

BuddySpace: Enhanced Presence Management for Collaborative Learning, Working, Gaming and Beyond

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Abstract: *BuddySpace* is the name of an ongoing research programme that looks at novel interfaces and capabilities for enhancing presence-based technologies. Our aim is to combine 'best of breed' concepts in presence, messaging, and location-based services with dynamic semantic filters. We aim to display the presence of relevant colleagues and resources (such as documents and devices) in an innovative and compelling graphical manner, and thereby improve distributed group problem-solving and cooperative activities. The paper outlines the key elements of our approach, including server modifications and custom client-side tools, and describes with some sample application areas currently under investigation.

Introduction

The concept of presence has matured in recent years to move away from the telepresence/virtual worlds approach, on the one hand, and the online/offline/ busy set of simple state indicators on the other hand, towards a blend of attributes that can characterise an individual's location, work trajectory, time frame of reference, goals, and intentions. Our challenge is how best to characterise presence, how to make it easy to manage and easy to visualise, and how to remain consistent with the user's expectations, work habits, and existing patterns of Instant Messaging and other communication tool usage. The challenge of Enhanced Presence Management extends to seeing presence in a broader and more generic perspective. As such, it may span across:

- different stakeholders (people, devices, facilities),
- different worlds (protocols, channels),
- different metrics (geographical, organisational, conceptual),
- different interfaces (desktop PC, lightweight applet, PDA, mobile phone)

We have begun a series of investigations into Enhanced Presence Management, including an expanded client interface and a study of the 'semantics of presence', described in turn below.

BuddySpace: the IM client

BuddySpace aims to provide enhanced presence management in IM and other contexts by looking beyond the popular linear or hierarchical buddy lists and into the realms of spatial representations of three kinds:

- *map representations*, typified by location-based services, augmented in our case by innovative filtering and clustering algorithms;
- *logical representations*, such as corporate campus and project/task timelines;
- *abstract representations*, such as graffiti walls and massively multiplayer game environments.

BuddySpace builds on seven years of research in large-scale audience presence that led to the creation of the KMi Stadium and Lyceum webcasting/virtual

classroom environments [1], [2], and leverages our extensive background in large-scale software visualisation [3]. A key theme is that participants prefer to focus on the primary content at hand (e.g. presentation graphics and audio), while enjoying indications of colleagues' presence in a lightweight peripheral manner (e.g. via simple status lights, in contrast to the 'heavier' style promoted by videoconferencing or avatar-based chat environments).

An important insight of BuddySpace is that customised displays, whether of office layouts or entire continents, can be kept lightweight to yield important peripheral presence information. Yet they can scale to large numbers of users (many thousands in the case of Open University students, our first target audience), provided that

- a good *filtering* technique is deployed to show only users 'of interest';
- a good *clustering* algorithm is deployed to show many participants in one location, and
- the Jabber server is suitably modified to provide automatic group rosters, which augment the users personal lists.

We have already undertaken the server modifications and clustering algorithm, and currently deploy manual filtering. In other words, it is up to the user to personalise maps and buddy lists to select users of interest at any moment (but see below for our studies of the semantics of presence and ways to automate this). Examples of the current user interface are shown below (with selected close-ups provided in Appendix A). Note that the auto-generated maps in two snapshots include insets which show 'just enough' of the required context (Europe in one case, whole world in another), depending upon where users are located:



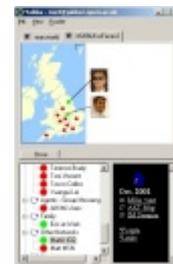
Plain chat, embedded browser



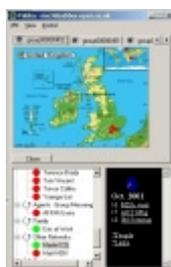
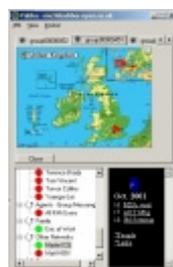
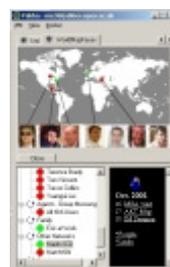
Office plan



