WIRELESS WORLD
RESEARCH FORUM

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User responses to scenarios of future mobile services in Mobilife

***Abstract*— The MobiLife project researches new mobile applications and services that will support busy family members in their everyday lives. A user study was conducted with 17 families (61 participants) in Italy and Finland to discuss the user tasks and behaviour in illustrative MobiLife scenarios of use. The results of the study related to group management capability highlight that its perceived usefulness is mainly seen in relation to other applications and services in which is used as a building block; social acceptance is also dependent to the actual availability of sound privacy, trust and transparency solutions.**

***Index Terms*—user centered design, mobile communications, group management, privacy and trust.**

INTRODUCTION

THE IST project MobiLife is investigating mobile applications and services to support families in their everyday lives.

This paper describes the user research that has explored how mobile services might support families in a range of activities characterized by the group dimension, which is one of the central research themes in the MobiLife project. The paper begins with an overview of the research objectives of MobiLife and then explains the methods and results of scenario-based interviews with families in Italy and Finland; the paper refers also the service categorization activity which has been functional to the scenario analysis.

MobiLife Overview

MobiLife aims to understand how innovative mobile applications and services can help families. In particular, we are interested in exploiting the user potential of several particular technology areas: context awareness, privacy and trust (among groups), adaptation, personalization, and semantic interoperability of services.

The objective of MobiLife is to develop services based on these technologies that will meet the needs of family members who are juggling multiple roles, including their roles in the family, their roles at work and school, and their other social roles (member of a civic association, friend and so on). MobiLife's approach is to integrate different perspectives, such as the user-centred design point of view, business and marketing approaches, and technology development views.

This paper describes the first step of the user-centered design process in MobiLife, which has been to conduct user research based on sample scenarios of use of such services. The next step is to build low-fidelity mock-ups of some of this mobile functionality that can be tested with family members.

At this early stage, the MobiLife scenarios cover a wide range of possible user tasks and behaviors enabled by mobile applications and services; we have focused especially on the tasks that have a relevant group aspect for this paper.

User study method

Within MobiLife, we are using a scenario-based approach to portray the experiences that users will be able to have with future mobile applications and services. In this context, the word "scenario" is used to mean

a narrative description of what the user does and experiences when using a computing system [1].

In order to develop high-level illustrative scenarios for MobiLife, we began by gathering existing scenarios of use from other projects (such as the other WWI projects [2] and foresight initiatives like FMS [3], the Finland TUTTI project [4] and Wireless@KTH study [5]) as well as a number of other scenarios coming from MobiLife technical work packages (WPs 2 through 4).

Scenario analysis and service categorization

All the scenarios mentioned above were then analyzed in order to understand:

-- the underlying user tasks or behaviour shown in each scenario;

-- the related system capabilities that enable the user task or behaviour;

-- research questions for that task or behaviour, relating to the technological feasibility, acceptability to users or other user research issues, and the economic environment.

First, we created scenarios that illustrate the types of user tasks and behaviour that might be enabled by the mobile services prototyped in MobiLife. Then we used storyboards of these scenarios to share these ideas with prospective users.

The results of this scenario analysis were consolidated in order to identify the user tasks and behaviour that were in common across many of the scenarios. For example, if a user in one scenario was shown adding a group member in her shared space, and another user performed the same task in a different scenario, a single canonical task ("New members can be added to a trusted group of people over time, either temporarily or more permanently") was created, with the goal of creating a "master list" of the user tasks/behaviour shown in all of the scenarios that were analyzed. The objective of this activity was to survey all of the user tasks and behaviour that have been included in scenarios of future mobile applications and services (especially those coming from the MobiLife technical work packages) in order to identify the task/behaviour that are most relevant for families' everyday lives.

A categorization effort has then been essential to match general system capabilities with user tasks or behaviour, so that every single granular meaningful unit at the user level could be associated with one or more system capabilities. Using this principle, user tasks and behaviour has been grouped according the following categories:

-- Interaction with multiple devices.

