

Wintext - Communicating Desktop Context for Collaboration Awareness

Position paper for OzCHI 2006 workshop 3: Supporting Awareness in Intense Distributed Collaboration

Marko Nieminen

Usability and User Interfaces

Software Business and Engineering Institute (SoberIT)

Department of Computer Science and Engineering

Helsinki University of Technology (TKK)

<http://www.soberit.tkk.fi/mhtn>

Background. This position paper has its focus in the brief introduction of concepts that I would like to discuss in the workshop about "Supporting awareness in intense distributed collaboration". On the one hand I would like to share the concepts for broader elaboration and on the other hand I hope to be able to receive feedback about the concepts from other participants.

Context awareness is a key concept in ubiquitous computing (Salber & Abowd 1998) that provides a framework for gathering and delivering context information. Sources of context information are environment, location, system environment (OS level information), computing resources, network traffic, and connectivity. My approach towards *context* and *awareness* is initially based on the *context-of-use* that is expressed in ISO 9241 as the physical, social, and organisational environment in which the human actor resides while performing his/her tasks. *Context information* may be seen to be the core of the information that is being used when a person is communicating information about his/her state to other people, friends or colleagues. From the standpoint of the other people, context information provides *awareness* about the situation in which the person delivering it is. The core of awareness is in many ways in the revealed, delivered, and communicated context information.

Motivation. Often, context information is seen as something that needs to be restricted and secured from outside access. One might say that "my context is just my business". Context is seen as private. People surround themselves with a "bubble" of personal space. They tend to become stressed when other people invade their "bubble" (Interpersonal distance introduced by Hall 1966; Pettijohn 1998). Hall introduced four interpersonal distances: intimate distance (less than 1.5 feet), personal distance (1.5-4 feet), social distance (4-12 feet), and public distance (12- feet). Privacy concerns emphasize the need to restrict access to the individual's personal space like the location, nearby persons, or event in which the person is. More than these real space characteristics, the virtual space in which contemporary knowledge workers perform their tasks and activities, are not open for outsider's examination.

We may, however, have another viewpoint and approach towards context information: At least occasionally, the opening and delivery of one's context information *for awareness* may benefit not only the person communicating it but also the surrounding organisation. This approach is reflected, for instance, in the joint Nordic PRIMA research project (Privacy in the making) that has recently started. Researcher Sakari Tamminen from the PRIMA research project is also submitting his position paper to this workshop. I hope that we will be able to discuss our viewpoints with other participants in the workshop.

Virtual Contexts as the Source of Awareness. Contemporary networked working environments extend people's surroundings. The virtual extension is a standard part of contemporary knowledge worker's organisational surroundings. We may even see that working contexts are more and more determined by the virtual conditions than by the physical conditions. At the same time, knowledge work is shifting away from tasks done solely by individuals: teams of varying structure have taken place as a main style of organisation of work activities. Teamwork is being done in virtual and shared spaces. As teamwork requires coordination, awareness about other's activities is of central importance. There seems to be a need to form and define awareness functions in these virtual and shared spaces.

Intense Distributed Collaboration. Knowledge work in that is arranged in teams but organised in distributed (and cross-organisational) settings is challenging. Among the challenges is the awareness of other's work. A recent trend not only among youngsters but also at the workplace is the increasing utilisation of instant messaging applications. Instant messaging applications have brought *status information* both to home and office desktops. Currently, typical messaging applications provide a simple status message that can be revealed to others like "Online", or "Busy", or "Out to lunch". If needed, additional information can be delivered through free form instant messages. Often, people tend to ask additional questions about the current situation (i.e. context) before engaging into a more detailed discussion. This indicates the need for richer context information that may enable more effective communication.

This position statement aims at presenting a complementing way to include enriched and to some extent even automated context information to provide better context awareness for the interlinked team of knowledge workers. The provision of richer context information may, for instance, indicate appropriate situations in which people are in the same *contextual state* for exchanging thoughts about shared important topic. The same contextual state holds information about the knowledge worker's current thematic orientation i.e. what is the topic that he/she is currently dealing with. One way to address this thematic orientation is via analysis of documents and applications currently open at the desktop of the computer.

Conceptual Modelling of Awareness. Even though this position paper aims even at presenting a prototype in the implementation of detecting the context and the communication of context information to distant collaborators, the main purpose is in the conceptual modelling of the various virtual components that can be used to construct the concept of *context messaging for collaboration awareness*.

