Virtually Centralized, Globally Dispersed: A Sametime 3D Analysis

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ABSTRACT
Globalization has been making many companies expand their offices outside their national borders in order to maintain a competitive market share worldwide. With this strategy comes the overhead of managing globally dispersed teams that must function as a unit. To achieve this result without the overwhelming costs of air travel, most companies resort to technology, web conferences, phone conferences, e-mails and video conferences. Recently, a new form of interaction was made viable with the use of virtual worlds, enabling avatar-mediated communication and collaborative work in an immersive environment [2]. IBM is one of the companies that invested in this form of technology for the purpose of virtual meetings, collaborative work and training, and developed a system called Sametime 3D which integrates their Sametime messenger to a virtual world. This paper describes Sametime 3D and analyzes its features in the context of mixed reality meetings.

Author Keywords
Virtual worlds, virtual reality, FOSS, OSS, DVAS

ACM Classification Keywords
H.5.2 Information Interfaces and Presentation: Miscellaneous

INTRODUCTION
According to a survey conducted by Thinkbalm, an analyst firm focused on work-related use of the immersive internet, over 40% of the companies using immersive technologies saw a positive total economic benefit [4]. The study also showed that the alternatives considered for immersive environments were mainly web conferencing, face-to-face meeting, video conferencing and phone. These options were considered more expensive than immersive environments (which is the main reason why companies chose immersive technology), and less engaging. Communication scholars have also argued that using virtual environments for work purpose can increase productivity [13].

In 2006, IBM announced the investment of $100M in rising business areas, including virtual worlds [5]. This was the beginning of Sametime 3D. Over 2500 IBM employees and a variety of industries participated in pilot studies for six months, until the final system was released to potential clients on June 24th, 2009 [6]. Sametime 3D was also featured in the PBS (Public Broadcasting Service, an american non-profit television channel) Frontline documentary on a chapter dedicated to virtual worlds [11].

The main premise of environments such as Sametime 3D is the idea that online interactions are more productive if they take place within virtual reality that mimics the real world and that captures some data feeds from the real world, without capturing it in its entirety. Human presence is represented by avatars instead of video; those avatars may reproduce events in the real world (like lips movement when peope speak), but they establish a clear separation between the two realities. Designers are only starting to scratch the surface of the new possibilities that these systems present with respect to producing dual reality environments. What to mimic? What to keep separate? This paper does not provide any definite answers to these interesting questions; it simply gives more context for these questions by analyzing the concrete system Sametime 3D.

SAMETIME 3D
Sametime 3D was implemented on top of OpenSimulator, a multi-platform, multi-user 3D application server that began as a Second Life open source server implementation. A very important requirement that IBM had from its clients was the capability of delivering this service behind the clients firewall to guarantee privacy and security of information. OpenSimulator was a good match, as it can be deployed in the clients own server. The application was developed by IBM Research, and was called Virtual Collaboration for Lotus Sametime, or Sametime 3D.

The integration with the original Sametime application resulted in a unified user interface where creating virtual world meetings is as simple as creating a regular chat message.

*This work was conducted while the first author was working at IBM.

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Figure 1. Collaborative space. ©IBM

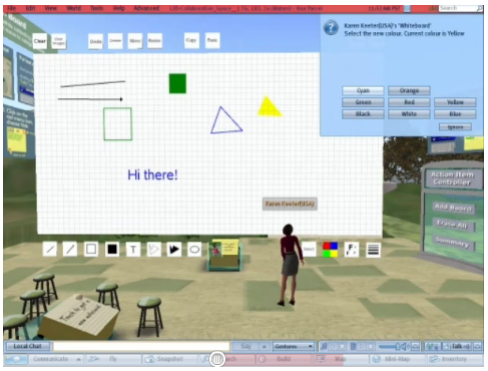

Figure 2. Whiteboard application in collaborative space. ©IBM

Users choose the participants of the virtual world meeting in their contact list. Conversation participants are automatically logged in and transported to the virtual meeting room. A web interface can be used to choose and load the meeting rooms.

In the virtual world, Sametime 3D provides the regular text-chat feature, as well as an optional spatial 3D voice capability (developed by Vivox). In the next subsections, the features of this application will be described, analyzed, and compared to other traditional methods of collaborative work settings.

Virtual Spaces

Users can choose from three different collaborative spaces: a theater-style amphitheater, a collaborative space or a boardroom. The amphitheater mimics a real amphitheater and is planned for presentation to large audiences. It contains many seats where all users can be positioned. The boardroom is intended to duplicate a real work-environment conference room, designed for a smaller number of users, but with the common immersive feeling of a real conference room. These two spaces are real-world representations that allow users to be immersed and have the look-and-feel that they are used to in real meetings, but do not bring any new functionality. In this paper, we will focus on the virtual collaborative space, see Figure 1.

Collaborative Space

The virtual collaborative space has all the tools that one would expect from a collaborative environment. The tools available in the virtual environment are a whiteboard, a screen that displays video and presentations, flip-charts, a brainstorming wall and an interactive polling tool. Real-life offices usually do not provide all these tools simultaneously in all conference rooms. Hence, these tools may make the Sametime 3D application attractive over real life spaces.

On the whiteboard, users can draw freely, save and load images previously drawn, use shapes like squares, triangles, circles, draw arrows, and other basic drawing functionalities one would expect from common desktop drawing tool software [14].

The screen allows for presentations in standard formats such as PowerPoint or ODP (Open Document Presentation, a standardized open format document) to be loaded through the web interface, and also allows video playback.

