

Context-Mediated Social Awareness and Some Future Challenges for Awareness Research

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ABSTRACT

In this paper I introduce context-mediated social awareness. Context-mediated social awareness is a term that describes how people who work in a distributed environment maintain some degree of awareness of each others work context. I will present how we have worked with awareness in the AWARE project and I will present three research issues I find relevant for awareness research: *Awareness, interruptions and activities*; *Context aware context-mediated social awareness*; and *Awareness and multi-user displays*.

Author Keywords

Awareness, Context-Mediated Social Awareness, Interruptions, Hospital Work.

INTRODUCTION

Awareness is used in a wide variety of settings, so before awareness can be discussed it is necessary to ask: what is awareness [12]? Or who is aware of what? Context awareness describes the situation where a computer is aware of its surroundings [11]. Software awareness might be used to describe how a computer program is aware of how it is used [2]. Safety awareness can be used to describe how an employee is aware of the safety of his company' IT systems. However, the awareness I am interested in is something called social awareness. It describes the situation where people working together want to maintain an awareness of each other in the work context.

Some research has described how people working in the same setting are able to maintain an awareness of each other. Heath and Luff use the terms displaying and monitoring to describe how people do this [7, 6].

Displaying describes how people explicitly or implicitly display clues about what they are currently doing; and monitoring describes how people explicitly or implicitly watch what other people in the same setting are doing. One of the important points about monitoring is that it is only the part of the setting that is relevant for a person's current work that is being monitored. Monitoring is a difficult task that cannot easily be turned into a computer system.

However, if people are not working in the same setting but are distributed over a larger area, the subtle task of monitoring and displaying become more difficult. The first attempt to build these systems tried to allow the same kind of awareness amongst distributed people by making a virtual porthole between the different settings. Dourish and Bly describe some of the first systems for building these portholes [3], and a lot of similar systems have since been built which especially try to come up with different solutions for protecting the privacy of the people using the system [8, 10]. In [12] Schmidt criticizes the porthole approach for lacking an understanding of awareness. The goal for awareness systems amongst dispersed people is not necessarily to try to reproduce a transparent setting just as if people were next to each other. Another approach is to see the distributed setting as fundamentally different from the situated setting. The goal is then to come up with new ideas about how to support awareness in the distributed situation that can as a starting point be inspired by the research done in the situated setting.

For some time I have worked with awareness in the AWARE project. In the project I have together with my co-worker Jakob Bardram looked at distributed social awareness in a hospital setting. Based on this work we have introduced the notion of context-mediated awareness to the research community [1]. In this paper I present our main findings from the AWARE project, summarize on the current state of the project and list some of the main challenges that the awareness research community should address.

THE AWARE PROJECT

Hospital work is highly collaborative. To treat a patient people with different professions and different skill levels

have to work together. During extensive field studies we observed how medical workers distributed over a larger area of the hospital had difficulties maintaining an awareness of each others work situation. This resulted in a large amount of time going into trying to locate people and in a large number of unwanted interruptions.

Context-Mediated Social Awareness

We looked at how these people tried to maintain a certain level of awareness and found that they used social artifacts to help them. They use e.g. whiteboards to communicate status information to all relevant personnel in a ward. By combining the knowledge of the work settings with different cues in the environment people find hints about their co-workers' context. By looking at a desk, you might be able to tell if the person is at work or not, if s/he has been busy before leaving the desk, and with what s/he is currently working. Similar information can be obtained by looking in online calendars, checking meeting rooms, or looking into the operating room at a hospital.

Hence, people use 'context cues' observed in their environment to maintain some kind of social awareness – or to put it in other words: the work context is used to mediate social awareness. We took this notion of context-mediated social awareness and tried to see if it was possible to computer-support it.

What we did was to combine a context aware system with a system for supporting social awareness. Some of the data collected by the context aware system was passed on to the social aware system. The social aware system transformed the data into several context cues that were distributed to the different users. One of the important points we wanted to emphasize was that we did not want to try to guess what the user was doing, based on the information from the context server. Instead, we wanted to present different context cues in its heterogeneity, letting the user combine these context cues with the user's knowledge of the work context to maintain an awareness of the different people's work situation.

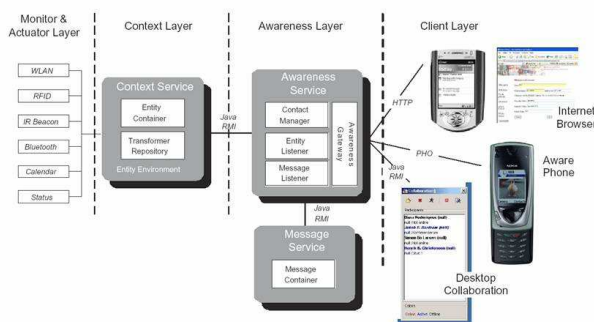


Figure 1: The AWARE architecture

We implemented the system running on a server and we built a set of different clients e.g. a client running on a high-

end mobile phone. As context cues we initially supported three context cues: a status the user could specify; what the calendar said the user was doing; and finally we implemented a location tracking system. The entire system was evaluated at a workshop together with several doctors and nurses. An overview of the system is shown in figure 1 and the mobile phone client is shown in figure 2. The project is described in details in [1] and in [4, 5].



Figure 2: The AWARE mobile phone client

The future of the AWARE project

In the AWARE project we have mainly focused on mobility, how you support awareness and reduce the number of unwanted interruptions in distributed collaborative work. In another project with which I am involved, we are looking at how to use information technology in operating theatres. When it concerns operating theatres we have some completely different requirements than in the mobile situation, and we are currently working on applying some of the findings about awareness, interruptions, and collaboration in the mobile setting, to a setting with the operating theatre at one end and mobile and distributed workers at the other end.

Another future challenge for the project we are working on is how to further evaluate the system. The system is currently fully usable and we are preparing a test in a real setting.

CHALLENGES FOR SOCIAL AWARENESS

Even though some of the ideas in the AWARE project are new other researchers have worked with similar systems [13, 14, 9]. I will end this paper by listing some of the future challenges for awareness systems we are currently interested in looking into.

Awareness, Interruptions, and Activities

When awareness systems are used to mediate social awareness amongst co-workers awareness is closely coupled to the research area about interruptions. However, the main model used when discussing interruptions is often quite simple. In this model a person can only have one ongoing activity at a given time. An interruption is

described as the situation where one activity is suspended on behalf of another activity. However, in some of the field studies we have carried out people sometimes work on several ongoing activities at the same time. Research into more complex model for interruptions can inform the research done in awareness as well.

Context Aware Context-Mediated Social Awareness

We have used the term context-mediated social awareness to describe how people to a certain degree can maintain mutual awareness when they work in a distributed environment. This facilitates that people in principle can monitor the entire work context. However, in a complex work setting like a hospital a specific doctor is not interested in monitoring all the other doctors, nurses, and patients present in the hospital. S/he would instead only be interested in monitoring the persons relevant for the work s/he is doing at the moment. Working on making a context aware awareness system without creating a lot of rules, is another area we are discussing.

Awareness and Multi-user Displays

If awareness information is displayed in public or as shared displays how should the awareness information react? If I have some people I maintain awareness about and a co-worker joins me, should our awareness information be merged together. Would I like to divide my awareness information into private and public information? Maybe some awareness information might only make sense when more than one person is present? We have discussed the situation in relation to the operating theatre case where several people might be relying on the same display, but also awareness systems that are used in peoples' homes might need to address the multi-user situation.

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