Supporting Tourists at the Bomarsund Fortress with a Mobile Value Service

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Abstract:

The future competitive advantages for a successful tourism industry will most probably be built around effective mobile value services. Mobile value services create customer value with the support of mobile technology, a support which should be context-adapted and user-adaptive; this in turn will help to form new routines for tourists who will miss the services if they are not available. This will then create a market for mobile value services. In this paper we describe the development of a mobile guide service which is aimed at supporting tourists at the fortress of Bomarsund—one of the most important attractions on the Aland islands—which cannot be seen as it was completely destroyed during the Crimean War in 1854. We developed and implemented a tourist guide for mobile phones which tells the story of the fortress from different angles as the tourists walk through the ruins. We argue and show that the mobile tourist guide is a mobile value service and that it provides some useful lessons of general significance for building mobile value services.

Keywords: artifact, design science, mobile value services, mobile tourist guide, tourist experience, value-in-use

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INTRODUCTION

The Åland Islands have more than 6750 islands on the Baltic Sea, between Stockholm in Sweden and Turku in Finland. Close to 27 000 people live in this autonomous region. As an archipelago, it also has a special status as an EU region. This full-function, miniature society is well-suited as a test bed for mobile services. Mobile value services for tourists and travelers have a potentially large market with about 2,285,000 visitors per year (http://www.asub.ax/files/inres1209.pdf). Furthermore, the service sector and tourist industry dominate the Åland economy, which makes mobile value services for tourists and travelers potentially both interesting and important This is the context and setting for a research, technology development, and service implementation project called *New Interactive Media (NIM)* Åland (September 2006–March 2008), jointly funded by the European Regional Development Fund and the Åland Autonomy Government.

The future competitive advantages for both the mobile service industry and a successful travel industry are likely to be built around effective mobile value services (e.g., Carlsson et al. 2006a, 2006b2008a, 2008b; Carlsson and Walden 2007). To create customer value, the mobile technology should be context-adapted and user-adaptive. The core of value services is that they should be of value to their users *at the moment* when they are used *in the context* in which they are used. Then the research task we face is that we will have to find out what this value could be and how we could build/form it with the help of mobile technology.

As a first indication, let us start with the Braudel Rule (Keen and Mackintosh 2001), according to which we have a value service if it expands the limits of the possible in the structure of everyday life routines. Thus a mobile value service for tourists would make it possible for them to carry out activities that would be either unknown to them or impossible to accomplish without it. When this occurs, tourists will change their routines—or build new routines—in order to continue using the activities or getting the benefits the new or changed routines give them. This view on mobile services is not widely accepted or even understood (Carlsson and Walden 2007). It appears that mobile services have been launched on the market because they are technically feasible, even when not necessarily wanted by any larger group of consumers. Grönroos (2008) points the way when he states that value is not created by the provider but rather in the customers' value-generating processes. In other words, mobile services cannot be designed for the tourists to create value *for* them but possibly in cooperation *with* them. This is what we want to gain a better understanding of within our research task: What type of mobile services will help tourists create value—expand the limits of the possible—during their visit?

CONTRIBUTION

Ruins from 1854 tell no story to the occasional tourist who happens to pass by; typically they generate the question—What happened here?—for which there is no immediate answer. Professional guides tell a story but they need to be booked in advance and the story they tell is mostly the same for all visitors. Clearly something more is needed.

To get an answer to the tourist, we can try mobile technology and develop a tourist guide for mobile phones. This should then be context-adapted—it should tell the story of the place—and it should be user-adaptive, i.e., present material the user can follow and which will tell him/her "what happened" in a way which is interesting. This is a value service that is of value to the user at the moment when it is used and in the context in which it is used. The research task we have undertaken is to find out what this value could be and how it could be built/formed with mobile technology.

The first results we sought were to find out what service value should be and how it is created in cooperation between the service providers and the users. We applied this to the design of mobile value services. We built a prototype for a guide services on mobile phones that tells the story about the ruins from six different angles depending on the origin and background knowledge of the tourists; this is done in four different languages, and the service can be activated anytime when the tourist passes by as it is downloaded on his/her mobile phone. The prototype was built as an artifact according to design science methodology with an aim to build a mobile value service, i.e., a mobile service that will change the routines of the occasional tourist and will be missed if it is not available anymore. We show that the design science methodology is useful for this purpose and that it serves as a good basis for developing a working prototype.

