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FURTHER QUESTS FOR VALUE-ADDED PRODUCTS & SERVICES IN MOBILE COMMERCE

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ABSTRACT

The introduction and the development of m-commerce will be a major challenge, as the cost of 3G licenses in several EU countries appears already in the initial stages to be out of proportion. And it seems clear that without real substance in m-commerce products and services the investments in the new mobile technology may still fail.

Yet, not much is known about what actually will be the m-commerce products and services. Here we will propose to build them around value-added product and service modules, some of which are going to be completely new as we can take advantage of the new mobile technology.

We will argue that value-added products and services can (should) be built around smart/intelligent technologies, which would be part of the products and/or services themselves or form support systems for (i) the users, (ii) the producers and (iii) the management of m-commerce products and services. Some of the needed technologies are already available, and we can readily implement them for the coming prototypes of the new 3G-based systems.

Index: mobile commerce, value-added products & services, intelligent information technologies

1. M-COMMERCE

Although m-commerce is an emerging field in its early stages there are a number of ideas of what is going to constitute the key success factors for the actors in the global m-commerce arena (the material for these factors have been collected from [Durlacher Research, BroadVision, Vignette, Nokia and TechNews]).

The key success factors include:

1. Customer ownership. Subscriber data may be key to the m-commerce market, which is shown by the recent boom in operator takeovers in the mobile industry. The user's personal data and preferences are the key if we want to find ways to add value to the user's experience. Nevertheless, questions can be raised if customer ownership is any better than a quickly shifting mirage as customers may change product and service providers very easily and without giving any notice.
2. Personalization. This is a key feature, which can be achieved by creating services that customise the end-user experience for the individual subscriber. It can be further enhanced if we add intelligent personalization platforms, which will optimise the interaction path for individual subscribers.
3. Localization. Location sensitive information is a key to m-commerce as it provides an easy access to relevant data sources at the locations where they are needed. The key target group will be travelling subscribers, which have diversified needs of high-quality information.
4. Ubiquity. This means that service is available at any time, anywhere. There are time-critical applications, which offer the ability to receive information and perform transactions from any location.

A key success factor will be to provide mobile users with a similar (or better) level of access and information than now is available in a wire-network environment.

5. Timeliness. The value of information that is inherent in its immediate delivery is a key success factor for mobile operations.
6. Convenience. A key success factor will be to find m-commerce solutions that provide added convenience to the users. The proposal is that the use of technology should increase the quality of life - then technology becomes valuable. The operators of the m-commerce value chain are in a key role to make this happen, and it may be possible to find ways to carry out business process reengineering activities in this value chain. The perceptions and the substance of what creates convenience for the users will be different for users of different cultural backgrounds, and it will be a challenge for global operators to find ways to diversify and adapt their services to different user groups.

We will use these success factors as a basis for an attempt to form an embryo of a conceptual framework for m-commerce products and services from three perspectives: *the customer*, *the producer* and *the management* (cf. [7], [8] for details).

Seen from the perspective of the *customer* the necessary distinguishing elements are

1. flexibility, m-commerce products and services should be available anywhere, at any time and anyhow [addresses key success factors 2, 3, 4 and 5].
2. value-adding, m-commerce products and services should improve productivity, they should be adaptive to localisation and they should be sensitive to customer personalisation [addresses key success factors 1, 2, and 6].
3. a mobile technology basis, m-commerce products and services should use innovative and distinguishing features of mobile technology to enhance the quality of life (e.g. messaging, entertainment, education, information, privacy, etc.) [addresses key success factors 2, 3, 4, 5 and 6].

Seen from the perspective of the *producer* the necessary distinguishing elements are

4. modularity, m-commerce products and services could be built from a core of generic product and service modules, which can be combined to form context adapted products and services; this should support the *flexibility* element [addresses key success factors 2, 3 and 6].
5. layers, m-commerce products and services could be built in layers to add attributes and characteristics, which are adapted to (i) customer personalisation, (ii) localisation, (iii) brand profiles, (iv) privacy, etc.; this should support the *value-adding* element [addresses key success factors 2, 3, 4 and 6].
6. bundling, m-commerce products and services could be built through a bundling of modular products and services, which would be a way to make use of the mobile technology basis. Bundling can be done through modules and layers, but can also be mobile technology based [addresses key success factors 1, 2, 3, 4, 5 and 6].

