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Editorial: Awareness and the WWW

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Foreword

Over the last decade, the issue of *awareness* has received increasing attention from practitioners in academia and industry. This applies to researchers from various horizons, and in particular from the Computer Supported Cooperative Work (CSCW), the Human–Computer Interaction (HCI) and the World Wide Web (WWW) communities. Nevertheless, awareness has remained a somewhat fuzzy concept, for which there exists no single, unequivocal definition. True, *awareness* is often meant as *awareness of other people*, and refers to the ability to maintain some knowledge about the situation and activities of others. There is also a tacit agreement that maintaining this knowledge should not require much effort or, in other words, that awareness should happen as "naturally" as possible. Supporting technology should be designed with this aim, which explains why human–computer interaction issues are of prime concern. Research has exhibited a wide spectrum of situations, in the context of which "awareness" can take very different meanings. Rather than to speak about awareness as such, it is therefore more appropriate to speak about particular types of awareness.

For instance, *group awareness* can be defined as the ability that peers may have to stay in touch and to keep track of each others activities. The information that group members maintain about each other may not be very consequent, nor very precise. Having only a general idea of what is happening, or merely that *something* is happening, is often already very valuable. Let us be clear about it: the realization of group awareness may not require any technology support at all. When people share the same room, they naturally produce and interpret a constant flow of subtle cues with this aim. Glancing at someone may be enough to decide whether it is appropriate or not to start a conversation. On the other hand, when the members of a group are scattered across space and time, technology may offer surrogates to this natural process—media spaces are an example for such technology. Obviously, groups formed in the context of the workplace greatly benefit from increased awareness. Communication and collaboration are easier, cooperation is smoother and, as a result, work processes are more efficient.

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But groups formed in other situations, for instance in domestic settings, can also take advantage of awareness. The benefits may not be measured in terms of efficiency, but rather in terms of bonding, empathy or in a stronger sense of belonging to a community.

Workspace awareness is another well-known type of awareness. It emphasizes the fact that awareness generally emerges when people share a space, or at least when they share artefacts. This applies to both synchronous and asynchronous collaboration. Some of the research in the domain has focused on the design of shared editors, i.e. software tools that support the collaborative creation and manipulation of digital artefacts. This effort has led to the design of novel user interface techniques and widgets, e.g. telepointers and radar views. Shared information spaces are other systems, which highlight the value of workspace awareness. Some of them are organized as document spaces, others are organized according to a spatial metaphor. In any case, awareness mechanisms can be introduced, allowing users to encounter each other on-line. Such mechanisms are clearly needed to ensure smooth collaboration within the information space, especially when users need access to shared artefacts.

Orthogonal to these types of awareness, *peripheral* and *contextual awareness* are two others. *Peripheral awareness* refers to the human ability to process information at the periphery of the attention, with a very low overhead. This ability allows humans to conduct more than one task at the same time, and has been exploited in the design of powerful user interfaces. Peripheral awareness is intimately related to the concept of *calm technology* that we see as one of the most fundamental ideas introduced by *ubiquitous computing*. *Contextual awareness*, on the other hand, refers to the ability of a system to adapt its behaviour to the current situation—that is, the situation of the system itself, of its environment, and of its users. Peripheral and contextual awareness are general notions, and apply to very diverse situations. Interestingly enough, they are particularly relevant to the design of awareness tools (e.g. group and workspace awareness tools). Indeed, group awareness tools are often designed to be as less obtrusive as possible, and to require as less user intervention as possible. The way to achieve these goals is precisely to take advantage of peripheral awareness and to present information in such a way that it does not require the dedicated attention of the users. On the other hand, contextual awareness is useful to adapt both *what* the users should be made aware of (i.e. to provide an information filtering mechanism), and *how* they should be made aware of it (e.g. prefer an auditory to a visual notification), depending on their situation.

Group, workspace, peripheral and contextual awareness are only four of all the awareness types referenced in the literature. There are many more, even though they sometimes offer only slightly different viewpoints or use different wording for describing similar ideas. Nevertheless, this brief introduction should have emphasized that awareness is not a very precise notion, and that research on the subject covers a broad range of issues. Not surprisingly, this is also true for this special issue of the International Journal on Human Computer Studies. Our first goal in preparing this edition was to examine what awareness could mean in the specific context of the WWW—as we shall see, there are two different ways to look at the question. Our second goal was to propose an overview of the field that would be as thorough as possible. We believe that, thanks to the quality and the diversity of submissions, we

were able to achieve these two goals. The seven papers finally selected for publication offer very different perspectives on the theme of the special issue, suggesting different ways to look at the relationship between awareness and the WWW. At the same time, all articles obviously have a strong focus on human–computer interaction issues, and report on the design, the implementation and the evaluation of systems.

Awareness *in* the web

The first way to look at the relationship between awareness and the WWW is to consider the web as an activity space. It can easily be advocated that the web is more than a collection of hypertext documents: people increasingly treat the system as a virtual world, in which they visit schools, shops and other places. In these conditions, it can be argued that users should be made more aware of the activity taking place in the web. This is the perspective of the first three papers published in the issue.