We found two fundamental issues with mobile value services: (1) what value do they provide as new artifacts, and (2) what will demonstrate this value? We learned during the process that value cannot be created for a tourist; at most we can participate in value creation with the tourist. Then a natural next step will be to find out how mobile technology should be adapted to value co-creation. We introduced a mobile value service business model which is a network model bringing a different approach to the business model used by the mobile network operators.

In this paper we will focus on a mobile tourist guide (our candidate for a mobile value service), which will support tourists at the fortress of Bomarsund—one of the most important tourist attractions on the Åland Islands—which cannot be seen as it was completely destroyed during the Crimean War in 1854. The mobile tourist guide tells the story of the buildings and events around them together with stories about key persons from Åland, Finland, Russia, England, and France and from different angles as a tourist walks around the area and visits different parts of the once imposing fortress.

The Bomarsund mobile guide is an example of the mobile technology development for tourist support in many EU countries, as tourism has become one of the major industries in Europe. This is evident from the growing interest to support tourists with web- and mobile technologies, which have turned out to be both cost-effective and value-adding. Tourists are supported with digital information throughout their travel and in sharing information with fellow travelers (e.g., Carlsson et al. 2008a, 2008b). The web-services developed (e.g., www.visitaland.com), the advanced mobile networks (e.g., 3G, Wi-Fi, Bluetooth), the mobile handsets and smart phones, and the new generations of data-oriented mobile services are designed and developed to offer information and entertainment to tourists. Mobile phones are personal and user-adaptive. Location awareness, time sensitivity, and personalization will in the next few years be implemented in smart phones, making them ideal for giving tourists a continuous access to interactive and personalized travel information and services. This is in line with Rasinger et al. (2007) who found that mobile tourist guides show potential for supporting tourists when they are in places which are new and unknown for them. Compared to the Internet, mobile technologies promise to offer tourists a new level of freedom to explore various sites and thereby opening the site for new experiences.

This paper is structured as follows. The next section addresses the value creation process and the related research done using mobile technology within the tourist context. The third section introduces our research methodology. The fourth section describes the actual design of the Bomarsund mobile tourist guide, and, in the fifth section, we return to the core question and explain what we learned about building mobile value services. Finally, the paper concludes with a short summary.

VALUE CREATION AND RELATED RESEARCH

In his seminal paper, Grönroos (2008) summarizes almost three decades of discussion on how customer value is created through services—an insight that could become a driver for mobile value services. He wrote:

> "A service is in itself an activity … with in-built ability to transform the potential value (or utility) for the consumer into real value for him. … A service has use value … whereas a good (as such) has exchange value for the consumer" (Grönroos 1979, p. 86).

A proposition based on that premise is that customers are not predominantly interested in goods or services but in how these can be used for value creation. Therefore, firms need to focus on understanding their customers' everyday practices and value-generating processes so that they can *assist* in customers' value creation. Firms should thus not aspire to create value *for* their customers (except in special cases); the focus should be on finding ways for firms to *co-create* value with their customers. This insight, we believe, will be a guiding principle for building mobile value services.

The basic idea for the Bomarsund mobile guide was to provide personalized guide information adapted to the environment. These same ideas have also been adopted in a number of recent research and development projects on personalized tourist services (e.g., Cheverst et al. 2000; Poslad et al. 2001; Pospischil et al. 2002; van Setten et al. 2004; Grün 2005; Schwinger et al. 2005).

Tourist information needs have been studied from different perspectives. In the consumer behavior framework, tourists are seen as decision makers using various information search strategies to support their pre-visit and onsite decisions, such as choice of destination, accommodation, transportation, or activities (e.g., Sirakaya and Woodside 2005; Freyer 2001). In the *pre-visit* phase, information is sought for destination assessment, itinerary planning, and logistics (e.g., transportation, accommodation); *onsite,* ad-hoc information is sought on directions, recommendations, and activities on location; in the *post-visit* phase, tourists want to recollect views from the trip and share them with others, and information is collected to support the storytelling (Frolich et al, 2002). It is generally believed that mobile tourist guides will be a good way to support tourists in the *onsite* phase. To some extent, the *post-visit* phase becomes important as many snapshots are made with camera phones and mobile blogging, when available, can capture on-site ideas and information.

Information and communication technology plays an important enabling role in tourism and as Buhalis (2003) pointed out, tourism and technology go hand in hand. The airline companies have traditionally been the early users of new technology and have been investing heavily in ICT (Buhalis 2003). For example, Lufthansa offers an

extensive range of services via mobile technology and has often been presented as an industry leader in this area. Several commercial services can be found on the market, such as the *Travel Buddy* service, launched in April 2006 and available for several destinations in Europe. The service provides location-based information to visitors and residents about local activities, events, restaurants, clubs as well as weather forecasts. The service is SMS-based and is operated by sending keywords to get information (good, intuitive keywords as "whatson, kidstuff, mustdo, tours, dining, clubbin, weather"). A visitor to Manchester could access the Travel Buddy service by filling in an online form or by sending an SMS "Manchester" to a mobile phone number (http://www.visitmanchester.com/travelbuddy/travelbuddy.html).