Receiver-oriented Awareness. Communication of context information for awareness is not trivial. Following types of questions may rise when considering the communication of context information: What do I want to tell my colleagues about my current state of activities? What is my current working context? How do I want to reveal of my context to my colleagues? How much should I communicate to my colleagues about my current working context? These types of questions point out that communicating the context for awareness is not only dependent on who is the source of the context and awareness information. It is also dependent on who is receiving that information. Context information is not similar to all related persons, colleagues and stakeholders. However, tailoring context information to every individual receiver would become a far too laborious thing to manage in real settings. In this matter, the concept of *layered awareness* provides one way to address the issue.

Layered Awareness and Social Distance

Layered awareness may be looked at the direction of the concept of *social distance* introduced by Georg Simmel and his student Robert Park in 1890's (Levine & al. 1976). By applying the concept through the *Bogardus Social Distance Scale* (introduced by

Bogardus in 1925) it provides a background model for analysing the layered characteristic of context information that can be delivered to different people and stakeholders.

The Bogardus Social Distance Scale measures people's willingness to participate in social contacts of varying degrees of closeness to other people. Bogardus has presented his psychometric scale that describes the social distances between people. The closest social distance has the value "1" meaning that there is no social distance between persons like is the case in marriage (see table 1). The next distance, "2", is similar to the distance of close personal friends. The most distant situation "would exclude from my country" gets distance score 7.

Table 1. The Bogardus Social Distance scale.

- As close relatives by marriage (score 1.00)
- As my close personal friends (2.00)
- As neighbors on the same street (3.00)
- As co-workers in the same occupation (4.00)
- As citizens in my country (5.00)
- As only visitors in my country (6.00)
- Would exclude from my country (7.00)

The Bogardus Social Distance Scale may be used when defining awareness features to be used in distributed and somewhat loosely organised networked teams. The communication of context information for awareness about "My Status" is different when social distance changes. Thus, from the standpoint of the "receiving" person, awareness information is different from what another person receives from the same source person. This structure is not, however, supported by the current awareness delivery functions that exist in the modern ICT tools for co-operation and collaboration.

Wintext - An Exploratory Implementation of Context Awareness

To explore and evaluate the conceptual idea of capturing the current working context from the computer desktop, we have created a simple application called *Wintext*. *Wintext* stands for "Windows" (meaning the windows on the screen, not the underlying operating system nor the real windows at the workplace) and "Context" that aims at capturing the idea of using the desktop situation (or context) as the reflector of the current working state of the user. These technical constructs form the basis of *Wintext* and the analysis of desktop context that may be delivered to other members of the collaborative and distributed team.



Figure 1. The user interface of the prototype application "Wintext".

The aim of *Wintext* is not to present a finalised product for context messaging. Instead, the aim is to make the concept of *context messaging* more concrete and understandable with the realisation.

In figure 1 we see the *Wintext* prototype application gathering information about the current context through the arrangement of open windows (i.e. task constructors) at the computer desktop. The *Wintext* prototype gathers information about the open and active elements at the user's computer desktop. The application provides also translation routines that

can be used to create more general semantics about the detailed technical elements on screen.

The simplified user interface shown in the picture consists of 1) aggregate cleartext translation of the desktop context (retrieved through the analysis done via *context translation rules*; in the picture the aggregate context translation is "Writing dr thesis(!)"), 2) the heading of the currently active window (i.e. *active task*, in the picture the field starting with words "Knowledge Storage...", an MS Word thesis document), 3) information about the networking environment (IP address; in the case of mobile computing with a laptop computer, this address is capable of revealing e.g. the connection type to the internet), 4) date and time information of the computer, 5) user-selected and user-set status of availability, 6) list of detailed level translations done through the analysis of the context translation rules, and 7) the *context translation rules* (the rules.txt) file.

Wintext prototype gathers information about the current status of the user's computer desktop.

