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Consumer Value of Context Aware and Location Based Mobile Services

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Abstract

Context aware services have the ability to utilize information about the user's context to adapt services to the user's current situation and needs. In this paper we consider users' perceptions of the added value of location awareness and presence information in mobile services. We use an experimental design, where stimuli comprising specific bundles of mobile services were presented to groups of respondents. The stimuli showed increasing, manipulated, levels of context-awareness, including location of the user and location and availability of buddies as distinct levels. Our results indicate that simply adding context aware features to mobile services does not necessarily provide added value to users, rather the contrary. The potential added value of insight in buddies' location and availability is offset by people's reluctance to share location information with others. Although the average perceived value overall is rather low there exists a substantial minority that does appreciate the added context aware features. High scores on constructs like product involvement, social influence and self-expressiveness characterize this group. The results also show that context aware service bundles with utilitarian elements have a higher perceived value than bundles with hedonic elements. On the basis of the different results some guidelines for designing context aware mobile services are formulated.

Keywords: mobile services, context aware, customer value, location based, service bundle, presence

Introduction

In contrast to the tremendous success of mobile voice communication services, the success of mobile data services is still limited (Carlsson, 2006). With 'mobile services' we refer to all kinds of innovative services that combine technologies and concepts from the domains of telecommunication, information technology, and consumer electronics. While voice communication has become a commodity and mobile phone penetration has risen close to or even higher than 100% in Europe, the adoption of mobile services is hampered by an apparent lack of

added value (Ojala et al., 2003), a mismatch between launched applications and the everyday needs of target users (Carlsson, 2006; Steinfeld, 2004), and ineffective business models (Carlsson, 2006; Steinfeld, 2004; Haaker et al., 2006).

A core value element in mobile services is that they can be used anytime and anywhere, which enables people to communicate or to access information at any location, any time and in any situation (mITF, 2004). The intention to use mobile services is however found to depend on the situational context (Bouwman et al., 2008). Therefore, mobile services and applications that adapt to the context may provide greater added value (Bae et al., 2006; Klemettinen, 2007). Context awareness deals with the ability to utilize information about the user's environment (context) in order to adapt services to the user's current situation and needs (Dockhorn Costa, 2005). The most well known form of context awareness is location awareness, which is used to adapt services to the current location of the user (Raper et al., 2007). Navigation services, e.g. in-car personal navigation, are among the most popular location based services (Berg Insight, 2007). Other examples of context aware mobile services deal with social context. For example presence services like MSN Mobile Messenger allow users to share information on social context like their online or offline status, or availability for communication. Context characteristics can also be derived from sensors, e.g. bio-sensors to measure heart rates, and used to adapt or trigger specific service behaviour (Klemettinen, 2007; Koolwaaij et al., 2006).

Lately a significant amount of research has been conducted with regard to technological opportunities and possibilities of context aware mobile services (Hegering, 2004). These services often combine multiple forms of context awareness with personal preferences stored in profiles to create tailored solutions to meet users' needs (Klemettinen, 2007). Research focuses particularly on mobile services architectures, context modeling (e.g. Sinderen et al, 2006), context management (e.g. Kranenburg et al., 2006), context reasoning (e.g. Tao Gu et al., 2005), and on building reference applications. Less attention has been given to user evaluations of context aware services and applications. Relatively little is known about the actual added value of different context aware features in mobile services, and about the factors that contribute to user adoption of these services. For example the degree of control with respect to location disclosure is important (Consolvo et al., 2005). However, research in customer needs and behaviour concerning context aware mobile services is hindered by the fact that respondents have difficulty understanding the specific characteristics of services that are not yet available. Decisions regarding adoption of context aware services revolve around consumers' perceptions of their potential use and expected benefits and costs, and depend on technology and service characteristics (Bouwman et al., 2007a), personal characteristics (Teerling et al., 2007) and context characteristics (Laukkanen and Lauronen, 2005).

In this paper we therefore address the following question: what are users' perceptions of the added value of location awareness and presence information in mobile services? To address this question we used an experimental design, where stimuli, in our case specific bundles of mobile services, were presented to groups of respondents.

