Extending Mobile Social Software With Contextual Information

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Abstract. This article points out how mobile contextual information can enhance social networking tasks through mobile social software. Since the mobile phone is considered a personal belonging by most people, the context of the mobile phone is treated as the context of its user. The contextual information of the mobile phone can enhance and make social networking tasks easier to perform on the go. The article shows that vital communicative and social information can be extracted from four types of mobile contextual information: physical, computational, time and user context. This article also covers the issues concerning personal integrity and security when social softwares can pinpoint or map user behavior through contextual information.

1 Introduction

The use of social software is a major trend among users of the Internet today. Everyone is connected, but the connectivity goes beyond the physical uplink. People today are more interested in being connected to each other, whether it might be through an online forum, a community or by sharing a tagged photography as on Facebook. One can say that social software manages techniques for social practices that create, maintain and manage social networks. These applications encourage the circulation of culture and social life in an unrestricted networked-based medium [1]. The virtual communities has made the world smaller, but tied their users to their desks or laptops. Typically the users access these social softwares from their homes or work places. However these are not the general life situations in which people experience new things and feel eager to share and communicate this with their online friends. In their everyday lives people are often on the go, moving from one place to another. Visiting different locations, seeing and experiencing new things, traveling or enganging in various types of social interaction. When doing all this, there is one piece of communicative technology always present, the mobile phone says Nokia researcher Jan Chipchase. The mobile phone will bring us new ways to share, access and build social networks through social software.

When using your mobile phone to access social software, things get different from using a desktop computer. One general issue is how to present the information on the small screen, another is how the user should interact to communicate

and provide the latest personal updates to their social network. Presumably these issues will be solved somehow since collaborative and participatory services such as social software are essential to satisfy the needs of today's users. Developers often see the mobile phone as something with great limitations compared to a desktop or laptop computer. What needs to be addressed is that some of the issues with the mobile phone can actually be used to its benefit. One problem with the mobile phone is the fact that it has an ever changing context and the consumers demands that it works in every single one of them. This is an issue for designers and developers but also a benefit since the information from this context could be used to enhance social information exchange instead of limiting it. In many aspects, mobile phones are very well suited for creating and enlarging social communities [4]. Not only do people take their phone with them wherever they go, but the devices also offer a wide variety of tools supporting social exchange, such as cameras, video and audio players, which allow users to communicate in a variety of audio and visual manners. However, the main reason why mobile phones are great tools for social software interaction is the way we feel about them, they are personal affects [chipchase]. Because of the fact that we have our mobile phone with us wherever we go, important contextual information can be gathered to extend the social semantics produced by social software. Apart from the standard sensors and effectors found on the mobile phone, new intelligent sensors that can extract contextual information can be employed. The context of the mobile phone is often an important factor to our communication abilities as well as to our mood and our feelings. Contextual cues can be such things as light, sound, location, time of day, occupation and velocity.

The aim of this paper is to describe the social difference between desktop based social software and mobile social software. By this showing that social software can be enhanced and provide greater social semantics by making use of the context of the mobile phone. Scenarios describing how contextual information can extend and support mobile social software interaction is presented along with methods to make this possible. Social softwares are in this article considered to be web based applications such as Facebook. Other social software solutions employing other techniques such as augmented reality will not be discussed.

2   Social Software

A social software manifests itself by offering multiple users the ability to interact online through media of different forms. Julian Bleecker [1] says that *'One can say that social software manage techniques for articulating social practices that create, maintain and manage networks of relationships amongst people'*. He continues pointing out that *'These applications encourage the circulation of culture and social life in an unrestricted networked-based medium'*.

