

## From MCom Visions to Mobile Value Services

**Christer Carlsson**

IAMSR/Abo Akademi University, Turku, Finland  
christer.carlsson@abo.fi

**Pirkko Walden**

IAMSR/Abo Akademi University, Turku, Finland  
pirkko.walden@abo.fi

### **Abstract**

*The first papers on mobile commerce were offered to the Bled conference commencing in 2000. Initially, they were not received with enthusiasm; the reviewers were rather sceptical as to the research methods used and the visions of a global m-commerce offered. Nevertheless, the first panel sessions were overcrowded and the eBled organizers quickly recognized a new and exciting movement taking shape. The rest is – as the saying goes – history.*

*There are around 6 billion mobile phone users in the world but the mobile services in actual use are – besides voice calls and SMS – rather few (at least in comparison to the hype around smart phones). Based on our experience from annual series of consumer studies we argue that there are fundamental misunderstandings in relation to both the mobile service concept and the basis for building user value. By following the development of mobile technology over a 10 year interval we have found out – much to our surprise - that not much has changed in the actual use of mobile services despite the fact that we have had about three generations of mobile phones during these 10 years. We have summarized insight from panels run at the eBled conferences and from a number of papers presented at the conference and worked out a description of the development of mobile commerce and mobile services.*

**Keywords:** Mobile commerce, mobile services, mobile value services, smart phones

## **1 Introduction**

At the 15<sup>th</sup> eBled Conference in 2002 one of the early papers on m-commerce (Carlsson and Walden 2002) was presented and we outlined the new research area as promising but hit by the first hype wave. Extremely rapid penetration and growth processes were predicted on the basis of some quick descriptions of mobile technology. The roots of these predictions are often found in markets with a low penetration rate of mobile technology. Nevertheless, the authors said that it should be clear that without real substance in m-commerce products and services the investments in the new mobile technology could still fail. We claimed that much more should be known about what actually will be the m-commerce products and services. We argued then, and argue now that value-added products and services should be understood from the viewpoints of (i) the users, (ii) the producers and (iii) the management.

Mobile commerce (m-commerce) was in the early days and in many cases of anecdotal evidence understood as electronic commerce products and services offered on mobile platforms. This was turning out to be unfortunate for several reasons: (i) web-based technology was being squeezed into small mobile devices, (ii) user interfaces, which work well on 17" or 19" screens, did not work on the small screens of mobile devices, (iii) the user context for Internet products and services is still not the same as the mobile context, and (iv) the choices of products and services are not compatible with the needs of mobile users. The web-metaphor was also unfortunate as it was leading the design of mobile products and services astray. Keen and Mackintosh (2001) then defined m-commerce as the extension of electronic commerce from (i) wired to wireless computers and telecommunications, and from (ii) fixed locations to anytime, anywhere, and anyone. It appears that now (in 2012) there is more understanding of what is required of mobile commerce.

In a Plenary Address at the ECIS 2001 conference Kalevi Kontinen (then a senior executive with 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: (i) mobile client, standard services (for tourism, shopping, health care, logistics, etc.), separate voice; (ii) as (i) + services, aware of a client location; (iii) as (ii) + moving services, aware of their own location; (iv) as (iii) + services, aware of other clients in vicinity. For some reason, even in 2012, we are still not building mobile services that could live up to Kontinen's vision.

A very contrary view was offered by a Wharton School report from the same year 2002: "Wireless Dreaming: Is 3G Dead?" (July 2002), which appears to state that 3G is only advertising hype for which there is no real need or demand: "The idea of chatting, surfing the web, zipping snapshots of loved ones back and forth, and using the same phone in Bangkok, San Francisco and London is appealing. But whether this dream will become reality is largely unclear, say many experts at Wharton and elsewhere". The Wharton expertise builds on the US market, in which the penetration of modern mobile technology was relatively low in 2002. Then it was not surprising that some misconceptions were growing. The same mobile phone could be used in Bangkok and London (but not in San Francisco) as the standard chaos referred to was prevalent in the US market, but not so much elsewhere. Our studies showed (in 2002) that chatting and surfing were not preferred uses of the mobile phones – the Wharton expert report claimed so in order to get something to shoot at. The zipping of snapshots from mobile phones (such as the Nokia 7650), which was being ridiculed, was becoming a hot application in Europe in the summer of 2002. In the work we were doing with mobile markets (Carlsson and Walden, 2001, 2002a, 2002 b) it turned out that the "expert" reports published almost weekly on the Web were way off the mark in most of their "facts" and predictions. It was a bit surprising to find out that quite a few of these reports were published in the US, in which the mobile markets were 3-4 years behind both Europe and Asia.

The 15<sup>th</sup> eBled conference was not the first one with mobile papers in the program. At the 13<sup>th</sup> eBled Felix Hampe with Paula and Paul Swatman presented a paper *Mobile electronic commerce: reintermediation in the payment system*, which summarized the state of enabling technology for mobile telecommunications and also gave an overview of applications for mobile electronic commerce. Also at the 14<sup>th</sup> eBled there was a paper on mobile technology: Niina Mallat, Tomi Dahlberg, Timo Saarinen and Virpi Kristiina Tuunainen on *Efficient*

*Service Production and Consumer Choice of Delivery Channels* which worked out delivery channels for retail banking services.

It can safely be said that there were a number of years, actually the 15<sup>th</sup> eBled to the 21<sup>st</sup> eBled, that were the years of keen interest in applications of mobile technology; we have collected the published papers in an Appendix. After 1 paper in each of 2000 and 2001, there were 60 in the next 8 years to 2009 – between 5 and 9 each year. After the 22<sup>nd</sup> eBled the number of contributions has faded – for some reason. We ran panels on mobile commerce (and mobile services) at the 15<sup>th</sup>-19<sup>th</sup> eBled conferences and then again at the 21<sup>st</sup>-22<sup>nd</sup> conferences; the same trend was visible, at first we had crowded sessions with about 40 participants but during the last two panel sessions there was enough space for everybody to find a chair.

