CELL: Connecting Everyday Life in an archipeLago

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ABSTRACT
In this paper, we explore the design of a seamless broadcast communication system that brings together the distributed community of remote secondary education schools. In contrast to higher education, primary and secondary education establishments should remain distributed, in order to maintain a balance of urban and rural life in the developing and the developed world. We plan to deploy an ambient and social interactive TV platform (physical installation, authoring tools, interactive content) that supports social communication in a positive way. In particular, we present the physical design and the conceptual model of the system.

Keywords
Interaction design, social connectedness, remote schools.

1. INTRODUCTION
In this research program, we aim to make a contribution towards the understanding of the long-term effects of locative media (e.g., public shared displays and mobile personal terminals) on the casual social aspects of distance collaboration (e.g., current status of remote partner's work in joint project and highlighting of hot topics). For this purpose, we will employ a longitudinal evaluation of the employed ICT. In terms of measurement constructs, we aim to evaluate whether 'social presence' is enhanced by the use of locative media. Communication media differ in their degree of 'social presence' and this is one factor that molds interaction. Short (1976) defined social presence as the sense of awareness of the presence of an interaction partner in a mediated environment. Notably, social presence has been associated with enhanced online social interaction (Tu and McIsaac 2002). Therefore, it is expected that the proposed system might have positive effects to the core activities of distance collaboration (e.g., learning), although this is not the primary objective of the project.

There is a significant body of related research, but no integrated approach. In the 70's and 80's, several video-art installations have explored the links between television, architectural space and community identity. During the 90's and onwards, the artistic inspiration has caught on with research labs, which developed several distant communication systems. Nevertheless, previous academic research has not been evaluated with casual users in public spaces for prolonged periods of time. As a matter of fact, the most interesting effects of distance communication systems on everyday life, such as community identity, community awareness, and civic participation have not been documented.

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In summary, we aim to explore how locative media enable new forms of social practice and contribute towards enhancing and perhaps expanding social encounters in everyday places, within an educational and distance collaboration context. For this purpose, we will explore the use of ambient video-links (e.g., a public display that is dynamically updated to reflect the status of distant partners), which support distant cultural exchange and learning activities. Indeed, the majority of the European educational organizations have been involved in human resources exchanges and joint projects that aim to promote mutual understanding and long-term cooperation between the wide diversity of European cultures (for example the Erasmus and the Commenius programs by the European Commission). Although ICT has been widely employed as collaboration 'tool,' for learning, the value of advanced ICT as 'medium' of continuous and subtle social presence and awareness has been neglected so far.

2. RELATED WORK
Among the broad research directions in this interdisciplinary field, there have been some interesting findings that frame the motivations of the current research program. Adams (1992) studied the phenomenon that TV is described by people and considered by the media researchers as a physical place. Wildman (2001) traces the historical impact of communication technologies (radio, TV, telephone) to the design of the homes and reports that each of these technologies, slowly, yet boldly, transformed the design of domestic space. In addition, media researchers found that the design of the domestic space has an influence on the way people watch TV (Pardun and Krugman 1994). Although TV is implicitly assumed as a domestic technology, there are also several uses of TV in public space (McCarthy 2001). In this context, Ambient ITV is defined as a rich audiovisual user experience that spans physical places (private, public) and devices (TV, mobile, public display).

In order to provide support for remote and casual social awareness, we aim to augment the familiarity and accessibility of mass communication with subtle interactivity (e.g. social presence visualizations) and user-generated content. Despite the criticism concerning the value of television (Putnam 2001) and mass communication, there are studies that reveal several worthwhile aspects, such as social communication. Indeed, media content is a shared experience and it is employed as a placeholder for interpersonal and group communication (Kubey and Csikszentmihalyi 1990). Although television has been implicitly assumed as a domestic technology, there are also several uses of media content in public space (McCarthy 2001.). Previous research has proposed several techniques that employ sensor data and visualize remote social activity, but there are no research

results on the longitudinal effects of these visualizations. For this purpose, we aim to employ user evaluation techniques to assess activity visualization techniques on distant community awareness during off-line periods.