Seen from the perspective of the *management* the necessary distinguishing elements are

7. value/cost ratios, m-commerce products and services should show good or very good value for cost in comparison with similar products and services; this should form the basis for pricing strategies, and cost and revenue models [addresses key success factors 2, 3 and 4].
8. production, logistics, marketing and advertising, m-commerce products and services should have innovative features in comparison with similar products and services; this may be a function of the possibilities offered by the mobile technology [addresses key success factors 2, 3 and 5].
9. business model, m-commerce products and services should use innovative and distinguishing features of mobile technology to support new business models [addresses key success factors 4, 5 and 6].

As the distinction between products and services may become blurred as they are produced with digital mobile technology we need to introduce the following distinctive elements:

- services: intangible, no ownership is defined;
- products: tangible, ownership is defined;
- digital products: intangible, ownership is defined
- digital services: intangible, no ownership is defined;
- digital product & service: intangible, ownership is defined;
- digital service & product: intangible, ownership is not defined;

The last two cases point to the possibility that we have proprietary services as part of digital products or that services may have products incorporated, for which no ownership can be claimed. It appears that ownership is a key feature for products – a key feature for services is that the client’s presence is needed. This may then serve as a guideline for building m-commerce products and services. The recent debate about the Napster Internet-site shows that the distinction between products and services is not that clear, and that producers of m-commerce products and service may have problems getting their rights defined and recognized. This is again a key issue for securing revenue from mobile commerce. The copyright to material on the Internet has also recently been debated as David Brooks found out that large parts of the material he collected over five years for his site www.vangoghgallery.com had been copied and used for a competing site – his ownership was not recognized in the court.

The quest for *killer applications*, which is a common feature in most of the business seminars sold by the key e-business consulting companies, may be a quest in vain. Already from the elements we have introduced above it appears evident that single, outstanding killer applications may be rare and far between. This has also been visible in discussion of m-commerce products and services, in which we have various types of combinations:

- *Killer Cocktail*, a mix in which the components cannot be distinguished [Nokia];
- *Killer Pizza*, a mix in which the components can be distinguished;
- *Killer Bouquet*, a set of components for which the aggregate is more than the sum of its parts [The Mobile Commerce Research Centre];
- *Killer Soup*, the more ingredients you put in, the better it gets – an operator will be needed for stirring;
- *Killer Fondue*, as for the soup, but no operator is needed for stirring;

Using these, no doubt rather stirring metaphors, the “killer bouquet” can be given the following schematic representation (cf. fig. 1).

In Fig.1 products and services are shown as “thin sets”, but they can be built with multiple layers (cf. the *producer* perspective), and each layer may be defined by multiple attributes, which may be the same or different for each layer. The products and services are described with multiple attributes (the “red dots” in Fig.1), which represent, for instance, the key success factors, the distinguishing elements (from the user, producer or management perspectives), or some other features, which are essential for the design of good m-commerce product and service combinations. The attributes can be specific for modules and/or layers, and they can be defined for specific products and services, or be specific for bundles of products and services. It appears that we with these simple elements can describe a considerable variety of m-commerce product and service alternatives.

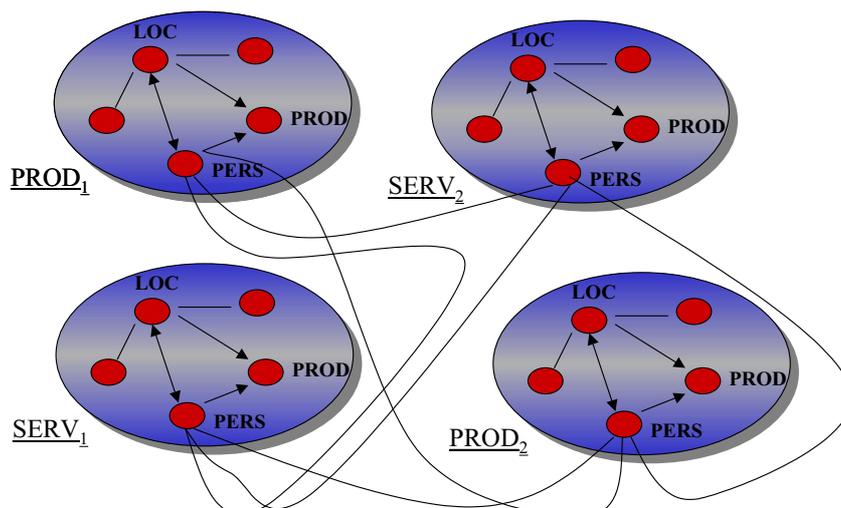


Figure 1. The *Killer Bouquet* of m-commerce products & services.

