

**ERCIM Fellowship Programme**

**Report on Work Conducted by Dr Rod McCall**

**at CRP- Gabriel Lippmann, Luxembourg**

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## Overview of Research

The changing nature of the workplace and the advance of Internet technologies have radically altered the way that people work together. For example European projects such as Networks of Excellence typically have partners spread across a wide geographical area. With partners being geographically spread it is often the case that information which we take for granted in offices, such as the pile of papers sitting on someones desk being an indicator of their work level are no longer relevant. Hence we need to explore ways of keeping people informed about the work level, or rather the nature and volume of interactions that individuals, groups of individuals or an entire project are engaged in. In this case an interaction refers to an exchange of information, for example sending an email or reading a forum post. The work presented in this report focusses on providing awareness information to a geographically diverse group of people using a visualisation based on the ambient technology paradigm.

## Specific Areas of Development Research

The main pieces of work conducted as part of the ERCIM fellowship were two user studies and the development of a prototype visualisation system. The work was closely aligned to that taking place within the FNR funded SUGAR project, which aims to develop visualisations of users and their interactions. The visualisation is known as the Ambient Workplace (AW). However while the SUGAR project focussed on developing visualisations of historical (asynchronous) information, the work conducted as part of the ERCIM fellowship focusses on realtime (synchronous) information. As part of this work the author was involved in the development of interaction metrics and the underlying metaphors used within the visualisation.

### ***Background: Awareness & The Ambient Technology Paradigm***

Awareness is a critical aspect of many CSCW systems and is essential to the overall fluidity and naturalness of collaboration [1]. Ellis argued that 'the philosophy of groupware is to encourage cooperation by making it known and instantly apparent to all who is sharing what with whom' [2]. Awareness of the activities of others also helps to provide a context for one's own activity [3] and may help shape our activities. With this in mind the AW focuses on providing support for workplace awareness, rather than informal, social or group awareness (for a discussion and definitions of these types of awareness see [4]). Workplace awareness provides information on the identity of those in the workplace, their activities and location. Within this area the AW uses metrics from Otjacques et al [5] to display individual and group awareness. Individual awareness refers to the displaying information about an individual, where as group awareness presents anonymous or aggregated information.

Ambient displays exist within the users peripheral attention zone, the objective being that the information is always available but that the user does not need to specifically attend to it. Moreover, the information should be presented in as non-intrusive a way as possible, for example avoiding complex graphics which take time to interpret or the use of animation which may distract end users. The work on informative art by the Viktoria Institute in Sweden provides a good background to such displays.<sup>1</sup>

### ***System Development***

A prototype was developed using the Python programming language and various third party libraries. In order to reduce development time the Jabber instant messaging platform was used as the method for controlling user logins, presence and for sending information to and from the clients and servers. The visualisation is displayed in the Windows Active Desktop. The main components of interest are the database, BOT and the client (see illustration 1). The database stores information about the users and their interactions. As the system is built upon the Jabber instant messaging server an automated chat BOT is used to send information from the database to the various clients. It also responds to requests from client machines. At the time of writing the client is responsible for generating the graphics used in the visualisation, these are constructed using SVG (scalable vector graphics). As the system develops the client will provide connections to other applications such as GAIM (Instant Messaging client) and Word. Some tests have already been carried out to test communication between GAIM and the client.

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1 <http://www.viktoria.se/fal/projects/infoart/>