One could expect that mobile tourist guides would have come a long way since the late 1990s (Abowd et al. 1997) as there has been much talk about them. However, most of the work seems to have stopped at working prototypes. In their recent survey, Grün et al. (2008) worked through four mobile tourist guides: *Berlin Tainment* offers a framework for assisting service providers in developing context-aware entertainment services; *etPlanner* is a platform for interactive mobile travel guidance for Innsbrück, a running pilot of the system is available; *MobileStuttgart* is a mobile city guide developed for the World Cup 2006 in Germany, and *Digital Concierge* is a personal assistant to offer tourism content for the visitor in Singapore, a running pilot of the system is available.

We also have some older systems, such as GUIDE (Cheverst et al. 2000), CRUMPET (Poslad et al. 2001), *m-ToGuide* (2001), LoL@ (e.g., Pospischil et al.2002) and COMPASS (van Setten et al. 2004) which use mobile positioning technologies (e.g., GPS) to give the tourist suggestions and recommendations and to offer guidance based on the context. *COMPASS*—short for COntextaware Mobile Personal ASSistant—offers individual tourists context-aware recommendations and services which are based on the tourist's geographical location. *CRUMPET*—Creation of User-friendly Mobile Services Personalized for Tourism—relies on agent technology to pro-actively give location sensitive and personalized information on tourist attractions, restaurants and tours. For the *GUIDE* system, Tellmaris combines 3D graphics with 2D maps on mobile devices and develops location-based services to give tourists up-to-date and context-aware information about a city; the device is a PDA and the information is based on the user's current physical location, his/herpast behaviour and personal preferences. Another mobile guide is the *LoL@* (e.g. Pospischil et al. 2002)—this acronym is built from Local Location Assistant—which uses GPS to show tourist locations and information about important tourist sites in Vienna on a map with route planning and multimedia interaction. The *m-ToGuide* offers city travelers location-specific (with GPS) multimedia information about places of interest on a digital map and supports virtual tours of the city. An innovative feature is that it also supports recording of experiences with text and snapshots for after-tour personal diaries (http://www.motorolatele.com/MOTOnow/).

The *IMAGE* research project (e.g., Edwards et. al. 2006)—short for Intelligent Mobility Agent for Complex Geographic Environments—has created a Mobility Agent to mimic a traditional travel agent that assists the user with travel decisions for short-distance land transport, to purchase travel and accommodation, and to inform about possible activities en-route or at the destination. A somewhat different approach is used in *Time Treks* which combines a story-based game with cultural and historical information to create a mobile tour (e.g., Kim and Schliesser, 2007).

There have been a number of studies of the mobile services market in Finland (for example, Bouwman et al. 2008) which show that most of the services introduced have not created much value for the consumers, and were withdrawn from the market rather quickly, often before they even had a chance to initiate any demand. The ways tourists need mobile services are, of course, different from the ways citizens use mobile services as a part of their everyday life. The failures mobile operators have had with mobile services have also hampered efforts to develop mobile services for tourists. One more partial explanation is that building mobile value services is not an easy task. This, in part, motivated the study carried out here: we wanted to find out what is needed in order to build a mobile value service.

RESEARCH METHODOLOGY

Our research focus is on mobile value services for tourists. The service we have developed—the Bomarsund mobile tourist guide—allows the user to search for information which is relevant to the place where she/he is, which fits the user's background knowledge and language skills, and which gives life and tells stories about some ruins with no visible story to tell. In this way the mobile guide makes it possible for tourists to experience the historical fortress in ways which would not otherwise be possible. This is one of its value creating features.

The mobile guide is integrated with a mobile community system (part of the *NIM Åland* prototypes), which adds a social perspective to the mobile tourism services; tourists get travel information through interaction with other travelers in Åland. This offers a second aspect to creating value—value co-creation among tourists in the same region (Prahalad 2004). The mobile guide is different from the community services because it offers researched,

professional knowledge which could not be provided by fellow travelers—but it could, of course, be enhanced by blogging historians sharing links with the tourists.