-- Interaction with personalized physical environments.

-- Interaction with personalized user interfaces.

-- Interaction with personalized content and services.

-- Group formation and membership.

-- Scheduling.

-- Location tracking.

-- Navigation and way-finding.

-- Interaction with commercial services.

-- Multimedia and data applications and services, shared (multi-person) and personal (single individual).

-- Monitoring.

-- Billing.

User Study Participants

The results discussed in this paper are based on qualitative user research conducted with families in Finland and Italy during November 2004.

To better understand the communications and group dynamics among the family, MobiLife has decided to focus upon families who are undergoing some kind of transition period (for example, the birth of a child, or one member moving away from home). These transition periods often introduce new communication needs into the family, and the changes in the family's day-to-day activities are likely to make characteristics of group organization, problems, and so on more visible to the researcher. Therefore, for MobiLife, two particular definitions of the "family" were selected as the user groups to

focus upon:

-- Families with young children (e.g. a family with a child going to school for the first time) – referred to as "younger" families below.

-- Families with older children moving away – referred to as "older" families below.

The families who participated in the user study belonged to one of these two categories. A total of 17 family interviews were conducted in Italy (10) and Finland (7). Four of the 10 Italian families and three of the seven Finnish families were younger families. There were 61 interview participants in total, with an average of 3.6 participants per family. The participants weren't especially heavy users of the Internet or of mobile technologies, but in general did use the Internet frequently (at home and at work or school) and did use mobile phones. Among participants in both countries, it was common to own a mobile phone (91% in Finland and 77% in Italy), but less common to browse the Internet from a mobile device or use other types of mobile devices.

Interview method

The families were interviewed in their homes in a group setting (not one-on-one interviews with each family member). Each interview session began with demographic questions about the members of the family. Then the family completed a drawing exercise to explain the social networks that the family members took part in; studies on social networking patterns were used as a methodological reference. The next part of the interview addressed the family's current methods of communication, group coordination and group awareness. Various means of communication and related habits were then added to the map. Finally, the storyboards formed the basis of a discussion about the mobile services shown in the scenarios.

MobiLife scenarios

The MobiLife scenarios depict a variety of mobile services and applications by showing how they might be used by the different family members. Each scenario focuses on a different aspect of life: planned activities during the work week (the "Monday" scenario), dealing with unexpected events during the work week ("Friday"), enjoying leisure activities on the weekend ("Sunday"), and taking a special outing as a family ("Olympics").

In particular, the Monday scenario shows a family with young kids planning for a hard working day, and indicates that the parents have different ways to reconcile personal and work lifestyles. In the Friday scenario something unexpected (a minor car accident) has interesting implications in the family organization. The Sunday scenario represents a slightly older family on a typical leisure-oriented day, in which several social relationships with the extended family and beyond are shown. The last scenario, Olympics, shows a family with a grown-up child who is studying at a remote university; the parents decide to take a vacation to visit the Winter Olympics.

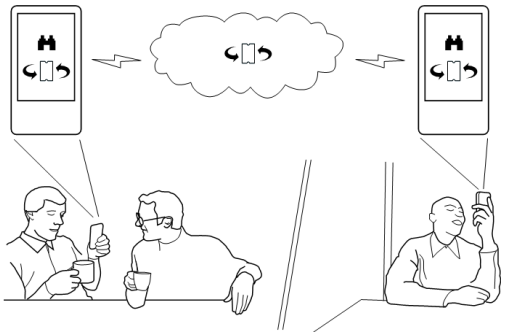

Fig. 1. Sample illustration from the storyboards of the scenarios.

Each of the described scenarios shows some activity in which group management is implied. The specific tasks related to group formation and membership are:

-- Users can form themselves into groups dynamically. Existing groups can be expanded by adding the contacts of the people in the group (for example). Groups can be formed dynamically based on user's physical location. Within these groups, users

should be able to make distinctions about their level of trust in particular individuals. In some groups, it's good for individuals to remain anonymous.