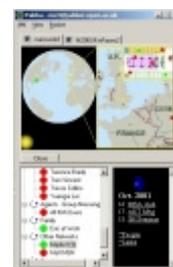
Campus map



OU Tutorial Group

UK + World
(auto-generated)UK + Europe
(auto-generated)

World + faces

World + Europe
+ Office plan

Downloads of the first prototype, including running instructions and tools for creating your own clickable maps, are available at <http://jabber.open.ac.uk/>. Here are some of the challenges we face in the realm of unobtrusive presence management tools:

- **The 'low-cost power' conundrum**
How can we provide 'powerful presence' indicators, such as map and picture information, while still retaining the perceived end-user advantages of 'lightweight peripheral presence'?
- **Scaleability**
Can our approach scale to distributed workgroups of realistic size?
- **Added value**
What extra benefits do our workers derive from the serendipitous interactions afforded by lightweight peripheral presence?
- **Visual Representation**
What is the best way to display work colleague presence in a meaningful-yet-non-intrusive fashion?

Presence and Semantics

In addition to the appearance and ease-of-use of presence management tools, the actual *meaning* of a person's presence status is a topic of great interest. Within the UK EPSRC-funded Advanced Knowledge Technologies project [4], we are developing richer presence representations that reflect user's work intentions. For the specific sub-project CoAKTinG: Collaborative Advanced Knowledge Technologies in the Grid [5], we intend to augment the prototype BuddySpace with semantic visual filters that customise the display of presence information to yield participants of interest at the right moment (e.g. those working on work-package X, or interested in ontology Y). The difference from earlier work, such as dynamic sliders or group filtering in Odigo, is that the users will be asked to subscribe to a community or discourse. This would include an underlying ontology of communal research interest, project timescales and work plans, thereby enabling a degree of intelligent match-making even when users do not choose identical keywords (as is now required in the IM world). Key research questions in this realm are as follows:

- **Automatic filtering**
How much of automatic roster construction and group visualisation can be provided 'hands-free', i.e. without significant end-user investment? Our early prototype already takes a major burden off the end-user.
- **Semantics of match-making**
What do we need to store about the research interests of colleagues in order to indicate their simultaneous presence? Our research project is looking at ways to deploy semi-automatic subscriptions to 'topics and themes of common interest'.
- **Presence semantics and dynamics**
Indicators such as 'online', 'away', or 'busy' are proving to be much less useful than more advanced status indicators such as 'now working on work-package X', and we need a richer presence vocabulary to reflect this. What should this vocabulary look like? Early indications are that a shared community of practice needs to co-evolve its own vocabulary and 'not too large' set of indicators for this to be effective and scaleable.

The next section highlights some of the current application areas in which we are beginning to deploy our first prototypes.

Applications

Open University 'Alternative Learning Experience': The UK's Open University (OU) is one of the world's largest Universities, with over 160,000 distance-learning students enrolled and distributed throughout the world. It has been described a

'Mega-University' [6] and as such takes particular care with regard to the extensive support provided to its students at a distance. In particular, student support has historically included a significant component of face-to-face tuition via residential summer schools and tutorial groups of approximately 20 students per dedicated tutor (hence 8,000 tutors!). For many courses, residential summer schools are supplemented by an '*Alternative Learning Experience*' whereby students use advanced communication technologies to undertake tutorial and group project work. In this context, there are several issues that we need to take into account:

- new intake of students annually
- small interval (weeks) between student registration and course delivery
- legacy registration/database environment
- legacy asynchronous discussion forums/email systems
- high student expectation of quality end-user experience

Rather than simply deploying 'many chat rooms', the Open University tutorial environment looks at ways to foster quality experiences by integrating discussion forums with tightly-focussed and tightly-timetabled exercises and 'breakout' sessions. In this light, a variant of BuddySpace is being deployed for an Autumn 2002 enrolment of OU students, with an eye towards gathering empirical evidence of the impact and effectiveness of its use in a live tutoring environment.

