

The USE Project: designing smart spaces for real people

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1 Usable ubiquitous computing

Usable ubiquitous computing is almost an oxymoron. In particular, in smart conference rooms, applications of ubicomp technologies have generally been far from user-friendly. 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. 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 remote conferencing systems with rich media handling capabilities. Exploiting all these technologies in one room, however, is a daunting task. 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 room functions are vital to particular tasks, or for a particular room, or are well suited to a particular culture.

Maintenance is another issue: nearly all “smart” rooms have resident experts who keep the room’s systems functioning, and who often must be available on an everyday basis just to enable people to use the room. The systems in these rooms are designed for and assume the presence of these human “wizards”; they are seldom designed with usability in mind. In addition, people don’t know what to expect in these rooms; as yet there is no technology standard for next-generation conference rooms. The challenge here is to strike an effective balance between usability and new kinds of functionality (such as multiple displays, new interfaces, rich media systems, new uploading/access/security systems, robust mobile integration). Development 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, including smart environments.

2 The USE Project

We describe our work-in-progress: a “wizard-free” conference room designed for ease of use, yet retaining next-generation functionality. Called USE (Usable Smart Environments), our system uses multi-display systems, immersive conferencing, rich media corporate memory systems, and secure authentication. It is based in cross-cultural sociological studies on the way people use conference rooms.

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The USE project has developed a flexible, extensible architecture specifically designed to enhance ease of use in smart environment technologies. The architecture allows customization and personalization of smart environments for particular people and groups, types of work, and specific physical spaces.



Figure 1. Usability nightmare: multiple screens of various sizes and shapes for using rich media in a conference room. What content goes where? How can such a complex environment be designed for maximum usability?

3 Work-in-progress: status

USE V1.0 is now installed at FXPAL. The current design incorporates two large SMARTboards as projection and annotation and digital whiteboard surfaces; a Tandberg teleconferencing system; two NEC 610 short-throw projectors; an RFID authentication plus biometric identification system; and a kiosk-style room control console. All systems work seamlessly together, based on the USE architecture which supports multi-screen presentation, annotation and digital whiteboards, tele-conferencing with document sharing, strong secure authentication/ID systems, integration with corporate memory systems, and easy accessing, and archiving of documents. We are now iterating into Version 2.0, incorporating stronger security, a new method for annotating, and a new type of biometric authentication system. We have also initiated studies with our colleagues in Japan on designing across cultures for usability. Currently we are co-designing a USE system for installation -in Tokyo in early 2007.