

Keeping in Touch with the Family: Home and Away with the ASTRA Awareness System

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ABSTRACT

This paper describes research in supporting close family members living apart to keep in touch with each other. We introduce an awareness system for supporting lightweight social communication between mobile individuals and people at home. Communication is based on pictures, short messages and reachability information. A field test has provided empirical evidence that affective benefits, to this point only hypothesized by researchers in awareness systems, are indeed experienced by users of our system.

Categories and Subject Descriptors: H.4.3 [Information Systems Applications] Communications Applications; H.5.2 [Information Interfaces and Presentation] User Interfaces - User-centered design; H.5.3 [Information Interfaces and Presentation] Group and Organization Interfaces - Asynchronous interaction.

General Terms: Design, Experimentation.

Keywords: Awareness Systems, Affective Benefits.

AWARENESS SYSTEMS AND AWARENESS

Awareness systems are a class of computer mediated communication (CMC) systems that support individuals to maintain, with low effort, a peripheral awareness of each other's activities. Pioneering awareness systems have focused on the workplace, as for example Media Spaces [1]. Early concepts of awareness systems for the home are the digital family portrait [5] and the design concepts proposed by the Casablanca project [2]. To date, only the interLiving project [3] has attempted to develop and deploy a functional awareness system for a home environment. Likewise, there has been little attempt to understand the concept of awareness itself.

Researchers approach the concept of awareness from several angles. Works like the digital family portrait [5] focus on attaining awareness with minimal cognitive effort through pre-attentive processes of the user. More important for the design of awareness systems, is to study the benefits

that users experience through interacting with awareness systems and the role they can play in the gamut of social interactions of an individual. This wider perspective is adopted by [4] who define *affective awareness* as the general sense of being in touch with one's friends and family. However, the exact nature of this feeling, how to achieve it and how to assess it, remain unexplored to date.

The research presented aims to redress this limitation in the context of the design of a novel service for maintaining awareness between households and mobile individuals. This service allows informal, social communication to be enjoyed at moments of leisure and relaxation at home. Access from home is combined with spontaneous, lightweight sharing of experiences on the move. Following work to conceptualise the notion of awareness, we have created the Affective Benefits and Costs of communication (ABC) questionnaire [7]. The ABC questionnaire includes the following scales, each of which contains 4 items. The first 3 scales refer to costs and the last 5 to benefits.

- *Obligations*: Social obligations felt or created as a result of using the awareness system.
- *Expectations*: Expectations for communication are raised or unmet as a result of using the awareness system.
- *Privacy*: The extent to which awareness threatens privacy.
- *Thinking about*: Thinking about another and knowing one is thought about.
- *Staying Aware*: The extent to which people feel aware of the daily life activities of others.
- *Connected*: The feeling of being connected or "in touch"..
- *Sharing experiences*: How much one feels other people are involved in his/her life, sharing experiences.
- *Recognition*: The extent to which each other's feelings are understood.
- *Group attraction*: The feeling of being part of a group.

THE ToTell LIST CONCEPT

Based on a study of informal social communication within the extended user family, reported in [6], the ToTell list

concept was defined. Similar to a ToDo list, the ToTell list acts as a reminder, but this one reminds of interesting moments and experiences to talk about. In the requirements study we had found that most affective benefits are attained from informal, social and emotional communications, where the initiator of the communication wants to share some personal news or story. Items in the ToTell list are pictures or messages, similar to a postcard, to encourage for personal effort to be manifested: The field study showed clearly that effort to start a communication, process costs related to time and money, etc., are not valued, while the personal effort put to communicate at the right moment and to personalize the message for the receiver are appreciated by the receiver [6]. This and earlier studies of ours have shown the importance of timing. We want to support the spontaneous capture of experiences as they happen and to allow for serendipitous communication, but without disturbing or constraining the receiver at inopportune moments. Concrete messages and pictures were preferred over abstract visualisations, as this was an unequivocal preference of the informants in our requirements study [6]. The ToTell list was conceived as a complement, enhancement and trigger for communication through other means rather than a replacement of them. Its main purpose is to stimulate curiosity and provide content for informal social communication.

THE ASTRA PROTOTYPE

Figure 1 illustrates how the ToTell list concept was realized in the ASTRA prototype. During the day, an individual can capture daily experiences using a mobile device that supports picture taking, freehand drawing and handwriting. The ToTell list composed in this way is shared with related family members at home, where the list can be accessed using the tablet device shown on the coffee table in figure 1. When the device is not used it shows an overview of such messages in a spiral visualisation. The touch-screen interface can be used to browse similar messages and check the availability of others.

