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center for Communication, Media and Information technologies (CMI)
Department of Electronic Systems,
Aalborg University Copenhagen,
A.C. Meyers Vænge 15,
DK-2450 Copenhagen SV
Tel +45 99403661
E-mail cmi@cmi.aau.dk
URL <http://www.cmi.aau.dk>

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That's Pretty Smart, but Also a Bit Frightening:

A Qualitative Study About Mobile Tracking Among Danish Mobile Users

Thomas Bjørner¹, Lene Sørensen² and Hanne Westh Nicolajsen³

Aalborg University Copenhagen

E-mails: ¹tbj@create.aau.dk; ls@cmi.aau.dk; westh@hum.aau.dk

ABSTRACT

The increasing use of mobile phones and services introduces the challenging question of how to take advantage of the services without the service providers taking advantage of us. The notion of location-based services often means a less transparent partner and may constitute a challenge too big for some users to be a part of the natural developments in mobile services. This paper focuses on one segment of Danish mobile phone users who are trailing behind advanced mobile users but have an interest in trends and technological developments. The overall purpose is to gain an insight into this segment's perception of location-based services by focusing on different existing and forthcoming services. The paper concludes that users are generally willing to disclose location-based data if they find the services useful and to their advantage. Privacy and trust are essential elements in judging this perspective.

KEY WORDS

Mobile services, location tracking, location-aware, privacy, trust, user survey

INTRODUCTION

'Chris F., in Goshen, Indiana wrote a tip @ Red Leon Hotel, Salt Lake City'. This is an example of an entry on the Foursquare.com service, where users of the service can at all times update information on their whereabouts and share it with other users of the service. This service is just one example of the advances in location-enhanced technologies, which makes it much easier to be located by others – and to locate

others. The capability of the Android phones provides other examples of the advances in location-enhanced technologies, such as the service updating the weather forecast for the user's current location, which works by default.

Location-based services can be categorised into a large number of categories varying according to their functionality. Poolsappasit and Ray (2009) present a number of examples of location-based services from navigation (directions and traffic control), information (travel and tourist), tracking (people or vehicles) to emergency (police and ambulances), advertising (advertisement alerts), billing (road tolls) and social networking (locating friends and instant messaging). In particular, people-tracking and social networking are based on exact information about the user and his/her whereabouts.

New services on the user's mobile phone (such as Foursquare.com) provide location information with a high degree of spatial precision. This may present a difficult privacy trade-off, as it requires disclosing one's location to another person, company or authority. The understanding of privacy varies from one individual to another, however. Some people are willing to share all location information with anyone, whereas others only want to share location information with selected friends or family members. One of the big questions is thus how users perceive and deal with the notion of privacy when using applications and services on their mobile phone.

To explore whether, why and what Danish mobile users are willing to disclose about their location we have conducted a study, which is part of the CAMMP research project.¹ The aim of the CAMMP project is to identify innovative mobile services based on convergence of technologies such as Internet, broadcasting, radio and 3G technologies and the challenges this presents to potential users.

Many studies and applications highlight the importance of keeping people's location information private, and deal with the negative consequences of tracking people (see, for example, Barkhuus, 2004; Snekkenes, 2001). The aim of this paper is to open and widen the discussion in pursuit of a deeper and more nuanced insight of user attitudes towards data disclosure in mobile tracking services. This is pursued by discussing different kinds of location information as well as different kinds of location tracking. A better understanding of how Danish mobile users perceive the concept of location-based services can guide the development of services in new

directions. The study is based on a set of qualitative interviews with randomly selected users of mobile services.

The paper is organised as follows. Section 2 includes a state of the art of the notion of location-based services and privacy. The methodological set-up for the study is presented in Section 3. Findings of the study are presented in Section 4. The findings are focused on three different location-based services presented for users in their daily life: tracking at the airport, advert pushes and traffic information. Discussions on the findings are presented in Section 5, and Section 6 concludes.

