

## THE EBB AND FLOW OF COLLABORATION IN GROUPWARE

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Much of the excitement and early success of groupware for remote collaboration stems from people being able to connect to others in real-time for the purpose of on-line communication and/or information exchange. People with a great need to collaborate could now do so electronically, and those curious about the technology acquired an intriguing set of systems to experiment with. Unfortunately, most groupware systems are awkward to use, for they do not support the graceful and often subtle ebb and flow of interaction that underlies rich collaboration. As the novelty of groupware wears off, people will become increasingly disgruntled by its rough edges.

In this presentation, I will reflect on my group's decade of experience researching the human factors behind collaboration and how they can be applied to groupware design. In particular, I will describe how we can do a better job in three areas critical to how groupware can support the natural ebb and flow of collaboration.

The first problem is that designers of groupware workspaces assumed that collaborations between people over their shared artifacts are tightly focused. Overlooked was that collaborators in prolonged everyday interaction often shift their attention smoothly between their individual and shared activities. We believe collaborators can do this easily in groupware only if it supports *workspace awareness*: the up-to-the-moment understanding of another person's interaction with the shared surface. At a simple level, this means that people need to stay aware of who is present, where others are working, and what others are doing in the workspace. Workspace awareness is critical to effective collaboration, as it helps coordinate activity, simplifies verbal communication, and manages movement between individual and shared work. Within this strange new situation, the groupware designer must try and recreate the conditions and cues that allow people to maintain a sense of workspace awareness. Consequently, we developed and evaluated a wide variety of visualization techniques that supply collaborators with the awareness they require for managing the ebb and flow of moving between individual and shared activities: radar overviews, fisheye views, and transparent layers.

The second problem is that designers of groupware concentrated on how the system would work after people had made contact. Overlooked was how people initiate their groupware encounters: i.e., the ebb and flow of how people naturally move from awareness of others to light-weight communication and work. Other researchers noticed that the backbone of everyday coordination and work between co-located team members is the casual interactions that occur over the course of the day. We believe the glue behind these interactions is *informal awareness*, where people track and maintain a general sense of who is around and what others are up to as they work and mingle in the same physical environment. Consequently, we developed and evaluated a series of systems to provide people with awareness of others. *Iconic presence indicators* display who is around and the likelihood of their availability. *Physical but digital surrogates* are out-of-the-box representations of remote people positioned within an office and under digital control. Surrogates show not only the activity of others, but can also become the media space for communication.

The final problem is that designers often built groupware that supported only particular collaborative acts. Overlooked was that people move themselves and their artifacts continually and effortlessly between different styles of collaboration: across time, across place, between individual and group activity and so on. The fragmented nature of groupware means that people find it awkward to make the transition from one collaboration style to another. Our approach was to consider how existing real world environments naturally provided ways to support different working styles. Consequently, we developed TeamRooms around a rooms metaphor (commercialized as Teamwave Workplace <http://www.teamwave.com>). As with everyday rooms, electronic rooms serve as a place where people can pursue both individual and group work, have formal and informal meetings, leave reminders and other work artifacts for others, and meet one another opportunistically.

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