Good to See You -
User responses to a TV-based video telephony service

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ABSTRACT
After many years of slow adoption within the market, video telephony is finally becoming accepted, e.g. in its high end version and in the form of video calls piggy-backed through computer-based VoIP services. Within the home, the TV set may serve as a useful additional way to access video-based communications. TV could also make video telephony accessible to people without computers or to people with insufficient computer skills. This paper presents a user study of a TV-based video telephony application. While, on average, more participants preferred the computer as a platform, many showed a strong preference for using video telephony on living-room TVs over computers, particularly those who experienced the application within a home setting. Our data indicate some strengths and weaknesses of living-room TVs as a platform for video telephony, and some requirements for the design of video telephony services aimed at the living room context.

Categories and Subject Descriptors
H.5.1 Multimedia Information services – Evaluation/ methodology. H5.2 User Interfaces [user-centered design]

General Terms
Design, Experimentation, Human Factors.

Keywords
Video telephony, conferencing, TV

1. INTRODUCTION
With many commercial Voice Over Internet Protocol (VOIP) services now supporting video telephony (e.g. Skype), low cost video-based communications have become available to anyone with a computer, a webcam, broadband internet, and the computer skills required to install the software and connect the hardware. Increased availability has been followed by increased use. One quarter of the many millions of Skype-to-Skype calls each year now include video [1].

TV may serve as a useful additional or alternative way to access video-based communications. For people with computers, TV may provide a useful extra access point (e.g. when the computer is in use). In some instances, it may be the preferred access point. For example, users may prefer to make and receive video calls whilst seated comfortably in the relaxed and social atmosphere of the living room.

For people in households where there is no computer, the TV system may provide a low-cost platform for accessing services like video telephony. TV video telephony services may also help those with poor computer skills to access video telephony. Most people are already familiar with TV-based interaction styles; in particular, those with digital television are already familiar with using their remote to control interactive services. Provided that TV-based video telephony services utilize these existing interaction styles, those with little computer experience should find it relatively easy to use these services.

This position paper presents some findings from a user evaluation of prototype TV system that incorporated a video telephony service. During the study, user feedback was elicited in both laboratory and field settings. Our findings point to some of the strengths and weakness of the living TV set as a platform for video telephony services. Also indicated are some implications for the design of video services targeted for use within a living room context.

2. BACKGROUND
After AT&T's Picturephone failed to achieve critical mass in terms of market acceptance, subsequent research into audio-visual telecommunication focused on audio-video conferencing especially in work-related settings involving more than two parties e.g. [7], [4]. Products targeting professional settings include specialized video-conferencing systems such as HP's high-end telepresence system 'Halo'. For the most part, the problems addressed by this research do not necessarily apply to video calls in private settings. For example, the problem of representing more than two parties [2] visually might not be as important in private video communication settings, which are usually one-to-one. There is a growing recognition of the importance of understanding people's needs with respect to technology use in the home [6], [3]. In contrast to research investigating video-based communications within work settings, video telephony within the home has received little attention. Our study gathered user responses to a TV-based video telephony application designed for a home setting that was evaluated both in the lab and home contexts.

3. METHOD

The prototype TV system evaluated in the study was developed within the Universal Satellite Home Connection (UNIC[1]) project. It was trialed during March, April and May 2008. Apart from the video telephony services, the system provided internet browsing, chat, television, video-on-demand, music, an electronic programme guide (EPG), news, radio podcasts, weather, and a service for sharing user-generated content. All services were delivered via a 2-way satellite-based infrastructure to a set-top-box and TV set. Users interacted with the system via a remote control and wireless keyboard and, when using the video telephony service, via a webcam. Laboratory trials were conducted in UK, France and Italy. 27 participants (avg. age 31) were asked in 90 minute individually run trials to fill in a questionnaire and carry out scenario-based tasks with each service. They were also interviewed about their general impressions of the system. Field trials were carried out in 6 households at sites in UK, France, Italy and Germany. Nine field-trial participants (avg. age 48) and their families were asked to use the system at their own convenience. The field trials varied from 10 days to 4 weeks. At the end of each trial, semi-structured interviews elicited general impressions of the system, responses to particular features and identified usability problems. Figure 1 shows the UNIC video telephony service in part-screen mode.

Figure 1: UNIC TV-based video telephony service

4. RESULTS

In the post trial interviews, participants were asked to imagine that they had a UNIC-like system with multiple TV-based interactive services and a computer with internet access, and were asked to indicate how they would like to access each service. Figure 2 shows the preferred platform for the video service.

A slightly higher proportion of laboratory participants preferred to access the video service via their computer (32% as opposed to the 28% who preferred the TV platform). However, the pattern amongst home trial participants was reversed with more people choosing TV as their preferred platform.

For the lab-based participants, it is notable that a large minority either preferred the TV platform (28%) or indicated they would use computer and TV equally to access video services (41%).