In studies on consumer use of information technology, there are a couple of recent additions to the value discussion (Grönroos 2008). The first one is that a mobile service will be of value to a user at the moment when it is needed and used in a context for which it is relevant (Carlsson and Walden 2007). The second one is that it has been useful to work with four interrelated concepts of value: intended and delivered value on the part of the service provider, and expected and perceived value on the part of the service user. In their study, Bouwman et al. (2008) noted that users redefine the value and the usage of technology and services in a way that fits their preferences and their behavior. In many cases, the intended value is not the value that will be delivered. This means that the perceived customer value, which made the customer decide to try the service in the first place, has often little to do with the expected value (Bouwman et al. 2008; Chen and Dubinsky 2003). Thus, the perceived value is what matters to the customers. In summary, a mobile service that is either offered or co-created in cooperation with fellow service users and with a perceived value for a tourist in a context for which the service is relevant and which will make the tourist change his or her routines—or form new routines that will not be changed for some period of time—will be a mobile value service for tourists.

We now have a basic understanding of what forms a mobile value service for tourists and—as we have found in a number of studies (e.g., Bouwman et al . 2007, 2008; Carlsson and Walden 2007; Walden et al.2007)—that mobile services so far, in most cases, are not value services. We wanted to design and develop a mobile guide service which offers something more than the services already available, and which would actually be a mobile value service. For this purpose, we will use a design science approach. We will also try to work out ways to make the design operational in the travel industry; that is, we want to find out what type of business model would be viable for building business around the service. This is a condition for the mobile guide service to survive and remain in the market.

As pointed out by Walls et al.(2004), design science is one of the few research paradigms in the IS field that is endogenous to the field itself. The methodology we used for designing and developing the mobile guide is an iterative design science approach (Hevner et al. 2004). This is useful as the design science paradigm seeks to extend the boundaries of human and organizational capabilities by creating new and innovative artifacts (Hevner et.al. 2004). In the design process, we see how the artifact evolves from a first idea to a final artifact (Peffers et al. 2008). According to Hevner et al. (2007), the design process is a sequence of expert activities that produces the design artifact. Before the final design artifact is generated, a "build-and-evaluate" loop has been iterated a number of times (Markus et al. 2002).

The Bomarsund mobile service aims at giving tourists a possibility to get into the dramatic and colorful history of the Bomarsund fortress, which would be difficult to achieve in any other way as a tourist, as only small fragments remain of the fortress. A design science approach is applicable for fast prototyping of mobile services when the users are involved in the development process.

The ideal approach would be to get access to a group of tourists or visitors that could spend sufficient time to work interactively with the design and prototype building team. As tourists are, by definition, short-term actors (if we look at a specific context), this was not possible. Instead the *NIM Åland* project used a group of volunteers who (1) proposed the idea for the mobile service, (2) met several times to work as assessment teams for the prototypes as they were developed, and (3) were offered an opportunity to become owners and entrepreneurs for the commercial mobile services.

The design and prototype building process progressed in phases. First, an animated prototype was constructed by the research group (service designers) to simulate the key features and user interfaces of the mobile guide. This was evaluated by the volunteer assessment teams who gave their impressions of the designs. The prototype was then taken over by a professional development team (consisting of an art designer, a technical developer, and two users) working with the service designers. This team evaluated the prototype in terms of screen layout, task design, and technical feasibility. Based on the findings from this evaluation, a second prototype was built to work on a mobile phone, but with limited interactive functionality; this was used as an instrument for the second iteration and was again tested by the volunteer assessment teams who tried out the functionality and worked out limitations and problems with the prototype. This was beneficial as the volunteer teams made mistakes that professionals do not make because they follow an intuitive understanding of how the service should work.

Then the testing was again taken over by a professional team of testers who checked all aspects of the usability of the prototype, which also included a set of tests carried out in a usability laboratory. The feedback from the second round of tests was used for the development of the final prototype, which was carefully tested and evaluated by a

smaller volunteer assessment team which was planned to be the future owners of the mobile guide service. They again had a number of things they wanted to change, and minor details were corrected and improved. Finally, the prototype was turned over for business planning and commercialization—a process that turned out not to be simple or straight-forward.

THE MOBILE GUIDE SERVICE

In the Åland Islands, a tourist has limited opportunities to know what to look for and what to expect. The availability of service personnel is a problem in the island community as the tourist season is rather short and tourist services are not available most of the year. A historical site may not necessarily have a guided tour available, material about the site may be difficult to obtain, and, if a tourist wants to go there on his/her own, very little can be seen and experienced. The consequence of this is that—as also shown by Halloway (2006) —the tourism industry will have to become increasingly impersonal. To give an impression to tourists of what was and what had taken place is what professional guides do. As these guides are not available on an ad hoc basis, the idea behind the Bomarsund mobile guide is to provide similar services but adding to it by using a mobile phone and tailor-made digital material. We added a much-wanted feature—that our assessment team brought up—presenting the history of the fortress in the form of storytelling. We will now work through some details of the Bomarsund case to give substance to the mobile guide service.

