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Smart rooms

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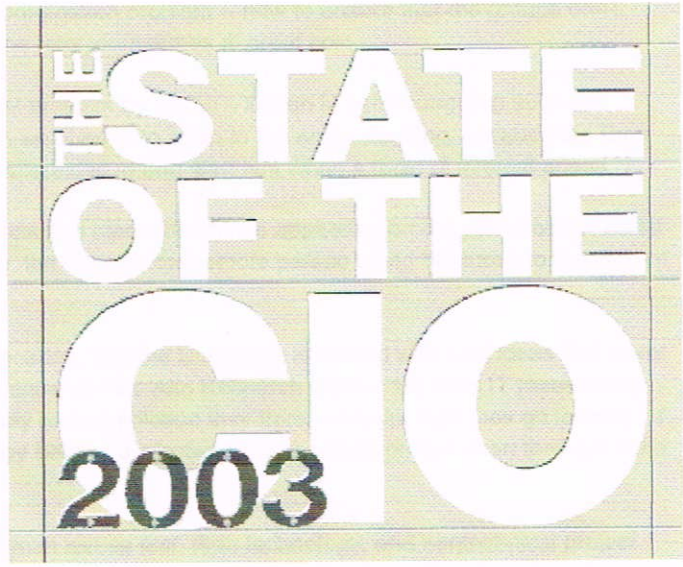

In just four months, students at Carnegie Mellon University (CMU) have built an "interactive physical and digital workspace," a prototype meeting room that could herald the future of interactive collaboration by design teams.

At first glance, the Pittsburgh-based university's "Barn" could be any meeting room, with tables and chairs and a whiteboard. But take a closer look and you'll see cameras, projectors, microphones, speakers and electronic pens mounted on the walls and ceiling.

You'll see project team members log into the Barn by presenting wearable radio-frequency identification tags to an electronic control panel. They wear sensors that identify them and track their locations as meetings unfold. At their first meeting, one of them will enter some group identification data, establishing a persistent virtual workspace for the life of the project. Fed by information from numerous devices, the Barn begins recording the meeting in its audio, video and data logs.

A student approaches the "Thinking Surface" -- an intelligent interactive display built into a digital whiteboard -- and sketches out an idea, which is then recorded in the meeting log along with her comments to the group. In response, someone at a table uses an electronic pen to circle a drawing on his PC, causing it to be projected onto the Thinking Surface, where it's also recorded.

"Social geometry" software knows the locations of attendees and adjusts lights and microphones accordingly.

When a decision is made or an important concept comes up, someone hits the TWI -- "that was important" -- button on his computer, adding a flag at the appropriate place in the meeting logs. A member of the group who was unable to attend can, via the Barn Web portal, later fast-forward through the meeting remotely, pausing at TWI markers. Or he can "attend" the meeting -- or any past meeting -- in its entirety, listening to and reading the meeting logs and studying images saved from the Thinking Surface.

The Barn and its Thinking Surface have been constructed to facilitate meetings whose goal is to produce some kind of design, whether software, hardware or a consumer product, says Asim Smailagic, a faculty adviser for the project. "It's for brainstorming, idea generation, knowledge generation and knowledge transfer," he says.

The Barn is noteworthy for the sheer number of features researchers thought to add to it, says Ted Selker, a professor at the Media Lab at MIT. "It's a typical CMU project. They are wonderful at doing the kitchen sink of x."

Selker praises the Barn's capability to record all aspects of a meeting. "We all feel disturbed about the ephemeralness of conversations. If you have a meeting that you don't talk about again for two weeks, you have basically forgotten it. It didn't exist."

Dan Siewiorek, director of the Human-Computer Interaction Institute at Carnegie Mellon, says large project teams with semi-independent subgroups face a coordination problem -- how to ensure that the groups don't make conflicting decisions that that must be undone later, sometimes at great cost.

Siewiorek says future Barn research will tackle that problem by letting a liaison in each subgroup audit the meetings of other groups from afar. But the liaison won't have to listen to the entire meeting, because the Barn will recognize keywords that the person might be interested in and alert him when a topic of interest arises.

"The Barn software could be checking conversations and ideas and things appearing on the whiteboards, and if something comes up that relates to another group, the focus of the remote person could be drawn to the current conversation," Siewiorek explains.

Work on IT support for collaboration goes back decades, and the landscape is littered with cool ideas that never went anywhere, says Daniel Bobrow, a research fellow at Palo Alto Research Center. He says IT researchers often put technology ahead of human factors. "They have a solution they think will help, then they go looking for a problem," he says. "They put in all the technology bells and whistles they can think of, but when they get done, it doesn't fit the practices of the people."

But Siewiorek says CMU researchers consider human issues first, then technology, and nontechnical project advisers at the school help with this. For example, one of them suggested that Barn meeting attendees be given bar stools to sit on rather than ordinary chairs. "Then they are more likely to get up and walk over to the Thinking Surface and draw, rather than sit and type at their computers," he says.

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