2.1   Social Software - Related work

A web based social software that has gained much in popularity over the past years is Facebook. Facebook gives their members the ability to connect to their

social network through their mobile phones but the image-centered architecture of Facebook is not very suitable for the mobile phone. Because of this, the mobile phone user of Facebook accesses a down-sized version providing only the basic necessities to perform standard tasks. The reason for this is primarily because the content of facebook does not really fit the mobile phone. In turn the reason for this is that the mobile phone was not the main focus when developing Facebook. In this case as in so many others, mobile phones are considered second-class citizens of the web. There are however reasons to re-evaluate.
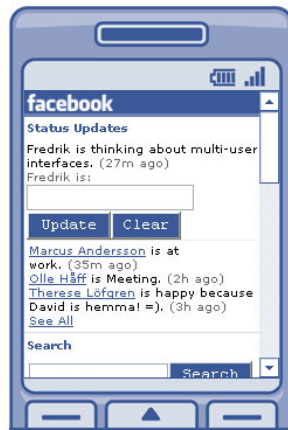

Fig. 1. Examples of today - Facebook mobile GUI

3   The mobile phone

The mobile phone as we see it today is one of our most valuable assets. We trust it to cater for our needs of communication wherever we might be located. It ensures us that we can come in contact with authorities and loved ones in the case of emergences. The mobile phone is in many cases one of our fundamental communication channels. During the last decade the way we look at our mobile phone has changed, the overall emotional bond we have to it is greater than to any other piece of technology we own.

3.1   Smart phones

Many of todays mobile phones are expanding their capabilities and becoming something new, smart phones [3]. The smart phone share many of the characterictics of the ordinary mobile phone. They however excel in some areas. They are often equipped with a qwerty keyboard, identifiable operative system enabled for third hand applications to be installed, high speed internet connection,

digital camera, audio-, video player and GPS. In the cities these devices can access WIFI hotspots to a low cost compared to using GPRS or similar solutions. The growing use of internet connected mobile devices has made mobile browsers more sophisticated which has led to the fact that content and service providers are becoming more concerned with designing user experiences specifically for the mobile phone [6]. The future of the mobile phone is the smart phone and some might say that todays mobile phones already are smart phones since the definition of a smart phone constantly is changing.

3.2   Mobile 2.0

The result of a more mobile devoted industry is that the web as we know it is changing. It is becoming pocketable. The current trends of the web is emerging through the needs of its users. And the trend is social networking. Hence it is certain to say that social networking through mobile social software will become popular. The mobile phone should be the central point of social interactions since we already share a strong emotional and social bond to it. The term Mobile 2.0 refer to the transfer of current web trends (web 2.0) to mobile phones. This transfer might instead of becoming a pale shadow of a desktop version offer greater social networking possibilities through incorporation of location-based social tagging, contextual input and on the go interaction.

4   Mobile Social Software

When looking at the mobile phone from a social software point of view, it already has a natural advantage in regards of user behaviour since it is a very social device. Its original purpose was to connect people with each other. Besides that it has taken on a very personal aspect. When is comes to mobile social software there are a couple of differences compared to accessing your social software through a desk- or laptop computer. One important factor in mobile social software interaction is to give the user the ability to connect anywhere at any time which supports spontaneous and emotional communications. A key issue to keep mobile users continously returning to the same service is to give the user something back. A kick that leaves the user wanting more. Mobile social software applications fulfill these needs as their kick is generated by the social interaction with the other users and they are thus also extemely varied [4]. The strong community feeling and the variety make users stay longer and also leverage their readiness to pay for the services, as the community becomes a part of their social life. The feature of carrying your social network in your pocket enables users to feel closer to their friends and thus create a sense of proximity to them.

4.1   Mobile Social Software - Related work

There are a few example of Mobile Social Software (MoSoSo). Many of these applications are focused on finding new friends through Bluetooth and has little

to no connection to the web. When talking about MoSoSo in this paper the focus is mainly on following the Mobile 2.0 development in converting the social software sites on the web today, e.g Facebook, to the mobile world. This media transfer should give the ability to enhance interaction and the social semantics. Below are some examples of MoSoSo:s that utilize contextual information in different ways. Some of their ideas and functionality are very interesting and can be deployed in the sense of this article.