The flip-charts allow for text writing, importing and exporting. This feature is particular to Sametime 3D and OpenSimulator, as drawing on primitives is not a feature Linden Labs Second Life provides.

The brainstorming wall is an organizational tool where ideas can be posted as notes in an organized table manner. The table and notes can also be saved and loaded as needed.

The polling tool performs instant voting results based on user position in the voting physical spaces.

The virtual whiteboard, show in Figure 2, brings scribbling to the virtual world. Use of electronic whiteboards have proven to be a very effective form of shaping the abstract and creativity of users, improving learning, and performing collaborative work [7, 8, 10]. By bringing the whiteboard to its virtual version, users can collaborate as if they would in the real world. It is common to not only look the drawings, but also look at the participants movements. For instance, in a real world meeting, a person standing up next to a board will be likely to participate in the drawing soon, as where people sitting in chairs are simply observers. This pattern is likely to be followed by participants in a virtual world, as users react in the same social patterns as they do within the real world. [3]. This information is lost in a two dimensional ”screen-sharing” style of collaboration.

Real to Virtual

A relevant aspect of the Sametime 3D application is the flow from real to virtual. Tools that are brought from the real world, like the whiteboard, flipcharts, presentation screens and post boards, have the potential to change how participants perceive reality versus virtual, and allows the virtual to be believable. In return, when virtual is believable, users may act as if the situation was real, and may attempt to be more participative and creative, as if they were facing real people and the real tools, rather then being hidden behind usernames, encouraging anonymity and shyness [3].

In this sense, the first potential impact of these environments is behavioral. When participating on non-immersive and non-visual meetings, such as chat rooms or phone conferences, users will avoid exposure. Collaborating as if they were dealing with a machine, focus is lost on the task at hand when they are not being required to be actively participating. Through virtual environments, where collaborators are represented by avatars, and thus passing the notion of being face to face, users will tend to act more human towards others and will pay more attention to the scenario, as there are visual actions that encourage increased perception.

Compared to video-conferencing, Sametime 3D looses information from the real world. This loss is seen as potentially benefitial: IBM employees often participate in these online meetings from home, and video cannot avoid to capture their private spaces and context, such as people's living rooms, their clothes (e.g. pajamas), etc., which distract from the working environment of these meetings.

From a technical perspective, virtual environments can potentially appeal to people with real world aspects that allow the mind to easily be convinced that it is a real situation. The spatial voice tricks the mind into feeling surrounded by an environment. Presentations that are uploaded to virtual forms and displayed in virtual screens, similar to real world projectors, bring the emotional and physical sensation of a real meeting room. The benefits are mostly behavioral, since it allows for the mind to believe it's participating in a real conference with real people, as opposed to web conferencing, where the user perceives others only as nicknames and content only in the form of either recorded video or offline view.

It should be noted that these potential benefits are largely unproven, and only exploratory design and research will tell how effective they are. Specifically, the line between capturing data streams from the real world feeding them to the virtual environment and choosing to ignore them is very much an open design question.

IMPRESSIONS

A common complaint on traditional phone conferences with many employees is the difficulty of telling who is currently speaking, especially during first-time meetings. In virtual worlds, the communication channel has been improved thanks to:

- Visual symbols indicating the current speaker.
- Spatial voice, delivering an immersive sound experience.

Spatial voice increases immersion and enables users to filter conversations that are particular to a certain group and thus allowing a multitude of groups to share a same virtual region without interference. These Sametime 3D features are offered as a paid service from Vivox, but OpenSimulator currently supports an open source voice plugin called FreeSwitch. This plugin development was made by IBM developers at the time of Sametime 3D development, and was contributed back to the community.

In the marketplace, Sametime 3D had only a lukewarm effect, and, as such, market validation of the overall idea is inconclusive. The price (in the order of $50,000) might have been too high, particularly to smaller and medium business interests. According to the Thinkbalm survey, the largest benefit of using immersive environments is cost, so this high value may have made it less appealing when compared to other existing methods.

SIMILAR APPLICATIONS

As companies expand their borders in the world and travelling costs become significant, the market for similar applications as Sametime 3D is growing. To cite a few, *Amphisocial* [1] is a virtual world meeting application that is built on top of *realeXtend* [12], an open-source OpenSimulator mod, and Oracle's Wonderland Toolkit, another virtual world simulator. *MPK20* [9] is Oracle's version of a virtual workplace, based on their own Wonderland technology. Another very recent similar application, *Venuegen* [15], has improved graphics and functionality and is based on their own proprietary technology. It uses a photo of the user to create a 3D model, and allows for users to present facial expressions, body posture and other nonverbal language to perform communication between avatars.

CONCLUSION

Developed by IBM as an immersive meeting environment, Sametime 3D was an attempt at exploring the space of dual reality design for working environments. This space promises to be a fruitful niche for gaining knowledge about people's perceptions of reality, and for developing innovative dual reality products. Of particular interest is the set of decisions about synchronizing the real and the virtual environments. We use the word "synchronization" in a broad sense, to denote the number of design features related to bringing elements from one reality into another. A number of interesting questions arise. Which elements of the real world are effective to reproduce in the virtual environment? Do people use virtual whiteboards as they use whiteboards in the real world? Are the secondary cues of whiteboard usage (such as proximity) present in the virtual counterpart? What other data feeds, besides voice, are important to bring into the virtual environment? Is physical similarity between avatars and their human drivers important for these interactions?

We have only started to scratch the surface on the potential of mixed and dual reality design. Formulation of these questions is the driver for the exploratory design work that lies ahead.

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