In this research program, we explore if and how the connectivity of distant communities could be reinforced through locative mass media communication (O'Hara et al. 2004), which support shared experiences, such as content sharing and collaborative interaction. Locative media offer new ways of combining the emerging ubiquitous nature of digital technologies with the significant qualities of physical environments. Like dwellings or fireplaces, locative media could promote social interaction and become a placeholder for shared experiences. Although video has not been very successful in distant personal or group communication (Finn 1997), it has several worthwhile qualities. Indeed, according to Fish et al. (1990): "The history of video as a communications technology has been a mixed one, showing great successes as a method of broadcasting entertainment, a mixed record as a method of educational distribution, and a dismal record as a mechanism for interpersonal communication." Therefore, we propose the following design specification, which is based on the successful track record of video broadcasting.

3. DESIGN

The main element of the link is a semi-spherical TV, which is coupled with a satellite semi-spherical mobile camera. Departing from the traditional 'boxy' form of TV sets was a main requirement in our design. The spherical TV is metaphorical to the shape of earth and provides a suitable "placeholder" for the remote place displayed on the screen. Moreover, next to the TV there is a small sphere that looks like a satellite planet, which houses a mobile camera that can be moved around. From the point of view of the participant, the TV screen is always-on displaying content, while the back-side of the semi-spherical and semi-transparent structure is lighted from inside, thus creating a bluish effect in dark environments, reminiscent of planet earth floating in space. Finally, there is a fixed outdoors landscape camera at each end of the link.

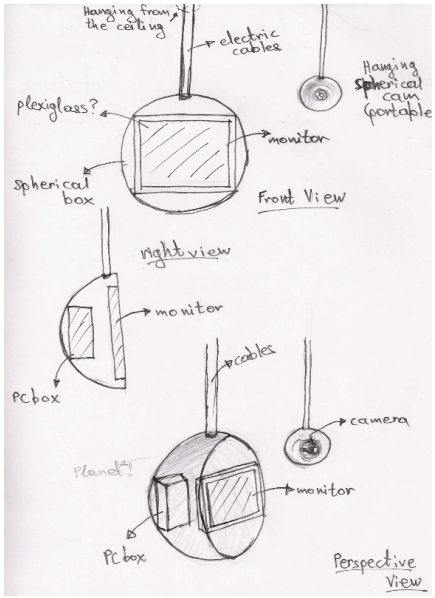

Figure 1 Physical design of the basic interaction elements

3.1 Three types of content: Live, fresh and canned bits

The telecommunication link features three types of bits:

Live bits that are streamed through a fixed, or a mobile camera. The fixed camera provides a constant awareness of the landscape and weather conditions (weather is always a great ice-breaker and conversation starter!) that surrounds the remote node. The mobile camera provides a reporter-style video, which is useful for real-time collaboration. For example, participants might use the mobile camera to work together on a common task, such as performance, or hand-crafts.

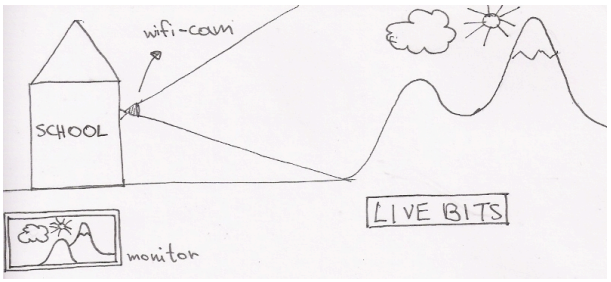

Figure 2 Live bits provide a contextual aspect (weather, view, etc) of a remote place

Fresh bits that are uploaded by participants who are co-operating over a distance. For example, student projects might consider cultural aspects, such as heritage, language, everyday life, or environmental issues. Participants are collecting media using any recording device and they upload them using their mobile phones or computers. Once uploaded, fresh bits (videos, photos, text) take priority into the Carousel queue and the TV screens switch from camera to the Carousel.