-- Users can access material and applications based on who they are and which groups they are in.

-- Within a group, communication can be directed to the correct individual.

-- Users verify other people's identities based on technology (e.g. someone is calling from the "right number").

-- Users develop strong community links (reach out to their neighbours, social services, etc.).

Relevant groups aspects are also included in different user tasks and behaviour classified under capability categories different than group formation and membership. Such is the case for instance regarding location tracking:

-- User's location is tracked both indoors and outdoors, can control who can see his/her location and can look for other users in the vicinity or be notified when someone he/she knows is nearby. Users can allow others to know their whereabouts with their mobile devices

Another example can be found with user tasks and behaviour related to the shared use of multimedia and data:

-- Users share data among a group (both in real-time and asynchronously). There is a shared repository for this information.

Another one is related to monitoring capabilities:

-- User monitors someone else's health or well-being. Conversely, the user can maintain some autonomy knowing that someone else is looking out for him/her. In case of an emergency, the user can get help (or the system can summon help automatically).

Fig. 2. Sample illustration from the storyboards of the scenarios.

Results

This section presents the key findings from the family discussions about some common tasks shown in the scenarios and with specific reference to group formation, membership and management. [6]

Because of the inherent limitations of the scenario-based interview method, these results will be used to inform the design of mock-ups and prototypes that can then be developed to actually going on with further design cycles.

Convenience and fun

One common finding across all scenarios it that convenience-focused ideas were well-regarded in the user evaluation e.g. swapping otherwise unusable sport event tickets in Olympics scenario or dealing with the aftermath of an unexpected event like a car accident in Friday scenario or again using different terminals seamlessly in Monday scenario:

That's fine, to have more and multiple terminals available where you can work.

That's great! No more tickets wasted!

In the case of ticket swapping, a more computer literate user picked up the idea and suggested to enhance it by replicating available online services:

You should even improve it… consider peer-to-peer… let the people exchange on their terms.

However, the younger family members gave more positive comments to some of the more playful, less practical aspects of the scenarios. Here there was the recognition that e.g. community functions, social networking, and so on will be increasing and that the ideas presented could be nice from that point of view. Similarly, some ideas were seen as appropriate mainly for special occasions, such as weddings or when travelling.

Actually much family interaction is about having fun together. Similar findings are reported also in other projects. For example, the interLiving project installed communication technology probes (for example, a real-time two-way video system called the videoProbe, and an asynchronous messaging system called messageProbe) in families' homes in order to study emergent uses of the technology. After several such studies, the interLiving researchers observed that while the technologies were used for practical purposes, they were also used in more playful ways: "This is not a startling conclusion – [Johan] Huizinga coined the term Homo Ludens in 1950, defining humans as playful creatures… However, aside from games, the design of technologies has generally focused on tools to improve our efficiency, not to support our playful side". [7]

Reliability, costs and skepticism

Many activities performed in the scenarios seemed to go too smoothly, with such supportive technology that some scenes were perceived as not really believable. The participants were used to the fact that technology does not always work so well and they predicted that future technologies may not be not reliable enough to support them in daily life tasks, agreements with loved ones, etc. Some of the technologies inherent in the scenarios (e.g. scheduling and personalization) imply a high degree of artificial intelligence, further contributing to the doubts about the abilities of these technologies to accomplish the kinds of tasks in question. It is not only that people do not want their lives to be controlled by technology, but also that they don't think it could handle the complexity of their lives. Skepticism sometimes transcended even into sarcasm, which indeed it is signal of how mixed and critical is today the perception of technological promises:

That's purely science-fiction…

People is aware that system suggestions, even if they are sensible from a practical point of view, may be put in jeopardy. If the rules are not clearly defined, changing route on a bus ride to pick-up people on request could go not so smoothly as envisaged:

How the other people can agree or disagree with that decision?