The mobile services that we use in our study comprised increasing, manipulated, levels of context awareness. We included location of the user and location and availability of buddies as distinct levels of context awareness. Two experiments were conducted. The first experiment focused on a utilitarian setting, i.e. the included services provided predominantly pragmatic or goal-directed value such as local searches (yellow pages) and directions from the current location. The second experiment focused on a hedonic setting, i.e. the services provided mostly hedonic or entertaining value such as taking pictures and automatic options for geo-tagging, annotating, storing and sharing these pictures. The aim of the paper is to contribute to the understanding of consumer value and adoption of context aware features in mobile services. Such understanding supports the design of value driven mobile service bundles.

The paper is organized as follows. First we elaborate on (customer value of) context aware mobile services and provide our main hypothesis. This is followed by a description of our research approach and experimental design. Subsequently we present our main findings and end with some

conclusions regarding our research and implications for the design of context aware mobile services.

Location based and context aware services

A service is called context aware if in its operation it uses context information other than explicit application logic related input (Abowd et al., 1998). The most well known form of context awareness is location awareness, which is used to adapt services to the current location of the user or users (Raper et al., 2007). Giaglis et al. (2003) provide a taxonomy of location based services including emergency services (e.g., automotive assistance), navigation services (e.g., personal navigation), information services (e.g., mobile yellow pages), marketing services (e.g., mobile advertising), tracking services (e.g., vehicle tracking) and even billing services (e.g., location-sensitive billing).

In-car personal navigation that is based on GPS location and advanced digital map technology is among the most popular applications. Personal navigation is moving from dedicated devices to advanced mobile devices that are equipped with GPS functionality and sufficient storage and computational capacity. The expected increase in penetration levels of GPS equipped devices is considered an important driver for the adoption of location based services (Berg Insight, 2007).

Location-based services (LBS) are growing in the U.S., largely thanks to the FCC's E-911 legislation, that required location information to be included in emergency calls made from mobile phones (totaltelecom, 2007). Raper et al. (2007), in their comprehensive overview of the field of location based services, label user acceptance for spatial cognition and interfaces of LBS as a key issue. Kallio (2005) and Kangas and Kinnunen (2005) find that user acceptance and actual use is strongly influenced by the context or situation of use. Kaasinen (2005) did a study about attitudes towards LBS. She found that users specifically requested instant on/off, dynamic scale adjustment, well designed labeling (of landmarks), push services that are under user control, and can be refined or cancelled easily, reliable services that are only used occasionally and support for content creation.

Zipf (2004) surveyed potential LBS users about their concepts of 'nearness', the map presentation and the type of content likely to be of interest. Raper (2006) reviewed the operational constraints on successful LBS deployment based on experience from 'live' LBS implementations, and highlighted context systems, positional fusion and application development platforms for LBS as key challenges for LBS.

Other forms of context awareness include social awareness and group awareness. Well-known examples of social aware services are presence services, for instance MSN Messenger. A more elaborate example of a context sharing mobile application is Contextwatcher (Koolwaaij et al. 2006). Contextwatcher is an application that allows users to share there whereabouts with buddies, or any other piece of context information they might want to share, ranging from body data to pictures, local weather information, and even subjective data such as moods and experiences. People involved in the trial said that in the end they were sharing much more context information than they had expected beforehand, just because it's fun.

Information gathered from multiple context sources may also be used to adapt service behaviour, e.g., providing recommendations about who to reach in a given situation or via which communication channel a person might be best reached (Ter Hofte et al., 2006). Sharing of social context information has the potential of supporting (dynamic) groups of people within social networks to more efficiently and effectively perform their activities (Ter Hofte et al., 2006). However, users' willingness to disclose their location is dependent on who can see their location, for what purpose and with what accuracy (Consolvo et al., 2005).

Hegering et al. (2004) advance several management challenges that are specifically hard when provisioning context aware services, such as configuration of the context value chain, fault management, accounting, performance (quality of context) and security. Regarding the adoption of

context aware services the tedious balancing of costs and benefits need mentioning. Financial costs may be one obstacle (KPMG, 2005) but other user sacrifices and uncertainties, e.g. related to privacy, trust in the service, or required cognitive effort (Teerling et al., 2007) are important here as well.

Our study aims at gaining insight into the added value of context aware aspects in mobile services. In our experimental design we consider increasing, manipulated, levels of context awareness, including location of the user and location and presence of buddies as distinct levels. A straightforward hypothesis appears to be

Hypothesis 1: increasing levels of location and presence awareness in mobile services are accompanied by increasing levels of customer value.

