowledge, to new patterns of information sharing among employees as well as to new ways of remote working known as teleworking. A common feature of such applications is that they are centered around a wired desktop computer that provides a convenient access to available information. Even though they provide some advantages for mobile workers as well, for example through an easier access to information, mobile processes remained mostly untouched from the digitalization initiatives of e-business. One major reason for that, is that mobile processes take place away from desktop computers and the enterprise.

In order to understand the potential of mobile technologies for mobile processes, first the different kind of mobility in enterprises need to be identified. According to (Luff and Heath 1998) three different types of mobility in enterprises can be distinguished:

- micro-mobility, which refers to the mobility of documents in an office environment for various purposes around a relatively circumscribed, or 'at hand' domain (one example of micro-mobility is the mobility of a document that is looked at during a conversation).
- local mobility that refers to the mobility of employees between rooms, floors and buildings around their stationary office
- remote mobility, which refers to employees that work remotely away from the offices and communicate with each other through technology.

Mobile technologies can support all types of mobility. For local mobility for example WLAN and Bluetooth as well as specific mobile devices have proven helpful. An example is the already mentioned digitalization of data collection within the SCM, where the responsible employee can record the incoming products and parts with the help of a wireless device. In the future it is expected that connectivity will go beyond access to the enterprise data. It is expected that offices will provide information spaces including machines and things, that can sense and deliver information according to the specific needs (see for example Thayer and Steenkiste 2003). For example by entering a room all available devices connect with the devices of the employee, who just entered the room and start to deliver and exchange information.

Most challenging is the support of remote mobile employees (Lyytinen and Yoo 1001). According to the different tasks we can distinguish two types of mobile forces: mobile sales force and mobile maintenance and support force. Both types of mobile forces have some common and some different requirements upon technology. The common element is the necessity to have access to the basic administrative data as agenda, timetable, e-mail and similar. In addition to that sales persons need information about customers and products while mobile maintenance forces need information about the specific product

that needs to be repaired, the product history, and in many cases access to repair manuals and experts of the company. In depth analysis of mobile work processes reveals, that mobile employees have specific requirements upon knowledge management. They usually have scheduled several customer visits a day. Many details of the customer needs or problems become often clear and concrete during the conversation with the customer. In such a situation the mobile employee does not have time to browse through data- and knowledge bases. He needs the relevant knowledge immediately and in a suitable form. Thus, mobile processes require a task- and context aware supply of knowledge (see for example Grimm et al. 2002; Lehnert 2002 and Fagrell et al. 1999). Due to the limitations of mobile devices, knowledge needs to be bundled and adapted furthermore according to the possibilities of the end devices (Fagrell et al. 1999 and Fagrell 2000).

Currently emerging applications related to mobile forces are summarized under the term mobile force automation and basically include functionality necessary for remote access to office information, while the supply of relevant knowledge for knowledge workers is not covered yet. Effective support of mobile workers with knowledge that goes beyond mobile access to office information, imposes challenges on the managerial and technical level. On the managerial level challenges can be summarized as follows:

- Management needs to be aware of the specific features of mobile technologies in order to be able to develop visions for new processes.
- The application of mobile technologies and the automation of mobile forces requires a considerable redesign of existing processes.
- Mobile force automation might change the working culture and responsibility of workers and needs to be accompanied with extensive change management measures.

Challenges on the technical level can be summarized as follows:

- Identification, storage and processing of task-context of mobile workers;
- Providing interfaces for inclusion of machine-to-machine communication for example with products that need to be repaired;
- Task-centered knowledge bundling and adaptation of existing content;
- Development of security concepts for mobile access to the enterprise infrastructure as well as related to the management of end devices;

Identification and development of interfaces to CRM and management of product knowledge.

[4] Interview with Thomas Kern, Head of Product Management “Business”

[5] Interview with Ezra Stein, Marketing of Broadband Services Sunrise Mobile

[6] Interview with Matthias Koch, CEO Monzoon Networks AG

[7] Interview with Patrick Winkler, founder of NetAir

[8] Interview with Jean-Christophe Heger, founder of the Myotis association

4 Summary Of Challenges Of M-Business For Enterprises

In the above sections the main challenges that need to be addressed by enterprises were presented for the different components of m-business separately. This section provides an integrated view on the challenges. From the enterprise point of view, we can summarize the challenges in three categories: Challenges on managerial level, on social level, and on the technical level. The challenges on the managerial level can be summarized as follows:

- Development of understanding for the specific features of mobile technologies and in particular their relationships to already existing applications,
- Development of visions for new innovative processes and products,
- Development of understanding for possible implications upon relationships with employees, customers and business partners,
- Change management and process redesign.

The challenges on the social level basically relate to privacy issues of mobile technologies and to the change of working culture (see for example Allen 2003). In addition to that an important aspect are legal considerations (see for example Pitkönen et al. 2003).