## 2 Mobile Services – Early Days

The early reasoning about what constitutes the key success factors for mobile services was built along a classical structure: the *customer*, the *producer* and the *management*.

Seen from the perspective of the *customer* the necessary distinguishing elements are (Carlsson 2000, Carlsson and Walden 2002): (i) flexibility, m-commerce products and services should be available anywhere, at any time and anyhow; (ii) value-adding, m-commerce products and services should improve productivity, they should be adaptive to localization and they should be sensitive to customer personalization; (iii) 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.).

Seen from the perspective of the *producer* the necessary distinguishing elements are: (iv) 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; (v) layers, m-commerce products and services could be built in layers to add attributes and characteristics, which are adapted to (v.i) customer personalization, (v.ii) localization, (v.iii) brand profiles, (v.iv) privacy, etc.; (vi) 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.

Seen from the perspective of the *management* the necessary distinguishing elements are: (vii) 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 competitive pricing strategies, and cost and revenue models; (viii) 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; (ix) business model, m-commerce products and services should use innovative and distinguishing features of mobile technology to support new business models.

The quest for killer applications, which was a common feature in most of the business seminars sold by the key e-business consulting companies in 2002, may (still in 2012) be a quest in vain for m-commerce. Already in 2002 it appeared to be evident that single, outstanding killer applications may be rare and far between. In an early researcher workshop

in Brussels we had some fun with the killer applications and outlined the following contributions: (i) *killer cocktail*, a mix in which the components cannot be distinguished (Nokia); (ii) *killer pizza*, a mix in which the components can be distinguished; (iii) *killer bouquet*, a set of components for which the aggregate is more than the sum of its parts (the one we chose as our metaphor); (iv) *killer soup*, the more ingredients you put in, the better it gets – an operator will be needed for stirring; (v) *killer fondue*, as for the soup, but no operator is needed for stirring. Using these, no doubt rather stirring metaphors, the “killer bouquet” is a bundle of m-commerce products and services (cf. (vi) *bundling*, in the producer perspective above).

The simple and obvious next step was to understand what these m-commerce products and services may be. This was built on an expert survey in Finland, France, Germany, Hong Kong and Singapore in 2001-2002 in cooperation with our research partners. The study in Hong Kong was carried out by Doug Vogel (City University of Hong Kong) and the study in Singapore by Lai-Lai Tung (Nankiang Technological University, Singapore).

In Finland 31 companies participated in the survey, in Hong Kong 31, and in Singapore 28, and we will briefly summarize the results here as they represent a snapshot of the understanding of m-commerce at that time. The companies were (i) providers of m-commerce products and services, (ii) providers of m-commerce infrastructures, as well as (iii) providers of consulting and financial services in the area of m-commerce. The experts were asked to evaluate a number of m-commerce services and the likelihood of achieving a satisfactory level of turnover within the next 18 months.

The experts' opinions from Singapore and Hong Kong showed that *mobile shopping* was supposed to have a high potential of success. The opinions differed quite a bit when compared with the Finnish experts. The reason for the big gap between the opinions was not obvious and explanations were built on cultural aspects. *Communication* applications like SMS were found to have a high potential of success, but there were differences between the expert opinions; the experts in Finland were more positive than their counterparts in Hong Kong and Singapore. As pointed out by Keen and Mackintosh (2001) messaging has been one of the “killer applications” of the Internet, of mobile phones in Europe and Japan, and of other wireless devices, such as pagers. Mobile messaging for person-to-person communication was identified as a service with a high success potential in Finland, but also in Hong Kong and Singapore. *M-learning* and *m-education* were seen by the experts in Hong Kong to have a good potential for success. The experts in Singapore, and especially in Finland, did not share this view. *Mobile banking* was seen as having a potential for success, especially in Hong Kong; *brokerage* was also seen to have some potential according to the experts in Hong Kong and Singapore. The Finnish experts were not as positive, which might reflect the fact that the banking markets were not as developed in Finland as in Hong Kong or Singapore. Other profitable applications were expected in the area of *entertainment*, which was emphasized by the experts in Finland and Hong Kong; the experts in Singapore were less positive in their opinions. The experts did not think that *m-insurance* services will be profitable; the insurance business involved a lot of face-to-face contact (much less in 2012) as a key element of the business is trust, which may be a barrier for the insurance business to go mobile.

If anything could be marked as a “killer application” on the Finnish m-commerce market in 2002 it certainly was the *SMS*. A “killer application” on the Hong Kong and Singapore markets would be the possibilities for *mobile shopping*, but this appears to have covered only the selection of products and services, not the payments nor the logistics. The differences are

still unexplained, and an interesting fact is that “shopping” was emphasized also by the French sample of experts. There were differing opinions on “*surfing/browsing*”; it appears that in 2002 it was the case that mobile devices were not seen as good tools for using the Internet, that the surfing and browsing were activities, which belong to workstations and large screens and to a context where time is reserved for this activity. *Auctions* were not seen as a viable activity for the mobile devices, and the reason may again be one of context. Auctions require a focused use of time, which is not a primary expectation for mobile activities. A bit surprising was that *mobile health care* was not seen as a key potential activity. The reason was probably that the infrastructure for mobile health applications were not developed enough (this is still the case in many countries in 2012).