In "*Livemaps for collection awareness*," Doron Cohen, Michal Jacovi, Yoelle Maarek and Vladimir Soroka show that annotated site maps are an efficient way to make web surfers aware of each other. First reflecting on the success of chat applications and on the relative failure of awareness-enabled web sites, they identify possible reasons for this situation. They then introduce the concept of "collection awareness" and present Livemaps, a system that implements this concept. A user study, aimed at verifying the effectiveness of the Livemaps in the context of a particular web site, is also described in the article.

In "*Look who's visiting: Supporting visitor awareness in the web*," Hans-Werner Gellersen and Albrecht Schmidt defend a very interesting viewpoint on the theme of the special issue. They argue that web publishers, i.e. the people who create web places, should be made aware of the activity occurring in these places (also at times when they are engaged in real-world activities). They describe three mechanisms for achieving this goal: (1) the ambient representation of web activity, (2) the provision of web activity views that support comparison and (3) the ability to glance into the visitor's sites. Lessons gathered during the evaluation of their system are discussed and highlight the benefits of seamlessly bridging the WWW with the real world.

In "*Supporting online resource discovery in the context of ongoing tasks with proactive assistants*," Jay Budzik, Shannon Bradshaw, Xiaobin Fu and Kristian Hammond describe two systems, Watson and I2I. The systems ambition is to raise the awareness that users have of existing resources on web-based systems. To this end, the systems observe the behaviour of users, identify shared interests and propose to guide their further actions. Ultimately, the systems allow people to meet like-minded peers on the network and support the communication with them.

Awareness *through* the web

The second way to look at the relationship between awareness and the WWW is merely to consider the web as an implementation platform for awareness tools. Web

technologies are powerful tools for building CSCW systems. They offer many advantages, for instance in terms of rapid application development, ease of integration, critical mass of users and perhaps most importantly ubiquitous access. Awareness tools obviously also benefit from these properties, while sometimes requiring the extension of standard technologies. The last four papers in this issue follow this approach and describe web-based awareness tools. Yet, although they share this viewpoint, the papers address very diverse problems and present very different kinds of systems.

In "*Design, experiences, and user preferences for a Web-based awareness tool*," Alison Lee and Andreas Girgensohn share their experiences with the design, the implementation, the deployment, and the evaluation of a tool which provides group and collaboration awareness through the web. Beyond the very interesting description of their system, the authors propose a general approach for guiding the design and technical development through naturalistic user studies.

In "*Virtual team awareness and groupware support: An evaluation of the TeamSCOPE system*," Chyng-Yang Jang, Charles Steinfield and Ben Pfaff present TeamSCOPE, a web-based collaborative system designed to support the needs of globally distributed teams. The system supports four types of awareness via a range of mechanisms. Most interestingly, the paper reports on the evaluation of the system with eight engineering design teams over an extended period. The authors share their experiences and draw conclusions from this evaluation.

In "*Supporting the awareness of shared interests and experiences in communities*," Yasuyuki Sumi and Kenji Mase enlarge the scope of awareness systems from workgroups to communities. First introducing the notion of *community awareness,* they present a tour-guide system. In this context, they present a collection of innovative tools that encourage the encounters of people with shared interests.

Finally, in "*Instant messaging with WebWho*," Ylva Hård af Segerstad and Peter Ljungstrand examine how awareness of presence can affect instant messaging applications. In their study, conducted with their own web-based awareness tool, they analyse the messages exchanged by students. They show that an awareness of both the physical and the virtual presence of peers affects these messages. The results of their analysis also show that awareness tools are used not only for collaborative work, but also for entertainment purposes.

The seven articles published in this issue certainly give a good overview of what awareness can mean in the context of the World Wide Web. We hope that they will be as interesting to the readers of the International Journal on Human Computer Studies as they have been to us. We should also mention that this special issue follows a workshop on the same theme, which was held at the ACM International Conference on Computer Supported Cooperative Work (CSCW 2000, Philadelphia). The proceedings of this workshop are available on-line (http://www2.mic.atr.co.jp/dept2/awareness/). Some of the papers presented at the workshop have also been published in the ACM SIGGROUP Bulletin (Vol. 21, No. 3). In particular, an introductory paper proposes a thorough survey of the field and an extensive list of references.

As a concluding remark, we would like to emphasize that the value of awareness is increasingly recognized in settings other than the workplace. We foresee the coming

transition to domestic settings, which will raise further opportunities, further challenges and in any case offer a very exciting and rewarding research field.

We would like to sincerely express our thanks to the reviewers who have helped us during the preparation of this issue. We, in the same way as the authors, have been truly impressed by the depth of their comments and the soundness of their analysis. They have greatly contributed to the quality of this issue and we are indebted to them for this. These experts are Kenneth M. Anderson, Keith Cheverst, Tom Erickson, Tom Gross, Pilar Herrero, Pascal Molli, Devina Ramduny, Javier Segovia and Mark Sifer.