The building of the Bomarsund fortress started in 1832 when Finland was part of the Russian Empire and was planned to become the Western-most fortress of the Russian Empire. The fortress was designed as a 290 meter long, two-storied casemate with six cannon towers, to house a garrison of 2500 troops. At the time of the Crimean War, the fortress was of strategic importance as a key outpost for the Russian forces. A French-British fleet had tried to destroy the Russian fleet at Kronstadt but failed in this campaign and attacked Bomarsund instead. The attack started on August 8, 1854, with an invasion force of 12,000 French soldiers and eighty French and British warships. The defenders numbered only 2000 Russian soldiers with forty cannons. The main campaign was fought August 10–16, after which the defending force capitulated and the fortress was blown up on September 2, 1854. Today there is not much left for tourists to see—only some partial walls and some parts of the cannon towers (Figure 1; more details can be found at http://en.wikipedia.org/wiki/Bomarsund). As a footnote, Wikipedia notes that the first Victoria Cross was awarded at Bomarsund to Charles Davis Lucas, a twenty-year-old Irish Mate who later rose to the position of Rear-Admiral.

A tourist visiting Bomarsund—in Sund, a short twenty-minute trip by car from Mariehamn—will not get any of the fascinating stories surrounding Bomarsund unless she/he manages to get a professional guide to tell the stories, and these guides are in short supply. The guides tell standard, generic stories which were developed to give some overall impression of Bomarsund for an average tourist. The problem is that most tourists are not average, they have special interests and they are keen to get into specific topics, such as: What did the fortress actually look like? Where were the cannons? Where were the French-British fleet? Where did the French soldiers attack? What happened with the defenders? What happened to the 12,000 civilians living in and around the fortress? What was life like in Bomarsund? The locals know some of the history but not much. There are some historians who know everything about the history, but they are not available to tell the stories, as there are no means to book and pay them for consulting a stray tourist with sufficient background to appreciate the deeper insight.

Figure 1: The Bomarsund fortress ruins.

The Bomarsund mobile guide was built to serve as a very insightful mobile guide, which offers a possibility for the tourist to get context-adapted material (Figure 2, the numbers 1–6) which tells the story about Bomarsund from different perspectives. The mobile guide was built to present material, for example, in English for British visitors about the British fleet and the battle fought at Bomarsund from that perspective (and the footnote about the first Victoria Cross). Material is available as well in French (to tell the French part of the story and to point to the inscription about Bomarsund at the Arc de Triomphe in Paris), Russian, Swedish, and Finnish. The mobile guide is built around movie clips, pictures, 3D graphics, speech and sound effects to illustrate the building process, what the area used to look like, and how the battles were fought (not unlike the *Time Treks*).

Figure 2: The Bomarsund mobile guide.

The mobile guide has five main parts, each linked to specific places at Bomarsund (the numbers 1–5 in Figure 2). The *first* part contains information about the planning and politics involved; the *second* part focuses on the building of the fortress and the community which was growing around the fortress; the *third* part looks at the battle at Bomarsund from the perspective of the Russian defenders, while the *fourth* part looks at the same battle from the perspective of the French-British attackers; the *fifth* part is focused on the following peace and the history and development of Åland and Finland. There is a *sixth* part with separate presentations of the ruins of the three towers (only three of the planned six were actually built). The material of the multimedia presentations was collected from historical sources and from local historians. The material is very rich and can be adapted to and enhanced to support different groups with varying interests in the history. The mobile guide was developed and run on Nokia N73 smart phones (which are now a bit outdated) with good multimedia support, but most of the material can be accessed and used also with phones of less functionality.

We expected to be able to borrow solutions for the mobile guide system from similar guides at Finnish museums but found out that not many museums offer electronic, mobile audio, or video guides. The Kiasma Museum has an electronic audio guide for the Landscape Collection and the Espoo Museum of Modern Art has an electronic audio guide for the art exhibition, but none of these offered useful solutions for our purposes. It turned out that the Bomarsund mobile guide is an innovation for historic sites.

