

Project View IM: A Tool for Juggling Multiple Projects and Teams.

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ABSTRACT

Previous research suggests working on multiple projects may lead to stress and misallocation of attention. A modest redesign of Instant Messenger (IM) could help team members juggle multiple projects and teams. This paper describes the implementation of this redesign—an IM plug-in called Project View IM (PVIM). PVIM uses automatic project status logging to show active project-related files and team members. In a preliminary evaluation experiment, participants working collaboratively with different partners on two projects found PVIM and IM to be equally usable and informative but PVIM participants reported less workload stress. We discuss future work to iterate the design and measure allocation of attention and task performance.

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INTRODUCTION

Corporations and research organizations increasingly use project teams as a way to organize work. People often work on multiple projects and teams simultaneously [15] [12]. For example, consultants work on multiple accounts; university professors teach classes and work on different research projects, and engineers, designers and marketers work on multiple product development teams. We describe the implementation of a new instant messaging (IM) system called Project View IM (PVIM) that augments people's ability to coordinate their work trajectories across multiple projects and teams.

The term "trajectory" refers to the sequence of activities through which a person, resource, or task moves [18]. For

information workers, work trajectories often involve a variety of individual tasks embedded in larger team projects [7]. Trajectory management is a particularly difficult coordination problem. Often, people can concentrate on only one complex task at a time. Working on that task, however, means not working on other tasks and projects. Working on that task thus influences the outcomes of the projects that they are not working on. When working on multiple projects of equal importance, people tend to allocate attention and effort unevenly [7]. Doing so also leads to individual stress [15].

When collaborators are collocated, they can coordinate work trajectories through passive awareness of workplace activities and informal face-to-face communication [5]. For example, a worker who is currently focused on one of his or her many tasks may be reminded of other, equally important, tasks by seeing colleagues in the hallway. When collaborators are remotely located, however, there are fewer opportunities to see them, and less awareness, making trajectory management more difficult.

Recent work suggests that IM can facilitate distributed work by supporting informal communication, (e.g., [9], [14], [17]). Some workers prefer IM to informal in-person conversation because they perceive it to be less intrusive and to allow multitasking [17]. On the other hand, IM exchanges can be disruptive [3][16] and may not help people juggle multiple projects and teams effectively [7]. Current IM notifications such as "online" provide social awareness [14][17] but little information about what colleagues are doing. Reminding people of others without providing any work-related information may lead collaborators to poorly time their interruptions.

PROJECT VIEW IM

We developed PVIM to help team members better manage their attention across multiple projects and teams. From previous work on the use of IM to manage multiple projects [7], we postulated:

- People tend to forget about other projects and team members when immersed in one project. They would benefit from a *reminding function* in IM, similar to that in their to-do lists.

- Although IM notifies users about the availability of others, it leaves them uncertain about what others are working on. People would benefit from *awareness of others' activities* via IM. This awareness would both help people distribute their effort more appropriately across their multiple projects and help them time their interruptions better.

PVIM addresses these two goals by providing people with a list of their projects and by providing information about what partners on these projects are doing. Figure 1 shows a version of PVIM, used in our evaluation experiment, customized for a detective (Detective Lee) working on multiple cases (Alspach Homicide, Middlebrook Homicide) with multiple partners (Detective Chris, Detective Jamie, etc.). The top part of the screen contains a list of the projects. Under each project is a list of collaborators on that project. To the left of each member's name is one of three status icons: green for online and working on that project, yellow for online and not working on the project, and red for offline. If a partner is online and working on a joint project, the name of the document they are working on (e.g., PoliceReport.doc) is shown to the right in parentheses. In the next section, we describe the design choices behind PVIM in further detail.

DESIGN OF PVIM

We reviewed the literature to iterate design ideas to develop PVIM. Below, we briefly describe each of our design goals.

Provide integration with existing IM clients. PVIM is designed as a plug-in that works with existing IM clients because users of existing tools are reluctant to switch to a new one unless it supports the same functionality [1]. As shown in Figure 1, underneath the PVIM plug-in we provide the same contact list used in standard IM clients.