STATE OF THE ART

One of the most popular and negative perspectives of surveillance and tracking originates from the dystopian novel *1984* by George Orwell (Orwell, 1949 [2000]). The novel depicts a world of pervasive government surveillance, and incessant public mind control. Privacy has been abolished by a totalitarian regime, which uses tracking and total control over the media to maintain its power. In this Big Brother society tracking is necessary as long as people are capable of moving around and having their own views. The Big Brother metaphor is often used when we are talking and writing about surveillance and tracking, and leads to a negative understanding of it, especially in public debate (Hendren, 2008; Doyle, 2010). In research also there are examples of a negative focus (Clarke, 1994; Simon, 2005; Haggerty, 2006).

The mobile phone has certainly made changes to society and its understanding of privacy. Some literature addresses how the mobile phone contributes to a privatisation of the public arena, for instance where private or even intimate subjects are involved, e.g. how people break up or have quarrels via the mobile phone. Parts of people's personality, which otherwise would have stayed hidden, are made accessible to others (Fortunati, 2002; Ling, 2004; Höflich 2006; Chan, Vogel and Ma, 2007; Campbell 2008; Bjoerner, 2010). This example indicates that mobile phone users have a tendency to be willing to share private data with others in a public space.

Despite the growing literature within the field of location-based services not much literature about users' willingness to disclose location data in relation to such services can be found. In several studies, however, privacy is shown to be essential in relation to location-based services (Barkhuus, 2004; Snekkenes, 2001; Bisdikian et al.,

2001). Barkuus and Dey (2003) have studied users' privacy concerns in respect of location-based services. They distinguish between location-tracking mobile services, which rely on the tracking of people's location by other parties (for example, the service provider), and location-aware services, which are based on data generated by the geographical position of a device (for example, the time or the weather forecast for the location of the person) (Snekkenes, 2001). Barkuus and Dey (2003) conclude that people consider both types of location-based services useful. In addition they find that users in general are not overly concerned about their privacy when using location-based services. Concerns about privacy are greater, however, when the service is based on other parties' tracking of the user's location (location tracking) compared with location-aware services. This is explained by the finding that position-aware (location-aware) services are considered to be less intrusive than location-tracking services. In another study by Barkhuus (2004) it is emphasised that users who have an initial worry about privacy in respect of location-tracking services felt less threatened and more accepting of the services after using them. This suggests that real experiences change our attitudes and practices and confidence grows or a more nuanced picture develops.

In the pursuit of understanding these nuances another element closely linked to privacy and location-based services can be found. The element of trust is a key concept for mobile services in general and also in relation to location tracking (see for example Kaasinen, 2005; Cheung and Lee, 2006; Urban, Sultan and Qualls, 2000). Trust is defined in a variety of ways. Fogg and Tseng (1999) describe trust as an indicator of a positive belief about the perceived reliability of, dependability of, and confidence in a person. Kaasinen (2005) agrees with this definition but argues that using mobile services is far more complex in relation to trust. With mobile service networks, the user often does not know the identity of the service providers with whom s/he is interacting. This indicates that there are other elements which establish trust for users of mobile services. Kaasinen (2005) sees trust in mobile services as an indicator of the perceived reliability of the technology, the information and functions provided, reliance on the service in planned usage situations, and the user's confidence that s/he can keep the service under control and that no misuse of personal data will follow from using the service.

In the area of e-commerce Gefen, Rao and Tractinsky (2003) build on Mayer, Davis and Schoorman (1995), who define trust as, ‘the willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control the other party’. This definition elaborates two important factors in trust: expectations and the willingness to be vulnerable. We translate expectations into the usefulness of a given location-based service. In Kaasinen (2003) it was found that location-aware information is seen as especially useful to users when they find themselves in unusual situations, such as an unfamiliar environment, which generate specific needs. Furthermore, it was found that users like to create and store their own location-aware data, and that they are willing to share these data with others. Regarding disclosure of location in social relations Consolvo et al. (2005) found that the most important factors are who places the request and what is felt about the requester, why the requester wants the user's location, and what level of detail would be most useful to the requester. These factors determine whether location data are disclosed. Consolvo et al. (2005) further conclude that users are typically willing to disclose either nothing or the most useful details.

