A Usability Study of Workspace Awareness Widgets

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ABSTRACT

Groupware systems that use large shared workspaces generally provide only limited awareness information about other collaborators in the workspace. We are designing a set of groupware widgets to provide this missing information. This paper describes a usability study of a number of such widgets. The study has both validated our intuitions about the need for workspace awareness information, and revealed the strengths and weaknesses of several current designs.

KEYWORDS: Groupware, CSCW, awareness, usability

INTRODUCTION

Compared with physical shared workspaces such as table tops and whiteboards, shared workspaces in groupware are greatly impoverished. In particular, systems supporting a relaxed-WYSIWIS (What You See Is What I See) view of large workspaces often fail to convey information about *workspace awareness*, the up-to-the minute knowledge about the location and actions of other collaborators.

We have designed a suite of *groupware awareness widgets* to address this deficiency [2]. These widgets augment a user's view of the workspace with information about the workspace, the location of other collaborators, and their actions within the workspace.

This paper describes initial observations from a study carried out to evaluate a shared workspace system that incorporated several different awareness widgets. We had two goals in this study. First, we wanted to confirm our intuitions that workspace awareness is used in shared workspaces. Second, we wanted to evaluate how well our current widget designs support the maintenance of workspace awareness. We were particularly interested in knowing if the information in the widgets was easy to interpret, if they distracted users from their tasks, and if users thought they were worth the extra screen space.

METHODOLOGY

We constructed a groupware editor for manipulating the layout of a two page newspaper spread, allowing users to move pictures, headings, and columns of text. Eight pairs of subjects, primarily senior undergraduate computer science students, worked on separate workstations. Subjects were within speaking distance but unable to see each other. Each user could scroll independently within the layout, and their window was large enough to view about one third of the workspace at a time.

Pairs completed two layout tasks, each limited to fifteen minutes. One task was performed with limited awareness information about the other person. Subjects used either the shared workspace by itself, or combined with a *miniature view* showing only the locations of objects within the workspace. Half the pairs completed this condition first.

In the other condition, subjects used the shared workspace along with one of three awareness widgets we had built. The first was a *multi-user scrollbar*, which shows the location of each user with a colored bar beside the "thumb" of the conventional scrollbar. The second was a *radar view*, which shows a miniature of the entire document, a rectangle for the extent of each user's view, and a telepointer showing their mouse location. In both of these widgets, participants are differentiated by color. The third was a *local view* widget, which shows the full scale but limited region immediately around the other user's mouse cursor.

To collect data, we videotaped the tasks, asked subjects to fill out questionnaires, and conducted interviews to follow up particular aspects of the session.

RESULTS

All pairs completed their tasks and produced reasonable layouts, and made use of workspace awareness in doing so. Several of the widgets that we tested provided useful awareness information, and most subjects greatly favoured the conditions that included these widgets.

Use of Workspace Awareness

We observed a variety of working styles, ranging from "divide and conquer" to tightly coupled collaboration. Regardless of the style, there was evidence that the pairs

maintained an awareness of each other's use of the workspace, and acted on that information to collaborate with their partner and complete their task.

Many of our observations of the use of awareness echo previous observational studies. For example, we noticed the frequent use of gestures [3]. For gestures to be interpreted, the receiver must see them, and therefore the sender must be aware of the receiver's view. Gestures were most often communicated through the main telepointers, but people sometimes gestured by moving objects in the workspace or by using the telepointer in the radar widget. In addition to gestures, we also noticed the regular use of deictic references (e.g. "move *this* object"). As with gestures, deixis depends on the hearer being able to see what the speaker is pointing at, or the hearer having a mental picture of their work area.

Use of Awareness Widgets
The widgets were well received by subjects, who used them, liked them, and often requested even more awareness information than what was available. Widgets were used in two ways. First, subjects used the widgets to keep track of the locations of objects, and as a high level overview of the entire layout. For example, many subjects used the radar to check if text columns fit on the page. Second, subjects used the widgets to keep track of their partner's location, activities, and progress on the task. For example, widgets assisted subjects in discussing placement of articles with their partner, who was working on the other page.

Feedback from subjects showed that the radar and miniature view widgets were most useful in their task. Although subjects could see some use for the local view and multi-user scrollbar widgets, these did not seem to support the task better than the plain workspace. Below, we consider these results in terms of ease of interpretation, distraction and perceived value of the widgets.

To explore how easily the information in the widgets was interpreted, we considered the difficulty of shifting contexts between the main view and the widgets, and the problem of mapping colors to users. The context shift to the radar view proved not to be a problem—subjects reported that it was easy to identify workspace objects in the radar view. Users found it more difficult to integrate the two different dimensions of the scrollbar than to interpret the view rectangles in the radar. Interpreting the local view was extremely problematic for all subjects who used it. Several remarked on its small size and erratic motion. The mapping between colors and people in the radar and the multi-user scrollbar proved difficult for some subjects. One subject said "I couldn't figure it out; I just watched for motion."

Distraction was an issue in some widgets but not in others. None of the subjects found that the radar view or miniature

stole their attention. Only one of four subjects found the scrollbars distracting. However, all users of the local view found it very disruptive, due to its erratic motion.

Finally, we asked subjects about the value of the widgets in completing their task, and whether they were worth their screen space. All subjects using the radar and miniature said that they found them valuable and worth the screen space — and even complained when we took them away. Their assessment of the scrollbars and local view was less positive; only two scrollbar users found them valuable, while none of the local view users found it valuable.

DISCUSSION
There are a number of lessons that can be drawn from these results. First, overviews are useful both for managing one's own interaction with a large workspace, and for maintaining awareness of other's locations and activities. The overview frees the user from having to maintain a mental model of the ever-changing workspace found in relaxed-WYSIWIS groupware. Second, if awareness information is to be easily interpreted, it must be presented in a familiar context, ideally that of the workspace itself [1]. Though the radar was physically separate, it closely paralleled the workspace, providing an easy transition between the two. Third, awareness widgets must try to be as lightweight as the mechanisms of face-to-face interaction, or they will not be used. For example, integrating the two separate dimensions of the scrollbar required more effort than finding view outlines in the radar.

CONCLUSIONS
Overall, this study has confirmed our belief that workspace awareness is an important part of collaborating in large workspaces. Though all of our pairs completed the task, we found that some of our widget designs provided useful awareness information that would otherwise be missing from a groupware system. This information allowed for more natural interaction over the workspace. In some cases, our widgets were remarkably effective, leading one subject to remark "it really felt like you were working on the same big table." We expect the issues raised here will motivate groupware designers to continue exploring awareness with the goal of building more natural shared workspaces.

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