### 3 Mobile Life – An Enhanced Vision

We proposed – when the results of the expert surveys (carried out in 2001-2) were at hand (Carlsson and Walden 2001) – that adoption and the use of m-commerce products and services would now depend on the attitudes of the individuals. If consumers feel that anytime, anywhere services are important, i.e. the freedom Keen and Mackintosh (2001) discussed, they would use the products and services. It seemed obvious that m-commerce products and services must add significant perceived value to the customers. The experts’ opinions supported the Keen and Mackintosh propositions, i.e. customers go wireless because of the high level of flexibility that the mobile devices offer both in terms of time and place. Other reasons found were to improve productivity in terms of saving time, and to get up-to-date information. We found out that things that have to do with the customers’ social status do have some importance, but these factors were not as important as one would expect. Interesting was that the experts did not think that access to specific applications, that would be available only through a mobile device, would be of high importance. The experts in Hong Kong and Singapore concurred on this view, but the Finnish experts thought that this point is even less important. The experts probably saw mobile commerce as complementary to Internet commerce and not as a completely independent business environment. The question of complementary versus independent m-commerce services correspond also with the proposals brought by Cattaneo and Martinoli (2001) to different supplier business models.

The experts in Hong Kong and Singapore concurred on the importance of lower prices and cost savings, which were seen as less important by the Finnish experts. There was also another (not very large) difference, the experts in Hong Kong and Finland regarded fun and entertainment as potentially important applications, but they were found less so by the Singapore experts.

In a panel at the 16<sup>th</sup> eBled Conference in 2003, the concept of “*Mobile Life*” was introduced as a metaphor for the penetration of mobile technology into our daily life and into our daily routines – much as Peter Keen had outlined in his vision of the *Freedom Economy* in 2001 (Keen-Mackintosh 2001). The panel agenda addressed the implications of *mobile life* as follows: *living the Mobile Life is motivated by and built on knowledge mobilisation, own and others; knowledge mobilisation has a double connotation: (i) activation of knowledge and (ii) making it mobile*. The description of the mobile life arena already recognized that mobile technology was to have a huge impact on the users and their daily lives.

The context description for the panel (members included Christer Carlsson, Doug Vogel, Pirkko Walden and Hannes Werthner) was: *The global penetration of wireless phones alone is expected to grow to 1 billion by 2003 (by late 2002 in some estimates). The number of WAP*

users globally will be approximately 600 million according to some estimates. Lately, there has been some doubt if WAP will eventually make it through the GPRS standard or if we are going to get only tailored user applications. Overall, whatever the solutions will be, this amounts to a huge market for Internet business products and services, on a much larger scale than we have been able to envision with the present e-commerce technology. The mobile technology requires that we find ways to build new value added products & services, which would work on the mobile devices and which would make it easy to adopt new business principles. (In 2012 it is now clear that WAP was not accepted as a global standard despite its early promise).

In the 2003 vision, mobile technology offered much more: mobile platforms were being built for personalised decision support at the point of decision, as support for problem-solving as problems appear, as platforms for mobile health care, as support environments for virtual teamwork, as personalised and interactive time management platforms, etc. This amounted to new and innovative ways to improve on and enhance the everyday routines we have invented to simplify and organize our lives. In this way, mobile technology was to impact our world in profound, new ways, which would have consequences for both business and society.

Research in mobile life applications should (according to the 2003 panel) focus on (i) building and testing new, effective products & services, and (by critically evaluating results), (ii) finding generic products & services, which would both offer significant value added substance to the customers and means for companies to build a growing profitable business. It was anticipated that there is not *one* customer group for mobile life applications but many different customer profiles, having their origins in different social and cultural backgrounds. They were seen to be reflected in particularities in the using behaviour, in the purchasing habits, in the need for support and in the attitudes towards issues like privacy, security and trust. It was essential that such profiles be identified and acted upon by both the present and future mobile life applications. ( In 2012 this is now identified as a need for finding and identifying key market segments).

It was found that *mobile commerce* will not grow as a viable business unless products & services have true value adding properties in terms of localization, personalization, timeliness, convenience and ubiquity; this insight was formulated but ways to resolve the dilemma of building products & services with these properties at an affordable cost to the users was at that stage still not known. *Mobile education* will become a success when the material to be taught can be offered through mobile devices and platforms in a timely way without undue reduction of form and content. *Mobile e-health* may become a success when the logistics involved in medical information exchange and use is resolved in a way which satisfies security concerns. All mobile commerce activities will require good payment system standards for mobile transactions, which is still a challenge to be met in 2012.

It was also found that the design of *mobile commerce* products & services should aim at an integrated, value-adding chain from the producer to the end-user. *Mobile education* applications should be built as an integrated chain from the teacher to the student offering value added provisions for the teacher, the students and the administration in managing the education process. *Mobile e-health* would show logistical benefits for the health care organizations if the chain could be integrated with value adding interfaces from end-to-end.

Many of the themes defining mobile commerce were brought up very early at the eBled conferences, yet they still have not been solved in any practical and commercially successful way in the development of mobile technology and mobile services being developed on this

technology. There was a first generation shift in the mobile technology around 2005. (The timing was different in different countries, generally as a function of the penetration rate of mobile technology). But the improved technology did not drive any significant changes in the use of mobile services (as reported at the 19<sup>th</sup> eBled conference, cf. Carlsson et al 2006). Thus, we will jump to the 21<sup>st</sup> eBled conference in our storyline.

## 4 Mobile Value Services

At the 21<sup>st</sup> eBled conference in 2008, a panel was built to put focus on the many still unresolved problems with building user value as part of mobile service designs. The panel included Christer Carlsson, Tomi Dahlberg (then a professor with Helsinki School of Economics but with experience as a senior executive with a network operator), Ilkka Lakaniemi (Nokia Siemens Networks) and Pirkko Walden.