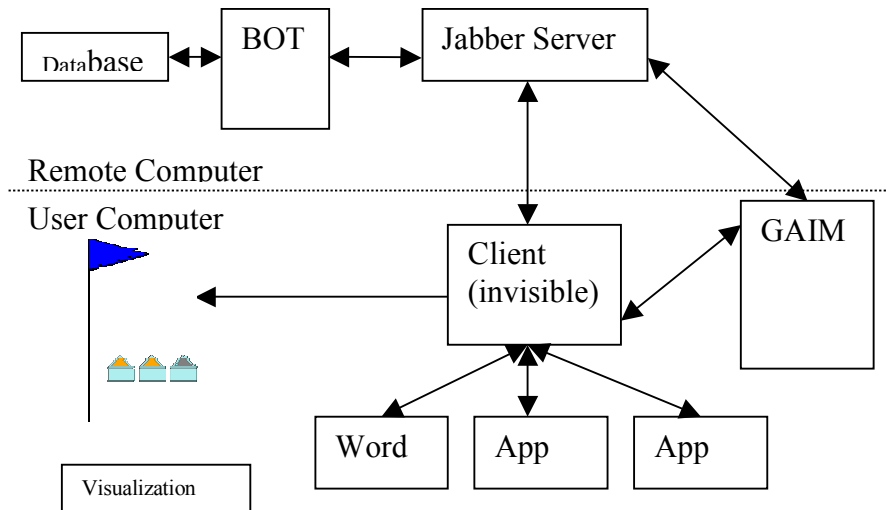


Illustration 1: An overview of the system architecture.

The system makes use of a maritime flags metaphor (See illustration 1, lower left and illustration 2, lower left). Although the design is subject to change it displays both global and individual awareness information. For example the blue flag presents information about the overall nature and number of interactions within the workgroup. In contrast the beacons indicate the online status and number of interactions by an individual entity. Illustration 2 shows the Ambient Workplace (or visualization) displayed as part of the Windows desktop. As it is part of the Active Desktop the user is able to move, resize or close it at will. Moreover, there is no GUI, so no user interaction is required. In contrast with backgrounds (or wallpaper) items displayed in the Windows Active Desktop appear between the background and the icons.

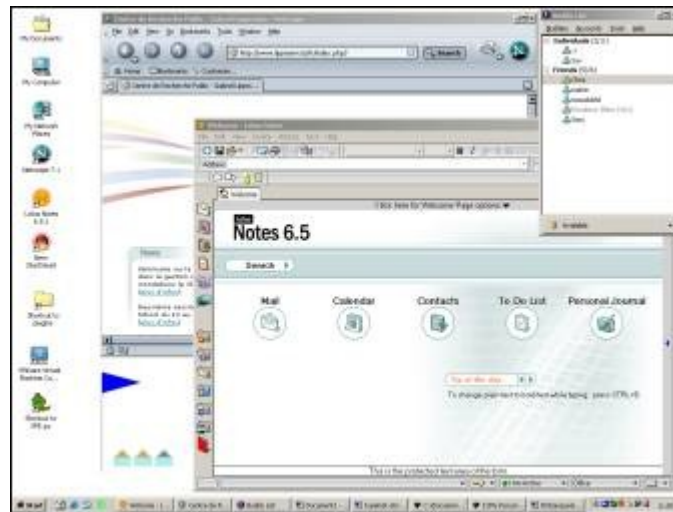


Illustration 2: A display of how the visualisation (left) looks when part of the Windows Active Desktop.

## Studies

Two user studies were conducted during the ERCIM fellowship, due to their nature both are currently ongoing. The first asked student participants of an NoE to provide information about their collaborations with others, for example which pieces of software they used and who they were in most frequent contact with. The response rate was rather low and as such the questionnaire has been left online for people to complete in their own time.

A second multi-part study was conducted with a view to informing the design of the visualisation. Part one of the study focussed on asking people to draw various aspects of the visualisation. This part is intended to provide starting points for the remaining phases. At the time of writing phase two is in progress and will make use of focus groups. The

objective of this part of the study is to gain information on the designs from phase one and to develop a shortlist of preferred designs. These designs can be totally new or based upon those from earlier parts. Phase three involves modifying the prototype to reflect the design decisions from the focus group and then testing the prototype on a group of end users. Results from this phase will be used to enhance the prototype.