Make projects and teams visible. The projects and teams members in the interface help people remember their total workload. We provide constantly updated awareness information of team members and organize the information by project.

Provide levels of awareness. Providing too much awareness of others can decrease one's own work performance [4]. Furthermore, different levels of detail may be necessary for different purposes. To address both issues, we use a two-level strategy for awareness information. At the most generic level, colored circles indicate whether someone is online and working on a project, online and not working on that project, or offline. When more specific information is necessary, users can examine the right-hand side of the interface to identify which document or program is being used.

Provide information redundancy, (e.g., [20]). Pretesting of our initial PVIM prototype suggested that some users

had difficulty interpreting color-coded icons. Therefore, we redundantly combine color-coded icons and text to represent project awareness information. For example, as shown in Figure 1, names with an outlined red circle on the left are also grayed out and marked as "offline".

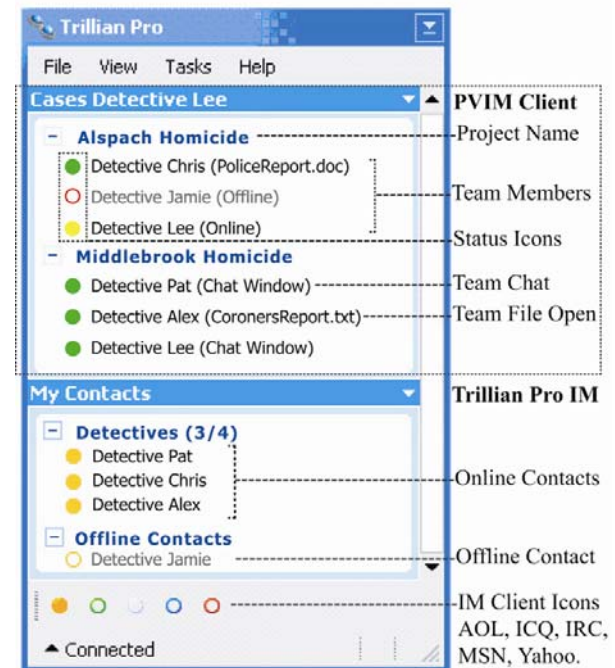


Figure 1. PVIM module in the Trillian Pro interface.

Minimize the effort necessary to create awareness information. People are unlikely to take the time to update their work activities by hand, (e.g., [11]). PVIM thus automatically detects which projects and documents team members are working on.

Allow users to control privacy, (e.g., [9]). PVIM respects privacy by providing information only to people on a shared project. In addition, individual users can turn PVIM on or off manually and control when the detailed awareness modality is on or off.

SYSTEM IMPLEMENTATION

We implemented PVIM as a plug-in for Trillian Pro 2.0, a commercial Windows IM client developed by Cerulean Studios. Trillian Pro allows people to use any of the major instant messaging services (AIM, ICQ, MSN, Yahoo, and IRC) in one application simultaneously. We chose to use Trillian Pro because of its popularity and the availability of a free Software Development Kit (SDK) giving access to most of the client's functionality.

PVIM consists of two parts, PVIM clients and a PVIM server. The PVIM client is written in C. It plugs into Trillian Pro. The client monitors what project and document a user is working on and the user's activity status (idle, away, etc.). It also updates status changes

from other clients, and sends its own status changes to the PVIM server. Each PVIM client has a customizable configuration file that lists projects and team members. To allow the PVIM client to identify an active project from a file in use, for each project a string of characters to match in active filenames is associated with each project. The PVIM client uses the Windows API to retrieve the active window and make an informed decision on what project the user is currently working on. The configuration file also allows each user to specify project groups and turn on or off special options like status icons, detailed awareness information and status messages.

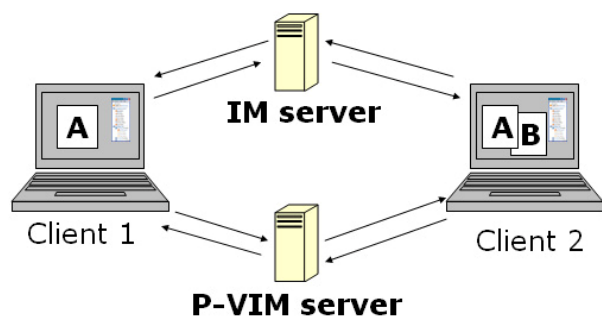


Figure 2. PVIM Set up. PVIM plugs into the client's Trillian Pro application. Awareness information is sent via the PVIM server; text messages go through the regular IM server.

