Media Spaces: Past Visions, Current Realities, Future Promise

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Abstract
Established researchers and practitioners active in the development and deployment of media spaces review what seemed to be promised twenty years ago, what has actually been achieved, and what we might anticipate over the next twenty years.

Keywords
Media spaces, synchronous communication, videoconferencing, awareness, presence, telepresence, distributed work, computer-supported collaborative work.

ACM Classification Keywords
H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

Introduction
In a comprehensive readings collection on CSCW, Ron Baecker defined media space as "a computer-controlled teleconferencing or videoconferencing system in which audio and video communications are used to overcome the barriers of physical separation". [1] The concept was generally applied to synchronous or real-time communications supporting collaboration. At the time it began, integrating audio and video into digital networks and computing was not a dream but a heretical notion. There have been many technology developments since

An early media space at Xerox PARC. Like physical space, the visual connections were never turned off merging the separate locations. Used for active conferencing, office-sharing, negotiation of interaction, awareness, socializing, and embodied interaction (e.g. shared drawing).

the first media space research projects in the mid 1980's and early 1990''s. But what has happened to the ideas of the media space? While there are ubiquitous cell-phone cameras, web-cams, iChat, the Internet, YouTube, and globalized work, how do these current technologies and collaborative experiences look like and look different than those of the media space? Are media spaces as envisioned part of the fabric of everyday experience? What is the current state of systems that employ socially negotiated control instead of enforcing an established policy? What is the meaning of "awareness" and "presence" today? Asking these questions will, inevitably, engender reassessment of HCI and CSCW research in general, since media space was one of the seminal ideas of HCI and CSCW.

The Panel

The panelists represent a spectrum of original and current media spaces researchers and practitioners. They will reflect on the significant lessons of 20 years of media space research and suggest strategies to move to their visions of media space over the next 15 years. We expect lively dialog among them and with the audience on those lessons and their visions.

POSITION STATEMENTS:

Steve Harrison

Steve Harrison, AIA, is a Research Faculty member in Computer Science at Virginia Tech. Previously, at Xerox PARC, he co-developed the first media space research project [2][3]. He is currently pulling together an edited volume, *Media Space: 20+ Years of Mediated Life*.

Steve Harrison

The media space was predicated on the integration of audio and video into networked computing, and on high bandwidth to the desktop. At the time of the first research media spaces, integrating audio and video into networked computing was a radical notion. While these two assumptions were correct, they did not anticipate the ubiquity of portable wireless connection like the camera-equipped cell phones. Where the media space assumptions assumed more or less fixed locations for media pick-up and display – and therefore used spatiality as its point of departure and metaphor – wireless connectivity breaks the spatial paradigm. For example, how many times have cell phone conversations seemed "out of place" in our lives? So are the spatial lessons of the media space irrelevant today?

This then leads to a second question – What constitutes a media space? The original definitions focused on the technology. But they were only partial 20 years ago because they could not fully account for interaction between the separate paradigms that inform media space design and analysis: spatial, social, and communicative. The media melds with the space, altering the sense of space and place. While media spaces were intended to provide continuity of sociality for physically separated members, it also greatly distorted the social conventions of physical space: people would overhear without being seen, for example. And the usual measures of information flow seemed inadequate to explain the interplay of social cueing that media spaces provided, leading to research on shared drawing and awareness. With the lens of wireless IT, we see that multiple paradigms and multiple definitions are necessary to make any sense of mediated life.

Ron Baecker

There was an explosion of media space development in the mid-80s. By 1992, research results seemed to suggest that the following could be expected by the end of the century: 1) corporate-wide media space deployments with awareness servers; 2) fully digital media space implementations; 3) video windows deployed in public spaces; 4) novel display and interaction hardware and software to enhance the sense of presence; 5) seamless integration of task space and interpersonal

Ron Baecker
Ronald Baecker is Professor of Computer Science, Bell University Labs Chair in Human-Computer Interaction, and founder and Chief Scientist of the Knowledge Media Design Institute at the University of Toronto. He worked on the CAVECAT and Ontario Telepresence media space projects from 1989 to 1995, and since 2001 has directed development of the open source ePresence Interactive Media system (http://epresence.tv).

Bill Buxton
Bill began using computers over 30 years ago as a musician. The Scientific Director of the Ontario Telepresence Project at the University of Toronto (1989 - 1995), he is now a principal researcher at Microsoft. In 2007, he was named Doctor of Design, *Honoris Causa*, by the Ontario College of Art and Design.

space technologies; and 6) widespread availability of synchronous shared editors.

Despite the passage of 15 years, this has not been the case. Few media spaces are in use. Voice over Internet Protocol (VoIP) is still unreliable enough that many deployments involve parallel use of digital Internet data and video transmission along with traditional audioconferencing. Video windows are not in use; there has been no significant deployment of innovative hardware designed to enhance the sense of presence. Task space and interpersonal technologies have been integrated in part, yet synchronous shared editors have achieved little success in comparison to asynchronous methods of document version control.

