PRAVTA—A Light-Weight WAP Awareness Client

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Abstract. Despite huge progress in information and communication technology it is often difficult to spontaneously contact persons who are at other locations. This is often due to the fact that important information about the persons at the other sites is missing. Users need to know if the potential communication or cooperation partners are present in the system, if they are available, how busy they are, and so forth. Furthermore, users need this information independently of their current location and adapted to their current context. In this paper we introduce the PRAVTA prototype that provides users with awareness about presence, availability, and tasks of other users anytime and anyplace.

1 Introduction

Huge progress in information and communication technology makes it increasingly easy to communicate and cooperate with other persons over distance. Nevertheless, it is sometimes still difficult to spontaneously reach the persons that are needed. This is often due to the fact that important information about persons at other sites is missing. Users need information whether the person to be contacted is present in the system (e.g., does the person have a mobile phone and is it on; or is the person currently working on the PC and equipped for video conferencing), whether the person is available for communication (e.g., does the person want to have a conversation), and whether the topic of the intended conversation does fit the current task context of the person. We, therefore, argue that users need information about the presence, availability, and tasks of their colleagues.

In this paper we present a WAP prototype that allows users to query for these types of information and to enter it about themselves. We will briefly introduce awareness. Then we will present the implementation and functionality of the PRAVTA Prototype.

2 Awareness

In the computer-supported cooperative work (CSCW) community it has been emphasised for years that efficient and effective cooperation requires that the cooperating individuals are well informed [3]. They require awareness—information about the other persons they are cooperating with, about their actions, about shared artefacts, and so forth. If the cooperating individuals are at the same place this information is obvious and can be gathered easily. If the individuals who are at different places have to cooperate technological support is essential. In order to develop technological support we first have to analyse what we exactly mean with awareness, what types of awareness are relevant, and how they can be supported technologically.

Awareness is the up-to-the-minute knowledge of a user about other users and shared artefacts and includes information about the other participants' locations in the shared space, their present and past actions, and their intentions and possible future actions [5]. *Presence awareness* is the most basic information and refers to the pervasive experience of who is around. In the literature it is sometimes called informal awareness or general awareness [1]. It is a prerequisite for spontaneous interaction. *Availability awareness* is more specific information about the current disposition of other users—that is, it informs about the current occupation of the user, the mood, the attention, and emotions of the user. Some authors [e.g., 6] call it social awareness. *Task awareness* refers to knowledge about other users' work contexts. In collaborative settings it is often useful to know if somebody else is working in the same work context at the same time. For instance, if I know that

one or more of the co-authors for a paper are currently also working on the paper, I can easily coordinate with them about our changes to the shared document.

3 The PRAVTA Prototype

The PRAVTA prototype is an example implementation of a more general concept of ubiquitous and context-specific support for presence, availability, and task awareness.

3.1 Concept

The PRAVTA prototype constitutes an elaborated client for an awareness information environment called NESSIE [9]. The concept of NESSIE is based on sensors, events, and indicators. Sensors are associated with actors, shared artefacts, or any other object and capture events related to them. The generated events are sent to the NESSIE server, which stores the events in an event database. Indicators are used to present the events to interested users with adequate access rights. A range of stationary indicators is available for NESSIE ranging from presentations on a computer monitor like pop-up windows, ticker tapes, and 3D graphical presentations in a multi-user environment to presentations in some ambient displays like balloons and a magic bowl. These indicators are very powerful and allow the users to capture the information in the foreground, but also in the background of their attention. However, they are all stationary and have so far only been installed in office environments.

The aim of the PRAVTA prototype was to develop a system that provides users with adequate awareness information anytime and anyplace. The PRAVTA prototype covers the full range of potentially relevant awareness information as discussed above—it can provide users with presence awareness, availability awareness, and task awareness about potential communication and cooperation partners. Users can customise the system in various ways. In particular, they can specify the type of information they want to receive (e.g., logins or full user names) and the type of presentation (e.g., lists, tables, icons). The PRAVTA prototype was implemented for WAP. It runs on small, mobile devices and offers an easy to use interface, where users can receive awareness information and enter information about their current status with only a few clicks.