- **Social Serendipity:** This is a new mobile-phoneŬbased system that uses Bluetooth hardware addresses and a database of user profiles to cue informal, face-to-face interactions between nearby users who do not know each other, but probably should. It combines the existing communications infrastructure with online introduction system functionality to facilitate interactions between physically proximate people through a centralized server. [3]
- **Hummingbird:** This is a custom-developed mobile RF device that alerts users when they are near another user. The Hummingbird supports collaboration and was designed to augment traditional office communication media such as instant messaging and email. [3]
- **Jabberwocky:** This application performs repeated Bluetooth scans to develop a sense of an urban landscape. By continually logging nearby phones, the system fosters a sense of the 'familiar strangers' that creates an urban community. [3]

5   Contextual information

In this article context in considered to be something that characterize the situation of the mobile user. Dey et al [2] describes context as *'any information that can be used to characterize the situation of an entity'*. User context is described as the conditions associated to the users current location, such as social aspects or physical properties. The following list has been adapted from Chen el al [9]. It identifies four types of contextual categories:

- Physical
- Computing
- Time
- User context

These contextual categories contain sub categories that are all important when discussing contextual information, but it is rarely only one type of contextual cue that can disclose the semantic meaning of for instance the users social situation. By combining different contextual cues it is however quite possible to do this. One can say that it is the combination of the cues that together create the contextual and situational semantics.

5.1   Mobile contextual information

The context of a mobile phone is impossible to predict. It is an ever changing source of information. For mobile computing, context is everything. Freed from the relative homogeneity of the desk-bound PC, mobile interactions are deeply situated [8]. In order to design for successful mobile interactions, we must understand the overlapping spheres of context in which they take place. The main interests in mobile contextual information is depicted below in Figure 2. Depending on situation different types of contextual cues are important.
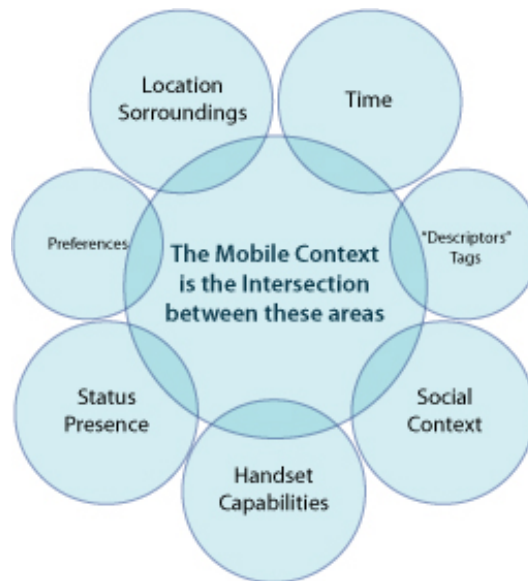

Fig. 2. Mobile Context

6   Implementational scenarios

This section describes how contextual information can both enhance social software interaction in ease of use and create automated services that senses important contextual cues in order to perform desired tasks. To show how contextual information can be used to enhance social software interaction I have identified a couple of key tasks often performed by social software users.

1. Find a friend
2. Capture and tag media
3. List visited locations
4. Update personal status

5. Interact asynchronously

These tasks can be categorized as Enhancements or as Automated services depending on how they are implemented on the mobile phone. This article tries to examplify how these typical social software tasks can be extended through mobile contextual information.

6.1   Enhancements

Enhancements of tasks means that tasks can be simplified or extended with more, or at least more accurate, information in an effortless manner. The social software can help the user with tasks through the use of contextual cues and information otherwise not visible to the user.

Find a friend A friend on lets say Facebook is often someone you already know. A person from your past or present life. You can say that web based social softwares is an inventory of your social network. Your social network is however not expanded extensively through the use of it. This can however be done through the mobile phone. A large amount of applications today uses Bluetooth technology to search the surrounding context for devices of different kinds (4.1). An MoSoSo communicating through Bluetooth could be able to identify and store other users in proximity. If two users have the same kind of interests, or have a friend in common, a notification could be sent out that says that perhaps they should be friends.

Capture and tag media When capturing media from a mobile phone, one of the most important aspects is the location and the depiction. Contextual information can be used to provide pre-defined/commonly used tags based on location and proximity of other users. One example of this can be a user located near the Big Ben in London. The user snaps a picture from his/hers mobile phone of Henry, who is a friend standing in front of Big Ben using a MoSoSo application. The context aware application senses that the user is in close proximity of the Big Ben and the Bluetooth beacon senses that Henry and some MoSoSo stranger is in close vicinity. The application can therefore present the following suggestions of tags, shown in Figure 3.