In the literature, there is a clear focus on privacy and trust as fundamental elements of users’ willingness to use location-based services and to share location information with others. These elements are influenced by the type of location-based service, the technology involved, the experiences of the user and whether the service is based on location tracking or location position. In addition the relationship and image of the requesting partner is of relevance as well as the purpose of the service and its usefulness and stability.

METHODS

The method for the work in this paper has been based on purposeful sampling (Koerber and McMichael, 2008), the semi-structured interview guide (Kvale and Brinkmann, 2009) and multi-grounded theory (Goldkuhl and Cronholm, 2010). In the following, each of the elements will be described further.

Purposeful sampling

Koerber and McMichael (2008) describe purposeful sampling as the situation where the researcher is looking for participants who possess certain traits or qualities. In this approach, the researcher looks for maximum variation to represent as much as possible the range of insights represented. This paper, however, has been driven by a special focus on a particular segment of users of mobile services. Within the CAMMP project, a segmentation model has been developed for Danes' use of mobile phones. Four user segments have been derived (Wieland and Thaarup, 2010): the Basis user, the Buzz User, the Bling User and the Business User. The segments represent a growing usage of and interest in advanced mobile services and smart phones. The Basis users focus on the core functionality of the mobile phone, communication in making and receiving calls; the Business Users are the most advanced and use the phone as a desktop for sending, receiving and working on documents.

This paper has a special interest in targeting the Buzz user segment. It represents around 36% of all mobile phone users. The Buzz user is typically between 20 and 50 years of age. There are slightly more women than men in this segment. The Buzz users prioritise camera, radio and MP3 on the mobile phone, and typically send many text messages and photos via their mobile. Around 18% of these users have 3G but are rarely if ever online via the phone. They have a general focus on a small phone with a prolonged battery life as well as capacity. More details can be found in Wieland and Thaarup (2010).

The reason for focusing on the Buzz user segment in this work is the possibility of shifting the Buzz users in the direction of becoming more advanced mobile service consumers. Buzz users are characterised by a keen interest in what goes on in the Internet and are front runners when it comes to engaging in social networks and communities (Wieland and Thaarup, 2010). This study focuses on understanding how this segment of users views trends in services on the mobile relating to personalisation of services, location-based services, and monitoring services. We thus include both location-tracking and location-aware services as defined by Barkuus and Dey (2003).

QUALITATIVE INTERVIEWS

All recruited users were interviewed with a semi-structured interview guide (Kvale and Brinkmann, 2009). The guide consisted of 31 questions with examples of services the user could reflect on. Examples of services were structured into services already existing in Denmark (where the user would have a possibility of understanding and knowing the service), examples from abroad (where some users would know the services either from experience or from reading/hearing about them) and finally some futuristic examples of services that did not at present exist. In the interview guide all examples were followed by questions on how the user felt about the services, whether he/she would use it, and why. Additionally, the interview guide focused on understanding which personal data the user would be willing to share with a service provider and the circumstances under which they did share private data.

Examples of questions are:

- What do you think about GPS in the car warning about traffic jams? Why?
- What do you think about public cameras on buildings? Why?
- What do you think about commercials pushed to your mobile when you are approaching special restaurants? Why?

It should be mentioned that the recruitment of participants took place by means of a specially developed screening guide. The guide consists of five questions asking about the person's mobile phone, their habit of using the phone and how often they used advanced services (if at all). From these five questions, it can be determined (with a high likelihood) which segment the person belongs to. Interviews took place only with Buzz users.

The set-up

Recruitment and interviews took place over four weeks in June and July 2010. As mentioned, the survey was based on purposeful sampling (Koerper and McMichael, 2008). It was decided to recruit in public spaces in order to get a number of significantly different persons in the survey in relation to background, age and social status who were still Buzz users. Recruitment took place in trains, shopping malls, libraries, at offices, in a school, etc. The interviews took place at the recruitment venue, presenting a challenge in respect of identifying people who were not in a hurry who would be comfortable and relaxed enough to participate in the interview where

they stood or sat. One of the recruitment strategies was to address people who were already seated (in a train or in a library) and to conduct the interviews outside rush hours when everybody was busy.

All interviews were initiated with the five screening questions to evaluate if the person was a Buzz user, and only if they were did the actual interview take place. A total of 16 people were interviewed (nine women and seven men). Details of the place of the interview, the gender and age of the person and the level of mobile use can be found in table 1.