This hypothesis is addressed in two experiments, one in a utilitarian setting and one in a hedonic setting (Kleijnen et al., 2007). Pragmatic context aware services have been around for some time as business to employee services that focus on providing location dependent information in transport or workforce management. As a first step towards consumer adoption, those context aware services that carry a predominantly pragmatic value, e.g. navigation services, may meet with higher valuation. We therefore hypothesize:

Hypothesis 2: location and presence aware service bundles with utilitarian elements have a higher perceived value than bundles with hedonic elements.

Research Method

To be able to investigate the role of context awareness we used an experimental design, where stimuli, in our case specific thematic sets of mobile services, are presented to groups of respondent. The sets of mobile services comprise increasing levels of context awareness and focus on specific themes.

We distinguish four levels of context awareness, i.e. no context awareness, location of the user, location of the user and selected buddies, and location of the user and location and availability of selected buddies, see Figure 1. We added these four levels of context awareness to two specific mobile service bundles, i.e. a hedonic and an utilitarian service bundle. Hedonic services are characterized by elements of fun and entertainment, while utilitarian services are typically more focused on efficient and pragmatic time management (Kleijnen et al., 2007). These differences were operationalized by service descriptions that focused on these key concepts. Utilitarian services were presented by a service bundle that focused on effective time management; allowing consumers to plan their traveling in a more effective way. Hedonic services were represented by entertainment services that are rapidly gaining popularity in the market, e.g., moblog (mobile blogging) and mobile picture sharing. Taking into account these two different manipulations and the four context awareness levels, a 4x2 design is obtained, containing eight different scenario descriptions
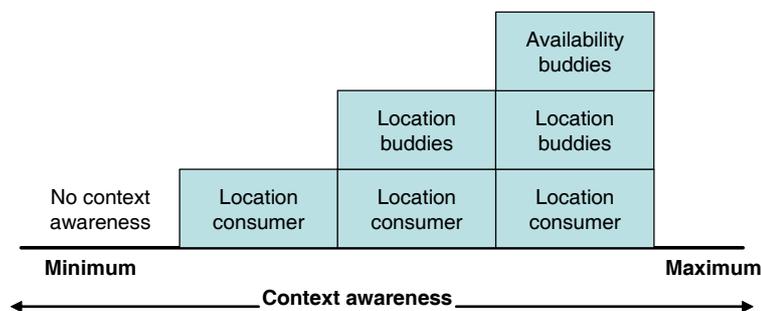

Figure 1: Overview of levels of context awareness considered in the experiments

The scenarios were developed in accordance with recent trends and service introductions in the market. Given the lack of a single killer application for mobile data services, and given that the mobile device and services should fulfil personal user needs in varying circumstances, a bundle of services is more capable of providing the right 'bundle of benefits' (Kottler, 1999; Stremersch and Tellis, 2002). A core compact bundle of services was therefore developed for the hedonic and the utilitarian setting. Scenarios were developed by adding the possibilities of specific levels of context awareness to this core set. To maintain the highest possible level of realism, a large mobile service provider developing context aware services was involved in the development of the scenarios. Additionally, the scenarios were subjected to a qualitative pretest in which 20 respondents (10 consumers and 10 mobile service experts) were asked to critically evaluate the scenarios in terms of clarity and realism. Second, we subjected the scenarios to a large scale quantitative pre-test using 191 respondents. The results of both the interviews and the quantitative pretest resulted in minor adaptations of the scenarios, related to fine-tuning sentence formulations rather than radical changes in content. A summary of the scenarios with the highest levels of context awareness are given in Table 1.

Table 1: *Summary of two mobile service scenario's, i.e. location of user and location and availability of buddies*

Context aware features and service aspects
Recognition of user's current location; Recognition of location of buddies; Sharing location information with buddies; Sharing availability information with buddies; Visualising location and availability information on map

Utilitarian mobile service description	
Search Yellow Pages for addresses. Provide directions from user or buddy location to specific addresses and/or buddies automatically. Contact buddies that are available. Visualize locations and directions on map.	
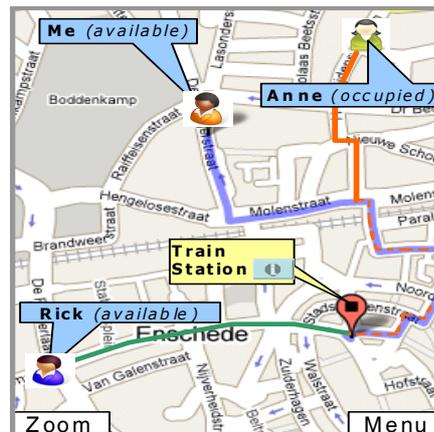
Hedonic mobile service description	
Pictures (made with mobile phone) and messages are automatically stored in a moblog (mobile diary) and labelled with date, time and location. Moblog entries and current locations of different buddies can be shared and visualised on a map.	