On the technical level the following challenges can be identified:

- In order to realize the benefits a more individualized and modular data collection will be necessary as well as special approaches for presenting information in a suitable form for end devices.
- Machine-to-machine communication needs to be considered as a possible option in the design of those applications related to products and in particular related to product handling. This is increasingly important not only for mobile supply chain management but also for customer applications (see for example the intelligent super store).
- Provision of the available information in different formats and contexts, which again leads to new content and knowledge management solutions.
- Provision of intelligent communication spaces for employees and customers as well as interface design for such spaces.
- Extension and application of existing security concepts and solutions to the mobile channel.

A major challenge of m-business is however the integration of the various components into an integrated solution. Even though each of the applications can provide considerable benefits for the specific business processes, major benefits can be achieved through an integrated usage. For example how can the more detailed information available through RFID technology be transferred and made visible in the final product. A practical scenario, where this might be relevant is the following: Due to the many food processing scandals, the consumer of meet wants to know where the respective animal was born, how it has been transported, and similar. Another example is the need to synchronize information flow related to individual and highly customized orders. Namely, a customized individual order gets its identification when the customer presses the buy button and needs to be passed through the inter-company information infrastructure all along to the suppliers, it needs to be assigned to the individual products and parts relevant for that offer and presented on request to the customers or employees responsible for the order or for further handling of the product and customer. In general, information

stemming from one application can be transformed to useful customer, employee or process input information of another application. In order to achieve integrated solutions we first need to develop awareness for the interdependences of the different mobile applications and we need solutions on a technical, process, product, strategy and communication level.

All the presented applications and scenarios, are in their infancy stages. However they demonstrate the great potential for improvements of processes and for innovation in enterprises. In the future mobile technology will converge with Internet technology and play an important role. However, their successful implementation depends on the right understanding of their implication not in a limited application area, but for all processes in the organization and its relationships to the various stakeholders - customers, employees and business partners. In general relationships will be on a more detailed level, with many different aspects. The overall implication of mobile technologies needs to be taken in consideration in research as well (see Lyytinen and Yoo, 2001)

Acknowledgement

The work presented in this paper was supported by the National Competence Center in Research on Mobile Information and Communication Systems (NCCR-MICS), a center supported by the Swiss National Science Foundation under grant number 5005-67322.

References

Akhgar B, Siddiqi J, Foster M, Siddiqi H, Akhgar A (2002): Applying Customer Relationship management (CRM) in the Mobile Commerce Market". In: Proceedings of the International Conference on Mobile Computing.

Allen J.P. (2003). The Evolution of New Mobile Applications: A Sociotechnical Perspective. In: International Journal of Electronic Commerce, Vol. 8 No. 1, pp. 23-36.

Anckar B, D'Incau D (2002). Value-Added Services in Mobile Commerce: An Analytical Framework and Empirical Findings from a Nationals Consumer Survey, Proceedings of the 35th Hawaii International Conference on Systems Sciences.

Balasubramanian S, Peterson R. A., Jarvenpaa S.L (2002): Exploring the Implications of M-Commerce for Markets and Marketing. In: Journal of Academy od Marketing Science, Vol. 30, No. 4, pp. 348-361.

Baldi, St & Pyu-Pyu Thaung, H (2001), 'The Entertaining Way to M-Commerce: Japan's Approach to the Mobile Internet – a Model for Europe?' in *Electronic Markets-International Journal of Electronic Commerce and Business Media*, Vol 12(1), 6-13, 2001/02.

Barns S. J, Scornavacca E (2003): Mobile Marketing: The Role of Permission and acceptance. In: Giaglis G. M, Wrthner H, Tschammer V, Froeschl, K. a (Eds.): The Second International Conference on Mobile Business, Österreichische Computer Gesellschaft, Druckerei Riegelnik, Wien. pp. 153 - 163.

Berger S, Lehmann H, Lehner F. (2002): Mobile B2B Applications - A Critical Appraisal of Their Utility. In: Proceedings of the First International Conference on M-Business, Athens, 2002.

Christ O, Fleisch E. (2004): Ubiquitous Computing - Betriebswirtschaftliche Potentiale geerdeter Informationssysteme. In: Stanoevska-Slabeva K (Edt.): Digital Economy - Anspruch und Wirklichkeit. To appear in June 2004, Springer, Heidelberg, pp. 443-457.

Dao D, Rizos Ch, Wang J (2002): Location-based Services: Technical and Business Issues". In: GPS Solutions, (2002), No. 6, pp. 169-178.

Fagrell H, Johannesson E (2000): Newsmate: Knowledge Management for Mobile Journalists. In: Proceedings of IRIS 23.

Fagrell H, Ljungberg F, Bergquist M (1999): Exploring Support for Knowledge Management in Mobile Work. In: Proceedings of ECSCW 99, Kluwer Academic Press, Copenhagen Danmark, pp. 259-269.