The context outlined for the panel started with the following observations: *Mobile value services are still an emerging network solution with formative solutions in unformed markets of global, gigantic reach. We still do not fully understand the driving forces, which are going to create commercially viable and user-valued products & services. We still do not have agreed standards for the infrastructure, neither for the support technologies needed to operate the emerging mobile business nor for the potential users to fully benefit from mobile services.*

The panel found some propositions that could be claimed to be at the core of applications built around mobile, wireless technology: (i) *mobility* - mobile phones are brought along as individual tools and instruments, which has changed the everyday routines of communicating; (ii) *availability* - mobile phones allow their users to be continuously connected, which has changed the communication infrastructure in significant ways; (iii) *ubiquity* - network interconnectivity and roaming agreements allow mobile communication anywhere and at any time; (iv) *value services* - mobile technology is a platform for services that expand the limits of the possible in the structure of everyday life routines. The key *proposal* was then that any mobile value service should show an evolutionary path of development from these four value-building features.

In 2008 there was a generation shift as smart mobile phones were getting advanced and enhanced features for mobile services and the replacement process of the older generation mobile phones was gaining momentum in both Europe and Asia. In 2011 we saw that *the potential* to use advanced and enhanced mobile services did not result in any *actual* use of these services, which is one of the major challenges for the mobile service developers.

In a recent paper, smart phones are seen to drive the development of mobile applications and a more or less intuitive belief is that once the users have a smart phone they will download applications and start using a wider variety of mobile services and/or more advanced mobile services (Sell et al., 2012). Application downloads have grown during the last few years; with the downloads from Apple's App Store being now 15 billion. In Europe in 2010, 1.9% of subscribers used mobile applications. This figure is expected to be 7.2% in 2015. The corresponding figures worldwide are a bit lower, 1.4% and 5.9%, whereas the figures for North America are in a class of their own, 7.7% and 26.9%. (Portio, 2011). In a recent study we found that in addition to a small 'power user' group (15%) and a substantial set of 'interested but inactive users' (47%), there is a large group (38% of smart phone users) that does not use any advanced services and has a low motivation to continue using smart phones in the future (Sell et al., 2012). Similar results were found in a study for the network operator

DNA (AddValue, 2012) where 29% of the respondents were found to be ‘passive smart phone users’ who use only voice and short message services.

If we now turn back to the 2008 panel – it was found that there were not any clear ideas on what mobile services will satisfy the Braudel Rule (“*freedom becomes value when it expands the limits of the possible in the structure of everyday life routines*” – Peter Keen) but a partial insight was that mobile value services may be a better answer than mobile data services.

It was found out in the discussion that there are a number of problems which hamper progress: (i) markets for mobile technology applications are described in theory; there is no real understanding of what they are in practice; (ii) common wisdom is often anchored in limited market surveys which find only specialized user groups; (iii) the infrastructure and business models for mobile services are only being formed and major market actors are moving to establish positions; (iv) full-scale introductions of mobile services have been mostly trial and error – it appears that the mobile network operators are to be blamed for this. This was in 2008; in 2012 we still do not have good ways to resolve the problems that hamper the progress – there is, for instance, no accepted standard for mobile service business models.

After the panel discussion, the impediments were pursued and a few more observations were collected and debated. It was found that market foresights had repeatedly been widely off the mark in the previous 5-7 years and a consequence was that there was no reliable data available for a systematic and constructive discussion of mobile services. Consumers appear to form their own markets which required quickly adaptive and new forms of business models.

Some consensus was formed in 2008 around the insight that the point missed is how to create and implement user value. Some good answers and some indications of the road ahead were formulated by Peter Keen in his keynote at the HICSS-38 conference. Peter’s starting points (which are still valid after more than 7 years): (i) experts overrate data services as a natural driver of demand; (ii) for consumers, flexibility – freedom of location and access – is key (hence the wifi explosion); (iii) “knowledge” is a matter of conversation, not information – part of PCCI (Personal Consumer Communications Industry); chat rooms made AOL, SMS was the unplanned killer app, WAP was a disappointment; (iv) the mobile industry has wasted well over \$1 trillion in the search for business models for data services - these amounted (in 2008) to 2-3% of revenues, but messaging represented 10-15%.

One of the results of the panel was an outline of what should be understood with *mobile value services* (MVS): (i) MVS will be part of and an implementation of the value web models; (ii) MVS will be generic, modular designs that will support and be part of web community services; (iii) MVS will implement the Braudel Rule; (iv) MVS will be key drivers in the forming of community services. The mobile value services were seen as important as they would be a roadmap for both mobile data services ( a focus area for the mobile network operators) and web community services.

## 5 Knowledge Mobilisation

At the 23<sup>rd</sup> eBled conference in 2010, we followed up on Peter Keen’s propositions on how to build user value for mobile services and on the *Mobile Life* concept introduced at the 16<sup>th</sup> eBled (Carlsson, et al. 2010). The focus was on *knowledge* and how to make this available to users over smart mobile phones; this was the basis for a further idea that knowledge could be an essential part of the value formed for users and hence part of the *mobile value services* we



had been hunting for at several eBled conferences. In 2010 it started to be possible to build this type of more advanced services as the new generation of smart phones could serve as platforms and as they started to be included as terminals in cloud computing architectures.

*Knowledge mobilisation* represents a change of paradigm in the creation, building, handling and distribution of knowledge. The traditional approach has been *knowledge management*, which is to collect knowledge from experts, knowledge workers and professionals and to redistribute it throughout the organisation. This has not been as successful as its proponents hoped. The new approach is to produce timely and relevant knowledge for the context in which the user intends to operate, in a form which is consistent with the background knowledge the user has, with a context-adaptive content and with modern information and communication technology (including advanced communicators and smart phones).