Variables and Scales

Respondents were asked to give their opinion with respect to different value scales, i.e. intention to use and overall value (Cronin et al., 2000). Reliability of the scales was assessed by means of a Cronbach's alpha. For the value measures alpha's ranged from 0.88 to 0.96.

Next to relating value to levels of context awareness, we also want to explore the effects of other factors on consumer value perception. Next to common background characteristics, such as age, gender, income, we employed a range of semantic differential scales to measure the independent variables in our study. With alpha's ranging from 0.74 to 0.93 these scales are cognitive effort, i.e. the perceived effort of learning to use the service (Kleijnen et al., 2007), product involvement, i.e. the familiarity with and interest in mobile services (Zinkhan and Locander, 1988), impulsiveness (Puri, 1996), innovativeness with respect to mobile services (Kleijnen et al., 2004), privacy, i.e. attitude towards privacy issues concerning mobile technology (Kleijnen et al., 2007; Malhotra et al., 2004), self expressiveness, i.e. to what extend does using the mobile service help you to express to others who you are (Nysveen et al., 2005), and social influence, i.e. in how far others influence ones attitude toward mobile services (Lu et al., 2005). Since the study focuses on context awareness, we also included characteristics with respect to situational context of respondents. For example questions about how many days each week are respondents at work, alone, or in a hurry. These questions are referred to as 'life-style' characteristics. All scales were considered in the aforementioned qualitative and quantitative pre-tests.

The questionnaire contained subsequent parts, starting with general questions on attitude towards mobile technology and general characteristics. Following this, a particular mobile service scenario was presented. The respondents were then asked to imagine themselves in that situation and answer questions concerning the particular situation and the use of these mobile services, e.g. value, intention to use, cognitive effort. The final part of the questionnaire concerned background characteristics, e.g., gender, life-style.

Sample

We conducted a between-subjects experiment, whereby we approached consumers from a consumer panel to participate in our research. Participants were randomly assigned to one of the scenarios. After screening the questionnaires for incompleteness and abnormalities (Tabachnik and Fidell 1996), we were left with a total sample of 403 respondents that was almost evenly divided over the various scenarios, i.e., between 49 and 53 respondents for each scenario. The sample contained 56% women and 44% men and a broad range of age categories: younger than 25 years: 6%, 25 to 35 years: 19%, 36 to 45 years: 25%, 45 to 55 years: 25% and older than 55 years: 25%.

Results

The manipulations, i.e., level of context awareness and utilitarian versus hedonic, were checked in control questions. The answers to these questions proved that respondents overall recognized and understood the manipulations.

Table 2: *Assessment of total value and intention to use for the different utilitarian (util) and hedonic (hed) scenarios*

Context awareness		Total value			Intention to use		
		util	hed	sig	util	hed	sig
Basic	Average	3.34	2.48	*	2.16	1.94	
	Stdev	1.61	1.43		1.46	1.47	
LBS	Average	3.33	2.64	*	2.45	1.80	*
	Stdev	1.71	1.54		1.52	1.19	
LBS&CA	Average	2.85	2.39		1.82	1.59	
	Stdev	1.63	1.38		1.13	0.98	
LBS&CA+	Average	2.79	2.19	*	2.18	1.59	*
	Stdev	1.43	1.32		1.53	0.97	

* sig < .05, i.e. significant difference between hedonic and utilitarian scenario.

Table 2 gives an overview of respondents' rating for different aspects. The ratings should be related to the scale on which they were measured, i.e. from 1=very low to 7=very high, with 4 being the neutral point. The ratings are presented for both the utilitarian and hedonic scenarios, with different levels of context awareness, i.e. Basic=no context awareness, LBS=location of user, LBS&CA=location of user and buddies, LBS&CA+=location of user and location and availability of buddies.