Results from phase one of the second study pointed to people finding the basic design a good starting point. Although the results are inconclusive at this stage there was a preference towards the use of beacons for individual awareness, and flags for global awareness. Moreover, the range of designs provided by the study participants will prove a strong basis upon which to finalise the design of the visualisation. It also provided a range of designs which had not been previously considered.

## Publication List

### **An Ambient Workplace for Raising Awareness of Internet-based Cooperation**

*Benoît Otjacques, Rod McCall, Fernand Feltz*

**Abstract:** This paper discusses a prototype desktop ambient display system known as the Ambient Workplace (AW) that is used to visualise some aspects of cooperation among a group of co-workers. The AW draws on the ambient technology paradigm by providing a visualisation that represents the interactions of the co-workers (either individuals or groups) in their peripheral attention zone. The paper discusses the development of a prototype system based on a series of indices which uses a maritime flags metaphor. It also presents some results from the first part of an ongoing study into improving the design of the system.

*In the proceedings of CDVE 2006, Mallorca, Spain. (in press)*

### **Towards An Ambient Desktop to Promote Workplace Awareness**

*Rod McCall, Benoît Otjacques, Fernand Feltz*

**Abstract:** This paper describes a prototype system that displays synchronous workplace awareness information using the ambient technology paradigm. It focuses on making people aware of the nature and volume of interactions that have taken place within a workgroup. The visualisation uses simple graphics based on a maritime flags metaphor, is displayed in the Windows Active Desktop and is designed to be as non-intrusive as possible. The information used in the visualisation is drawn from a database which stores information about the type and frequency of interactions by the users of the co-operative environment. The system uses lightweight technologies and it should be easy to add features to support delivery of the information to standard client applications, smart boards, PDA's and mobile phones.

*In the proceedings of HCI 2006: Engage, London, UK. (in press)*

### **Developing Ambient Displays for Collaborative Work**

*Rod McCall, Benoît Otjacques, Fernand Feltz*

This paper discusses a prototype system known as the Ambient Workplace (AW) that lets people monitor work patterns within a group of co-workers. The AW provides information in the users peripheral attention zone with the objective being that the user soaks up the information without needing to specifically attend to it. Information is displayed within standard applications such as the Windows Active Desktop, Outlook or Word. At present the system displays various types of awareness information, for example the number of interactions a specific user or groups of users has initiated and whether they are online. It also displays global information about the volume and type of work for the entire group. The Ambient Workplace uses Python and displays information using Scalable Vector Graphics (SVG). It uses a client/server architecture built upon the XMPP instant messaging protocol and retrieves information from a MySQL database. The objective was to build a system which can be easily ported to other platforms such as mobile phones and smart boards as well as to leverage existing libraries while allowing rapid prototyping of the user interface.

*In the proceedings of Europython 2006: Geneva, Switzerland. (in press)*

Two further publications are planned for CHI 2007 and Nordichi 2006.

[1] Gutwin, C. and Greenberg, S. (1999) *The effects of Workspace Awareness Support on the Usability of Real-Time Distributed Groupware*. ACM Transactions on Computer-Human Interaction, Vol. 6, N° 3, pp. ~243-281.

[2] Ellis, C. (1995) *Keepers, Synchronizers, Communicators and Agents*. ACM SIGOIS Bulletin, Vol. 15, N° 3, pp.~ 10-14.[3] Dourish, P. and Bellotti, V. (1992) *Awareness and coordination in shared workspaces*. Proceedings of CSCW'92. Toronto, Canada, October 31 – 4 November, pp.~107-114. ACM, New York

[4] Greenberg, S., Gutwin, C., and Cockburn, A. (1996) *Awareness Through Fisheye Views in Relaxed-WYSIWIS Groupware*. Proceedings of Graphics Interface Conference 1996, Toronto, Canada, May 22-24.

[5] Otjacques, B., Noirhomme M., Figueroa, J., and Feltz, F. (2006), *Composite Indexes as Metrics of Cooperative Activity*. Proceedings of AIM 2006, Luxembourg, June 7-9.