To *mobilise* means “to make or become ready for action” which in the case of knowledge mobilisation can be interpreted as “to make knowledge available for real-time use in a form which is adapted to the context of use and to the needs and cognitive profile of the user”. We have implemented this as building mobile value services with knowledge elements that are relevant and useful for specific contexts and adaptive to the skill and knowledge levels of the users.

A quick sketch of the main idea is to make knowledge mobilisation possible by developing technologies to facilitate information/knowledge access from multiple heterogeneous sources by nomadic users. The technologies to be used include multi-agent systems, fuzzy ontology as part of the semantic web and computational intelligence with high level reasoning.

Ontology is metadata, which use a defined vocabulary of terms, each with an explicitly defined semantics. Fuzzy ontology is expected to be a means to benefit from, on one hand, the existing conceptual power of “traditional” existing semantic web technologies and, on the other hand, to add the flexibility which is urgently needed to operate large scale practical and industrial information bases.

The Semantic Web being designed deals with hard semantics for handling crisp data; RDF cannot be used to represent soft semantics; it is possible (if we make a rough generalisation) that Semantic Web will be irrelevant for handling most of the information used in practice (which is built on soft semantics).

It is possible to extend the RDF by encoding fuzzy sets/fuzzy logic in the RDF format; the fuzzy component will simply have a URI to a system of fuzzy sets or fuzzy logic or fuzzy conceptual graphs (which is a promising way to deal with natural language applications). A fuzzy ontology is preferable to a classic ontology as it can be used to represent the same semantic content in much less space than a classic ontology (a reduction by 90 % has been reached in some experiments).

A good way to find out what possibilities we have to realize knowledge mobilisation with the help of a fuzzy ontology and to really make it work is to build a working prototype. This was done with industrial partners but the details are confidential and cannot be published. The idea was born to build, as a test case, *knowledge mobilisation tools that can turn amateurs into wine connoisseurs*.

A wine ontology had already proved its validity as a test environment (Calegari and Ciucci 2006). Wines are described with a number of attributes and there are different rules for how to choose the “right” wine for different contexts. Most of the wine knowledge is expressed in common sense terms and most of the finer points on how to select the proper wine for

different circumstances build on tacit knowledge. A wine ontology which is totally binary and based on a true-false logic will have some basic deficiencies: for instance, two wines which are priced at 100\$ and 1000\$ might both be classified as “expensive”, but it is also true that the second is far more expensive than the first. As we will see in the following (cf. fig. 1) the type of knowledge we will have to work into a wine ontology will require large numbers of elements in order to provide the knowledge support that we envisioned; we quickly found that the reduction in complexity offered by fuzzy ontology is the only meaningful way to proceed. We developed a basic ontology for describing and selecting a “proper” wine (cf. Figure 1).

Repeated testing and sometimes heated arguments with wine drinkers show that advice on wine should cover at least the following dimensions:

Country of origin: wines from different countries have different character and have their own supporters; wines get different characteristics depending on the region, vintage, wine yard, grapes, producer, etc.

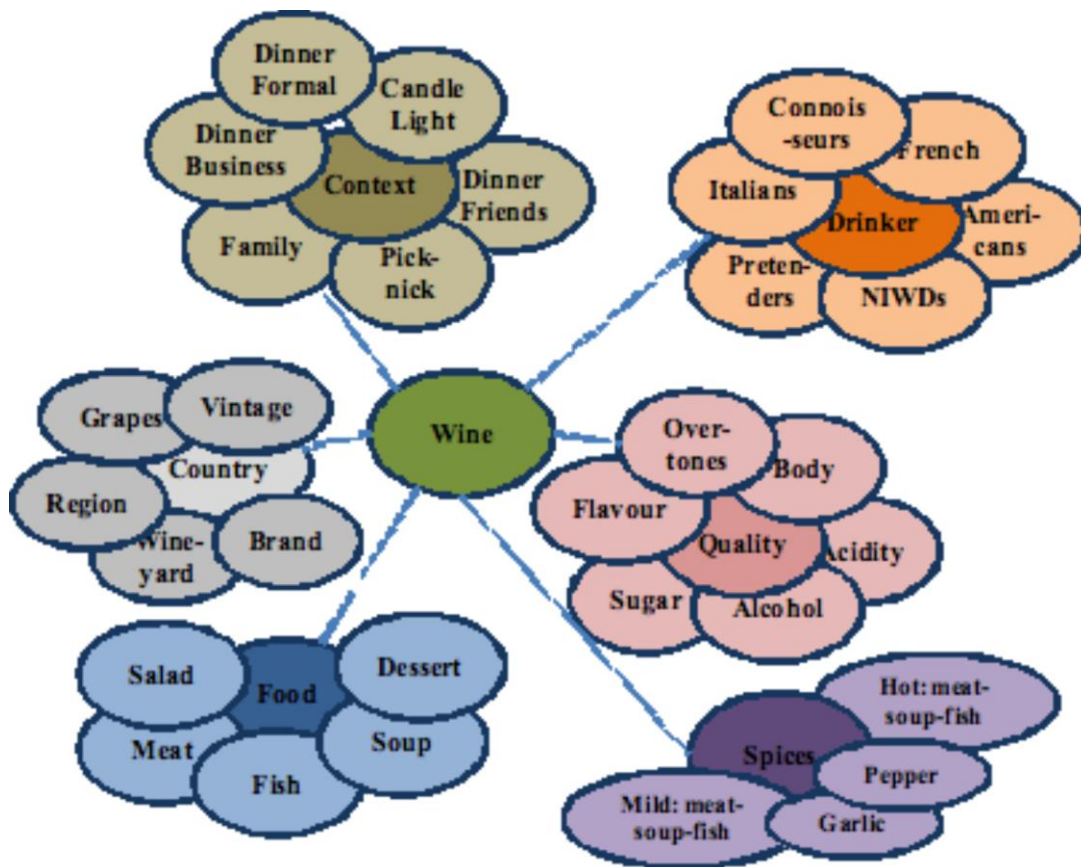


Figure 1: A wine ontology

Quality: there is some consensus that wine quality is expressed in terms of acidity, sugar and alcohol level; there are more difficult quality terms - body, flavour and overtones – which are understood only in terms of tacit knowledge.