The information displayed in the spiral overview consists of pictures or drawings and text notes made on the mobile device. The spiral is divided in 3 areas: The main area of the spiral holds 6 pictures, whose size and position portrays recency. The centre of the spiral gives access to earlier items, the outer end to more recent ones.

Users operate the ASTRA home system through a Philips desXcape wireless LCD monitor, which affords touch-screen interaction. The software for the homebound application is a Java client, implemented in Java SDK 2, version 1.4.1. For the field tests, we used existing functionality of the Sony Ericsson P800 mobile phone, which contains a camera, to create and send e-mail messages to a server. Messages, pictures and real time reachability information are managed by the Telenor Mobile Presence Server (MPP). This is an experimental middleware, that is accessed through Internet by the home



Figure 1. Connecting mobile user with the household through the ASTRA prototype

and the mobile devices. A local telecom company provided a GPRS (General Packet Radio Service) connection to connect the mobile phone with the server.

LABORATORY TEST

A formative evaluation of the prototype was conducted in the HomeLab, a laboratory within the research campus of Philips in Eindhoven, The Netherlands. This laboratory is a home simulation, rich in technological infrastructure and state-of-the-art observation equipment, purpose built for testing technology for the home.

Set-up and procedure

4 families (parents with children) and 1 group of close friends were recruited through email adverts. In total 19 people (11 males and 8 females) took part, 11 were adults and 8 children.

From each group 1 person stayed in the HomeLab, while the others visited a nearby open-air museum. They were asked to spend 2 hours there and to send at least 6 messages to the person in the HomeLab, using the P800 mobile phone. HomeLab participants took part in a usability test and were then requested to occasionally monitor the ASTRA device. When the other participants returned from the museum, the HomeLab participants explained the system to them, verbalising in this way their conception of ASTRA. Finally, a group interview was conducted.

Results

Participants found the interface easy to understand and to use, though they helped identify some points for improvement. On average, participants sent 12 pictures. Though interviewed participants liked to share their experiences, they did not feel a particular need to use an awareness system like ASTRA. This was attributed to the short time they experienced the system and to that they used the system to perform test-tasks rather than to satisfy an actual communication need. The HomeLab study identified several areas for improvement both in the underlying service and the interface and thus paved the way for the more demanding field experiment.

THE FIELD EXPERIMENT

A field experiment was conducted, which aimed to assess the user's experience of ASTRA when this was introduced in their daily life and existing communication patterns.

Experiment Design

The test involved 2 pairs of households: The households of a brother and his sister and the households of two parents and their adult son. In total 7 adults, 4 teenagers and 2 children were involved. The families participated out of interest but received a financial reward as well.

We used a within-subjects design consisting of 2 phases lasting a week each. In the first week the current communication between the 2 households was observed. In the second week ASTRA was introduced to them. Each household received 1 homebound device and 1 mobile device. Communication was observed by means of a diary, by logging ASTRA usage and by group interviews. The affective benefits of using ASTRA were assessed using the ABC questionnaire [7].

Results

In the first test, ASTRA was used for 1 week with only some minor technical problems. In the second test, however, ASTRA could be used for 4 days only because of technical difficulties. Mobile participants were very active in sharing moments and experiences. 90 messages were posted in the first test and 69 in the second. Considering that each household was given only 1 mobile device, this is quite substantial. The home device was used in average for 23 minutes per day in the first test and 69 in the second. In both cases, participants used the home device most frequently in the first days of the test, after which the novelty wore off somewhat.

The pictures sent show a variety of topics, generally concerning everyday events but also special happenings such as a birthday party. Long explanatory notes accompanied some pictures. Somewhat unexpected was that participants had entirely picture-based "conversations". E.g., when one family sent a picture about a party with the theme "vampires" that they were preparing, the other family responded with pictures in which one of them was wearing a vampire mask (see figure 2). Interestingly, while participants started off composing pictures carefully and almost artistically, by the end of the week they compromised on the quality of the composition as they only cared about capturing and communicating events.

The mean scores for all scales of the ABC Questionnaire are shown in Figure 3. The Wilcoxon test was used to check for significant differences between scores. The results show no significant differences in the scales of the ABC relating to obligations, expectations and privacy. In the second week, when they were using ASTRA, participants reported thinking about each other more often ($Z=-2.67$, $p=.008$), being more aware of each other's experiences, ($Z=-.2.31$, $p=.021$), feeling more connected to



Figure 2. Top: the preparation of the party; below: the other family's reaction.

each other ($Z=-2.02$, $p=.043$), sharing more experiences ($Z=-2.38$, $p=.011$), and experiencing higher levels of group attraction ($Z=-2.23$, $p=.026$). Recognition was also higher in the second week, but this difference was not significant. In short, in the week when they used ASTRA, participants experienced substantially increased affective benefits without increased affective costs.