3.2 Implementation

The PRAVTA prototype is implemented on two layers: the PRAVTA Client that realises the user interface by means of the wireless application protocol (WAP) technology and the PRAVTA Communication Layer. Being based on WAP, the PRAVTA prototype can be accessed from any mobile device that supports WAP such as mobile phones, palmtops, or smart phones. Figure 1 shows the software architecture of the whole system consisting of the PRAVTA Client, the remaining NESSIE components, and the PRAVTA Communication Layer that connects the two.

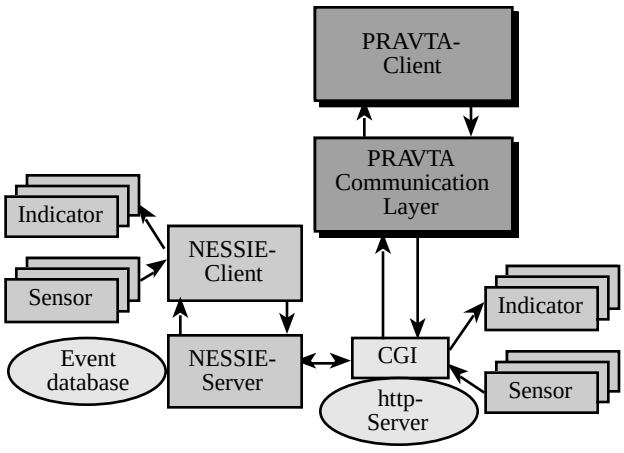

Figure 1. The PRAVTA software architecture.

The user interface at the *PRAVTA Client* is implemented in the wireless markup language (WML) and in the wireless markup script language (WMLScript). The wireless application protocol connects the user interface to the PRAVTA communication layer. The *PRAVTA Communication Layer* translates the data from the NESSIE server into PRAVTA format (i.e., WML and WMLScript) and translates the data from the PRAVTA client into NESSIE format. It provides mechanisms for login and access control, and so forth. It is implemented in Tcl/Tk. The PRAVTA Communication Layer uses of the common gateway interface provided by NESSIE in order to communicate with the remaining parts of NESSIE.

3.3 Functionality

The first page of the PRAVTA prototype shows the front page and a menu from which users can choose various actions. Figure 2 shows screenshots of the front page, the action menu list, and the login dialogue.

Figure 2. The PRAVTA prototype user interface: (a) front page; (b) action menu list; (c) login dialogue.

The user needs to be logged in before she can query for information about other users. This is important to maintain privacy of users. We will discuss the issue of privacy and related issues later on. The user then can check who is online. Figure 3 shows screenshots of the result of the action menu items 'Who is online?', 'Check availability', and 'Checktasks', as well as the actual state in the 3D multi-user environment.

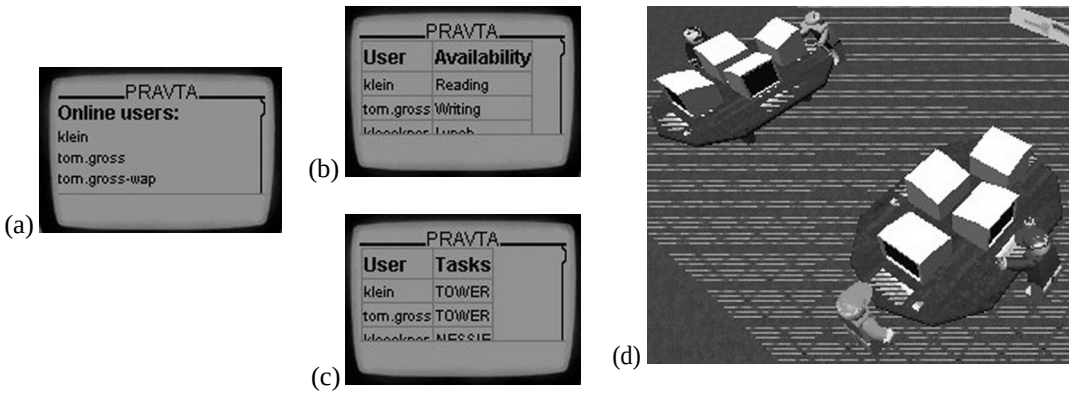

Figure 3. The PRAVTA prototype user interface: (a) result of 'Who is online?'; (b) result of 'Check availability'; (c) result of 'Check tasks'; (d) corresponding 3D multi-user environment.