[1] http://www.unic-project.org/

It should also be noted that all the laboratory participants had a computer at home. Possibly, people without computers would express a stronger preference for the TV platform.
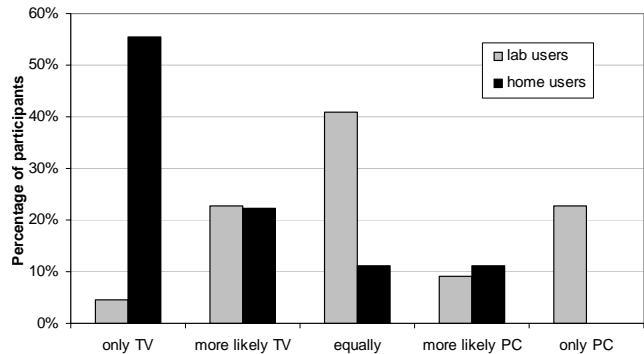

Figure 2: Preferred platform for audio-visual calls

4.1 Pros and Cons of TV-based audio-visual communication

While experiencing the UNIC video phone service, or in the post trial interviews, some participants pointed to advantages of the living room TV set as a platform for video telephony services. A frequently cited advantage relates to the fact that, for most people, the living room is a place to relax and socialize. *"When you have a phone conversation where do you normally talk? You normally sit in an armchair relaxing talking to your friends. So I would say the most logical place to have [a video phone service] would be in that sort of relaxing talking setting"*.

An advantage for some participants concerned the close proximity of the living room to other social areas of their household, in particular the kitchen. With the living room TV closer to areas where they spent most time during waking hours, it would be easier to make and receive video calls. Also, ease of access was helped by the fact that the TV was often switched on.

Several participants thought the TV particularly well-suited to conversations where more than one person wanted to take part at one or both ends. TV sets typically have larger displays, and the displays can usually be seen from several comfortable seating positions. *"With a big screen in the living room...the whole family can sit down and potentially interact...you can see everyone at the same time and they can see you...with a computer, it's more restrictive"*.

The main perceived drawback of video calls via the living room television was the potential for reduced privacy and freedom from distraction given the increased likelihood of others being present or entering the room during a call.

Some favoured the TV set for conversations that involved friends and family but not for business or work related conversations. For the latter, they though it would be easier to avoid disruption when using the computer.

Some were also concerned about potential competition for use e.g. when they wanted to make or receive video calls, other household members might want to watch television or play games.

4.2 Requirements

One key requirement expressed by many participants was that the system should provide safeguards for their privacy. Many were

concerned that hackers could potentially gain access to the webcam and, thereby, view what was occurring within their living room. For some, this was a reason enough not to have a video telephony service in the living room. Others felt that their privacy concerns would be assuaged by a physical means of blocking the camera e.g. several suggested a plastic moveable cover that could be brought down to block the camera view – featured by a number of webcams but not the one used in the trial.

Many participants were keen to have the type of online/offline status indicators provided by existing VoIP services. In particular, many wanted an 'invisible' status indicator so they could view who was online without being visible. Some were keen to set which status indicator appeared when switching on the TV system and when entering the video telephony service.

Another common concern was that incoming calls could disrupt television viewing. Some wanted audio rather than visual alerts for incoming calls arguing that visual alerts would be too distracting. Also, audio warnings would be better for alerting people who were not directly watching the television.

Several said they would want the option to ignore incoming calls - e.g. when engrossed in film or television programme – and believed this would not be easy with the status indicators provided by computer-based VoIP services. Online indicators suggested you were at home and, thus, made it difficult to ignore calls. Offline or invisible indicators, on the other hand, suggested you were not contactable at all. One suggestion was to dispense with status indicators entirely: as with traditional phones, it would be easier to ignore calls because it would not be obvious that you were at home and ignoring the call.

Several participants said that it should be possible to make or receive calls when the TV system was switched off. One suggestion was to route incoming video calls via other phones as audio calls when the TV system was switched off.

Some participants noted that, to be usable with friends and family, the service would need to be interoperable with other video telephony services, as they did not think it likely that many friends and family would share the same TV system.

One participant pointed to a problem that often occurred with computer-based video telephony services: the camera of the person at the other end of the call could be zoomed in or out too far or not pointed in the right direction. He thought this was more likely to occur in the living room context as people would be further away, in differing seating positions and because, sometimes, there would be more than one person at the other location. He suggested a potential solution to the problem: each person in the call could have control of the camera at the other end. By moving the camera, they could zoom in on the other person's face to see facial expressions or zoom out to see the wider context. They could also scan the camera if someone else was present.

5. DISCUSSION & CONCLUSION
In summary, our findings suggest that many people would like to access video telephony services via their living room television set. Perceived strengths of the living room TV platform include the relaxed and sociable atmosphere of the living room, and the fact that the living room TV set is usually viewable from multiple seating positions and thus better suited to shared use at one or both ends of the conversation. Perceived drawbacks include a potential for reduced privacy and freedom from distraction, and the increased likelihood of competition for use of the living room TV display compared with a computer.

Our findings also indicate some requirements for video telephony services targeted at living room TV sets and, in some cases, potential design solutions. Many users were keen to have a means to prevent unauthorized access to the webcam. A physical barrier blocking the camera was viewed as a good way to achieve this. Another common requirement was to have mechanisms to help users avoid distraction from incoming calls. The main suggestion here was for audio alerts and for status indicators that invited calls but were easy to ignore if necessary. Possibly, ambient awareness solutions as implemented in [5] would help meet this requirement. Some users were keen to have interoperability with other devices in the home (e.g. telephone) and with other kinds of video telephony service. Finally, there may be a need for mechanisms to allow users to switch between detailed and context views e.g. to support conversations where there is more than one person in the living room at the other location. A solution might be to allow users to control the camera at the other location (see for example Polycom's Video Conference Systems). Alternatively, automatic camera movement and/or switching, as suggested in [7], might provide a solution. Whether these approaches, in which people relinquish control over their camera, are compatible with the aforementioned need for privacy would need to be tested in people's homes.

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