Context: the type of wine which suits a context is often determined in terms of macro attributes such as country (“typical French or Italian wines”) or quality (“light or heavy flavour”) or brand (“at least one of the better *premiere crue* of the 2009 Chablis”); some of

the typical contexts are shown in Figure 1 - the context-based recommendations are, of course, loose and general.

Drinker: the tastes in wine are very individualistic but some rough categories have been identified as a basis for the ontology; we created storylines for each category of wine drinkers based on common wisdom (e.g. Americans as less knowledgeable wine drinkers) which (i) gave us material to build relations in the ontology, and (ii) generated lively discussions about the stereotypes, which gave us even more material for the relations.

Food and spices: most recommendations for wine are based on the type of food and spices with which the wines are going to be combined (cf. fig.1 for categories). We have gradually found out that there are two levels of knowledge – the *common sense* and the *sommelier* levels. Every wine drinker knows some common sense rules on how to combine wines with food and spices (“a heavy red wine kills the taste of whitefish”; “hot spices and garlic kill the *bouquet* of expensive Chablis; combine with a cheap Australian white”) and these can be easily built as relations in the ontology. The *sommelier* rules decide the optimal combinations of several types of wine for the whole meal; this will make sure that the wines fit the courses served and that the wines do not kill each other. The relations needed to represent this knowledge easily run into the hundreds (or thousands, if the really finer points need to be covered).

It turned out that fuzzy ontology is a powerful platform on which knowledge representation and reasoning tools can be built and implemented to work out recommendations for the proper choice of wine. We have worked out that a fuzzy ontology framework can be the basis for knowledge mobilisation, and that we can get systematic answers to queries with a number of classical/standard methods building on fuzzy sets and fuzzy logic.

The prototype that was developed for a Nokia N900 smart phone was used to demonstrate how amateur wine drinkers can become wine connoisseurs (or will appear to be connoisseurs). The next steps is intended to show that the fuzzy ontology offers a good way to build a connection to the Semantic Web. It will then become possible to build Mobile Value Services that connect to and use the knowledge produced and distributed through the Semantic Web – this was already postulated in some of the Microsoft visions of the future smart phone.

## 6 Mobile Research Clusters at the eBled Conferences

We have collected all the papers published at the eBled conferences in the *Appendix* after searching through the archives for papers with “mobile” in the Abstract; we discarded those which clearly had nothing to do with mobile commerce, mobile services, applications of mobile technology, etc.; we admit that the method is not precise and if an author managed to avoid mentioning “mobile” in the abstract of a paper on mobile commerce then that paper is not included. We have still probably managed to miss some relevant papers for other reasons, but these should be few and the result should be roughly correct.

Working through the list of papers it appears that there are two clusters which appear to dominate the contributions on “mobile” to eBled: the Dutch and the authors’ own Finnish clusters each of which has contributed about a dozen papers. The Finnish influence is enhanced by the Aalto cluster (which was not Aalto at that time) that has contributed 4 papers. Felix Hampe has been adding to both the German and the Australian contributions and we have logged him and his co-authors for 5 contributions. The Australians show about 5 papers

contributed; Greek authors show 3 papers (all at the 15<sup>th</sup> eBled), the Danish and the Norwegians 2-3. The remaining third of the papers have diverse authorship.

The country dimension is of course not a precise classification as many of the researchers have found each others at the eBled conferences and started working together. We have an *m-community* in place that continues to grow and to open up new vistas for research; this community was formed in the panel discussions and the formal paper sessions in Bled. Just to mention a few examples: Felix Hampe first joined forces with the Delft group and then both groups linked up with IAMSR; Harry Bouwman is now spending five years in the Finnish Distinguished Professors program at IAMSR in Turku, Finland. The doctoral students affiliated with the research groups have formed research networks and postdoc researchers work on joint research projects.

Based on a scan of the central themes of the papers presented at eBled, a few themes emerge: (i) mobile payment in various forms and support systems for them; (ii) empirical studies of consumer and customer value, preferences, attitudes, adoption and use of mobile services; (iii) mobile health and support systems for medical information, and (iv) mobile community support with interfaces to group support and government services. Besides these themes there are a number of new research directions – such as context aware and location based services – that will probably form new central themes as they gain consumer and user support.

## 7 Summary and Conclusions

When the sessions on mobile commerce and applications of mobile technology started at the eBled conferences the number of mobile phone subscriptions worldwide were getting close to 1 billion; the key concern was the hunt for *killer applications* that would quickly be runaway business successes generating revenues in the 10's and 100's of billions. The surprise and disappointment were interesting to follow as this did not happen.

The next movement of high hopes was built around *mobile data services*, i.e. the expectations that users would like to run Internet services over their mobile phones and that this would both make use of and require the processing of large sets of data. As Peter Keen showed, the idea was not that good as it turned out that users are much more demanding, the services need to make sense to them and need to build some value that they cannot get otherwise.

We picked up on this thread and discussed the building of *mobile value services* in panels and in a number of papers at several eBled conferences. There is now some progress visible towards actually creating value for the mobile service users as the latest generation of mobile technology supports very advanced services that are actually easy to use, i.e. the users can master the services without investing more time than they would actually like to use.