Gebert H, Geib M, Kolbe L, Brenner W (2003): Knowledge-Enabled Customer Relationship Management. Integrating Customer Relationship management and Knowledge Management Concepts. In: Journal of Knowledge Management, Vol. 7, No. 5, pp. 107-123.

Grimm M, Tazary M. R., Balfanz D (2002): Towards a Framework for Mobile Knowlege Management. In: Proceedings of the 4th International Conference on Practical Aspects of Knowledge Management - PAKM 2002. Vienna, Austria, December 2-3, 2002. LNCS, Springer.

Kaasinen E (2003): User needs for location-aware mobile services. In: Personal and Ubiquitous Computing, Vol. 7, No. 1, 2003, pp. 70-79.

Kalakota R, Whinston A (1996): Frontiers of Electronic Commerce, Reading, MA, Addison-Wesley.

Kalakota R, Robinson M (2001): e-Business 2.0. Addison-Wesley, Upper Saddle River, NJ.

Kannan P. K, Chang A, Whinston A (2001): Wireless Commerce: Marketing Issues and Possibilities, In: *Proceedings of the 34th Hawaii International Conference on System Sciences*.

Kavassalis P, Spyropoulou N, Drossos D, Mitrokostas E, Gikas G, Hatzistamatiou A (2003): Mobile Permission Marketing: Framing the Market Inquiry. In: International Journal of Electronic Commerce, Vol. 8, No. 1, pp. 55-79.

Kärkkäinen M, Holmström J (2002): Wireless Product Identification: Enabler for Handling Efficiency, Customisation and Information Sharing. In: Supply Chain Management: An International Journal, Vol. 7, No. 4, pp. 242-252.

Kemper, H.G, Wolf E (2002): Interactive Process Models for Mobile Application Systems: A Framework. In: Proceedings of the 23th International Conference on Information System, pp. 401-413.

Lehner F (2002): Mobile Business und mobile Dienste (3. Aufl.), Arbeitsbericht Nr. 49 Schriftenreihe des Lehrstuhls für Wirtschaftsinformatik III, Universität Regensburg, http://www-mobile.uni-regensburg.de/publikationen.html [Viewed 12.06.2002].

Lehner F (2002a): Mobile Knowledge Management. In: Hartmann D (Hrsg.): Geschäftsprozesse mit Mobile Computing, Vieweg Verlag, pp. 153-172.

Luff P, Heath Ch (1998): Mobility in Collaboration. In: Proceedings of CSCW'98, ACM Press, pp. 305-314.

Lyytinen K, Yoo, Y (2001): The Next Wave of Nomadic Computing: A Research Agenda for Information Systems Research", Sprouts: Working Papers on Information Environments, Systems and Organizations, Vol 1, Summer. http://wheatheare.cwru.edu/sprouts/2001/010301.pdf

Norman, D.A. (1998). *The Invisible Computer*, MIT Press, Boston.

Müller-Varese, F (1999): *Mobile Commerce Report*, Durlacher Research Ltd., London (www.durlacher.com).

Pitkönen O, Mäntylä M, Välimäki M, Kemppinen J (2003): Assessing Legal Challenges on the Mobile Internet. In: International Journal of Electronic Commerce, Vol. 8 No. 1, pp. 101-120.

Shaw M.J. (2000): Building an E-Business from Enterprise Systems. In: Information Systems Frontiers, Vol. 2; No. 1, pp. 7-17.

Shih G, Shim S (2002): A Service Management Framework for M-Commerce Applications, In: Mobile Networks and Applications, vol 7, 2002, pp. 199-212.

Stafford Th. E; Gillenson, M.L. (2003): Mobile Commerce: What It Is and What It Could Be. In: communication of the ACM, Vol. 46, No. 12, pp. 33-35.

Stanoevska-Slabeva (2003): Towards a Reference Model for M-Commerce Applications. In: Proceedings of the ECIS 2003 conference.

Sun J (2003): Information Requirements Elicitation in Mobile Commerce. In: Communication of the ACM, Vol. 46, No. 12, pp. 45-47.

Thayer S. M. and Steenkiste (2003): An Architecture for the Integration of Physical and Information Spaces. In: Personal and Ubiquitous Computing, 2003, No. 7, pp. 82-90.

Tracey M, Smith-Doerflein K.S. (2001): Supply Chain management: What Training Professionals Need to Know. In: Industrial and Commercial Training, Vol. 33, No. 3, pp. 99-103.

Vihinen J, Tuunainen V.K. (2002): Mobile Business: Channel Capabilities and Requirements. In: Proceedings of the First International Conference on Mobile Business.

Woods J (2004): How to Respond to Wal-Mart's RFID Requirements?. Gartner , Inc. 2004.

Zhang J.J, Yuan Y (2002): M-Commerce Versus Internet-Based E-Commerce: The Key Differences. In: Proceedings of the Eight Americas Conference on Information Systems.

Zobel, J (2001), *Mobile Business und M-Commerce*, München, Wien, Carl Hanser Verlag.