All interviewees were offered a small gift (a box of chocolates or a bag of sweets) in appreciation for their time. The gift was not offered before the recruitment took place but was visible to all parties (it was held in the hands of the interviewer).

All interviews were recorded and transcribed. Since the interviews took place at different public locations there was a lot of noise on the recordings so the interviewer performed the transcription him/herself. Each interview lasted 15 to 25 minutes.

INTERVIEW ID	INTERVIEW LOCATION	GENDER /AGE	MOBILE USE IN GENERAL
I1	Shopping Mall	W - 40	Phone calls, sms, sometimes pictures
I2	Shopping Mall	W - 65	Calls, sms and the calendar. Mobile Internet rarely used
I3	Shopping Mall	W -70	Use instead of fixed line phone, calls and sms
I4	Shopping Mall	W – 75	Primarily calls, a little sms
I5	Office, CUCE ¹	W - 48	Sms, phoning, sometimes the calendar, knowledge of the gaming possibilities
I6	University Library	M - 25	Sms, calls, sometimes calendar and photos
I7	University Library	W-28	Sms, calling, photos, never the calendar (too small)
I8	University Library	W - 30	Sms, photos, calling, the alarm clock
I9	AAU ²	M - 52	Calendar, music and camera. Used mobile Internet by sending 1-2 e-mails a week
I10	Train	M-31	Sms, calls, calendar, a little music and camera
I11	Train	M-20	Sms, calls, music, sometimes calendar
I12	Train	W-20	Sms, calls, camera, music, calendar, bought a few apps
I13	Train	M-30	Sms, calls, camera, calendar
I14	Train	M-22	Sms, calls, music, camera and the calendar (a little)
I15	Train	M-30	Camera, calendar and occasionally the Internet
I16	Train	W-19	Sms, calls, camera, music, calendar

¹ Copenhagen University College of Engineering; ² Craftsman working at Aalborg University Copenhagen

Table 1 Interviewed persons: Location, gender, age and mobile use

The grounded theory element

Grounded theory is an established approach to empirically-based theory development in many fields, and its strength is the systematic procedure of data analysis and an open-minded approach toward empirical data. In this study we have used the multi-grounded theory approach (Goldkuhl and Cronholm, 2010) to analyse our qualitative data in this sociological field of study. Multi-grounded theory goes beyond the purely inductive approach of grounded theory, and adopts a more critical approach to empirical data and the use of external theories. Using the traditional grounded theory approach we generated categories from empirical data, illustrated by characteristic examples of data (Glaser and Strauss, 1967). Instead of following the process used by Strauss and Corbin (1998), i.e. open coding, axial coding, and selective coding, however, we followed a strategy that was inspired by Goldkuhl and Cronholm (2010). The strategy was applied in the following steps:

1. Research interest: we started with a research interest within mobile users' willingness to disclose their location, and chose some specific examples of particular interest (described later in this chapter).
2. Inductive coding: similar to open coding (Strauss and Corbin, 1998), with an open mind regarding the data, and we conducted some categories in an inductive way.
3. Conceptual refinement: reflections on the categories and critical assessment of the empirical statements, also taking some of the contextual conditions for the interview statements into account, e.g. the effect of interviewing people in public spaces. In a reflective way we also discussed if the respondent really was a Buzz user when looking at their statements.
4. Pattern coding: similar to axial coding (Strauss and Corbin, 1998), where the categories are combined into theoretical statements.
5. Theory condensation: similar to the selective coding in grounded theory, where we choose one category to be the core category, and related all the other categories to that category.
6. Theoretical matching: comparisons are made between the theories of trust and privacy as key research areas of this study.
7. Explicit empirical validation.
8. Evaluation of theoretical cohesion.

A criticism of grounded theory is that it is too unfocused in both the empirical and theoretical phases (Goldkuhl and Cronholm, 2010). That we should ‘ignore literature of theory and fact on the area under study’ (Glaser and Strauss, 1967), seems a little naïve, however. We worked with the categories in a reflective way and challenged the data, which involved critical reflections on the empirical statements, but we did not force preconceived ideas and theories directly on our data. Theories and general concepts also gave a loose frame for the categories that were later developed. We shaped and reshaped our data.