A simple list resulting from the query *Who is online* shows that currently the users 'klein', 'tom.gross', and 'tom.gross-wap', and so forth are logged in. In fact, 'tom.gross-wap' is the user who in our example performed the query using a mobile phone. That is, the user can see herself in the list of online users. The fact that anybody can be seen by anybody else is called reciprocity of awareness. The list shows all users who are logged in on the NESSIE Server no matter what system they are using. Currently, mobile users can log in from the PRAVTA prototype, and stationary users can log in from a Java-based NESSIE Client, and from a 3D multi-user environment [2]. The result of *Check availability* shows a table with the current availability of the users. Currently the PRAVTA prototype offers availability states such as Reading, Writing, Meeting, and so forth. The result of *Check tasks* shows a table with the current tasks (i.e., task

contexts) of the users. The table shows that when the screenshot was made user ‘klein’ and user ‘tom.gross-wap’ were working in the context of the TOWER project, and so forth.

In the 3D multi-user environment presence awareness is provided by the presence of user avatars; availability awareness is provided by a visualisation of the current activity of the respective user; and task awareness is symbolised by the room the avatar is in and the table the avatar is using.

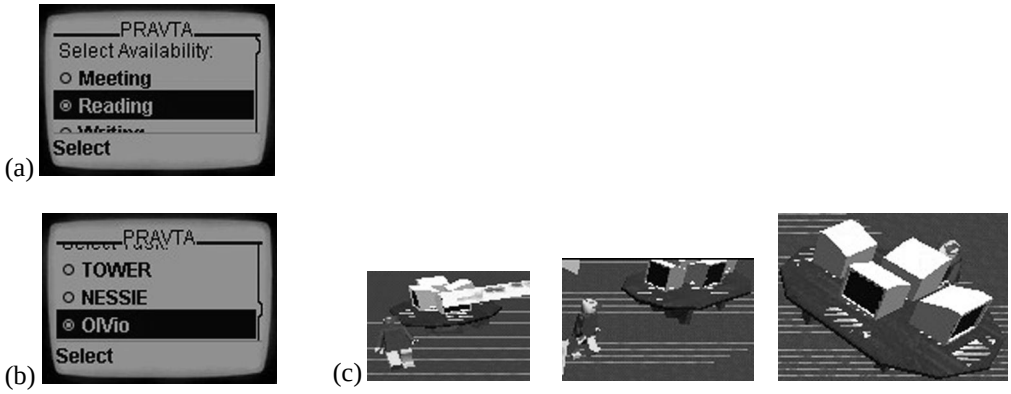

Figure 4. The PRAVTA prototype user interface: (a) update of availability; (b) update of task; (c) corresponding update of the user task (i.e., location) in the 3D multi-user environment (showing the user tom.gross-wap: leaving the TOWER task context, walking, working in the new OlVio task context).

Users can not only query information, but also change their own status. Figure 4 shows screenshots of the dialogue for changing the availability information and the task information as well as the corresponding update in the 3D multi-user environment. On the top of the dialogue the user can choose if she is currently in a Meeting, Reading, Writing, having Lunch, and so forth (cf. Figure 4a). On the bottom of the dialogue the user can enter information about her current task context (cf. Figure 4b). The status of the user is then immediately updated in the NESSIE server and the various clients also receive the updated information. Figure 4c shows the update in the 3D world as an example—the avatar representing user ‘tom.gross-wap’ leaves the TOWER project space and moves towards the OlVio project space, where it starts reading. It can also be seen that this user is currently the only person working in the context of the OlVio project.

Finally, Figure 5 shows screenshots of the broadcasting functionality of the PRAVTA prototype: a screenshot with a dialogue for entering a broadcast message, the feedback of the executed command, and the resulting tickertape on the PCs of the colleagues in the offices.