THE MOBILE GUIDE AS A VALUE SERVICE

As we stated initially, we will describe the development of a mobile service which will support tourists at the destroyed fortress of Bomarsund. We developed and implemented a mobile tourist guide which tells the story of the fortress and its fate from different angles as the tourists walk through the area and visit different parts of the once imposing fortress. We want to show that the mobile tourist guide is a mobile value service and then find out what this would mean in terms of business models.

On the surface, it is easy to verify that a tourist will get very different insights into the history and fate of the Bomarsund fortress simply by comparing Figures 1 and 2. In the first case, there are some ruins a tourist can only guess about. In the second case, there is a mobile guide service that tells the story about the fortress from several different perspectives and the tourist can form a vision of what happened and how the events unfolded. This is also the case of a service which will "[be of] value for a tourist in a context for which the service is relevant and which will make the tourist change his/her routines"—the basic understanding we defined earlier in this paper for a mobile value service. We used this understanding and figured out what tourists need when they get to Bomarsund and want to know about the history of the fortress. This is in line with Grönroos (1979)—the mobile guide has an "in-built ability to transform the potential value (as it is available on a mobile phone [comment added]) for the consumer into real value for him (when on location in Bomarsund [comment added])." The mobile guide is available and can be activated—and paid for—when the tourist is in Bomarsund and wants to learn about what she/he cannot see. In this way, the mobile guide service will "expand the limits of the possible" which is one of the characteristics of a value service; the other characteristic—that a tourist will be reluctant to give up the service—can be verified by surveys with tourists at Bomarsund, both one-time visitors and returning visitors.

Keen and Mackintosh (2001) propose that a mobile service becomes a mobile value service when it produces "freedom" instead of just adding features to an existing service. This "freedom" is the possibility to visit the ruins whenever convenient and to get guiding services that fit the interests of the tourist and the occasion of the visit (professional guides normally offer a standard program and charge much more for a tailored service). Similar arguments are offered by Lee and Mills (2007) who suggest that the key factors for traveling customers' satisfaction

with the support offered through mobile devices are determined by degree of perception and perceived value of services provided. Satisfaction of customers is, following this argumentation, determined by using attractive (e.g., location- and profile-based) services compliant with privacy settings. In many cases, a service may be offered free of charge to enhance the tourism experience; some examples are mobile hotel reservation services (Hotel Reservation Service 2008), services provided by local authorities for promoting points-of-interest as well as events and services (State Capital Stuttgart 2008).

The ideas are one thing, they give some indication of how the service could be constructed, but it will not come into existence until it is designed, built, and implemented. We have described the actual design-building-testing-adaptation process we went through (cf. Section 2); thus, here it will be sufficient to point out that we were closely following the Guidelines for Design Science in IS Research that Hevner et al. (2004) proposed a few years ago (here summarized): (1) We should build an innovative purposeful artifact (here: Bomarsund), (2) for a specific purpose (here: testing if a mobile guide can be a mobile value service); (3) we should thoroughly evaluate the artifact (here: test programs with service providers, intended users, service organizations, etc.); (4) the artifact must be innovative, solving unsolved problems or known problems in a more effective or efficient way (here: tourists need to get information and an understanding of some ruins that once were a major fortress); (5) the artifact must be rigorously defined, formally represented, coherent, and internally consistent (here: developing second, third, and progressively more advanced and specified prototypes with better and better validated software); (6) the process of creating an artifact should be similar to a search process carried out in a problem space (here: successive prototypes represent better and more advanced problem solving); (7) a design artifact is complete and effective when it satisfies the requirements and constraints of the problem it was meant to solve (here: tourists will use the "Bomarsund" regularly and would be deeply dissatisfied if it were not available). These are then the design steps needed to get to a mobile value service.

The design is of course a necessary phase but it is not sufficient to make the service operational and useful for the tourists. There should be some understanding of how to make the service a viable business for it to actually be available and used by tourists—and in a wider context by the travel industry.

The mobile services may be stand-alone or they may be combined to form bundles; i.e., they will produce added value through interaction with other mobile services like the services we developed in the NIM Åland project. The mobile guide service could be part of a mobile tourist gateway. First there is a possibility to find out about the islands while traveling there (travel, hotels, restaurants, events) and then to book places and services a tourist wants to enjoy, and then to get guide services at these places. To this it would be possible to add a mobile community service for blogging and for sharing insights and experiences with other tourists both *onsite* and *post-visit*.

The typical business model for mobile services is the mobile network operator (MNO) "develop-push to market—find out if it flies" model. The insight from a series of studies of mobile markets (e.g., Carlsson et al. 2008a, 2008b) shows that this has not been a good approach for the last few years and it has probably been a key reason why mobile services have not been too successful and we have a declining market for mobile services in most EU countries.

