Ubiquitous computing in next generation conference rooms: interweaving rich media, mobile devices, and smart environments

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Summary

This workshop explores how the design of next-generation conference rooms can be informed by the most recent research in rich media, context-aware mobile systems, ubiquitous displays, and interactive physical environments. How should conference room systems reflect the rapidly changing expectations around personal devices and smart spaces? What kinds of systems are needed to support meetings in technologically complex environments? How can design of conference room spaces and technologies account for social and cultural practices around meetings? What requirements are imposed by security and privacy issues in public spaces? Conference room research has been and remains a focal point for some of the most interesting and applied work in ubiquitous computing. We see a rich opportunity to draw together researchers from areas such as rich media, social computing, interactive furniture/smart environments, remote conferencing and mobile devices for a lively exchange of ideas on applied ubicomp in the conference room.

Keywords: Smart conference rooms, mobile devices, meeting support, rich media, context-aware computing, knowledge management, multimedia, tele-conferencing, active learning, interactive furniture.

1 Description and themes of the workshop

Next-generation conference rooms are often designed to anticipate the onslaught of new rich media presentation and ideation systems. Throughout the past couple of decades, many researchers have attempted to reinvent the conference room, aiming at shared online or visual/virtual spaces, smart tables or walls, media support and tele-conferencing systems of varying complexity [1, 4, 25]. Current research in high-end room systems often features a multiplicity of thin, bright display screens (both large and small),

along with interactive whiteboards, robotic cameras, and smart remote conferencing systems [9, 10, 15, 24]. Added into the mix one can find a variety of meeting capture and metadata management systems, automatic or not, focused on capturing different aspects of meetings in different media: to the Web, to one's PDA or phone, or to a company database [19, 22]. Smart spaces and interactive furniture design projects have shown systems embedded in tables, podiums, walls, chairs and even floors and lighting [16, 21, 23].

Exploiting the capabilities of all these technologies in one room, however, is a daunting task. For example, faced with three or more display screens, all but a few presenters are likely to opt for simply replicating the same image on all of them. Even more daunting is the design challenge: how to choose which capabilities are vital to particular tasks, or for a particular room, or are well suited to a particular culture.

At the same time, creating engaging meeting experiences can increase both knowledge transfer and knowledge retention [17]. The incorporation of media-rich engagement strategies in meetings creates a need to provide meeting participants with appropriate tools for managing these media.

Research in areas such as context-aware computing, interactive furniture/smart environments, and mobile devices is moving rapidly. People expect to find the adaptable ease of use that they get from their personal devices in all the technology they encounter.

What lessons can we take from the research to date as we move forward? For example, what aspects of meeting capture and access technologies have proven to be useful, and how should a smart environment enable them? Can next-generation conference room systems support educational as well as business meetings? What

intersections exist with other research areas such as digital libraries?

We are confident that a lively and useful discussion will be engendered by bringing lessons learned from recent ubicomp research in games, multimedia applications, and social software to ongoing research in conference rooms systems. Although conference room technology has been a rich area for research for a number of years, it has not been specifically addressed in the UbiComp community as a workshop. This workshop combines some of the themes of past UbiComp workshops such as "Ubiquitous Display Environments" (2004), "Interactive Tables and Walls" (2002) and the "UbiSys" systems support series (2003 – 2004) into an applied focus for integrating architecture and tangible media, information design and display, and mobile and computer-mediated communications: the next-generation conference room.

Figure 1. Multiple screens (five screens of various sizes and shapes, including a podium screen) for using rich media in a conference room. What goes where? How does one author for such an environment? How should the physical space affect information flow?

2 Workshop activities and goals

The aim of this workshop is to bring together researchers and practitioners working in a variety of disciplines that impact design, technology implementation, usability and evaluation of next-generation conference rooms. We expect a highly interactive atmosphere to encourage a lively discussion and exchange of ideas.

Activities:

One function of this workshop is to collect "lessons learned" from smart conference room research to date, and develop a shared definition of ongoing research areas going forward. We'll begin with brief reviews of and remarks on salient research; lightning

demos; discussions (alternating between breakout teams to identify and classify areas of interest, and larger whole-group discussions) and finally proceed to a collation of ideas, charting a roadmap for continued research.