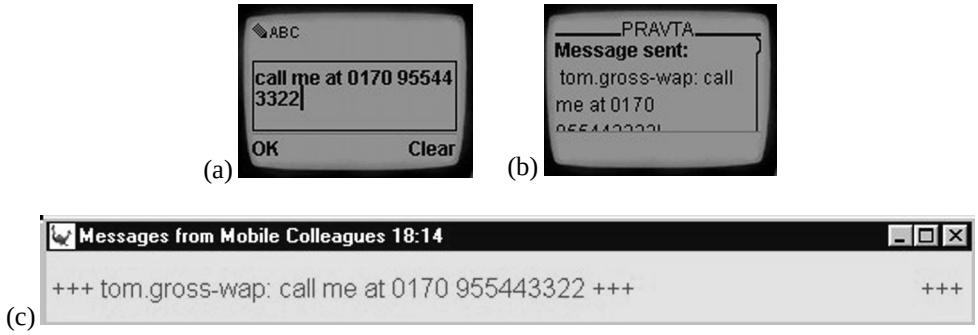

Figure 5. The PRAVTA prototype user interface: (a) send message dialogue; (b) feedback; (c) resulting tickertape on the PCs of the colleagues in the offices.

The tickertape runs on the monitors of the PCs of all users who currently run any kind of NESSIE client. So far, the tickertape is only used to show the concept of broadcasting in PRAVTA. Of course, the broadcasting functionality could be extended. For instance, in the 3D world the broadcast message could be visualised as a bubble attached to the sender like in cartoons. For other mobile users who use PRAVTA on a mobile phone it could be translated into a short

message (SMS). For users who should be reached, but who are currently not logged into the system at all, the broadcast message could be translated into an email message.

4 Related Work

Only few systems and prototypes provide awareness for mobile and nomadic users. Examples are the Audio Aura and Nomadic Radio. The Audio Aura [8] provides mobile digital audio via portable, wireless headphones. The audio information that is provided depends on the physical actions and position of the user, which are traced by active badges. Users can choose sound designs like voice only, music only, sound effects only, or a mixture. The overall goal of Audio Aura is to provide serendipitous information (i.e., information that is relevant, but not essential) by use of background auditory cues.

The Nomadic Radio [10] provides mobile digital audio via the SoundBeam Neckset. The particular strengths of the system are a contextual notification model and scalable auditory techniques for providing timely information and minimising interruptions. Whereas in Audio Aura only the position of the user in the physical environment is taken into account, in Nomadic Radio several sensors measure the environment of the user and try to infer her current context. For instance, an audio sensor captures whether the user is currently in a conversation. The auditory techniques can be scaled from silence for least interruption and conversation, to ambient cues for peripheral awareness, to auditory cues for notification about task completion, and so forth. On a whole the system offers sophisticated mechanisms for the subtle presentation of information. However, it primarily provides an interface for communication systems such as email and voice mail. It does not provide users with information about other users and it does not allow users to enter information about themselves.

Event notification services provide similar information as the PRAVTA prototype. For instance, Elvin [4] and Khronika [7] are systems that use sensors and daemons to capture information from various sources in the form of events and that allow users subscribe to events or to browse events. Once, the user has subscribed she is provided with related information automatically. These systems are similar to the core NESSIE system, but they do not offer the advantages of PRAVTA.

6 Conclusions

The PRAVTA prototype provides ubiquitous awareness about presence, availability, and tasks of other users. It allows users to query various types of information anytime and anywhere. Furthermore, users can flexibly update information about their presence, availability, and tasks.

Some features that have not yet been implemented for the PRAVTA prototype are a push-principle and the automatic capturing of data about the mobile users (especially their current location). So far, the WAP technology only supports queries by users. Currently, there are many discussions about the advantages of support for push services with WAP. With push services the user would not actively have to query the awareness information needed, but rather the system could send the information to the user immediately after it receives it. Automatic capturing of information about mobile users is also being discussed currently. For instance, the application of GPS systems in combination with WAP devices would allow to capture the current position of the users. This information could then be used for inferring information about the user's presence, availability, and task context, and for adapting the contents of the awareness information and its presentation to the current context of the user.

Acknowledgements

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