In general a decreasing trend can be observed in the ratings when context awareness is added to the services, where the utilitarian services are valued more than the hedonic ones. However the differences in rating between the context awareness levels are not significant, except for the difference in intention to use between LBS and LBS&CA in the utilitarian scenario. The difference in rating for total value between the utilitarian and the hedonic scenarios are significant for all levels of context awareness, except for LBS&CA. This confirms our second hypothesis.

Average ratings for total value and intention to use are rather low, ranging from 1.59 for intention to use in the hedonic LBS&CA scenario to 3.34 for total value in the basic utilitarian scenario. All ratings are far below the mean of the scale. The averages are that low, because of the high percentage of respondents who perceive no value with respect to the presented mobile services (29% for total value and 50% for intention to use). Figure 2 gives an overview of the distribution of ratings among respondents, i.e. the percentage of respondents with a specific rating. The graphs combine the ratings of all four utilitarian and hedonic scenarios, respectively. On average only 31% of the respondents rate the presented scenario with a 4 or higher for total value. For intention to use it is even worse; 7% give a rating equal to or above 4. Respondents appear to be more positive about utilitarian service bundles in comparison with the hedonic ones, i.e. lower ratings apply more often to the hedonic scenarios. The results also show a high variation between respondents. Such average low valuation with a high variation between individuals is also found in other studies on the value of mobile services (Haaker and de Vos, 2007; Bouwman et al., 2007b). They also conclude that such a low valuation does not imply that such services are not attractive for consumers or that providers cannot successfully exploit such services. Substantial minorities exist that do value the services. In fact providers would likely not be unhappy if all positive raters (31% of the mobile phone users) would become their customers.
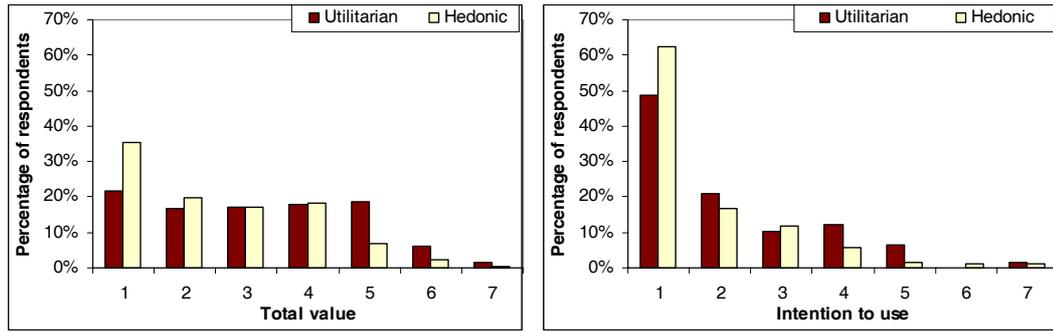
Figure 2: *Distribution of total value and intention to use ratings for utilitarian and hedonic scenarios*

Our hypothesis was that adding increasing levels of context awareness to a service bundle would increase the perceived value. We have to reject this hypothesis. No significant increases in total value or intention to use were observed, rather the contrary. This may be understood from users' attitude towards sharing of context information as discussed below. When assessing the explanatory value of the service characteristics (i.e. hedonic vs utilitarian, level of context awareness) by means of a regression analysis, we have to conclude that such characteristics only account for 6.2% of the total variance in total value. Hedonic services as compared to utilitarian services have a significant negative effect on total value. Effects of context aware aspects are not significant. Personal characteristics explain 24% of the variance in total value, with significant effects between 0.166 and 0.229 on total value for product involvement, control, social influence and self-expressiveness. Life style characteristics account for 4% of the variance, with a significant positive effect for people that are more than 2 days a week 'at ease'.

Attitude toward Sharing of Context Information

One issue with respect to context aware services is that the context of the user has to be available for service providers in order to be able to deliver the services. One can argue that consumers want a certain level of control over the use of their context information. Their concerns and opinions regarding these issues may have an effect on their value perceptions. Table 3 summarizes the attitude of respondents toward use of context information. Not only is location information of the user shared with the service provider, but in some scenarios location information is also shared with selected buddies. Most respondents (>80%) would like to give explicit consent to both service providers and buddies on use of location information. Respondents do not care very much about the accuracy of location information. The number of respondents differs as some questions were only relevant for certain scenarios.