A business model describes the business logic of a service, i.e., the way value is created for customers and the way providers can turn created value to revenue. This thinking is actually contradictory to the value co-creation approach introduced and promoted in service marketing, but it is the prevailing approach used in the telecom industry (e.g., Magnusson 2003). Service, technology, organization, and finance—also known as the STOF-model—are the domains that interact with each other and describe the context of the business models (Bouwman et al. 2008). Translated to the Bomarsund mobile guide service, the implementing (business, public) organization needs to be able to continuously work with the tourists to find out and understand their needs and then to adapt the service as needed—in the ideal case we get close to the idea of value co-creation. The present local approach in Åland with a dominating MNO which is able to charge up to 40 percent for network services seems to prevent any viable business with the mobile guide. The increasing availability of smart phones, supported by mobile web services developed by application providers, will enable users to run applications on the phone instead of via the network of mobile operators. The shift is toward open platforms that will enable business developers to implement new services independently from MNOs. Open innovation networks with a keen focus on user value are more likely to realize advanced mobile services.

In Figure 3 we show an outline of the design of a possible business model for the mobile guide service. In this model, Company A is the producer of mobile value services. Typically, the substance of the services is developed in cooperation with tourist service providers and tourist tour organizers, who have learned from experience where their customers feel the most frustration and where a specific service could save the day. Company A develops and implements various types of advanced mobile value services (with localization, personalisation, context adaptive

features), but is doing this through a network of out-tasking and in-sourcing (Keen and Mackintosh 2001) partners. Partner A1 may have the task to provide a network (e.g., 3G, WLAN, WiMax) for the service; partner A2 (which may be several companies) will develop mobile services (e.g., $A2_1$ the mobile guide and $A2_2$ the mobile community service to which they retain ownership and for which they charge for the added value they provide, e.g., Lee and Mills 2007) which are included in and contribute to the mobile value.

There seems to be some advantages in using this mobile value network model as a business model as MNOs have tried to be centralized service providers, i.e., covering the functions of both A1 and A2, but mainly having the competence to produce the A1 services and resorting to the "develop-push to market—find out if it flies" model for the A2 services, which has not been successful. The tests we carried out showed clearly that the mobile guide should not be offered by an MNO, it will not become a viable mobile business that way; rather the owner could/should be a Company A type of SME.
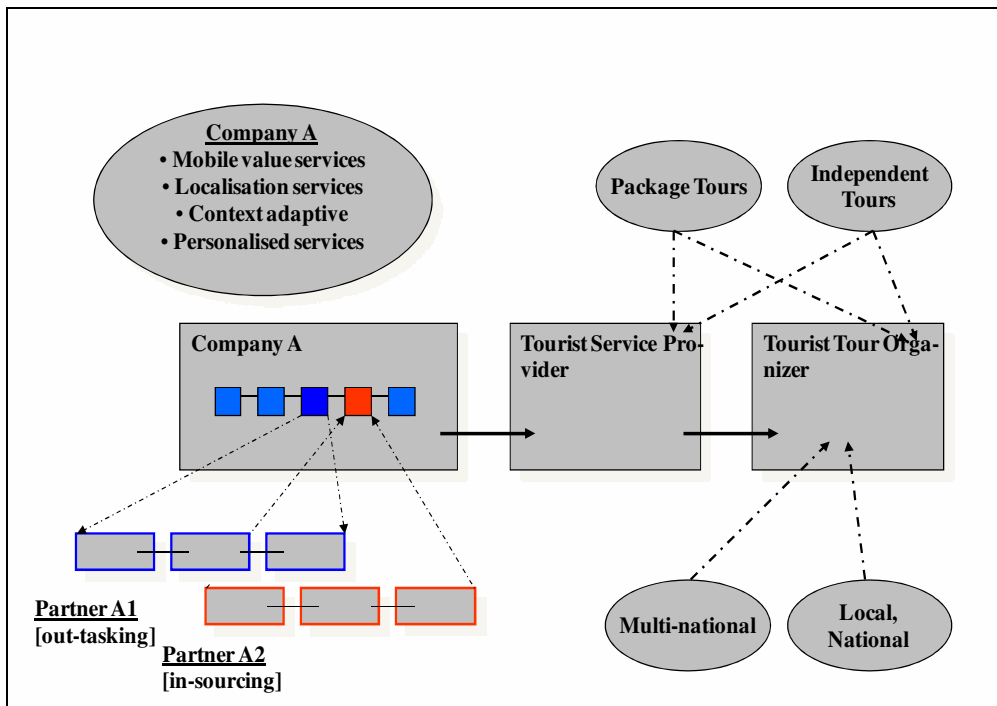
Figure 3: The mobile value network model.