Collaborative Advanced Knowledge Technologies: The *CoAKTinG* project, recently funded as part of the UK's e-Science Initiative on Grid computing, aims to integrate and adapt advanced knowledge technologies specifically to support distributed scientific collaboration. CoAKTinG will provide tools to assist scientific collaboration by integrating intelligent meeting spaces, ontologically annotated media streams from online meetings, decision rationale and group memory capture, meeting facilitation, planning and coordination support, scholarly argumentation, and instant messaging/presence (see [5]). In this context, BuddySpace will evolve towards what is effectively a 'desktop radar' environment, providing rapid access to colleagues, documents, and devices of interest at the right place and the right time., This depends upon detailed knowledge of the end-users' preferences and work behaviour patterns.

Massively multiplayer games: The aim of this aspect of our work is to focus on the notion of presence of other players in massively multiplayer games and investigate the potential of a game based purely on presence information. This work attempts to explore the idea of a game where the very presence of a large number of people could not only be advantageous for the game itself, but actually form the fundamental premise of its play. The work is in an early state, and an indication of its progress is described in [7].

Conclusion

As the concept of 'presence' evolves, it is imperative that we understand how to provide presence management tools that enhance the end-user's experience. The BuddySpace project deploys a variety of innovative interfaces and concepts, including map-based rosters, ontologically-based match-making filters and 'desktop radar', to provide just such an enhanced experience. Early prototypes now exist, and a range of experiments, including use by Open University courses and the CoAKTinG project, will provide valuable feedback for future enhancements.

References

- [1] Eisenstadt, M. Freeman, A.J., & Buckingham Shum, S. *Large scale telepresence and knowledge management*. Symposium on Knowledge Management, Switzerland, Nov. 1996

- [2] Scott, P., & Eisenstadt, M. *Experiments in telepresence: the KMi Stadium and Webcasting experiences*. In M. Eisenstadt and T. Vincent (Eds.) *The Knowledge Web: learning and collaborating on the Net*. London: Kogan Page, 1998.
- [3] Eisenstadt, M., Price, B., & Domingue, J. *Software visualisation as a pedagogical tool*. In P. Brna, B. duBoulay, and H. Pain (Eds.) *Learning to Build and Comprehend Complex Information Structures: Prolog as a Case Study*. Norwood, NJ: Ablex, 1999.
- [4] Advanced Knowledge Technologies (AKT) Project: <http://www.aktors.org>
- [5] Collaborative Advanced Knowledge Technologies in the GRID (CoAKTiNG): <http://www.aktors.org/coakting>
- [6] Daniel, J. *Mega-Universities and Knowledge Media*. London: Kogan Page, 1998.
- [7] Directory of massive presence gaming: <http://kmi.open.ac.uk/projects/presence>

Contacts

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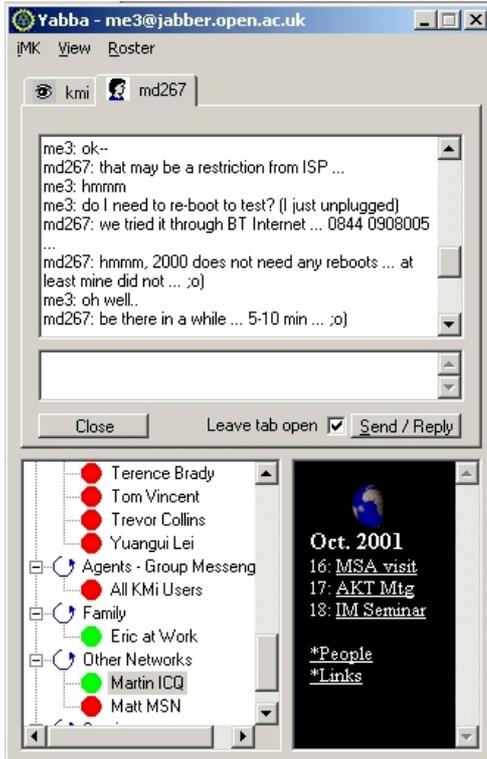
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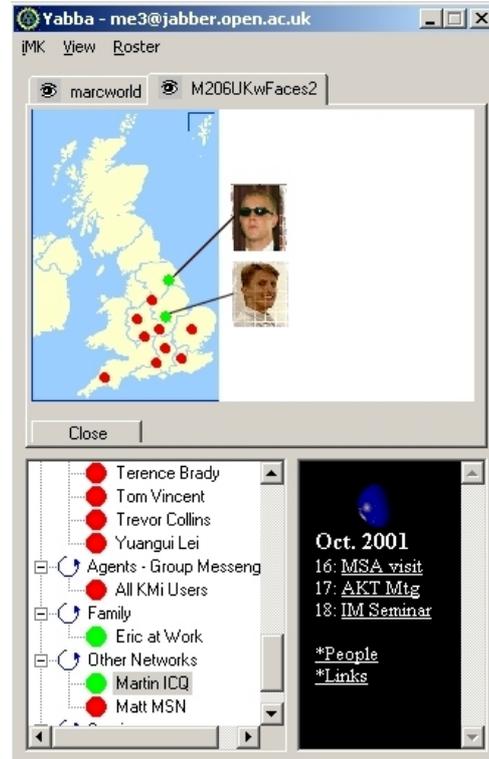
Web: <http://kmi.open.ac.uk/projects/buddyspace>