The latest step in the development is the *knowledge mobilisation* that now is offering possibilities to enhance mobile value services with knowledge from semantic web. This is opening up new possibilities for localisation, personalisation and modularity features to be used for building and implementing the services. We have formed a new vision that the smart mobile phone would actually *compose* the service so that it is relevant to the context and to the cognitive profile of the user, the service would be built in real time and it would be paid at delivery. This will have some strategic implications both for the mobile technology and mobile service architecture (the new movement is called *mobile cloud*) and for the business models that are going to put the services on the market.

The smart phone market shows a growing trend since 2010 and the smart phones started to have an impact on the use of mobile services in 2011; this was partly driven by the application stores of Android and Apple. The smart phone applications are, however, not the mainstream and not adopted by a majority of the mobile phone users. Most market studies are focused on early adopters, trend setters, power users, etc. and this has created the impression that advanced mobile services now dominate the market. A recent study by AddValue (2012) in Finland used the Norstat web panel for a survey of 1000 consumers (smart phone users, age groups 15-65; representative for the Finnish population). It found using latent class analysis that 29% of the smart phone users did not use the advanced mobile services (and some users tried to disconnect them); another 29% were mainly using the camera features and used the phone to distribute snapshots over social media; whereas the so-called power users, who used the smart phone for a variety of services, were only 27%. This is in line with the results we have from our longitudinal data – the majority of the consumers have yet to find meaningful use for advanced mobile services.

There are now around 6 billion mobile subscriptions worldwide and it is clear that this community of mobile technology users will generate more and more innovations on how to create value from the technology; it appears that research will have to tackle an increasing number of challenges.

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## **Appendix: Bled Papers on Mobile Technologies – 1995-2011**

### **2000 – 13th Bled eCommerce Conference (1)**

Mobile Electronic Commerce: Reintermediation in the Payment System, J. Felix Hampe, Paula M.C. Swatman, Paul A. Swatman

### **2001 – 14<sup>th</sup> Bled eCommerce Conference (1)**

Efficient Service Production and Consumer Choice of Delivery Channels, Niina Mallat, Tomi Dahlberg, Timo Saarinen, Virpi Kristiina Tuunainen

### **2002 – 15<sup>th</sup> Bled eCommerce Conference (8)**

Japan Net Bank: Japan's First Internet-Only Bank – A Teaching Case, Ali F. Farhoomand, Vincent Mak

Improving the Retail Grocery Supply Chain through Mobile Shopping of Electronically Referenced Products, Panos Kourouthanassis, George M. Giaglis, Georgios I. Doukidis, Vassilis Pergiodakis

On the Potential Use of Mobile Positioning Technologies in Indoor Environments, George M. Giaglis, Ada Pateli, Kostas Fouskas, Panos Kourouthanassis, Argiris Tsamakos

Critical Success Factors for Accelerating Mobile Commerce Diffusion in Europe, Adam P. Vrechopoulos, Ioanna D. Constantiou, Nikos Mylonopoulos, Ioannis Sideris

Making Sense of Mobile Applications – A Critical Note to Recent Approaches to Their Taxonomy and Classification, Hans Lehmann, Franz Lehner

The Introduction of M-Info – A Teaching Case, Els A.M. van de Kar

Security Issues in Mobile Commerce Using WAP, Niels Christian Juul, Niels Jørgensen

Factors Affecting the Successful Introduction of Mobile Payment Systems, Hans van der Heijden

### **2003 – 16th Bled eCommerce Conference (9)**

Usefulness and Self-Expressiveness: Extending TAM to Explain the Adoption of a Mobile Parking Service, Per E. Pedersen, Herbjørn Nysveen

Factors Affecting Consumer Adoption Decisions and Intents in Mobile Commerce: Empirical Insights, Bill Anckar, Christer Carlsson, Pirkko Walden

Postponement Strategies for Mobile Application Development – A Framework, Sze Ling Yuen

The Paradox of the Mobile Internet: Acceptance of Gadgets and Rejection of Innovations, Ann Fogelgren-Pedersen, Kim Viborg Andersen, Christian Jelbo

Reconsidering the Challenges of mPayments: A Roadmap to Plotting the Potential of the Future mCommerce Market, Melissa Soo Ding, J. Felix Hampe

Uses and Attitudes of Young People toward Technology and Mobile Telephony, Sandra Sieber, Josep Valor Sabatier

Mobile Services for Group Decision Support, Jerry van Leeuwen, Hans van der Heijden

Mobile Banking and Brokerage Systems – Managing IS Risks in the Beginning 21st Century, Elke Wolf

Network Formation for Provision of Mobile Information and Entertainment Services, Carleen F. Maitland, Elisabeth A.M. van de Kar, Uta Wehn de Montalvo

**2004 – 17<sup>th</sup> Bled eCommerce Conference (5)**

A Short-Form Measure Of Attitude Towards Using A Mobile Information Service, Mark Ogertschnig, Hans van der Heijden

It's All About My Phone! Use Of Mobile Services In Two Finnish Consumer Samples, Christer Carlsson, Kaarina Hyvönen, Petteri Repo, Pirkko Walden

Balancing Requirements For Customer Value Of Mobile Services, Edward Faber, Timber Haaker, Harry Bouwman

The Transition From E- To M-Business Chances And Challenges For Enterprises, Katarina Stanoevska-Slabeva

Mobile Community Support: A Mobile Reservation System For The Leisure Industry, J. Felix Hampe, Petra Schubert, Frank Schneider

**2005 – 18<sup>th</sup> Bled eConference (7)**

PDAs as Time Management Tools: Experiences with Mobile Digital Calendars, Anna Sell