FINDINGS

This section provides an overview of the findings of the interviews. The findings are grouped under three main categories, which are three of the scenarios used in the interview: the airport, McDonald's and on the road.

To understand whether, why and what Danish mobile users are willing to disclose about their location, it is important to understand the role of the mobile phone in our society. Ninety-eight percent of Danish families have a mobile phone (Danish Statistics Database, 2010). The mobile phone has become compact, inexpensive and ubiquitous. The mobile phone is not just a tool for communication, but functions as a social aid which is now widespread.

In the airport – that’s pretty smart!

A system at the Copenhagen Airport enables the passengers to know when it is time to go to their departure gate. It uses the passengers' exact position at the airport to determine when to send them that message. This system is based on a wireless technology that logs data each time a mobile phone enters a new zone. A combination of RFID and Bluetooth is used. This gives the airport exact information on how passengers move about in its buildings. This also gives airlines advantages, as they can use this information to cut down on delays, since they will be able to find out where their passengers are and whether they can make their flight. We have used the airport example to ascertain users' attitudes towards an exciting and operating tracking example in a Danish context and also to determine their attitudes towards an example where they have probably been location-tracked – but without knowing that they were.

Our recipients did not worry about or feel offended by a system that enables the airport to track people's whereabouts and get close to their personal communication devices. Actually, the attitudes towards being tracked in the airport were very positive. Many of the recipients used the word 'smart' of the airport example:

'That's pretty smart, but also a bit frightening that it is possible. If they can do it in the airport, they can also do it other places. Ahh then she is in the Noerrebro mall centre'. ID1, W40.

'I think they delete all the information when you leave the airport, don't they...I would not like it if they could track me here'. ID9, M52.

Both ID1 and ID9 export the example from the airport to the place they are interviewed, and neither one of them would like to be tracked now. ID1 and ID9 do not specify who 'they' are, but clearly feel somewhat insecure and apprehensive about the scenario. If they can be tracked in the airport, they can also be tracked in other places. This points clearly to the acceptance of location tracking for specific purposes in a limited geographical area and for a limited amount of time.

This example also makes sense of Luhmann's argument that technological development increases complexity (Luhmann, 1979), and because of this technological development the demand for trust also increases (Luhmann, 1979). ID9 trusts that someone (authority in the airport) will delete the information after the passengers leave the airport, but ID9 is not quite sure. A number of our recipients, exemplified by this quote from ID9, mention that this location tracking involves a problematic relationship with time. How long does the airport keep this information? What is the lifetime of these data? This involves some uncertainty about the future. According to Luhmann both trust and distrust refer to uncertainties about other people and systems, and that is why trust can jump to distrust when a certain line is crossed/ goes beyond the bounds of certainty (Luhmann 1979).

This concern about the lifetime of data also has something to do with whether the data are registered, or just monitored, as well as the purpose of tracking. Is it for detecting people or prevention of flights losing their time slot?

'That is fantastic. The big advantage is that the flight does not lose the slot, so it can be on time. I have nothing against location tracking or anything. If you have nothing to

hide it doesn't matter that you are tracked, and people know where you are. It can also be an advantage in several cases'. ID4, W75.

This elderly woman can see advantages, and uses a classic argument for video surveillance – if you have nothing to hide, you have nothing to fear. As elaborated by Solove (2007) the 'nothing to hide' argument speaks to some problems, but excludes others. It represents a general argument and a narrow way of conceiving privacy. ID4 is in general aware of some privacy concerns, so she does not put any personal information on Facebook, but this precaution does not include where she is (her destination) or pictures. Location is thus not seen as a privacy concern in this context.