The interrelations between the various products and services can be in terms of (i) technology, (ii) content, (iii) information, (iv) design, (v) co-production, etc. The *bouquet* can easily be extended to n products & m services.

In a Plenary Address at the recent ECIS 2001 conference in Bled, Kalevi Kontinen [Senior VP, Nokia Networks] added a number of distinguishing features to the m-commerce products and services. In his description, the *m* stands for both *mobile* and *multi-modal* and he identified key features of m-commerce as *wireless & anywhere & moving*. He then identified four different categories of services in an ascending order of technological challenge:

- mobile client, standard services [for tourism, shopping, health care, logistics, etc.], separate voice,
- + services, aware of a client location,
- + moving services, aware of their own location,
- + services, aware of other clients in vicinity

These features can be included in our general description in Fig.1 as combinations of modules, layers and bundles.

It also appears clear that a novel construct of products and services could form the basis for new business models. Keen and McDonald [14] introduced the combined concepts of *out-tasking* and *in-sourcing* in order to build innovative principles for a new e-commerce business model.

With out-tasking the producer of m-commerce products and services allows an independent producer, which preferably should be a best practice provider, to take care of the production of (a, some) part(s) of the products and/or services, but the ownership of the task remains with the producer. The tasks may include (i) producing one (or several) module(s), (ii) contributing to one (or several) layer(s), or (iii) taking care of part (or all) of the bundling.

With in-sourcing the producer of m-commerce products and services negotiates the use of products and services, which are owned and produced by a best practice provider, as part of a bundle or even as part of a module or layer. The parts introduced through in-sourcing activities may include (i) one (or several) module(s), (ii) one (or several) layer(s), or (iii) taking care of part (or all) of the bundling.

In some cases, this is described as creating a *value network* for both the users and producers in order to make a distinction with the well-known Porter value chain. The network metaphor may, however, not be sufficient as it probably will be too static for the m-commerce context, which is bound to change

both over time and as a result of the interaction of the actors. A better metaphor may be a *system of dynamic value entities*.

With an understanding of the key features and success factors it appears that the issues at the core of the m-commerce business logic are, *to develop value-added content, business models and technologies, which can create the key features and serve as drivers of the success factors*.

2. EARLY RESULTS FROM FINLAND

An expert survey on m-commerce in Finland was carried out in order to get insights into the state, the potential development and the key issues of mobile commerce as they appear in the summer of 2001. A sample of 50 companies was selected out of which 31 participated in the survey. The results are summarized in the following.

The slow speed and the high cost of service, and the limited screen size are seen as the major barriers for a rapid m-commerce expansion. Communication and personalized information applications were rated as potentially successful m-commerce applications. An emerging third group is entertainment applications.

Consumers go wireless because of the high level of flexibility that the mobile devices offer. Other reasons are to improve productivity and to get up-to-date information. Getting personalized information and services were also mentioned as important motivations for customers to use mobile products and services.

The one feasible pricing model seems to be to offer a flat-rate access to m-commerce products and services. The overall acceptance of advertising in the wireless environment is expected to be quite limited. Advertising on request seems to be slightly more attractive than receiving advertisements at regular intervals in order to benefit from discounted rates.

Finnish m-commerce companies seem to be ready to face global competition, but in terms of global market position and customer orientation they are slightly behind their international competitors.

B2C as well as B2B revenues are expected to grow at significant rates in the coming years. Especially the B2B revenues are rising at a faster pace than B2C.

Finland is considered to be the leading country in m-Commerce usage. The Top 3 group also includes Japan and Sweden; China is rated as the least promising country.

E-Commerce revenues in the B2B market and m-Commerce revenues in the B2C market are both predicted to grow strongly by the year 2005.