Mobile Commerce: Insights from Expert Surveys in Austria and Finland, Christer Carlsson, Joanna Carlsson, Michaela Denk, Pirkko Walden

Guidelines for Designing Mobile Information Service Systems in a Value Network, Elisabeth A. M. van de Kar

Adoption of Mobile Services across Different Technologies, Christer Carlsson, Kaarina Hyvönen, Petteri Repo, Pirkko Walden

A Framework for Delivering M-health Excellence, Nilmini Wickramasinghe, Steve Goldberg

A Case Study on Mobilizing Business Process, Vaida Kadyte

Mobile Couponing - Measuring Consumers' Acceptance and Preferences with a Limit Conjoint Approach, Kai Wehmeyer, Claas Müller-Lankenau

**2006 – 19<sup>th</sup> Bled eConference (7)**

Nice Mobile Services do not Fly. Observations of Mobile Services and the Finnish Consumers, Christer Carlsson, Joanna Carlsson, Jussi Puhakainen, Pirkko Walden

PIM APPLICATIONS - An Explorative Study on Benefits and Barriers, Miira Juntumaa, Virpi Kristiina Tuunainen

Mobile Service Bundles: The Example of Navigation Services, Timber Haaker & Henny de Vos, Harry Bouwman

Implementing a Mobile Wireless Environment in a Hospital Ward: Encouraging Adoption by Nursing, Julie Fisher, Linda Dawson, Stephen Weeding, Liza Heslop

An STP-Approach Focused on Customer Preferences for Mobile Business Applications, Bernhard Goldberger, Gernot Wörther, Michael Weber, Michaela Denk

Usage of a Mobile Medical Information System: An Investigation of Physicians in the Military Service, Shengnan Han, Ville Harkke, Mikael Collan, Franck Tétard

'What's in It for Me?' Taking M-Government to the People, Jennie Carroll

**2007 – 20<sup>th</sup> Bled eConference (9)**

NIM Åland: the quest for useful mobile services, Ville Harkke

Mobile RFID Management – An Application Scenario on the Handling of Industrial Liquid Containers, Goetz Botterweck, J. Felix Hampe, Sven Westenberg

Addictive, dependent, compulsive? A study of mobile phone usage, Val Hooper, You Zhou

Mobile Web 2.0, Robert Martignoni, Katarina Stanoevska-Slabeva

Empirical Findings on the Mobile Internet and E-Commerce, Hannu Verkasalo



Mobile Game-Based Learning – issues emerging from preliminary research and implications for game design, Alice Mitchell, Dragan Ciscic, Emanuel Maxl

E-Inclusion through text messaging: The emergence of an administrative ecology within an university student population via the use of a mobile academic information delivery system, Joan Richardson, John Lenarcic

Mobile ad intrusiveness – The effects of message type and situation, Kai Wehmeyer

Emerging Mobile Government Services: Strategies for Success, Tarek El-Kiki, Elaine Lawrence

#### **2008 – 21st Bled eConference (9)**

Optimising User Acceptance of Mandated Mobile Health Systems (MHS): The ePOC (Electronic Point-of-Care) Project Experience, Lois Burgess, Joan Cooper, Jason Sargent

Mobile technology in the Finnish construction industry – present problems and future challenges, Sonja Leskinen

Mobile Decision Support vs. Interpersonal Sales Communication: Predictors of Buying Intentions for Price Bundles, Wolfgang Maass, Tobias Kowatsch

Consumer Value of Context Aware and Location Based Mobile Services, Henny de Vos, Timber Haaker, Marije Teerling

A Risk Assessment Framework for Mobile Payments, Roger Clarke

Mobile Applications for Police Officers, Harry Bouwman, Timber Haaker, Henny de Vos

The MobiCert Mobile Information Community for Organic Primary Producers: a South Australian Prototype, Nhiem Lu, Paula Swatman

Capturing Value from Mobile Business Models: Design Issues That Matter, Mark de Reuver, Harry Bouwman, Timber Haaker

Using the eSana Framework in Dermatology to improve the Information Flow between Patients and Doctors, Marco Savini, Joël Vogt, Daniel Wenger

#### **2009 – 22<sup>nd</sup> Bled eConference (6)**

A Mobile Accident Report System, J. Felix Hampe, Stefan Stein

A Comparison of Mobile Payment Procedures in Finnish and Chinese Markets, Junying Zhong

Enhancing collaborative CRM with mobile technologies, Olaf Reinhold, Rainer Alt

Adoption of Personalisation Mobile Services: Evidence from Young Australians, Sally Rao Hill, Indrit Troshani

An Empirical Investigation of Mobile Health Adoption in Preventive Interventions, Mihail Cocosila, Norm Archer

Designing and Testing Service Experiences (Mobile, Web, Public Displays) for Airport

#### **2010 – 23rd Bled eConference (4)**

Equine Vaccination, a Paper Mess Waiting to get Solved. Could ICT be the Answer? Sonja Leskinen

DiaMonD: Developing a Diabetes Monitoring Device in the Australian Context, Nilmini Wickramasinghe, Indrit Troshani, Steve Goldberg

Knowledge Mobilisation for Knowledge Whenever and Wherever Needed, Christer Calsson, Matteo Brunelli, Jozsef Mezei

An Adaptive User Interface Framework for eHealth Services based on UIML, Joël Vogt, Andreas Meier

**2011 – 24th Bled eConference (2)**

Smart Coping with Stress: Biofeedback via Smart Phone for Stress Reduction and Relapse Prevention in Alcohol Dependent Subjects, Edith Maier, Ulrich Reimer, Monika Ridinger  
Using Activity Theory to Examine Information Systems for Supporting Mobile Work, Michael Er, Elaine Lawrence