The recent research in service logic and service management (Grönroos 2008) that we have previously quoted suggests that the mobile service development work has been on the wrong track: "The firm cannot create value for customers. Its role is, first of all, to serve as value facilitator. By providing customers with value-facilitating goods and services as input resources into customers' self-service value-generating processes, the firm is indirectly involved in the customers' value creation" (Grönroos 2008, p. 310). Thus, for mobile value services, we should aim at building the services *with* the users, not *for* the users. This is rather a different process from the traditional mobile service design, development, and implementation process we have worked through above and offers new challenges for design science research. It is also a challenge for the technology developers as the interaction will in most cases not be with people who know and understand the possibilities of mobile technology but more often with people who are amazed at the possibilities offered and will be satisfied with rather mundane solutions. Then they will not offer any leaps of creativity either. Nevertheless, the lightly structured value network model offers a good platform for the approach Grönroos (2008) is describing.

SUMMARY

The future competitive advantages for both the mobile service industry and a successful travel industry will most probably be built around effective mobile value services. Mobile services create customer value with the support of mobile technology, a support which should be context-adapted and user-adaptive. The core of value services is that they should be of value to their users at the moment when they are used in the context in which they are used. Mobile services in tourism settings will most certainly open up new business opportunities for service providers.

We carried out rather a detailed discussion of value services and noted as our starting point that mobile value services for tourists should make it possible for them to carry out activities that would be either unknown to them or impossible to accomplish without the mobile service. We noted that this view is not widely accepted and mobile services have been launched because they are technically feasible, not necessarily wanted by any larger group of consumers. We added to this the view of Grönroos (2008) that value is not created by the provider but rather in the customers' value-generating processes, i.e., mobile services cannot be designed for the tourists to create value for them but possibly in cooperation with them. This is, then, the understanding we have for the mobile guide—we should find ways to build or support activities with the tourists that help them get an understanding of the Bomarsund fortress which would be impossible without the mobile guide. This also shows that the traditional way of designing mobile services (use the technology to find nice applications and push them to the market) may be on the wrong track, as mobile technology providers cannot create value for customers; their role should be to serve as value facilitators.

The methodology we used for designing and developing the mobile guide is a design science approach, which is normally used for fast prototyping of mobile services when the users are involved in the development process. First, an animated prototype was constructed to simulate the key features and user interfaces of the mobile guide, which was tested and evaluated by volunteer assessment teams. This evaluation was the basis for the work of a professional development team that worked with the mobile guide designers to get professional solutions for screen layout, task design, and technical feasibility. The second prototype worked on a mobile phone, but with limited interactive functionality, and was again tested by the volunteer assessment teams that were expected to make the typical mistakes of nonprofessional users. Finally, with feedback from the second round of tests, the final prototype was developed and was carefully tested and evaluated by a smaller volunteer assessment team that included the prospective owners of the mobile guide service.

There are two fundamental issues with mobile value services: (1) What value do they provide as new artifacts, and (2) what will demonstrate this value? If we introduce and launch new mobile value services, we need to present evidence of the value being formed. Hevner et al. (2004) seem to propose that the insight about value formation is created through the knowledge and understanding of a design problem and its solution that is acquired in the building and application of an artifact (i.e., in our case the building of the Bomarsund mobile service prototype). Grönroos (2008, p. 299) has, however, a different view: "When using resources provided by a firm together with other resources and applying skills held by them, customers create value for themselves in their everyday practices (customer service logic); when creating interactive contacts with customers during their use of goods and services, the firm develops opportunities to co-create value with them and for them (provider service logic)." This process is now known as the *Prahalad* (2004) "value co-creation," the creation of value in everyday practices is analogous with the principle that mobile services become mobile value services when they begin to be part of everyday routines. Value co-creation technologies will probably be the next enhancement to mobile service technologies. The value co-creation approach is consistent with the notion we found with our volunteer assessment teams that mobile value services are created through the experiences the tourist will have with the service and that this contains everything necessary and sufficient to make the experience real and the service a value service.

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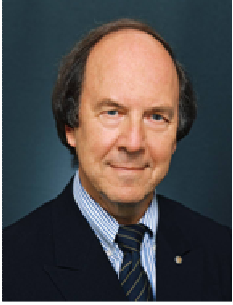
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