Focus will be on discussion and idea sharing, rather than presentation. However, to establish a basis for conversation, the first part of the workshop will be a round-robin introductory session (a couple of minutes per participant), immediately followed by a subset of invited panels, demonstrations and/or (very) short talks on workshop sub-topics, which will serve as provocations and points of departure for later discussion. The scope of interest includes but is not limited to (in no particular order):

- Social requirements for formal and informal meetings
- Ubiquitous displays: multiple screens, multiple media
- Interactive furnishings and smart environments
- Rich media for mobile devices in conference settings
- Remote and local multimedia conference support systems
- Designing across cultural and linguistic barriers
- Learning from prototypes and experimental systems
- Content preparation and presentation
- Meeting space design and physical form for smart objects
- Context-aware systems for conferencing
- Meeting capture and access
- Media transmission and storage
- Security, data handling, and privacy
- Spontaneous integration of public and private data and devices
- Appropriate design and evaluation techniques

Goals:

- Develop a better shared understanding of the intersection of ubicomp, rich media, and smart conference rooms

- Create interesting and unique documents on our topic, including a workshop report with sub-sections devoted to the primary themes; a workshop wiki that opens prior to the conference and remains open afterward; and, we hope, a collaborative report to be published in an appropriate journal.

- Assess interest/appropriateness for creating an ongoing set of collaborations and/or workshops around this topic. Though many conferences address related issues (multimedia, CSCW, CHI, ubiquitous computing, etc.) no event specifically focuses on the new generation of smart conference rooms and the many related research issues.

3 Organizers of the workshop

We are a deliberately diverse group, drawing from industry and academia, and from several disciplines (computer science, electrical engineering, business systems, social software, and interactive architecture/design) and cultures (US, Japan, Switzerland, China). All of us have been working in aspects of ubiquitous computing for many years.

- Maribeth Back (FXPAL, Palo Alto, CA, USA) has expertise in prototyping augmented realities and physical embedded systems with complex sensors [2, 3, 20]. As a senior researcher at Xerox PARC she worked on a number of ubicomp/smart environment systems as well as embedded-systems projects at MIT Media Lab and Harvard GSD. Her current research is in multi-modal systems, rich media, and smart environments and objects.

- Patrick Chiu (FXPAL) has expertise in prototyping software and interaction techniques for smart rooms including: electronic whiteboards [18], meeting capture systems [5], and multi-display environments [6]. He has worked at LiveWorks and Xerox PARC.

- Jun Miyazaki is a senior principal researcher and group manager at FXPAL Japan, Central Research Group, Fuji Xerox, Tokyo. His research interests include the Smartconference room environment [14], meta-data database systems for ubiquitous environments [27], and computer human interaction systems [28].

- Kazunori Horikiri, Fuji Xerox, Japan, is an engineer and designer who has expertise in ubiquitous computing and distributed computing. Currently, his work is focused on designing computing-embedded workplaces that enable knowledge workers to achieve effective and creative collaboration.

- Mark W. Newman is a research scientist at the Palo Alto Research Center and a doctoral student in computer science at the University of California Berkeley. Since joining PARC in 2000, he has worked as part of the Speakeasy/Obje project to explore how users interact with ubiquitous computing environments, and how systems can be designed to better support those interactions. [7, 8]

- Naohito Okude, Professor, Graduate School of Media and Governance, Keio University SFC, Japan. His research interests include human-computer interaction design, smart environment design and design rationale.

- Jeffrey Huang is Associate Professor of Architecture and Digital Media at the Harvard University Graduate School of Design. His research focuses on the design of augmented spaces for learning, meeting, brainstorming and other types of everyday social activities. Recent projects include the Swisshouse in Boston, Team Learning Module (TLM), Digital Agora in Washington DC, and Smart Store in Helsinki. [11,12]

4 Maximum number of participants

Excellent work often gets done in diverse groups where everyone has a voice; so we would like to cap the workshop at about 22 - 25 participants (including organizers). Informal queries lead us to believe that there is considerable interest in the workshop already, and we believe that entry will be competitive.

5 Soliciting participation

We will strive to attract diverse viewpoints, including people from different cultures, research areas, and disciplines, while maintaining a cohesive line of inquiry throughout the workshop. We hope to engage people with expertise in rich media, personal devices, smart environments, multimedia communication, ubiquitous display systems, social networks and software as well as in mobile and ubiquitous computing systems; and to draw engineers, researchers, and designers from both industry and academia.

To this end we will create a web site describing the workshop and the research areas of likely interest. The site will be linked from each of our organizations' web sites as well as the UbiComp 2005 site. We will distribute flyers at appropriate related conferences and at sites such as university computer science departments. Each of us will email solicitations to our professional lists, inform our colleagues, and issue personal solicitations for position paper submission to people we believe would make significant contributions to the workshop.

6 Selecting participants

Selection of workshop participants and presentations will be based on refereed submissions. Authors are invited to submit a 1-2 page position statement describing their interest, experience or ongoing research in the field, and including a brief biography. Position statements should have only one author, and admission to the workshop will be for that person only.

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