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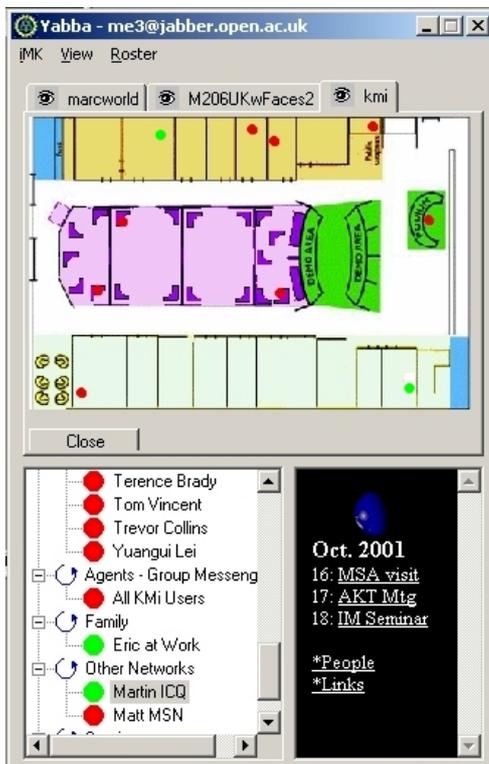
Appendix A: Close-ups of selected screen snapshots



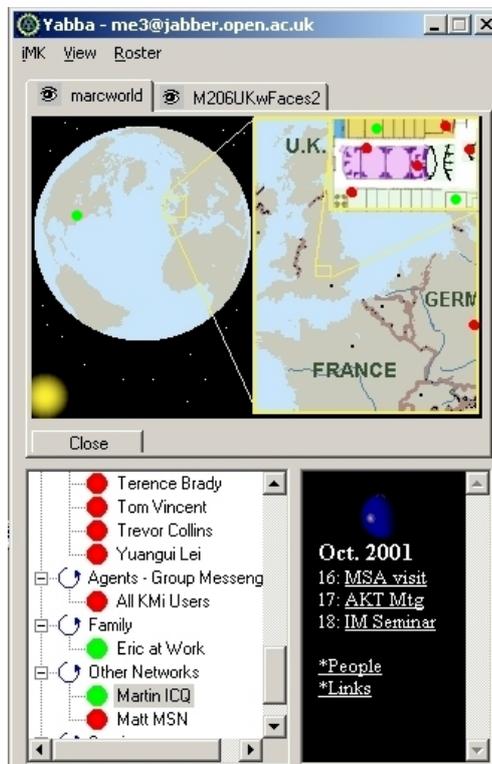
IM chat with mini-browser in lower right corner.



Map showing Martin and Eric online in the UK



Office floorplan showing only selected colleagues



Hybrid personal view showing world, Europe, and inset with own office floorplan.