Most of the Finnish companies participating in the survey have been active in mobile commerce for 12 – 24 months. A small percentage of the respondents are not offering m-commerce products and/or services of any kind. The typical m-commerce offerings were SMS and e-mail, personalized information and entertainment applications. Not surprisingly, these were the same products and services, which were judged to have the best potential for the future.

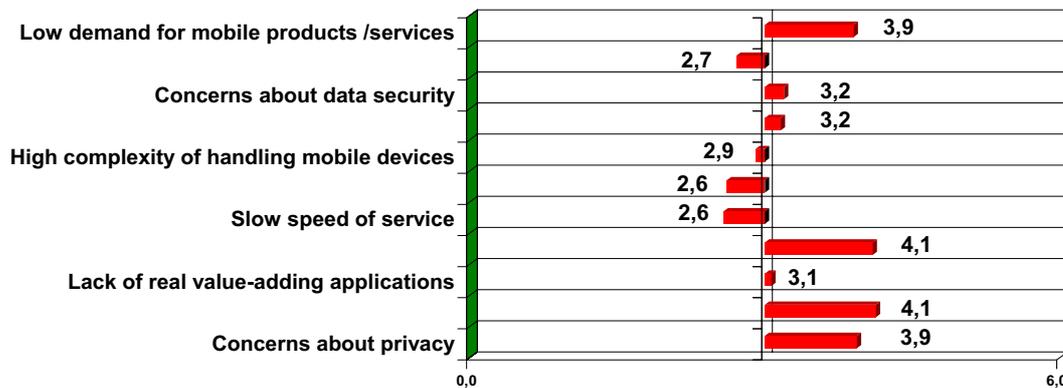
The Finnish companies find the future to be very positive. The revenues generated with mobile commerce products and services are estimated to more than double in the years 2002-2003.

The most frequently proposed “best” applications for the Finnish market were SMS, MMS and mobile e-mail. Entertainment applications, personalization and location based services were also listed among the top 10 products and services.

According to the respondents, personalization, messaging and value adding mobile services are going to be the primary areas of research in the near future.

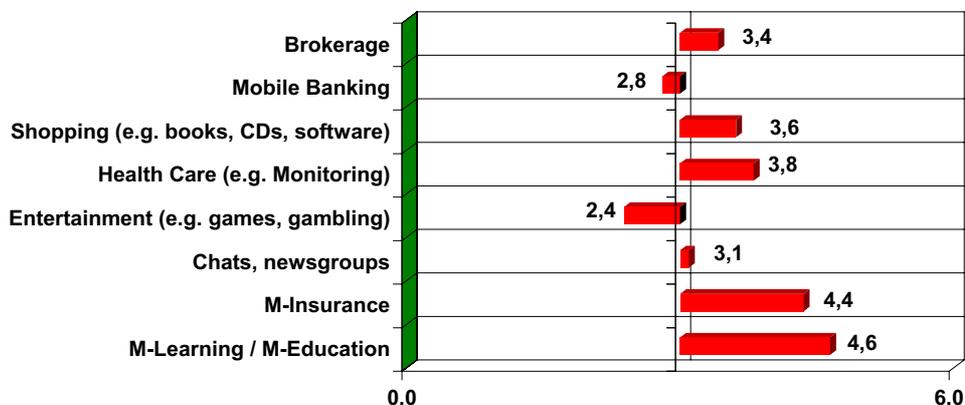
The 50 companies selected for the survey were (i) providers of m-commerce products and services, (ii) providers of m-commerce infrastructure and (iii) providers of consulting and financial services in the area of m-Commerce. The companies were contacted by phone, e-mail and regular mail, but the survey was carried out with a web-based questionnaire. The respondents actually had a choice of filling in the questionnaire while online or printing it out and sending the completed form via regular mail. All the respondents chose to use the electronic form. The time frame for the survey was June-August, 2001. In the following some summary data on details from the survey will be presented.