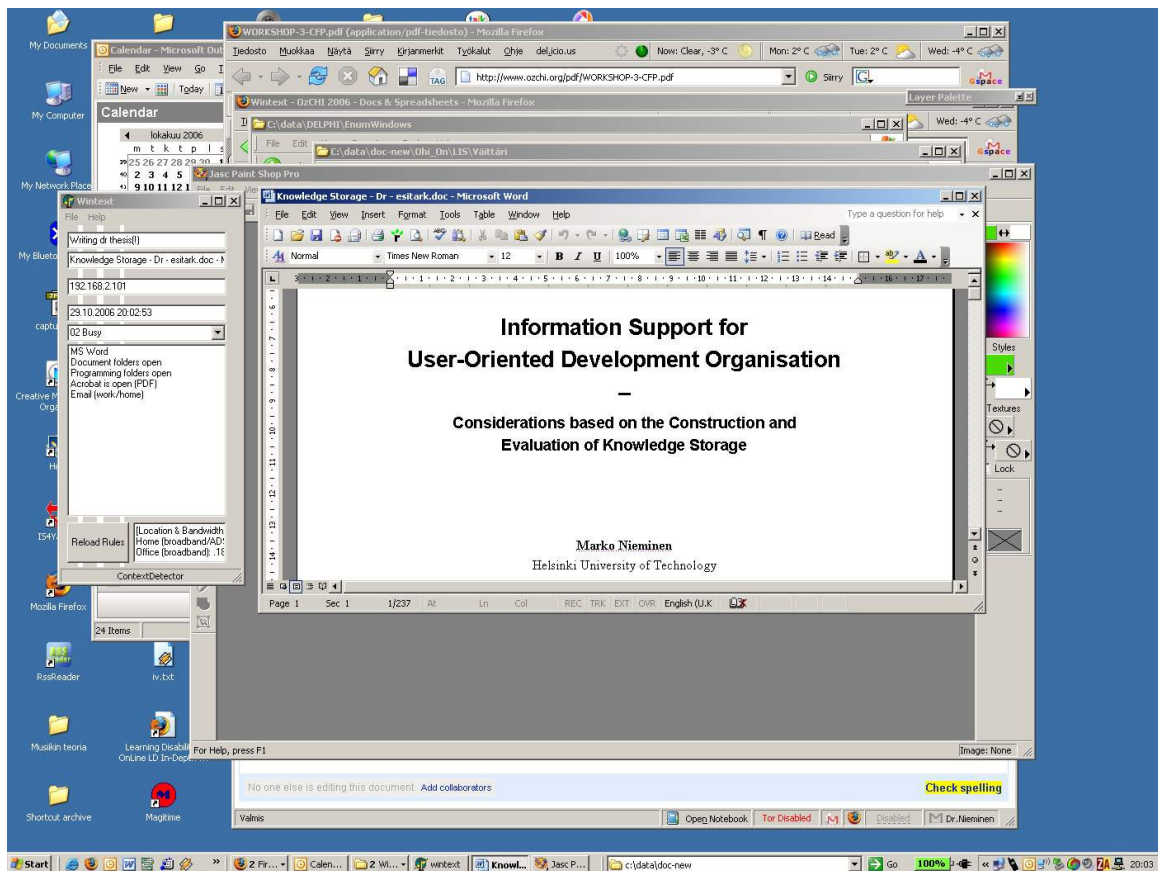


Figure 2. Wintext prototype at computer desktop (on the left) analysing the context for providing awareness information to distant collaborators.

In figure 2, we see that Wintext keeps track of active window (*active task* in the picture: word processor) as well as of all the open windows at the desktop (windows behind the active word processor window). The individual windows may be assigned a user-defined semantic "translation rule" as well as the constellation of the different windows (an "aggregate translation rule"). The translation rules are user-defined cleartext explanations about the meanings of the different open windows and their respective

window headings. These cleartext explanations can be used to aggregate the overwhelming and often cryptic detailed level context constructors i.e. the window headings to meaningful and human-understandable context descriptions. All this information (details and aggregates) can be used in the communication of context for providing awareness to collaborators at different social distance.

Context Translation Rules

As we currently lack the context delivery functions in normal desktop environments, the Wintext prototype makes use of window headings that are available and visible to the user. Window headings are typically easily detectable by the user and makes it easy to apply more meaningful semantics to these. These window headings are the source when we start detecting the user's context for providing awareness information to others.

Table 2. The file `rules.txt` contains the context translation rules. The information in this file can be delivered directly or in aggregated form to persons and stakeholders whose social distance differ from each other. The layered characteristic of awareness (i.e. different people and stakeholders are able to see different level of details) is being used to deliver this context information to specific persons and stakeholders. Every cleartext translation in the context translation table is followed by the detected window title on the desktop. In order to provide a more comprehensible description of the situation, the translated context description may be used to communicate the situation to other