Yet new kinds of media spaces have resulted from other developments not evident in the research literature of that period: 1) There is widespread availability of modest personal media spaces built on top of instant text and voice messaging applications, and also vigorous specialized markets in webconferencing and webcasting; furthermore, media space technologies are available at price points from hundreds of thousands of dollars to hundreds of dollars to "free" open source offerings. 2) We now realize that collaboration can begin with a synchronous event and continue long thereafter through persistent chat and dynamic media archives. 3) We realize that fruitful opportunities for media spaces often result from the need to support knowledge workers in specific tasks.

Bill Buxton
I see media spaces in the context of telepresence, that is, the establishment of a sense of presence over distance – whether in space, time, or both. But beyond the dimension spanned, the other key concern is the nature of the presence established. I think about these in at least three distinct dimensions:

- *Person Space:* that is, the space that lets you know that it is me, my mood, my personality, my trustworthiness, etc. This is the part of telepresence that is most often supported, as in videoconferencing, or to a lesser degree, teleconferencing.
- *Task Space:* that is, the shared space of the domain of interest. If I am doing tele-psychiatry, this and the person space may be the same. For most other activities, this is the space around the document, whiteboard or other physical or virtual artifacts that we are meeting about. Shared drawing, whiteboards, or writing would be examples. Many of these are supported by previous systems, but few have a smooth integration with the person space.
- *Shared Reference Space:* This is the most neglected of the classes of shared space that are requisite for a rich sense of presence. This is the superimposition of one's physical presence on the shared task space. This is what enables one to gesture, and point. It is what lets the remote person anticipate your next action because they see you approach, and maintain a peripheral awareness of what you are doing and to what. In nearly all shared drawing, writing and whiteboard examples, the remote person's reference space is defined by a moving point, such as their screen cursor. This gives them the gestural and referential capability of a fruit fly. I will concentrate on the nature of this third space and how they might be seamlessly integrated to finally support natural and non-intrusive interaction at a distance.

Steve Poltrock

Steve Poltrock is a Technical Fellow in the Mathematics & Computing Technology organization of Boeing Phantom Works where he leads Boeing's research in collaboration technology. He has investigated ways of supporting distributed teamwork with audio, video, and data conferencing and awareness features using many different approaches and technologies.

Elizabeth Churchill

Elizabeth Churchill is a Principal Research Scientist at Yahoo! Research, developing the research area of Internet Experiences. She previously worked at FXPAL, Fuji Xerox's Research laboratory in Silicon Valley, and at PARC, the Palo Alto Research Center. Inspired by virtual environments and media spaces, she has spent the last decade designing online, mobile and place-based 'conversational' applications. In addition to publishing research papers, she writes a column, P's&Q's for the ACM's interactions magazine, exploring emerging internet issues and etiquettes.

Steve Poltrock

Videoconferencing is regularly used in industry and academia to connect conference and class rooms. Expensive videoconferencing technologies have been widely adopted despite behavioral problems that arise from the ways videoconferencing is generally implemented. It has been strikingly unsuccessful, however, as a personal or small group communication technology despite the low cost and ready availability of this technology. Research intended to identify the performance benefits of personal videoconferencing has been largely unsuccessful. Experiments we conducted using video for awareness and for desktop conferencing have uncovered behavioral obstacles. For example, a personal videoconference demands attention from participants, reducing their ability to multitask. The capabilities of desktop conferencing will continue to increase and the costs will decrease, making it available to anyone who wants to use it, but social and behavioral norms will determine when and how it is used.

Elizabeth Churchill

Media spaces have always been about connecting people. Experiments beginning in the 1980's demonstrated how an A/V connection between rooms with large displays and between desktops with video windows could enrich social connection, allow close collaboration, and create a sense of being-in-place-together. Research papers explored aspects of connection, communication and collaboration offering discussions of awareness, access control, and synchronous collaborations over content. In this way, media spaces proved an excellent grounding for exploring the ramifications of different philosophical approaches and methodologies for understanding synchronous social action and interaction. But media spaces also pointed to a couple of other things. What role does the technology play in determining what is and what is not persistently accessible? The original media spaces were essentially about synchronous co-presence between people. However, believing that objects can, in some sense, stand in for people, and can thus mediate relationships, we have explored the way in which people can be present for others through their proxies. To accommodate continuing or persistent co-presence, we have developed a number of installations where we made it possible for people to post things into the physical world, leaving a mark of their presence. This allows cross time zone connections where synchronous encounters are not always practical. While not media spaces in the original sense, these installations embody something media space research pointed: that co-presence is created because of the planned and unplanned encounters between people, but also between people and others' stuff, the traces that are left intentionally and unintentionally for others to see. Future media spaces will be as much about asynchronous as synchronous communication; they will be mixed media, multi-representational and more explicitly mixed temporal frame, as much about presence through proxies as being there (and here) at the same time.

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