The mobile phone affords the opportunity to travel and structure further plans. The mobile communication (in an always-on situation) facilitates a mobile coordination, and this need for mobile coordination is very important concurrently with increased mobility. Rich Ling termed this 'micro and hyper coordination' (Ling, 2004). Everybody can reach each other via mobile coordination: when are you at home? where are you? who is doing what? etc. but within the airport example location tracking is not just a person-person relation but a system or authority which has the opportunity to find out where a person is located. The mobile phone can be used as mobile coordinator – but it also goes the other way round – to know where you are. As this elderly woman states, she sees tracking as helpful, and a kind of security:

'I think it's a help. I might be so old, that I can't find my way in the airport...so I don't feel offended or personally tracked'. ID3, W70.

This perspective is backed up by others who also see the service as a means to an end:

'In general I do not like surveillance, but when it is such a specific location and pretty functional...it's not a problem for me being tracked. There are cameras everywhere in the airport anyway'. ID6, M25

'Yes, then you can get help and such, much faster'. ID14, M22

In other examples from our interviews the identity and function of the service provider are given as a reason as to whether our informants are willing to give access to personal data such as their personal preferences, telephone numbers, etc. These

explanations are again indirectly related to the purpose as well as the credibility of the service provider.

‘They (the Danish Broadcast provider) are trustworthy and they provide services for you and make it convenient’. I7, W28

‘I don’t know how I would feel about another unknown television company. I’m not sure I would feel the same’. ID8, W30

As is also indirectly indicated, service providers providing a real and value-adding service are expected to be trustworthy and most people cannot see a reason why the service provider should use the access to their location data for other purposes. As the first two quotes reveal, however, it makes some of our informants think twice and come up with some concerns when asked more directly. As the quote beneath also indicates, trust is to a high degree a prerequisite but will be lost if damaging experiences or stories emerge.

‘I don’t think too much about it cause I haven’t experienced anything unpleasant, but you read about information’s being sold like credit numbers. There is always someone who is smart and may do all kinds of things’. ID9, M52

The importance of trust is thus emphasised in many of the interviews. The users are aware of trust relations and whether they feel a service provider is trustworthy or not, and they express concern and carefulness when they give away private data to a service provider.

‘... it is a matter of being careful and maybe not giving out too much information. I think we know how to adapt to it’. ID7, W28

The findings here indicate that the user's choice (whether consciously or not) in respect of giving out private data is dependent on the expected value of the service (the content), the specific and relevant purpose of the location information given and lastly who the service provider is (trust). Most respondents are willing to provide private data to almost any service, i.e. the travel agency, the local pizzeria, banks and the media agencies, if the respondents think it is reasonable and fair that the data should be provided. Many respondents follow up with an explanation, which is highly related to their experiences of interacting with Internet services, that they do not have

any problems in their interactions but they know that there are pitfalls such as service providers selling credit card numbers to others.

McDonald's – are you hungry?

McDonald's Europe via NAVTEQ's Direct Access has a program, which can connect with customers by including their location information on NAVTEQ maps. As part of the agreement McDonald's Europe has provided NAVTEQ with location information for more than 5,500 of its restaurants in 16 countries, including an indication of where drive-in facilities are available. NAVTEQ Direct Access lets companies (like McDonald's) include customers' locations on the NAVTEQ map by providing a single point of contact for updating the information. The program also collects merchants' brand icons (including the McDonald's logo), which are then available to NAVTEQ customers to display on the maps in their navigation devices or applications. It can also provide a text message that there is now a McDonald's restaurant nearby. We have used this McDonald's example as location tracking in a commercial context, and as an example: most Danish mobile users are not yet familiar with it but it is well known in other European countries.

‘That is really irritating. I do not like that example. That is a bit too much. Another thing is, that I don't like McDonald's either. But I want to control the information. If I need a McDonald's restaurant, I will find it myself. It is not okay'. ID1, W40

‘I would be really irritated, and absolutely not choose McDonald's... It is a bit too much. That is the same when in some countries they try to attract tourists to their restaurants’. ID 3, W70

This type of pushed information met with strong criticism from most of our informants. In the first quote an oft-cited argument is provided: namely that most people would like to decide for themselves the type of information they get. This is also stated indirectly in the second quote where the elderly woman states that she would get really annoyed. In the quote the McDonald's example is compared with another example of what Danish people often think crosses people's boundaries – canvassing in the street. This may point to cultural or personal differences in preferences regarding the type and amount of pushed information.