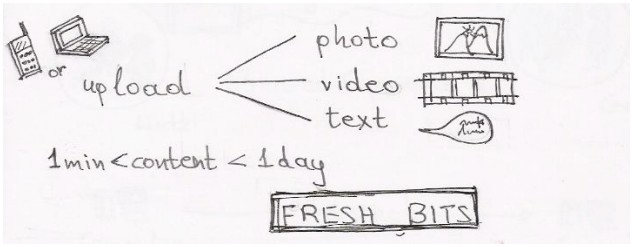

Figure 3 Fresh bits are specific to a common distant project between two remote schools

Canned bits that consist of edited versions of fresh and live bits after they have expired. For example, over the duration of a weekend the fixed landscape camera might provide enough content to edit into a few minutes of fast-paced overview of the weather conditions. Since this is a long-term video installation, over time, yearly seasons might be summarized in short clips, as well, providing a very basic periferic, yet important information about a remote partner. Fresh and live bits are manually edited and annotated, thus they get canned, in order to provide summarized versions of past events.

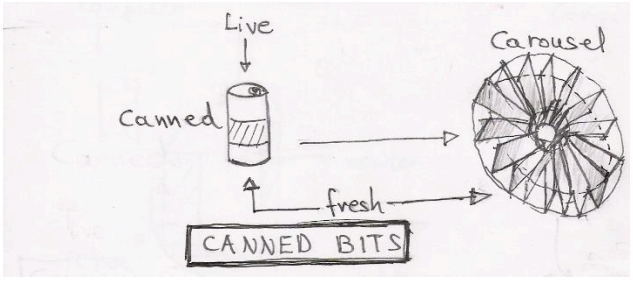

Figure 4 Canned bits provide an edited version of fresh and live bits, in order to summarize longer periods of time

3.2 Scenario of use

Two secondary education schools at Linz and Corfu participate in a European Commission cultural exchange program (e.g. eTwinning[1]). The educators have selected the topic of castles. A student at Linz sends a mobile text message about a castle displayed on the TV screen (Action), which might have been uploaded by an educator, or some other student. When the same content appears on the screen again it will be accompanied by that text message (Representation), which appears on the synced remote screen and immediately captures the attention of the students at Corfu. The latter will reply back by sending back a text, or even a multimedia message (Reaction). Next time the respective content appears on the screens it will be accompanied by those representations of shared actions, thus promoting mutual understanding (over culture, history or other issues) between remote groups.

Figure 5 A students sends a text message about a content on the screen (a), the message is displayed on the remote screen (b), remote students reply to the message and both messages accompany the respective content (c)

[1] The etwinning web portal provides a broad array of topics. http://www.etwinning.net

3.3 Conceptual model

The conceptual model of the system builds upon the familiarity and usability of television. Just like traditional broadcast TV the screens of the system remain always-on and broadcast the same audiovisual content across linked schools, thus creating a shared experience.

There are only two TV channels: 1) Live and 2) Shared carousel. The live channel provides a real-time feed from a remote place, and it is (metaphorically speaking) just like opening a window to a remote place. The default feed is coming from the fixed outdoors camera (which overlooks a broad landscape), until the mobile camera is switched on. Then, the mobile camera can be used as a portable teleconference terminal to set-up the rules of a cooperative activity and most importantly as a remote eye on a common task. Most notably, the shared carousel provides a broadcast-style channel synchronized across all TVs that participate. The carousel consists of fresh and canned bits and it is edited through a simple web interface that operates in the fashion of an online video- or photo-album.