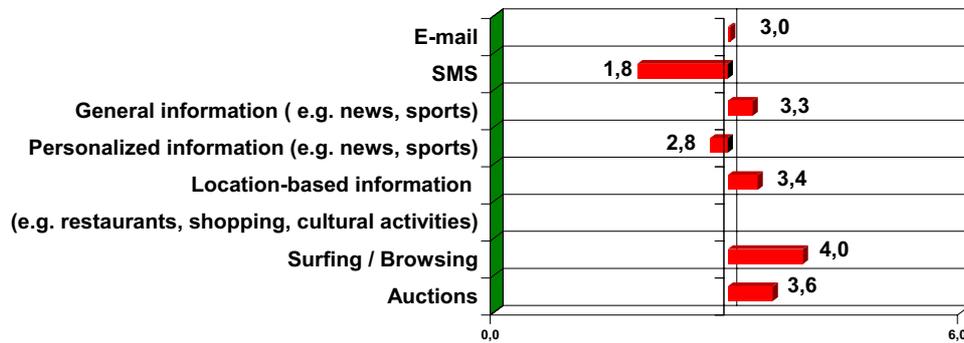
Q1. Which of the following factors constitute a barrier to a rapid expansion of m-Commerce in the next 18 months? [0.0-3.0 = large barrier; 3.1-6.0 = small barrier]



Key results: The slow speed of service is seen as a major barrier for rapid m-Commerce expansion. Also limited screen size of mobile devices and high cost of services are perceived to be inhibitors to prompt mobile commerce diffusion.

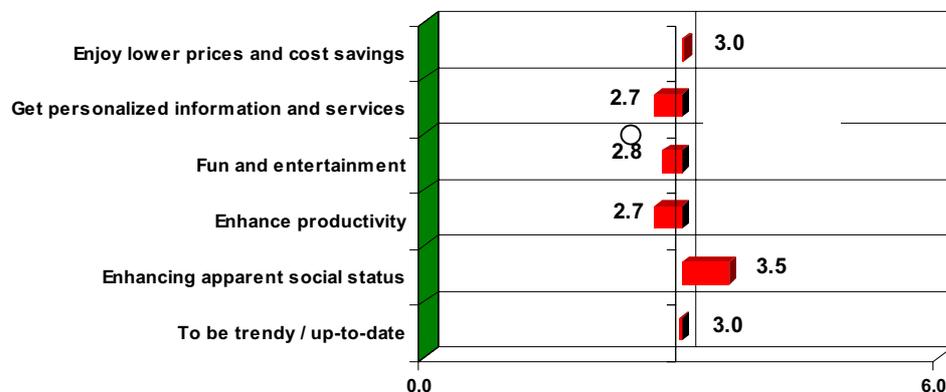
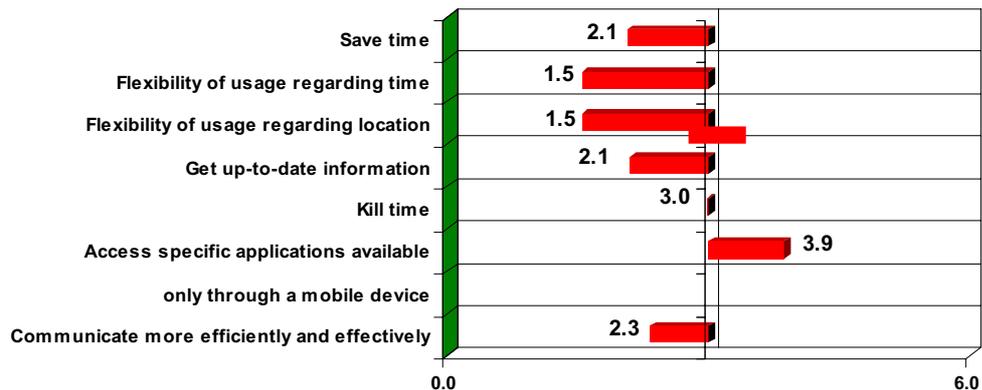
Q2. How do you evaluate the likelihood of firms achieving a satisfactory level of turnover for the following m-commerce services? [0.0-3.0 = high likelihood; 3.1-6.0 = low likelihood]





Key results: Communication applications like SMS are supposed to have a high potential of success. Personalized information applications with high value to the customers are also deemed to do well. Other potentially profitable applications are seen especially in the area of entertainment.