A number of the informants find the service to be smart or cool. Perhaps this would change if they get too many such messages or if they are in situations where eating is not on the agenda. Maybe a 'hungry' button should be invented to allow such information when needed.

'I think it would be cool. When you are in the car and hungry and have been driving for a long time. I wouldn't mind that'. ID4, W75

'It is smart and not smart. It is a thing they use to attract customers. But still smart since you then know where to go when you are hungry'. I14, M22

Again we know from other questions regarding the pushed information on the Internet that people's capacity and strategy in terms of information handling are quite different. Some state that they avoid all the pushed information because they can easily feel overwhelmed whereas others argue that it is no problem, and they just delete what they do not need.

'I always say no thanks (to personalised e-mail advertisements), because I think my inbox is overflowing with many different things'. ID2, W65

'I don't have time to check everything myself. (...) I just erase what I don't need'. ID5, W48

The users want to disclose what they think would generate valuable information for themselves. This depends on the content of the service and this example shows that some people like it while others discard the idea of the service more than the exact service that McDonald could provide. These attitudes are affected by the relationship between the receiver and sender. McDonald's is for some users a symbol of capitalism, and for some it does not have the best reputation or image, but the McDonald's example also indicates that the user's context at the time of the location tracking, including activity and mood, is a factor influencing willingness to receive mobile services, including those based on location tracking. These factors all indicate a need for personalisation based on personal preferences and situational preferences.

On the road – Road construction or speed control ahead

Many Danish mobile users are familiar with GPS information used in a traffic context, especially in their car. With the traffic receiver and traffic services they may get information that allows them to avoid traffic jams, etc. Users are notified of accidents or road constructions on their route. The users can touch the screen on their GPS to view traffic details or recalculate their route to avoid traffic. Or they may get information about speed traps in time to adjust their speed and avoid fines. We have used these examples because they are commonly employed, but do the users feel they disclose too much information about their location, and what are their attitudes towards GPS tracking?

Regarding information on traffic most of the respondents replied that they find the service smart and they mainly focus on the practical function of avoiding accidents or traffic jams by being informed about the problem and having an alternative route presented. Most of the users just see the value generated and do not express any concern.

‘This (traffic information) is really good 'cause then you can find another route. This would be really good’. ID5, W48

One of our female respondents replied that for this purpose it is acceptable, indicating that she is not happy about all the information provided. This impression is strengthened as she argues that it is possible to inform about all sorts of things, and she starts with a ‘but’. Her concern thus addresses the amount or the type of information pushed to the users.

‘That is pretty convenient. Information about roadwork and similar things, I think that is okay. But when you can get a warning about roadwork you can also be warned about other things’. ID1, W40

Another of the female respondents, one of the elderly women, expresses clear concern even in this instance of a location-aware service. She expresses a general concern about all the interruptions that influence our lives in negative ways.

‘Well, I don’t think I approve all this. I live in the moment. So all this control, I’m not a user. I like all the unpredictable’. ID2, W65

When it comes to the scenario about information on speed traps the users fall into two camps. The first group expresses positive feelings as this service provides them with an opportunity to avoid a fine for driving too fast.

‘Well it seems fine to me, then one can avoid a fine’. ID9, M52

The other group of users expresses concerns regarding the moral aspects of such a service, however. They see it as a problematic and immoral act that helps people to avoid fines, except when it has preventative effects, as argued by one of the participants.

‘This is meaningless, right! It means that you may drive insanely until you get warned. Honestly I find it deliberately contradicting’. ID6, M25

‘I think you should drive properly without threats. If it has a preventative effect then it is fine’. ID3, W70

In this example we see fewer privacy and trust concerns than in many of the other examples, which is probably related to the position-aware service, which is often found to be less intrusive and is combined with useful information and is a direct link between the service provided and the location data tracked. Pushed information is still seen as a distraction and could push us in other directions than the one intended, which is found to be bad. The main discussion is however about whether informing about speed traps is a good thing or not. The example thus indicates different understandings and ambiguity about the value of the service, indicating the lack of a common understanding of the effects of such a service. The discussion involves ethical aspects, as some see the content of the service as immoral, whereas others find it helpful.