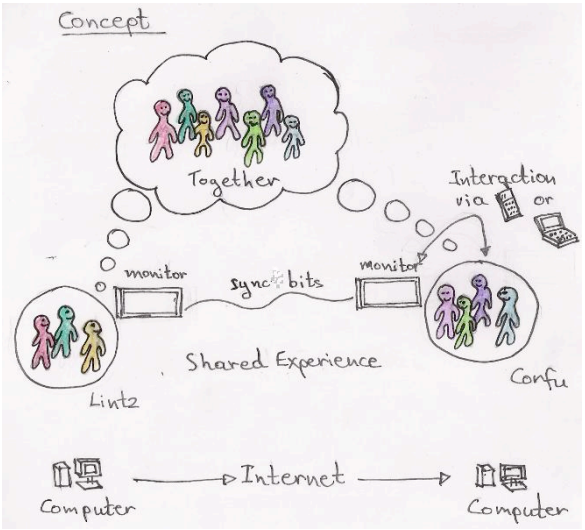

Figure 6 Conceptual model from system architecture to interaction design

The channels are triggered by external events, such as switching on the mobile camera, or uploading new content. Simple interaction instructions appear overlaid on TV content. The TV channels are set-up, edited, and controlled either by mobile phones or mobile computers. Mobile phones are used mostly by the students and leverage familiar interaction (text and MMS messages) with Music TV. The mobile computers provide access to the carousel and are used mostly by the educators or by a group of students who are approved to do moderation and content editing.

3.4 Ongoing work

We are developing a detailed system design and implementation, which has been guided by an empirical investigation on remote schools. We have collected an extensive set of data by employing the cultural probes methodology in a dozen of secondary education schools that reside on remote Greek islands.

Figure 7 The user requirements have been collected from a dozen schools on remote Greek islands

4. CONCLUSION

The ultimate research question behind this research program concerns cultural aspects of the viability of distant communities and whether technological support could make remote everyday life as engaging as life in the urban or centralized areas. For example, in Greece, the main motivation for supporting small and understaffed educational establishments over remote places and islands was to support local development and avoid the shrinkage of the population (Oswalt and Rieniets 2006) on the islands. The latter is a very worthwhile objective in Greece, where half the population lives in the greater Athens (capital) area. Could situated communication technologies, when guided by a user centered interaction design approach (McCollough 2004) overcome the distance barrier between distant partnerships?

Several teleconference systems have been developed by scientists and various telecommunication arrangements have been explored by artists, but we find that most of these works are either intrusive to user privacy (e.g. cameras that overlook public spaces), or rather awkward to use (e.g. video teleconference), or very abstract (e.g. filtered and transformed representations of human presence) to hold a meaningful conversation over time and over a distance. In contrast to previous telecommunication designs, we propose simple and malleable video installation that respects users' privacy and provides many opportunities for shared representation of action over a familiar television-style link. The use of a television metaphor is beneficial because it provides common ground to many people of diverse ages, cultures, and education.

We expect that most of the time the remote collaborators will follow their separate paths of living. Nevertheless, the screens will be always-on and display the conditions of a "live" remote landscape. Each time there is some fresh content, the shared channel is displaying a carousel of canned and fresh content. Finally, participants might opt-in a teleconference session just by picking-up the mobile camera, which promotes flexible use, instead of that afforded by the set-ups of typical video teleconference systems. Although the platform is potentially very dynamic (build on open Web standards), we have deliberately minimized the direct interaction opportunities with the TV (e.g. there is no channel changing button) in order to downplay its use as a tool and to highlight its use as a simple communication medium.

In the context of casual support of social awareness in distant collaboration, ICT and Television hold the potential for a different model of sharing individual and collaborative experience; one that is subtle and transparent to other concurrent activities. In practical terms, we aim to investigate the interplay between large-scale shared displays and meshes of small-scale personal mobile terminals that could be collectively employed to produce, distribute and control media content.

5. ACKNOWLEDGMENTS

This study was partially-supported by the European Commission Marie Curie Fellowship program (MC-ERG-2008-230894).

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