The java-based centralized PVIM server handles multiple simultaneous requests and sends real-time updates to all online PVIM clients. The server also maintains project lists, tracks which PVIM clients belong to each project group and sends messages accordingly to clients.

RELATED WORK

Commercial IM clients support both dyadic text-based conversation and group chat in a semi-synchronous way. They also provide awareness of who is logged on and their status, (e.g., idle, away). Research prototypes have explored other forms of awareness information. For example, Piazza [13] allows people to be aware of others who are doing similar tasks. Babble [6] supports opportunistic interaction among members of a workgroup and provides a lightweight graphical representation of online social activity. Rear View Mirror [9] provides presence awareness, instant messaging, and group chat. Other research prototypes provide awareness information from multiple sources or devices, (e.g., [2], [19]). Live Contacts [10] further augments IM functionality by updating scheduled appointments for each contact real-time from private calendars.

Our approach differs because we not only support individual and single group awareness but also support managing attention across multiple projects and teams. Our prototype explores a new way of making teams and projects visible within an existing communication tool to better support divided attention across multiple projects

and teams. The design is meant to help users remember their total workload and collaborators on each project. It also provides information about times when it may be less disruptive to coordinate with a team member about a shared project. We developed a plug-in within a commercially available IM application, a strategy that allows our system to extend to other existing IM clients.

EVALUATION

We developed a paper version and then a working prototype of PVIM. We evaluated the PVIM paper prototype by interviewing ten people about the prototype. We asked structured questions regarding four scenarios of use. In a scenario with an upcoming deadline, eight out of ten participants said they would send an IM message to a partner if their partner was not working on the shared project. We also interviewed two heavy IM users in depth to focus on privacy and awareness concerns. We used their suggestions in the second PVIM prototype.

To evaluate the second prototype we conducted a preliminary experiment comparing subjective reports of usability and workload using regular IM and a working version of PVIM. The experiment modeled the distributed work of police detectives who have different cases with different partners. Twenty groups of four participants worked via IM or PVIM on four different cases. Each participant worked with a different remote partner on two different cases. At the end of the session, participants completed a survey.

Participants evaluated the usability of the IM or PVIM interface by answering three 7-point scale items: the IM status messages were distracting me from my task at hand (reversed); using IM was easy; and using IM to communicate with two partners was confusing. We found no significant difference in ratings of usability between PVIM and IM. Thus, PVIM provided awareness information without distracting or confusing users.

Participants also rated their total workload on a 7-point scale (1= low, 7 = high) with five questions adapted from the NASA TLX scale [8]: mental demand, temporal demand, effort, performance (reversed), and frustration. The mean workload in IM sessions was 3.7 (sd = .16) versus 3.3 (sd = .14) in PVIM sessions, ($t[18] = 2.2$, $p = .05$). These results suggest PVIM reduces users' perceived workload.

LIMITATIONS & FUTURE WORK

Although our preliminary analysis of the effects of PVIM on workload are promising, further user testing is needed to determine how well the interface helps people to divide their time effectively across multiple projects with multiple partners. We first plan to analyze people's actual work activities in our laboratory experiment, to determine if PVIM improved collaboration. We then plan to further enhance our tool and evaluate it in a field setting.

CONCLUSION

Information workers often work on multiple projects with multiple partners. Coordinating work trajectories across these activities can be quite challenging, particularly when partners are remotely distributed. We developed PVIM as a plug in to standard IM that provides both a *reminding function* that allows users to keep track of their many different projects and team members and an *awareness function* that allows users to know which of their collaborators are working on a joint project and what they are doing. Preliminary user evaluation suggests that people find PVIM no more difficult to use than standard IM and that PVIM can reduce their subjective feelings of workload.

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