"I Heard You Were on Facebook" – Linking Awareness Systems to Online Social Networking

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ABSTRACT
Awareness systems have shown to be an effective channel for supporting social relationships. Prototype systems that support communication with intimate relationships are typically stand-alone systems. This paper describes the design of an awareness system that is linked to an online social network, allowing users to reach a broader network of friends and acquaintances when using the system. The system enables posting sound bites from daily life to one's Facebook wall. The user may record them actively, or they may let the system randomly capture environmental sounds. A final prototype was evaluated with three small friend-networks. Results support the expectation that the linked awareness devices on a social network, enhances social awareness beyond a network of physical devices. The paper further presents design insights for the development of the link between awareness systems and existing online social networks.

Author Keywords
Awareness systems, social network services, social connectedness, computer-mediated communication.

ACM Classification Keywords
H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

INTRODUCTION
Awareness systems can serve as powerful means for supporting people's experience of connectedness, closeness and experience of social presence. Although originally aimed at the work-domain [2], more and more, awareness systems have been applied in the home-context. In these cases, a key quality of awareness systems is their pervasiveness and subtleness in that environment.

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Social awareness systems are considered as subtle enablers of communicating social cues, usually using products naturally found in the home environment. Early examples of social awareness systems include the Family portrait [10]. This system informed the adult child of activity in the house of a senior adult, supporting aging-in-place. The ASTRA awareness system [9] was used among home inhabitants in order to share their daily experiences, enabling users to post and share pictures from daily life on a large screen in the home. The GustBowl project [6] was designed to fit existing routines of a college aged student coming home and emptying one's pockets. Via GustBowl parents could obtain a hint about the daily activity of their son or daughter. These and other examples, such as Hug-at-a-Distance [12] and SnowGlobe [13] are standalone systems, which are not directly connected to social network services. Also, they are all primarily designed for communication between intimate relationships such as family or close friends.

Online social network services (SNS) (e.g. MySpace, Google+, Facebook) also have great potential to foster social awareness. Two primary motives for using SNS are (1) finding old acquaintances, and (2) browsing, to find out what is going on within one's social group [8]. This indicates these systems are aimed at – or: primarily used for – social awareness of less intimate relationships. Although allowing access to a vast social network through friends and friends-of-friends, a threshold for connecting through a SNS is the need for an Internet device and the requirement to log into one's SNS-account. Few attempts have been made to connect awareness systems to online social network services, and, to our knowledge, no field studies have been conducted on user experience in this domain.

When awareness systems are linked to an existing social networking site, they could possibly lower threshold for communication within a larger network of both intimate and extended relationships [4]. This may also enable users that do not have an awareness system installed, to contribute and enjoy the social interaction that is generated through an awareness medium. The study presented in this paper explores the possibilities and user experiences of connecting a physical awareness system to an online social network service.

This paper describes an awareness system for home use that collects snippets of sound and is connected to Facebook. First, we describe the iterations that led to the prototype. The following section describes a field evaluation with three small user networks. Finally we discuss the value of linking awareness systems to social networks, arguing that this may be useful for supporting a sense of connectedness and 'being-in-touch' for particular user groups. We conclude by describing the obtained design insights.

SYSTEM DESIGN

The awareness system designed for this study was inspired by the work of [7] and [3] that consider Facebook a venue for mediated *sharing* (liking[1], commenting and posting) and *exploring* (finding, viewing and browsing). The design was developed in several idea and concept generation sessions, on which we will not elaborate in the present paper.

The first version of the prototype, called Facebook Listener, supported *sharing* by enabling recording and sharing a five-second sound sample with Facebook friends. This also included the possibility to automatically record and share samples at a fixed interval. Sound was considered to be more pervasive than a visual interface, which requires visual attention. To address privacy issues, users could choose to scramble the sample by adjusting the noise added to the sample. *Exploring* was supported by enabling playback of samples shared by other members of the social network. The device was designed to easily blend in the natural user environment, both in terms of interaction and visual aesthetics (color, material, etc.). Sound was used as it does not require visual attention of the user. It can include different levels of richness; besides voice message, sound samples could contain contextual cues such as environmental sound or tone of voice. This is an extension to the type of media usually shared on Facebook.

