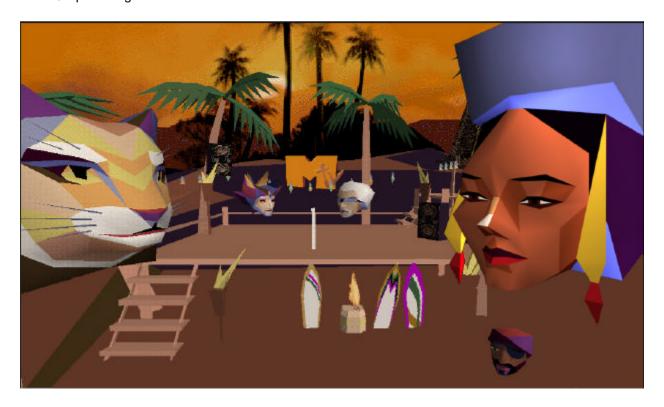# A 3D Natural Emulation Design Approach to Virtual Communities

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The design goal for OnLive's Internet-based Virtual Community system was to develop avatars and virtual communities where the participants sense a tele-presence – that they are really there in the virtual space with other people. This collective sense of "being-there" does not happen over the phone or with teleconferencing; it is a new and emerging phenomenon, unique to 3D virtual communities. While this group presence paradigm is a simple idea, the design and technical issues needed to begin to achieve this on internet-based, consumer PC platforms are complex. This design approach relies heavily on the following immersion-based techniques:

- 3D distanced attenuated voice and sound with stereo "hearing",
- a 3D navigation scheme that strives to be as comfortable as walking around,
- an immersive first person user interface with a human vision camera angle,
- individualized 3D head avatars that breathe, have emotions and lip sync, and,
- 3D space design that is geared toward human social interaction.

These techniques, which borrow from disciplines such as group dynamics, facial animation, architectural design, virtual reality and cognitive sciences, allow the system to draw from the natural social neural programming inherent in all of us rather than creating artificial, social-enabling user interface mechanisms. The main goal of all of these techniques is to support multi-participant communication and socialization.

Community comes from communication: 3D voice with 3D navigation
The structural process of a community, whether real or virtual, is communication, of which the most natural human form of communication is verbal. Verbal communication has both the explicit and the implicit message encoded in it. We therefore designed 3D spatial multi-participant voice with distance attenuation and stereo positioning. Avatars closest to you are heard the loudest; those to your right, louder from your right speaker. Using this approach the user interface mechanism becomes as simple as navigating towards the avatars you want to talk to and, thereby, away from those you no longer want to talk to, just like you would at a real cocktail party. By using spatial sound with 3D navigation, natural group dynamics situations occur; that is, several small circular conversational groups of 3 to 6 avatars form and dynamically reform depending on individual and group social preferences.

Avatar design: Binding the pair - You are your avatar.
Given the finite CPU/polygon/bandwidth resources, we invested them first in face-based avatars. The body with its hand gestures and body language is secondary for human communication and can be added as our resource limitations improve. The goal for us is what we call "binding the pair" -- binding the real person at the computer with his virtual avatar in cyberspace so she experiences this feeling of tele-presence, of really being there. You cannot believably bind a person with an inanimate object or a texture mapped photograph that does not emote. We tried to achieve "life" and believability with avatars that have autonomous blinking and facial movements (e.g. "breathing"), that lip sync to their voices and can display (at user control) a range of emotions.

We now have some early positive results that this technique is working because it has been noticed that users make "eye contact" with each other; they turn towards the speaking avatar and can feel uncomfortable when another avatar comes too close and "invades their personal space". This last point was very encouraging considering our goal of "binding the pair". If someone in real life comes within too close a proximity of you, you feel an uncomfortableness along with a physical tightening of your stomach muscles. This same sensation happens in the OnLive worlds showing that users perceive at some level that they are really there with other people -- avatars are perceived as beings not as objects being manipulated by other users on their home computers.

Evolving Issues: Getting beyond environment and into community creation.
Even if we have achieved all the goals I have spoken about here (which we are still far from doing), we would end up with users feeling they are their avatar, really in a place with other avatar beings collectively existing in the same virtual place. However, this merely provides infrastructure – the air, streets and buildings of a community, but not a community. As we have begun to tackle the infrastructure issues and are now getting thousands of people daily in our sites, we are just beginning to grapple with the social community issues. This requires the involvement of social engineers, cognitive psychologists, event producers, reporters and sociologists, to begin to understand the nature and requirements of a virtual community.