Computer Support of Team Work on Mobile Devices

Hilko Donker\textsuperscript{1} and Malte Blumberg\textsuperscript{2}

\textsuperscript{1}Dresden University of Technology, Faculty of Computer Science, Noethnitzer Str. 46, 01187 Dresden
\textsuperscript{2}CoreMedia, Ludwig-Erhard-Str. 18, 20459 Hamburg
hilko.donker@acm.org, papers@maltebb.de

Abstract. In this paper we present a general concept of a mobile access to a groupware. The central aspect is how to bridge the gap between Mobile Computing and Collaborative Software. Mobile devices have limited capabilities, and therefore only few user interactions are desired. Conversely, groupware requires numerous interactions in order to make virtual collaborative work effective. First, we examine existing approaches and define our specific goal. Then, we present background on our research on user requirements. Afterwards, the general aspects of a prototype we developed are shown, including exemplary examples. After having given information about the first evaluation results, we end with a short conclusion stating our future work.

Keywords: Mobile Groupware, UI Design for mobile devices.

1 Introduction

Groupware systems are usually conceptualized as applications that enable computer supported cooperative work [4]. These systems support (small) groups of people who are involved in a common task and who work on common goals. Small group collaboration requires members coordinating their activities, recognizing the activities of other group members, and who are able to communicate with each other. Groupware systems have to provide a kind of “group feeling”, called collaboration awareness [1] [3]. The participants have to be aware of other users involved in the collaborative task.

Today, users increasingly work in environments with varying resource constraints or where mobility is required. Mobile devices such as Personal Digital Assistants (PDAs), smart phones and cell phones have become a standard equipment of employees working at different locations or on the move. With the massive introduction of web-enabled mobile devices, users of this kind of devices are able to access a Groupware system from almost everywhere. Mobile devices are an appropriate medium for the delivery of important and just-in-time information. The use of such mobile devices leads to a new generation of Groupware systems, called mobile Groupware systems [11]. Extending stationary Groupware concepts to mobile devices offers great potential. However, too straightforward approaches, e.g. simply using desktop Groupware systems on mobile devices, fail due to the different nature of mobile devices and networks [14]. Obviously,
a system cannot deliver the same (amount of) information to a mobile device that it delivers to a desktop device. It has to adapt to the users’ context and deliver a reduced and adapted experience. Groupware systems significantly differ from single-user applications. Many users provide input (often simultaneously); output has to be processed for many users and shared data have to be kept consistent. This level of interaction is particularly challenging to support using mobile technologies when synchrony and timeliness of information is an issue [13]. In this paper our focus will not be on the support of loosely coupled group members, but on people with a high interdependence, so called teams.

1.1 User Interface Design of Applications on Mobile Devices

The market for cell phones, smart phones and Personal Digital Assistants (PDAs) is one of the most dynamic and competitive markets in the consumer devices industry. The input and output capabilities of cell phones are different from laptops or desktop PCs. In spite of rapid developments (e.g. iPhone), mobile devices still have more restrictions than the stationary equivalents. The term “handheld” implies that screen space is a limiting resource for interface development on such devices. Mobile interaction design has been recently addressed in a large number of publications (e.g. [7][9][17]). Zhang et al. [18] give an overview of the literature available on UI design, usability and related topics for mobile devices, in particular for cell phones and, to a smaller extent, for PDAs. They discuss that mobile devices have unique features which pose a number of significant challenges for examining usability, such as mobile context, connectivity, small screen size and restrictive data entry methods.

Considering the characteristics of mobile devices especially their pervasive and ubiquitous nature, the small size factor and the unique interaction modalities (e.g., touch screens, stylus, fingers, and combinations of the previous), a new range of usage paradigms has emerged [15]. As a consequence new usability guidelines have been established in order to provide users with applications that enhance their tasks and activities. Therefore, we put high effort on finding out the requirements for the mobile access to the Groupware.

1.2 Mobile Groupware

Roth et al. argue that although several Groupware systems are available, they can hardly be adapted to handheld devices [13]. Straightforward approaches, such as simply cross-compiling existing applications, fail owing to the specific properties of handheld devices and the connecting network: Handheld devices have low computational power, small memory and usually no mass storage devices. Handheld operating systems do not offer the same variety of services as desktop operating systems. Handheld applications follow a different usage paradigm. Network connections are still a problem. Litium et al. point out that Groupware systems will dedicatedly need to be developed to work in such environments [12]. The variability occurs along several dimensions: user and application demands, user mobility and intermittent connectivity, hardware and network variability.

From our point of view mobile collaboration creates the possibility for users to be connected to their work environment while they are on the move. Some of the