Estimating Communication Context through Location Information and Schedule Information – A Study with Home Office Workers

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ABSTRACT
We have developed a communication support system that estimates the situation of a person by using the location information of a PHS (Personal Handy phone System) and the schedule information. The system supports communication among dispersed and mobile individuals by using this estimated situation. In this paper, we describe it and a study with a small group of home office workers.

Keywords
Location information, message delivery, context-awareness

INTRODUCTION
With the popularization of mobile communication and Internet communication, new styles of working, such as "Tele-Work", "SOHO (Small Office/Home Office)", and so on, are increasing. New communication systems offer advantages, but they are also problematic. Given the widening variety of communication and work styles, it is difficult to make appropriate use of media and addresses in sending a message to such people. Even if a message is delivered, the addressee might not read or respond to it. In light of the increasing and widespread use of mobile phones, researchers have also been investigating ways to provide meaningful awareness information to anyone, anywhere, in order to facilitate making contact among users in the mobile environment [1-4]. We had developed such a messaging service using location information and schedule information [5] and we redesigned our system for home office workers. This paper describes the system and user impressions.

SYSTEM
Our system selects the most suitable telephone number or email address, and redirects each incoming message dynamically, according to the callee's communication context (schedule, location, and available media). It also documents the schedule and the location information of the users in an HTML file, which is a shared file on the World Wide Web (WWW). By knowing the callee's communication context, a caller would be able to decide the timing of the call and/or select the media to use.

Each user of carries a PHS, which is a kind of a cellular phone with which users can read or write an email and can use WWW browser, which also works as a location sensor. To obtain location information about each user, our system posts a cgi message with the telephone number of the PHS and the password every ten minutes to a map database service on the WWW [5]. Using that service, we can utilize the location detection service of PHS that NTT DoCoMo offers through the WWW. The service performs localization through the cell phone network. The detected location information for each user is stored to the database in our system.

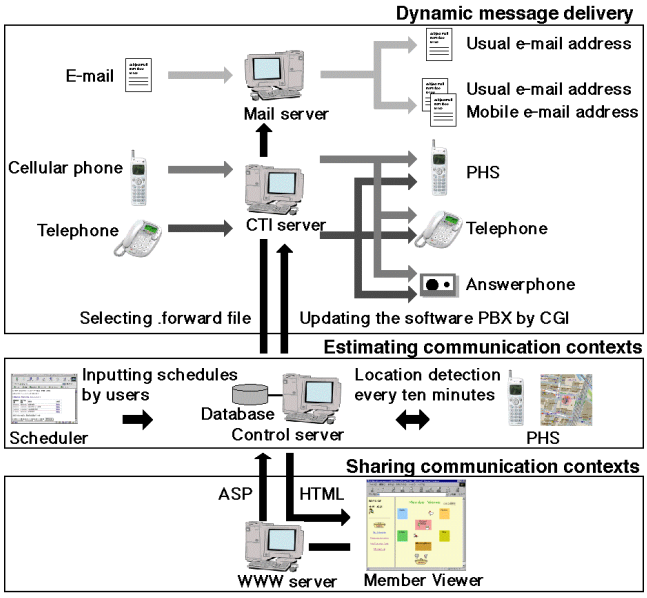

Figure 1 System configuration.

Each user chooses and registers rules about which means of communication are appropriate under what conditions beforehand. The system uses two kinds of rules: those

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regarding locations and those regarding types of work performed at those locations. We prepared a schedule-input form for each user according to the rules he or she selects. The control server checks each user's location and schedule information every ten minutes, and updates the settings for redirecting a call in the CTI server and ones in the mail server if necessary. With our system, messages to each user's assigned telephone number or to his or her assigned email address are redirected according to the callee's rules, location and schedule.

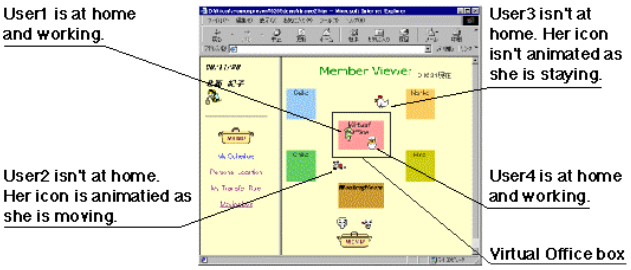

Figure 2 Sharing communication contexts.

Our system also documents the schedule and the location information in a HTML file. Whenever a user accesses the URL, the WWW server writes out the latest information in the database. The users in the previous study, which were small office workers, shared location names, schedules and available communication devices on the WWW. They requested a feature that would map their locations and we added a mapping Java applet. However, the users in this study, which were home office workers, did not wish to share location names or use the mapping Java applet. Privacy is clearly an issue of concern when working within the confines of a private home. They wished to share only the information of whether they were home and whether they were working if they were at home.

To support social awareness of the users, a HTML file called "Member Viewer" shows the respective user situations and schedules to other users (Figure 2). It contains a box representing each user's home. In the example shown in Figure 2, there are four users. If a user is at home, her icon is in the box; otherwise, it is out of the box. It doesn't show the location names or the map. If a user is not at home and she is moving, her icon is animated. If she is not at home and she is staying at a remote location, her icon is not animated. When a user is going out and she has entered a schedule, the schedule is shown when the mouse is put on her icon. When a user is at home and is working, the user's icon is in the Virtual Office box. In this case, communication accessibility would also be clearly signaled. Other users could make a telephone call without being concerned that they might disturb her. The Member Viewer is useful to informally determine conversation accessibilities of other users.

USER IMPRESSION AND DISCUSSION

We conducted a study with the small group of home office workers (4 users) in Tokyo over a period of four weeks (September 2000). The group was comprised of women aged 33 to 36 who have children and are working at home.

The users pointed out that the dynamic message delivery was convenient for the callee, although it made the caller uneasy not to know where the message would be redirected. They pointed out that the dynamic message delivery was adaptable for the callees but was not so adaptable for callers. They preferred the shared communication contexts to the dynamic message delivery. They told us that sharing communication contexts led to changes in the timing of calls, and in the length and content of telephone conversations. The Member Viewer might help callers and callees find a point of mutual agreement between the caller's demands and the callee's wishes.

They pointed out that it would be difficult to share communication contexts with strangers; use of this feature required mutual trust. These opinions are similar to those from users in our previous study. After participating in our experiment, the users began to exchange information not only about work but also about various things such as childcare. Our system might have improved the social interaction between users. On the other hand, they pointed out some demerits of sharing communication contexts as follows. When others members of the group know that a user is at home and send an email, the user is compelled and expected to send an email reply as soon as possible. In some cases, users might not wish to share their location and be available for interruption, even though they are aware of the merit of sharing location information.

Location and schedule might not be sufficient for determining user context; determination may need to include details such as immediate task or background information such as family or office situation. Our system is in the early stages of inception, and handled only the parameters location and schedule information.

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