The prototype had two elements; a base and a glass; inspired by the metaphor of using a glass to listen through a wall. In the prototype, the glass was used to toggle between two modes of the system: in 'listening' mode, the glass was turned upside down, and in 'sharing' mode, the glass was turned right-side up (Figure 1). The base contained switches, to detect the position of the glass, and additional controls to set the intensity of noise and to switch between samples of other users. LED's were implemented as status indicators, and the system was driven by an Arduino with an Xbee and FM-transmitter for wireless control. A computer was used to connect the system to Facebook.

Pilot

The prototype was evaluated in a field setting with two groups of three participants, over a period of six and seven days respectively. Participants were men, age 21-23. Two of the participants were given the prototype connected to their Facebook account. The third participant was interviewed at the end of the evaluation, to gain an understanding of the experience of a non-device-using member in the social network.

A primary observation from this pilot study was that users did not 'like' or comment on any of the sound samples. Users indicated that a possible reason for this is that they knew this would not be visible when using the device, unless the device-user would log on to Facebook. Furthermore, system users did not share pervasive sounds; rather they recorded specific sounds and samples.

Final Design

An improved design was made to support another field study of Facebook Listener. To provide feedback on the attention people on Facebook gave to sounds posted by users, the design of the prototype was modified: An LED indicated whenever an online user performed a Facebook-based action on the sound posts, e.g.: another Facebook user listening, commenting, or liking the sound sample.

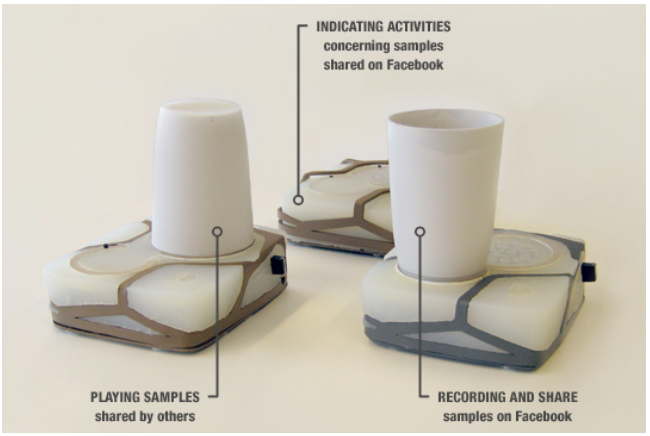

Figure 1: Facebook Listener; sharing mode (left) and exploration mode (right).

FIELD EVALUATION

Measurements

A face-to-face, guided interview was held with participants to gain insight on: (1) the motives and experience of prototype use, (2) changes in the relationship with the social network and other participants and (3) developments in Facebook use. The interview lasted for approximately 25 minutes.

Two types of questionnaires were used in pre-post measurement to quantify changes in social connectedness caused by the system. The 'Inclusion of Other in Self' scale (IOS) [1] was used to measure connectedness between the participants. The Affective Benefits and Costs Questionnaire [5] was included to assess the benefits and costs of the use of the system for social well-being. Finally, system and Facebook use was logged as behavioral data.

[1] On Facebook, users can choose to *like* another ones post. This post then gets labeled as "X likes this post (comment, photo, etc.)"

Participants

Three groups, consisting of four participants each, were recruited through a flyer distributed on Facebook and amongst university students. Seven of the participants were male and five of them were female, all in the age of 22 – 31. The groups were friends (both in real-life and on Facebook) before considering participation in the experiment.

Procedure

The field test was conducted in the participants' home environment. Questionnaires were distributed before installing the system, and after removing it several days later. After setting up the prototype and connecting it with the participant's Facebook account, a one-week evaluation was performed. Three participants from each group used a prototype at the same time. One participant did not have a prototype installed. After a week of use a semi-structured interview was held with all four participants of the group. During the week in which the system was used, Facebook use and use of Facebook Listener was logged.

RESULTS

System Use

Each of the participants actively used the prototype for an average of 3.8 days (sd=1.04). In total 86 samples were posted. Following completion of the evaluation period, only 33 of the original sound samples had remained on Facebook. This indicates users chose to remove samples from Facebook, after being (automatically) posted by the system.

Noise was applied to 12 of the 86 samples. Reasons indicated for using this feature by the participants were "to test the functionality" or "activated by accident". Four of the participants did not use this feature at all.

The log on system use showed that on average, 7.6 times (sd=9.01) samples were played using the prototype. System-users were shown an average of 23.88 feedback indications (sd=11.37) of someone on Facebook responding to their posted sample post. Some indications were shown directly after each other, as this event was only updated once every 2 minutes.