List visited locations A list of favourite places or locations can be gathered from the context of the mobile phone. Perhaps the user always has his/hers morning coffee at a coffee shop where there is a social software Bluetooth beacon. This beacon could send location-based information that letn the user know that he or she visited that particular coffee shop at certain hours during the week. This information can later be used to tag photos or find people situated there at that time. Registration of this kind information should be in the hands of the user instead of the sender, who could commercially profit from the situation.

Fig. 3. Context aware image tagging

6.2   Automated services

The ability to compose on the go social content is an important feature for mobile social software. Sometimes there is however not enough time to participate in the creation event. Automated services checking contextual sensors can in this case be a valuable asset. A user can in this scenario choose to let the software decide when the user is available for communication and for instance only send notifications when it is suitable from a social contextual point of view.

Update personal status A collection of contextual cues can be used to automatically update your personal status. Important cues can be time of day, calendar activities and velocity. A certain set of contextual cues can change the user's status, e.g. the combination of darkness, fixed location (no movement), time-of-day and the absence of sound can be interpreted as the user-status: Sleeping. Of course the users also should be able to customize their personal status and only let this automated service be an enhancement or extra feature that could deliver a richer user-status experience for everyone involved.

Interact asynchronously This means that the user should be able to interact with the social software when it is appropriate. This is one of the key reasons to why SMS is such a huge success. Sometimes you find yourself in environments where it is not suitable or possible to engage in social software interaction. A setting in your social software can search for contextual cues triggering this state. In this state other users can not interact directly with the user and are shown a 'Not available' message. Social network friends can instead choose to leave messages later forwarded to the users. Cues that trigger this functionality can be loud noices, voices, specific calendar appointments or a certain amount of

users in the proximity. Since the interaction with the mobile phone in most cases
demands full attention, this can be a good functionality that does not allow the
user to be disturbed in sensitive situations.

6.3   How to make this work

In order to find the importance of certain contextual cues in certain types of
situations and for specific tasks, an instrument called SocioXensor has been
developed [5]. SocioXensor is a mobile research instrument that allows social
scientists to gain a detailed and dynamic insight into social phenomena and
their relations. Data gathered from this instrument can be used to determine the
importance of certain contextual information in certain scenarios. More research
has to be done in this area to find specific guidelines of which contextual cues
that are important for a given set of scenarios. However, since not all people act
and behave in the same way the MoSOSO:s could benefit by incorporating this
instrument during learing periods where the software continously asks the users
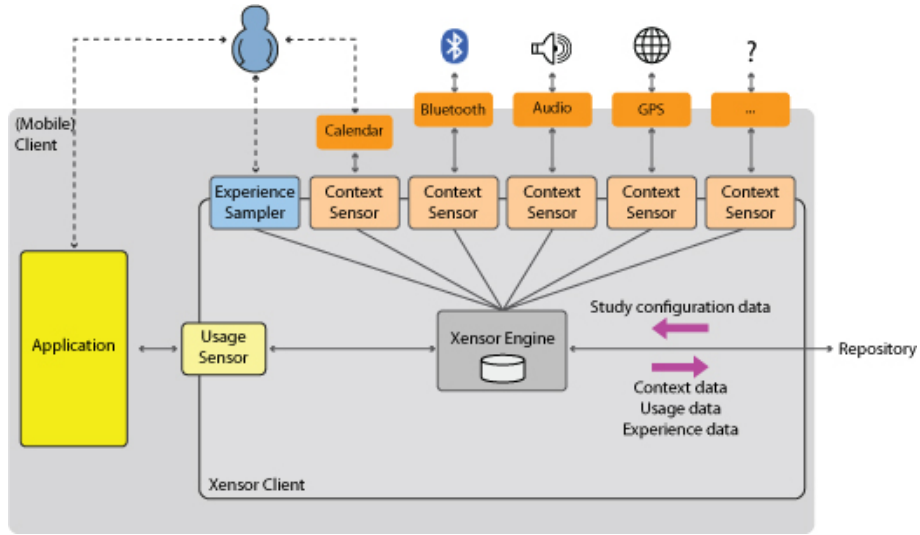questions at the same time as it collects contextual information.

