User acceptance in a pervasive care platform

Integrating a social alarm system in a communication network

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Abstract— **This position paper describes a social alarm system integrated in a larger communication platform. This platform, developed in the TranseCare project, uses audio/video communication to allow elderly users to make calls to friends and relatives, and to make alarm calls to a centralized alarm center. Combining these functionalities, it allows older users who live independently to stay in touch with the people they know without leaving their homes. At the same time, it can make them feel more safe, knowing they can contact an alarm center at any given time, in case of emergency. Moreover, the combination of a communication system with a social alarm system could make the acceptance of the alarm system easier, as the focus of the entire system is not only on healthcare-related issues.**

Communication networks; user acceptance; user-centered design

I. INTRODUCTION

In this paper we discuss the user influence on the design of an audio/video based communication platform to support 'independent living'. More specifically, we base our elaboration on a demo setup of the IBBT Transecare project that provides a direct audio/video communication link between the client and the professional healthcare provider. First we will shortly describe the two-part setup, followed by a discussion on user involvement and technology acceptance for this use case.

In the setup the client is provided with a set-top box that is connected to the television screen at home, and a small camera that is preferably installed on or nearby the television screen. The television is used for playback of audio, video and other interfacing. This does not interfere with the way people use their television but on the contrary it adds communication functionality in such a way that it allows users to switch between television watching and using the communication platform with minimal effort. A supplied remote control allows navigation through the software menu, as well as accepting or initiating audio/video calls. One specific use case is the alarm call, an audio/video call that is set up with an alarm center with a single push on the alarm button – for this specific purpose, the client's house is fitted with cameras in all relevant, frequently used rooms. It allows the user to set up a direct communication link with their professional healthcare provider without any form of navigation or tuning. To prevent an accidental audio/video call and to protect the privacy of the user, a thirty second delay is introduced before initiating the alarm to allow the user to cancel the call. This delay was already used in older, purely audio-based systems – it serves as a period allowing users to stop accidental calls.

On the side of the professional healthcare provider, a dedicated alarm center is connected to the communication network. The design of the center is based on user questioning, preliminary and iterative user tests and research on equivalent existing systems. The current center preserves all functionality as it exists in previous systems and adds extra convenience and functionality on top, introducing new technologies in healthcare. Some of the most important functionalities of this web based alarm center include call management, dispatching and logging. These functionalities allow the care providers to accept, handle and finish incoming alarm calls in an efficient and well-organized way with a familiar and intuitive look-and-feel. One of the innovative features of the center is the ability for the centralists to activate surveillance cameras in case they suspect an emergency. This can be especially interesting to estimate the severity of a situation where the client activated the alarm through a portable alarm button, although that use case does not lie within the scope of the set-top box setup.

II. USER CONCERNS – USER AND TASK ANALYSES

One of the critical issues in the development of assistive technologies such as the social alarm system described above is user acceptance (see [3] for a discussion of elderly user acceptance of technology). Apart from the fact that the system should be usable for the elderly, and react timely in the appropriate way, end users of the system – the elderly – have to be willing to integrate the system into their daily lives. The former issues can be investigated in a user-centered design cycle, and both technical and user tests. The latter issue – user acceptance – is more complex, and thus also needs attention from the early design stages until the final tests.

In the TranseCare project, several initiatives aim at making sure the user experience and acceptance levels of the system are high: end users are involved in all stages of the project. From the early stages of the project, user and task analyses have been carried out before implementing the system and its components. These analyses (a combination of pure

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observation and contextual inquiry[1] to question the user's needs and wants) resulted in a clear view of the user's current usage of existing systems. As the integrated system is essentially a communicative system, it was vital to involve all crucial user groups in the process: both the elderly and the alarm system operators have been observed and questioned separately.

During the user and task analyses, a number of issues were raised, both from the alarm centre and the end user side. The following lists some of the issues raised.

- In the current social alarm system setup, the elderly generally regarded the system as stigmatizing. Installation of the system was mostly pushed by relatives, while the elderly were reluctant to accept it: 'I don't need such a system' was a common reaction.
- Privacy issues were raised: end users were not sure whether they want all in-house cameras to be activated when they push the alarm button of the system, allowing the alarm centralist to see them. Especially when the alarm button is pushed inadvertently, this invades the user's privacy. Also, from the other end, centralists were generally not very enthusiastic about 'being seen' during calls – centralists also tended to regard cameras as an invasion of their privacy. From the client's side, this issue was partly alleviated by the thirty second delay, allowing users to switch off the alarm call before the cameras are switched on.
- Sometimes, concerns conflicted with each other. On the one hand, centralists don't want to create too personal a bond with the end users, as they fear social calls can become more numerous than real emergency calls. On the other, end users sometimes wonder if there is a real person at the other side of the system, given that all centralists say the same thing every time, due to the communication protocol they follow. Therefore, while centralists don't want a more personal communication, this would be welcomed by the elderly.

III. Raising User Acceptance through Integration

The concerns raised above require different solutions. For instance, the end user's privacy issues can be dealt with by ensuring that cameras are only activated when strictly necessary, with a clear agreement on when the cameras can be activated. Furthermore, the thirty second delay before initiating the alarm (as mentioned above) is also a measure to prevent unwanted alarm calls that might violate the user's privacy. The centralist's concern they will receive a lot more social calls can be eased by the call dispatching system. This system sends all calls to professional care providers: if they receive a social, rather than an emergency call, they can route the call to e.g. volunteers. In this flow, emergency calls are immediately addressed by professional care givers, and the care givers have very little hindrance of the social calls. In similar ways, trade-offs had to be made in the design phase, ensuring that the users' needs are taken into account, and that the primary goals of the alarm centre are still met.

However, one of the more delicate concerns is the perception of the social alarm system as being a system stigmatizing their users as elderly and not being able to take care of themselves. In TranseCare, attempts are made to counter this perception by integrating the social alarm system in a larger communicative system.

In the initial software design, it was stipulated that different parts (the video call application and the social alarm services) should be integrated seamlessly into one system. This is very convenient for users, as they have only one system they can use to communicate with their friends and family, and to call the alarm center. More importantly, however, it is our hypothesis is that this integration should raise the user acceptance. The social alarm system is not any more just another device that stigmatizes them as old. Instead, the application will be most commonly used to interact freely with relatives and friends. Only in case of emergency, the communication platform will act as a fully functional social alarm system. In other words, the main use of the platform is not focused solely on healthcare-related use (which can be found to have negative connotations and stigmas attached to them [2]), but on day-to-day use. The social alarm system is always present and available, but only as secondary functionality.

IV. Future Work

As mentioned previously, user acceptance of a system cannot be tested in a technical test, or even in usability test iterations. User acceptance can only be investigated over a prolonged period of usage. Consequently, it will be necessary to test this TranseCare development in an elaborate field trial. This field trial will include a small number of elderly participants that will use the system during a few months. This field trial should give us more information about user satisfaction over longer periods of usage, and about whether the installation of a social alarm system becomes more acceptable by integrating it into a larger communication platform.

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[3] Renaud, K. and van Biljon, J. "Predicting Technology Acceptance and Adoption by the Elderly: A Qualitative study," in ACM International Conference Proceeding Series, vol. 338, pp. 210-219, October 2008.

[1] Contextual inquiry is a technique for interviewing and observing users individually at their regular places of work as they do their own work (Whiteside & Wixon, 1990 in [1]).

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