Costs problems or other issues related to money (e.g. using one-to-many-sophisticate messaging instead of voice calls) have also been noticed by some family members, particularly the adults; even if cost details were not reported in the scenarios, some ideas, from their point of view, seemed to imply that a high cost should be expected:

It is quite useful to have these reminders… but I would never and never pay for them!

Location-tracking, privacy and trust

Participants could clearly see both benefits and drawbacks of location tracking functionality, especially in relation with group management capabilities. For instance a clear benefit was associated with the system providing knowledge of the whereabouts of one's friends.

On the other hand, privacy concerns were identified and location tracking was also seen as an instance of technology becoming too intrusive:

It could be nice but this means that we are going to be tracked all the time

I agree with my father… I use profiles on the Internet but with mobile is different… with one profile or another I would still to have tracked down night and day

Similarly, the parents in one Finnish family strongly objected to the idea of monitoring children's whereabouts. In their view, family relations should be based on trust, and one should not intrude on the privacy of other family members, even when they are children.

Another rather interesting point of disapproval, namely one related to technology leading to anxiety, came from an Italian family:

If I couldn't find my son's profile, I'd feel anxiety. I'd be better without

Group formation and membership

As said, group formation was best accepted when the scenario described how it could help solve some practical problem. When the application or its benefits were described in more abstract terms – for example interest group formation, in the Olympics scenario – many subjects considered it either uninteresting or unsafe:

I'm not interested in it: if there are friends, I would like to see them directly. Therefore, if I don't know people, I don't need to get in touch with them…

I find it rather dangerous… I don't like to meet unknown people this way.

Group formation was generally accepted for friends and acquaintances. It was also seen as appropriate for young people and those seeking new friends.

It can be an interesting service for young people and for lonely ones.

I'm sure that young people is going to use this stuff. But for the adults and the oldest is out of question.

Whereas group formation as generic functionality in mobile devices was questioned, it was seen as useful and required for some applications, for example multimedia sharing. In this case people noticed that the benefit was mostly related to the mobile extension of applications and services already available on the Internet:

That's fine, more or less like we do already with blogs.

The end of the Sunday scenario was appreciated by the subjects because it in fact brought people together, not only in distant locations and across time, but also physically:

Exchanging media is a great thing if they are related to daily life.

It is interesting to note that the user made himself clear using an example based on traditional media: in a nearby town, some people put together a collection of their children football team pictures, "and they went mad to exchange them. This is very much about real group sharing".

It was also commented that in this respect cultural patterns may have changed in a less preferable direction:

Great but the problem is that families are less and less together in the same moment and place to share anything!

Again, in this respect generational differences highlight special unmatched needs. Some families put a strong importance on the cases of the elderly members, the grandparents. Since they are very old and all of them live in different houses the worries about their physical conditions or daily troubles is constant and often a source of anxiety. In this occurrence they feel that any support to be more in contact would be of great help.

Conclusion

Key user feedback about group management have been used to define a set

of general design guidelines, which will be used as a reference for the following work in MobiLife.

In short, group formation capability should not be used for its own sake, but as a functionality of some accepted solution (e.g. multimedia sharing) or in the service of some practical task (e.g. forming an ad hoc group at the site of an auto accident). Users form a group because it's needed for some purpose.

Forming a group, adding or removing people from the group, leaving the group (permanently or temporarily) should be easy.

Privacy, trust, transparency have an important role. User must be able to see who is in the group. The logic of automation should be transparent: if groups are formed or expanded automatically, the user must be able to see the rationale for that, and the trust level among this group. User must also be able to control the information other group members can see about. Finally the inclusion perspective should not be overlooked. Even with a very simple device (e.g. a low-end cell phone), the user should get a minimal group service – at least the basic features should be available for anyone.

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