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Using Video Connections to Support Distance Collaboration: A Case Study

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ABSTRACT

This paper describes the lessons learned in a study on using a video connection between three geographically distributed groups. The video connection was set up to allow a few people from one site to be included in weekly status meetings held at another site. It was also used to hold informal meetings with a third site. Overall, participants at all sites preferred using video. However, the type of meeting, technical set up costs and lack of access to the video meeting room inhibited more extensive use of the video. Issues that arose in the study include physical set up, usage of the video equipment, data sharing, and participant attitudes towards video meetings. This paper concludes by listing ongoing work to both improve the video meeting experience and encourage spontaneous video meetings.

Keywords
Video, videoconferencing, remote collaboration

INTRODUCTION
To provide support for collaborative work between geographically distributed locations (San Jose, California; Westford, Massachusetts; and Cambridge, Massachusetts), video meeting facilities were set up at each of the three sites. A major goal was to make the video connection as easy to use as possible. Another major goal was to encourage ad hoc, informal meetings. The main use of the video system was to including a few San Jose team members on weekly status meetings held at Westford. Some informal meetings between San Jose and Cambridge also took place. The video connection played a different role depending on the meeting characteristics.

PHYSICAL SETUP
The video hardware at each site consisted of a Polycom Viewstation FX (with a pan/tilt camera and two

microphones), and a 50" plasma display with speakers. The display height and position of the Polycom Viewstation FX camera were fixed so seated participants would be looking straight ahead to view remote participants, and so eye contact between near and far participants would be optimized [1]. The large display was chosen so remote participants' faces could appear life-sized, hopefully making participants feel more a part of the meeting.

The San Jose video room was a converted office, 10' x 11.5', with videoconferencing hardware in one corner, two whiteboards mounted in the opposite corner, and a 40" round table (encouraging the inclusion of both local and remote participants) and four chairs in the middle.   This room was dedicated to the study and so was freely available. The Westford site used an existing conference room (about 16' x 25'). The camera and display were placed at one end of a long rectangular table. Westford's conference room was heavily used by many groups and finding free time on the room schedule was difficult. The Cambridge site used a large conference room with a large rectangular table. The video hardware was placed at the short end of the table. This room was moderately used by only one group. A one-page tutorial was provided to all sites, explaining the basics of how to establish a video connection to another site and offering troubleshooting help.

VIDEO MEETINGS
Most of the video meetings were weekly status meetings held at Westford among 10 to 15 participants, which used video to include two San Jose team members. Video provided the San Jose team with a richer meeting experience than by phone alone, but in order to see the large Westford group, the camera had to be zoomed out, causing them to appear small and farther away. In contrast, Westford had a good zoomed in view of the two San Jose people.   Interviews and e-mail surveys indicated the Westford team felt video helped their awareness and inclusion of the San Jose members. In these meetings, one person would present at a time. Due to time constraints,

group interaction and extensive questions were kept to a minimum.

In contrast to the Westford status meetings, a small number of informal video meetings were held between the San Jose and Cambridge sites. Although most were pre-scheduled they were quite different in character than the Westford status meetings. The number of participants at both ends was small and equally balanced, about two to five people at each end. The purpose of these meetings was to discuss ideas and make decisions, thus they were highly interactive. A smaller number of participants enabled both sites to get life-sized views of the other sites' participants.

LESSONS LEARNED

Most video meetings were observed, notes were taken, meeting participants were interviewed and email surveys taken to understand how video affected the meetings and to gain feedback on participant attitudes. In general participants preferred having video as part of the meeting. They felt more engaged in the meeting and more aware of what was happening with people at the other site. Some lessons leaned:

Availability of the facilities affects system use. The San Jose video room was freely available whereas the Westford video equipment was in a heavily used conference room that required advanced scheduling. The San Jose team felt no pressure to leave the room so they were free to experiment with the video controls and become more familiar with establishing a video connection, which wasn't the case with Westford team members.

Audio considerations. The audio quality of the Polycom Viewstation FX was considerably better than what one would hear over the phone. However, microphone placement played an important role. Voice dropout and annoying amplification of distracting noises (e.g. tapping pencils) were highly dependent on microphone placement.

Environment makes a difference. Overhead lighting cast shadows on faces of people on video. Placing lights so the participants' faces were illuminated would help. People tend to distribute themselves around the available table space. Small round tables are helpful in guiding a small number of participants to an optimal seating configuration for video meetings.

Ability to share data easily is important. The ability to share data had an effect on whether the San Jose team felt included at status meetings. The San Jose team struggled to view the Westford's white board and screen sharing display, both placed far away from the Westford camera. The clearest shared data was through an e-meeting application, where data was preloaded and viewable through a web browser.

Placement of participants enhances interaction. For small interactive groups, better interaction among all participants occurred when people at each site could easily face each other as well as the camera/monitor, such as was found in [2]. This usually takes the form of sitting in a half circle facing the video monitor. This way, no face will be obscured and turning to face other local participants is done naturally.

Use zooming to feel close. Also applying to smaller interactive video meetings, zooming in the camera reduces the perceived distance to remote participants and increases the intimate feel of the meeting.

ENCOURAGING SPONTANEOUS VIDEO MEETINGS

The Westford video meeting room was booked so heavily that potential spontaneous meetings were preempted. Pre/post meeting chats were kept to a minimum to free the room for the next group. Some spontaneous meetings did occur, however, between the San Jose and Cambridge sites. On one occasion, San Jose people experimenting with the video hardware made a connection to Cambridge to find someone sitting in their video meeting room. All parties then continued to chat as if they had bumped into each other in the hallway. To encourage these kinds of meetings we are taking steps in our video system set up:

- Enable easy access to the video room. Dedicated meeting spaces are being sought out for future video meeting rooms.
- Simplify the work needed to make a video connection. Reduce the number of steps required.
- Make data sharing simple and straightforward, either of computer screens or of printed documents. We have acquired hardware that makes high-resolution screen sharing across a video connection straightforward.

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