DISCUSSION AND CONCLUSIONS

Generally, Danish mobile ‘Buzz’ users embrace the new services, at least conceptually. In practice, they are much more critical in respect of what they gain from the services, the purpose of the services, the trustworthiness of the service provider, whether there is a clear link between the information disclosed and the service received and the ethical aspects of the service. Clearly, all users are aware of the trade-off between sharing private data (such as location, etc.) and what they get

from sharing the data. If there is a lack of transparency in the balance or there are questionable ethics, users are generally less willing to accept and use the mobile services. These findings are well in line with the findings of Consolvo et al. (2005) on willingness in terms of location disclosure in social services. Our data, however, more precisely address disclosure of location data to a service provider where the receiving user is in focus, not the provider. This shows the importance of the perceived value of the user instead of the perceived value of another user.

As indicated by Barkuus and Dey (2003) trust is more of an issue in the location-tracking than in the position-aware mobile service, which is further supported by our findings. We find the trust issue, however, includes one more element than d in e.g. Kasinen (2005). Our findings reveal that many of the users are willing to compromise potential risks of data misuse if they find the service received valuable to them. This may derive from the current opinion of this risk as being more potential than real. It may also, however, relate to the trust that Mayer, Davis and Schoorman (1995) define as, ‘the willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control the other party’. This definition elaborates two important factors in trust: expectations and the willingness to be vulnerable. We further found, however, that this balance is influenced by the perceived risk coming from general knowledge of unknown service providers behaving unethically regarding data (mis-) use and reduced risk relating to the image of well-known service providers.

Our findings reveal that this balance is highly individual. It is influenced by individual differences, like contextual individual preferences with varying interests and needs across situations and time influencing the perceived value of a given service at a specific point in time. Differences in moral attitudes is yet another element found as well as the relation to the service provider and the trust placed in them, which is also influenced by individual experiences, knowledge and attitudes. Some of the individual differences can be traced back to different information strategies, meaning that some users try to limit the received amount of information whereas others receive more and navigate around to find useful data and discard useless data. This may be traced even further back to attitudes towards how best to

live your life and how enforced control and pushed information may change how people live.

Some but definitely not all our 'Buzz' users perceive the location-based push services as an intrusion of their privacy, as explained in our theory relating to the Big Brother argument. The service is seen as an intrusion by some because they are against all types of tracking by a third party but for others the advertisement was not well received unless the user had an unmet need for the service at the time. For example, if the interviewed persons envision themselves as being hungry when they receive a mobile add from McDonald's, they have a much higher likelihood of accepting the service. Context is crucial for the acceptance of location-based push services. It is also important to note that this privacy issue is a dynamic response to the contextual circumstances rather than a static enforcement of rules. The users emphasise the importance of influence – so they can decide what and when they want to disclose their location and receive a service. An important factor for location tracking is the possibility of personalised adjustments. From this study we can conclude that location tracking must be seen in a larger and much more complex context, where the specific communication situation is taken into account. From a user perspective tracking is not only a negative action but also has potential for success and positive understanding. In the slightly longer term, it will be possible to use a more advanced technology that allows mobile users to have a track system on their mobile permanently so all they have to do is key in where they are going to receive current information on art, exhibitions, music, weather, etc. at their specific destination.

Location-based services have come to stay. The users with less advanced use of these services have a keen interest in the services (what we refer to as 'Buzz' users) but some reluctance in terms of accepting these services just like that. This paper illustrates, however, that these users will accept the services when they find value and the right trade-off for private data. It also shows that more potential users can be approached about using the location-based services, if the service provider/developer makes this 'trade' between services and data more explicit and easily understandable by the user.

Note

¹ CAMMP is short for Converged Advanced Mobile Media Platforms. The project is funded by the Danish Advanced Technology Foundation. It started in 2008 and runs for four years. CAMMP focuses on the convergence between the Internet, digital TV and radio and 3G mobile technologies and the possibilities this offers. The project investigates the potentials of the new converged infrastructure, and combines these with user-generated content and interaction between content providers and users. Part of the CAMMP project focuses on developing new services based on the convergence between broadcasting media on a mobile phone and other services offered by mobile phones.

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