Table 3: *Attitude towards sharing of location information*

	N	Average	Stdev	Percentage rating ≥ 4
Information on my location should be very accurate	301	2.38	1.66	27.2%
Explicit consent to service providers on use of location information	301	5.51	1.92	85.4%
Availability of exact location of buddies	201	2.15	1.48	23.9%
Explicit consent to buddies on use of location information	201	5.66	1.80	87.6%

Note: measurement on a 7-point scale, where 1=totally disagree to 7=totally agree. Number of respondents differ as some questions were only relevant for certain scenarios.

Table 4 presents respondents' willingness to share location information with specific people. Respondents dislike sharing information with unknown people. Colleagues and managers are sometimes allowed to see location information. Most respondents (> 80%) indicate that their partner should be given access to information on location and availability. This is particularly high, considering the fact that some of the respondents might not have a partner. The willingness to disclose location information to family (around 50%) and friends (around 25%) is much lower.

Table 4: *Attitude toward sharing of location information with specific persons*

Type of information	Share with …					
	Unknown person	**Partner**	**Family**	**Friends**	**Colleague**	**Manager**
Location information:						
- at home	2%	87%	56%	33%	10%	7%
- at work	4%	81%	49%	25%	23%	21%
- travelling	2%	87%	51%	27%	12%	11%
- away	2%	82%	41%	25%	5%	2%
Availability information	18%	83%	78%	70%	50%	44%

Both Table 3 and Table 4 show that respondents are rather reluctant with respect to sharing information. Underlying reasons are likely that they are concerned about their privacy or think that sharing information is not useful. It is clear that such opinions have a negative effect on their perceived value of services that use such information to adjust to the user's context.

Characteristics of the 'High Raters'

The results showed that on average respondents perceive a low value with respect to context aware service bundles. However, the variation between respondents in perceived total value is high. In fact, the average is dominated by people that perceive a (very) low value as was shown by the distribution of ratings (see Figure 2). A substantial minority is however rather positive about the services. This section deals with the respondents indicating that they value the presented set of mobile services with a four or higher. We denote these respondents with the 'high raters'. Note that '4' is the mean rating on the 7-point scale.
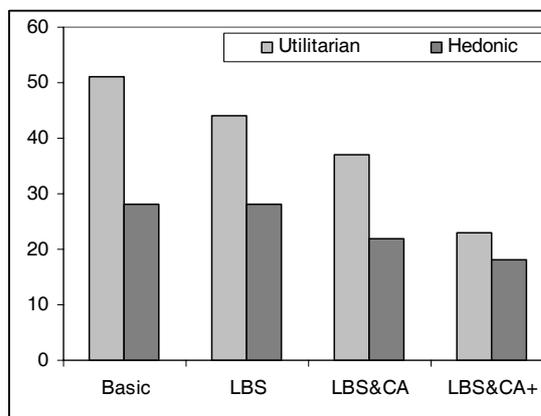

Figure 3: *Percentage of high raters within the scenarios.*

A total of 126 respondents indicated that they valued the presented set of mobile services with a 4 or higher. This is 31%. Figure 3 visualizes the percentage of people with a positive rating for each scenario. The basic utilitarian scenario is evenly distributed: about 50% rate the services as positive and 50% as negative. The percentage of high raters decreases in the utilitarian scenarios when context aware aspects are added. For the highest level of context awareness 23% value the services with a 4 or higher. The hedonic scenarios give a similar result although the differences are smaller than in the utilitarian scenario. In fact, the percentage of high raters for the highest context aware level is almost the same for the utilitarian and the hedonic scenarios.

Table 5 gives an overview of the specific characteristics of the high raters as compared to the others. Chi-square and t-tests were used to find significant differences on a 5% significance level. The high raters score significantly higher in most scenarios on social influence, i.e. the extent to which they are influenced by others to use mobile services such as presented to them. A high score on self-expressiveness characterizes especially the high raters of the utilitarian scenarios. High scores on product involvement and innovativeness characterize the high raters for the hedonic scenarios. Cognitive effort, i.e., whether it takes a lot of effort to learn how to use the service, is significantly lower for the high raters of the LBS&CA hedonic scenario. Unexpectedly, for the basic scenario cognitive effort for the high raters is higher than that of low raters. For the basic utilitarian scenario a few life style characteristics differ significantly, i.e. the respondents who are often alone and travel a lot value the service higher. For the hedonic scenario with LBS&CA+ no significant difference between high and low raters could be found for specific factors.