<p>[Location & Bandwidth] // What is my location and type of connection?</p> <p>Home (broadband/ADSL): 192.168.0.103 Office (broadband): .182 Mobile (GPRS): 169.254. WLAN (broadband): 172. NOT CONNECTED!: 127.0.0.1</p> <p>[Environment] // What kind of applications or documents are open at my desktop? What does a specific document mean about my status and situation?</p> <p>YOU MAY CALL ME! NetPhone (PicoPhone) is running: PicoPhone CALL ME! Skype is open!: Skype Email (work/home): - Microsoft Outlook Email (personal / Yahoo): Yahoo! Mail MSN Messenger: MSN Messenger Yahoo Messenger: Yahoo! Messenger</p> <p>Teaching folder open (-->teaching related task?): \Teaching Office Work (Office Hours - meeting?): Office Hours Network folder open (--> at work): T:\ Dissertation thesis folder open (writing thesis?): \doc\thesis\ MS Word: Microsoft Word Powerpoint: PowerPoint Text editor (EditPad) EditPad Lite Programming folders open: \java\ Document folders open: \doc\ Acrobat is open (PDF): Acrobat</p> <p>Winamp is loaded: - Winamp Music/Winamp is stopped: Winamp [Stopped] Music/Winamp is paused: Winamp [Paused] Music (MIDI) editor: Cakewalk Digital pictures folder open: \kuvia Digital picture browser open (looking at them?): ACDSee Digital picture viewer open (looking at them?): Picture Viewer</p>	<p>[Active Task] // What does the currently active window indicate about my situation, current activity, and task?</p> <p>Programming (C++): .cpp Music (listening): Winamp Music (Winamp stopped): Winamp [Stopped] Writing memo: EditPad Writing document (Word): Microsoft Word Editing/giving presentation (Powerpoint): PowerPoint</p> <p>Managing Messenger Status: MSN Messenger Chatting (Messenger): - chat Writing thesis: Dissertation.doc</p> <p>Browsing files: C:\ Browsing network files (work): T:\ Browsing files (programming): \java Browsing files (teaching): \Teaching</p> <p>Email: Outlook Email (personal): yahoo Email (work): TKK webmail</p> <p>Browsing Internet: Internet Explorer Browsing Internet: Mozilla Firefox Browsing Internet (google): Google Browsing Internet (reading news): >Uutiset</p> <p>In a call (PicoPhone): PicoPhone In a call (PC-Telephone): PC-Telephone In a call/chat (Skype): Skype</p> <p>Reading PDF file: Acrobat Looking at digital pictures: Windows Picture Browsing digital pictures: \My Pictures</p> <p>In a meeting / Office Hours: Office Hours Idle (Desktop background active): Program Manager</p> <p>Configuring system (Control Panel): Control Panel</p>
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collaborators. This acts for them as awareness information about the source person.

Context Delivery: Awareness for Other People

In traditional co-located intense collaboration, awareness about the current situation is often rather easy to perceive. It can be seen by looking around (e.g. "how do things seem to be") or it can be addressed via simple questions like "what is the status of the work" or "what are you doing right now". A short answer like "almost ready" may be sufficient. In distant co-operative situations, however, communication of the current situation and context may be difficult to do despite its importance. Understanding the context in which the other party is cannot always feasibly be detected by similar means. When working in highly coordinated and synchronized tasks, knowledge about the context may be delivered to co-workers.

The translated context information may finally be communicated to relevant distant co-workers. According to the context translation rules, the collaborative people are able to follow each other's activities and coordinate interlinked tasks efficiently despite distance. Depending on the *social distance*, the message will be detailed or general. More distant persons receive general information while other virtually connected colleagues may see detailed information about progress in the shared project. By receiving information about the contextual state of the other person, it will be easier to initiate discussions about topics that belong to the same *conceptual domain* in which the person currently is. The existing synchronized real-time communication channels like chat messengers and net phones can be used together with the delivered context information for activating detailed elaboration of the issues that currently exist in the person's conceptual domain.

About the Author

Within the last ten years, Marko Nieminen has been involved in several research projects addressing computer-supported co-operative work. There are several research projects addressing ICT-supported collaboration in industrial settings currently in his research area at TKK. A recently ended project [TechMedia](http://www.soberit.hut.fi/techmedia) (Technology Mediated Knowledge Services for Distributed Work Environments, www.soberit.hut.fi/techmedia) had its focus on the utilisation of web-based communication services in industrial settings. Currently, projects called Intact (Industrial Interaction through Open Service Platforms, www.soberit.hut.fi/intact) and FC-ICT (ICT in the New Business and Service Concepts of Foundry Industry, <http://www.soberit.hut.fi/fc-ict/>) are addressing the possibilities to utilise open service platforms for enabling inter-organisational collaboration and co-operation that also provide awareness services between different stakeholders. In both these projects, distributed collaboration points out the need for more elaborate communication and awareness management.

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