Q3. How do you rate the relative importance of the various motivations of both current and future consumers of m-Commerce products / services? [0.0-3.0 = high importance; 3.1-6.0 = low importance]



Key results: Consumers go wireless because of the high level of flexibility that the mobile devices offer. Other reasons are to improve productivity and to get up-to-date information. Getting personalized information and services is also valued among the experts as an important motivation for customers to use mobile products / services.

3. INTELLIGENT SUPPORT TECHNOLOGIES

It is intuitively appealing to try to build the products and services of the m-commerce domain with advanced, intelligent information technology for several reasons.

First of all, the m-commerce domain requires fast planning, problem solving and decision-making, and intelligent support technology will reduce both the number of errors and the magnitude of the errors.

Secondly, support should be available at the moment of decision-making, in an appropriate form and with the best possible substance.

Thirdly, intelligent information technology is a variety of technologies, ranging from machine intelligence, through artificial neural nets, genetic algorithms and case-based reasoning to soft computing, which is built on fuzzy logic, approximate reasoning and computing with words (cf. [2-6]).

Intelligent information technology appears to answer the call for *flexibility*, *value-added* and *bundling* (cf. above). As this is an exploratory study, space does not allow us to go into much detail, which is why we will focus on the flexibility and value-added features. Most of the elements described for these features can be produced with the *software agent* technology.

The automation of work and the automation of work with computers are central to the idea of software agents [1]. Kay [13] described software agents as soft robots living and doing its business within the computer's world; Cheong [9] as primarily human-delegated software entities that can perform a variety of tasks for their human masters; Maes [16] as the user's personal digital assistant. The field of agents is rich and diverse, yet fragmented. Different communities refer to "agents" in different ways: *robots*, *daemons*, *knowbots*, *softbots*, *taskbots*, *userbots*, *personal agents*, *personal assistants* and so on (cf. [12], [15], [20]).

The key attributes emphasised for agents are (i) situatedness, (ii) autonomy and (iii) flexibility. *Situatedness* means that an agent receives sensory input from its environment and that it can perform actions, which change the environment in certain ways. *Autonomy* means that the system is able to take initiative, to solve problems without direct intervention or constant guidance from a user or other agents, and it has control over its own action and internal state. To be *flexible* means that the system is *responsive*, *adaptive* or *robust*, which again requires that it perceives the environment and responds in a timely fashion to changes, which occur in it, and takes account of changing user needs and a changing task environment. In this way, an agent system comes to know about the user's preferences and can tailor interactions and actions to reflect them. Finally, an agent system can be made *proactive*. Then it not simply acts in response to the environment, but it is also able to exhibit opportunistic, goal-oriented behaviour and to take the initiative where appropriate. It does not wait to be told what to do next - rather it makes suggestions to the user (cf. [11], [12], [19], [20]).

The attributes (i)-(iii) are similar to those used to describe the *flexibility*, the *value-added* and the *bundling* features of m-commerce products and services. We have even been able to demonstrate with some multi-agent system prototypes¹ that software agents actually can be used to produce these features.

¹ The Imagine21 project, which was run as an ESPRIT project 1998-2000.

Modern support systems research is focused on the *theory and applications of intelligent systems and soft computing in management* (cf. [3]). *Soft computing* includes research on fuzzy logic, artificial neural nets, genetic algorithms and probabilistic modelling. The added feature to the *intelligent systems* is that in soft computing the machine learning systems are developed using fuzzy logic and the fuzzy sets theory as a theoretical and methodological basis. Work is under way to develop support systems for m-commerce, which include intelligent modules built from soft computing components.

4. SUMMARY AND CONCLUSION

We have introduced a number of key elements of mobile commerce products and services, and we have introduced some of the core issues we will have to deal with in order to turn the visions of mobile commerce into viable business projects. We have sketched a few principles of an emerging business model for m-commerce and we have pointed out a way to harmonize this business model with the product and service concepts of m-commerce.

Intelligent information technologies appear to get a key role for the users, the producers and the management of m-commerce products and services. The use will be two-fold: (i) as part of the value entities at the core of products and services, and (ii) as support systems at the core of the business models.

As this is a preliminary and conceptual study the conclusion must be tentative: the issues at the core of the m-commerce business logic are, *to develop value-added content, business models and support technologies, with the help of intelligent information technologies, which can create the key features and serve as the drivers of the success factors.*

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