Table 5: *Characteristics of the high raters, i.e. significant differences on personal characteristics as compared to the low raters.*

	Utilitarian (5% sig level)	**Hedonic** (5% sig level)
Basic	Control, self expressiveness, daily travelling of 1 hour or more, alone	Product involvement, cognitive effort
LBS	Social influence, self expressiveness	Product involvement, innovativeness, self expressiveness
LBS&CA	Social influence, Self expressiveness	Innovativeness, cognitive effort (-), social influence
LBS&CA+	Social influence, self expressiveness	

Next to the characteristics listed in Table 5 the high raters also differ significantly in their attitude toward sharing of location information. They appreciate more that their location information can be used by service providers, they think their locations information should be very accurate and they like information of buddies to be available to them. Regarding consent the high raters do not differ significantly. High raters are significantly more willing to share availability information with unknown people, partners and colleagues (sig. < 0.1). High raters do not significantly differ with respect to gender, age, income and level of education.

Discussion

This study considers the changes in perceived user value from adding different, manipulated, levels of context aware features to mobile services. The location of the user, and the location and availability of buddies are included as distinct levels. Our results indicate that simply adding context aware features to mobile services does not automatically result in added value for users. Rather the contrary is true. Bundles of services that automatically use the location and availability of buddies were found to have a lower value than bundles without these features. There is an apparent trade off between the usefulness and added value of location information of buddies on the one hand and the privacy one needs to give up when sharing this information with buddies on the other hand. On average the potential added value does not outweigh the loss of privacy. This is exemplified by users' general reluctance to disclose their location to other people. The willingness

to share location information with one's partner is above 80%, but this drops sharply to around 50% and 25% for sharing with family and friends, respectively. This result confirms the finding in (Consolvo et al., 2005) that people's willingness to share location information depends on whom it is to be shared with. For most respondents the group of likely buddies for location sharing is limited to family members. A second finding of our study is that context aware service bundles with predominantly utilitarian elements have a higher perceived value than bundles with mostly hedonic elements. Hedonic mobile service bundles are considered of lower value for all levels of context awareness.

Although average value ratings are low, we still find that about 31% of the respondents perceived a higher rating, i.e., 4 or more on a 7-point scale. High raters differ on specific background characteristics when comparing them to low raters. The high raters are in general people that are familiar with and interested in mobile services. They think that using such mobile services improves their status among friends and they use such mobile services to express their personality.

We are aware that one key problem when studying value and intention to use of services is that when these services are assessed in a laboratory (controlled, safe, reproducible) the results may have limited external validity as compared to studies 'in the wild' (semi-controlled, unpredictable, not reproducible) (Kallio et al., 2005). Still, as we carefully checked and iteratively improved our manipulations in the pre-test and the actual experiment, we feel that our results provide new insights into users' value perceptions of context aware features in mobile services. Another point to mention here is the age distribution of our respondents, which is relatively 'at age' given the domain of mobile services and may therefore bias our results. Over 50% of the respondents have an age above 45, and less than 25% below 36. However, the observed valuations did not differ significantly with age.

The results of this study provide some guidelines for providers of context aware services. These relate to the observed reluctance to share location information outside the family circle, the higher perceived value of utilitarian service bundles and the characteristics of the respondents with high ratings. With respect to marketing of such services, the emphasis should be on highlighting aspects that refer to characteristics of the respondents with high ratings, such as product involvement and status aspects related to social influence. As people prefer utilitarian (pragmatic) services and basically just want to share location information with their partner, providers could first target pragmatic service elements in a family setting. Providers should also reflect on the privacy issues of consumers and how these are addressed to decrease the concerns of users and hence increase perceived value.

Although we covered only a limited range of context aware aspects, i.e. user and buddy location and availability of buddies, it is likely that our guidelines are also applicable to other types of context information.

Further research will focus on gaining more insight into effects of personal characteristics on value and intention to use. Other value measures, such as utilitarian value or hedonic value might give rise to further guidelines for service providers. Since context aware services imply use in different user contexts, another line of research will be to explore the conditional value and the relation between user context and perceived value in more detail.

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