Diaries and interviews show that participants were very enthusiastic about their experience of ASTRA. Several participants had not expected to use the system a lot, but were convinced in the end. 7 out of 11 participants interviewed would like to use ASTRA in their daily lives. Others indicated that although they liked the system, they needed more time to 'find a place' for it in their existing communication patterns. Several people predicted that they would probably use it less if the novelty wore off. They would like to involve more people in this kind of communication, such as friends and other relatives, and use it for communication within their own household.

Participants were divided as to whether ASTRA would reduce or increase the use of other media, but nearly all thought that it would change the content of such contacts:

"You need less time/formalities to start the conversation, because you know more about each other's context."

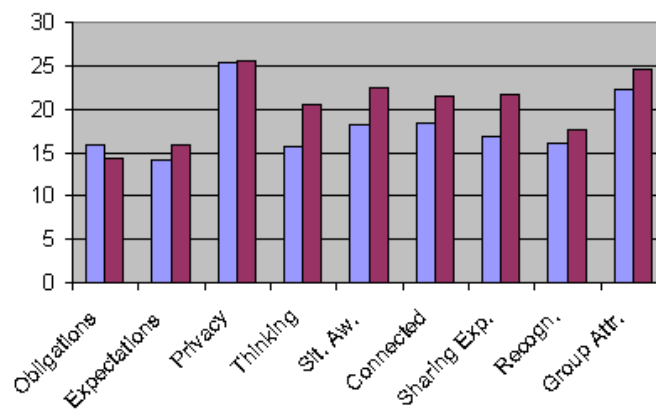


Figure 3. Mean scores on the ABC Questionnaire in the first and the second weeks of the field test.

Although the messages they exchanged were often quite trivial, they succeeded very well at generating feelings of connectedness and involvement between the households.

“There was more involvement, more curiosity. I was thinking about them much more than usual.”

“On the one hand it is a shallow way of communication, but you get a lasting sense of what the others are doing.”

In cases where participants took a picture without sending it immediately, e.g., because they were short of time, they would then not send it later at all. When the moment had passed the picture was deemed not sufficiently interesting or important to communicate. Many pictures and messages are only interesting to send and share at the moment they are captured and a lightweight system like ASTRA triggers communication where it would normally not occur.

Participants indicated that ASTRA did not create new obligations.

“It is non-committal. If someone sends you a long email you have to respond to it, but not to just a picture.”

We noticed remarkable differences in communication patterns between the 2 family pairs. Members of the second pair see each other regularly and use phone, e-mail and messaging almost daily to stay in touch. Members of the first pair do not see each other often, because of busy lifestyles; they know about important events but are not up-to-date regarding each other's daily experiences. From all interviews, we received strong indications that the first family benefited much more from ASTRA than the second. The pictures showed them previously unknown parts of each other's lives, which resulted in feelings of involvement that they usually don't experience.

DISCUSSION

The field test confirmed that ASTRA can help related distributed households to stay in touch. It supports individuals to share every-day experiences and “small news”, supporting communication through other means. This is a niche in communication needs that is currently unsupported by other media. Next to elderly people, who have been the primary group targeted in this field [2,5,6], busy families are potential beneficiaries for lightweight, asynchronous systems designed for sharing experiences. Participants indicated that the regularly incoming messages fostered a lasting sense of awareness about members of the other household and helped them to feel more involved in each other's lives.

In the future, we plan a longer-term study, involving more households, where a larger part of one's communication activities are supported and a larger part of one's social network is connected. To increase the realism of field tests we plan to extend the awareness system to connect more individuals and in richer participation structures.

CONCLUSION

This research has made several contributions to the study of awareness systems. It has provided evidence of affective benefits from awareness systems, that to this point have only been hypothesized. It constitutes a first real life deployment of an awareness system connecting families with mobile users, which is an essential step in providing true awareness of other individuals. ASTRA addresses a need of families currently unmet by other systems: serendipitous sharing of moments through the day. Finally, we have shed some light into the nature of awareness and we have developed the ABC questionnaire, which provides a credible yardstick for the quantitative assessment of awareness systems.

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