In terms of interaction with the Facebook page containing sound samples, of those samples that remained on Facebook at end of the study, on average each sample was played 7.45 times (sd=3.49). Facebook friends produced a total of 45 responses (i.e., comments and likes) on the samples, averaging 1.5 responses per sample (sd=1.63). This does not include the samples removed by the users.

Effects on Connectedness

The IOS and ABC-scales did not yield any significant differences between pre and post measurement. Participants noted "*a week of use is too short to notice any differences.*"

The interviews were analyzed using statement cards as described in the Context Mapping method [12]. From the interviews we learned that the presence of a physical device in the living room was perceived as a low threshold for sharing content on Facebook: "*When using the device, I did not have to think of all of the tasks (..) I just can leave a message.*" (Participant 2)

Participants confirmed having listened to the samples. Even though a large amount of the Facebook comments discussed the participation in the test, participants indicated improved social awareness in several ways. Most important comments are quoted (translated) below:

"*It is particularly nice to know what others are doing.*" (Participant 9)

"*I recorded quite general samples, which might be interesting for everyone in the newsfeed.*" (Participant 7)

"*I kept it on in the living room, especially to see about these comments (...) I immediately checked the comment online.*" (Participant 7)

"*I was very curious what others recorded. I listened to these samples, by the device or on their Facebook page.*" (Participant 6)

"(..) *it becomes more personal, you are more closely connected. I could imagine someone was talking to me. It can be really direct.*" (Participant 4)

DISCUSSION

The Facebook Listener was considered a helpful tool to connect with one's (online) social network. It enabled users to share content from their environment, without logging in or the need of a device such as a smart phone. This has been shown between awareness systems in previous studies (e.g. [6, 9, 12, 13]), but it has not been shown to hold for connections to a social network service.

We expected users to let Facebook Listener post sound samples that were randomly recorded by the device, allowing for a pervasive awareness in the background. However, users instead carefully crafted the sounds they posted, including a voice message, a television and a traffic sample. Also did user sometimes remove recorded sounds from their Facebook-wall. Both issues may be due to the richness of the modality: more content could be included, and users disclosed more information, which may have affected user-engagement when posting, and induced the tendency to only temporary share sound samples.

Regardless of whether samples were crafted or randomly recorded, the presence of the sample posts on the users' Facebook wall increased a sense of being connected, and it made them think more often about each other. Although we had expected more active participation in terms of *liking* and *commenting*, participants indicated that they checked each other's Facebook accounts more frequently, increasing social awareness.

A limitation of the study presented in this paper is the fact that we were unable to exclude a novelty effect with certainty. Previous studies on awareness systems [14] have suggested novelty effects to last for the first 2-3 days of a field trial, but this may be device-specific. Future longitudinal studies should further investigate this issue.

However, if the awareness system is designed to capture environmental sounds (or other cues) and communicates them to Facebook automatically (accounting for privacy, etc.), it could facilitate long-term pervasive interpersonal awareness between people.

DESIGN INSIGHTS

In bridging the gap between awareness systems and social network services, several insights were gained during the course of the presented study. These are summarized below:

- Posts appearing on ones Facebook wall provide friends with an ongoing interpersonal awareness, supporting the feeling of being in touch.
- Similar to regular Facebook interactions, feedback on content posted by a user is highly appreciated by other users. Therefore, it should be possible for users to receive feedback on their posts.
- The modality and richness of the possible cues affects the amount of effort people are willing to take in crafting a communication. Pervasive, background awareness may need lower bandwidth communication.

CONCLUSION

This research aimed to break new ground in the domain of computer mediated communication by connecting tangible awareness systems to social network services. In doing this, we aimed to understand the potential of this combination.

Awareness systems have been designed in many forms, with a large variety of functions and modalities. With the presented study we suggest there is potential in linking social awareness systems and Social Network Services, as it lowers communication thresholds and supports social connectedness with a broader network. However, in the design process, the integration of interactions between SNS and the awareness system needs to be carefully designed, accounting for privacy, feedback, and preferred modalities of interaction. Also, networks other than Facebook, may require changes of the taken approach. Although developing detailed design guidelines may need more case studies, this paper contributes to the field as a first step in exploring how to link awareness systems to an SNS, and it identifies relevant design insights.

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