Fig. 4. Xensor Client architecture, adapted from [5]

7   Privacy and Integrity

Even today when most web based social networking is done with the consensus
of the users, information can end up in the wrong hands. Some information
is always best kept personal. Melinger [7] says that *'Sociologists have illustrated*

*that desires for privacy often work against tendencies toward community creation
and sustenance'.* In some cases this might be the truth, but instead of displaying
raw sensitive information, it could be transformed to be more generalized. With
contextual information and automated processes the mobile social software can
create data that the users might find intrusive or incorrect. It is important to
point out that developing automated processes for social applications has to be
done with a great deal of causion. User information such as specific location is
not something that should be displayed for everyone, since it can be used to
intrude the personal privacy and integrity.

8   Discussion

As discussed in this article there are a great number of interesting scenarios
where contextual information can be useful to the user of mobile social software.
There are however some questions about whether these features are desirable
and if we are ready to hand over personal secrets and our privacy to a software.
Are we ready to accept tracking in the name of social networking or are these
features nothing more than fiction for the mass. It all boils down to the reward.
The reward is "'what you give is what you get"'. Questions such as: What do I
get if I let you know my location? can easily be answered with: I let you know
mine. When the rewards becomes clear many people will probably give up some
of their privacy for access to the same information about their friends. This
should work two-ways so that both parties creates a mutual agreement.

Apart from the question of whether we want this or not it seems that the
opportunities with context-aware mobile applications are great. The main reason
for this to actually come to life is that the mobile phone is supporting customers
throughout their day and serving as trusted companions. The capacities of the
companions combined with information about the context we travel through are
yet to be discoved but this article provides some examples.

When talking about sensors it is difficult to find which types of contextual
sensors are the most important ones without testing. But would the results of
such tests really effect the mobile phone producers into embedding the necessary
sensors? Today the answer is probably no. To create a web based mobile social
software everything has to be generalized to work on most mobile phones. Dif-
ferent sensors on different phones creates an enormous number of combination
and possible set ups. To start the creation of MoSoSo the developers should con-
centrate on one kind of sensor that most mobile phones have and go from there.
When looking at the related works it becomes clear that the incorporation of
Bluetooth into MoSoSo can be just this first step.

To make many users take the step from their desktop or laptop usage of social
software to mobile phones there have to be some kind of reward that extends their
social software. One such features can be to capture media. Capturing media
from the mobile phone is something that most people do, but incorporating this
into social software with a suggestion of commonly used tags based on location
that can be added instantly is a feature that many people would benefit from.

9   Conclusion

The mobile phone is one of our most trusted pieces of technology. We trust it to cater for our social and communication needs. Since the mobile phone is becoming more and more capable of processing data, capture media and browsing the web it is certain to say that social software would work exceptionally. There are of course limitations of mobile computing such as small screen sizes but in this article the benefits are emphasized. The possibilities for mobile social softwares by incorporation of contextual information are many and typical tasks can through this be simplified and social semantics enhanced. Web based social networks as we know them are becoming pocketable.

References

1. Bleecker, Julian: What is your social doing in my mobile? design patterns for mobile social software. (2006)
2. Dey, Anind Kumar: Providing architectural support for building context-aware applications. (2000)
3. Nathan Eagle and Alex Pentland: Social serendipity: Mobilizing social software. (2005)
4. Exit Games: Mobile social software - applications that drive social networking and maximize your revenues, whitepaper. (2006)
5. Henri ter Hofte, Raymond Otte, Arjan Peddemors, Ingrid Mulder: WhatŠs your lab doing in my pocket? supporting mobile field studies with socioxensor. (2006)
6. Josh Ulm: Designing engaging mobile experiences. (2007)
7. Melinger, Dan: Privacy and community in the design of mobile social software. (1998)
8. Savio, N., Braiterman, J.: Design sketch: The context of mobile interaction. (2007)
9. Rosa Alarcon, Luis A. Guerrero, S.F.O.J.A.P.: Analysis and design of mobile collaborative applications using contextual elements. (2006)