3-D Virtual World Technologies for the Digital Cities of Tomorrow

Panel Discussion on “Collaboration in Building Future Digital Cities”
Kyoto 2001.10.20

Katy Börner
Indiana University, USA
"How software is designed affects community development just as the architecture of a house affects those who live in it."

Jenny Preece, 2000
Why Using 3-D Virtual Worlds?

Because they enable to

♦ Create Collaborative (Meeting) Places.
♦ Connect Information to Place.
♦ Provide Multi-Modal Experiences.

Thus facilitating the creation of virtual places that are

♦ Highly usable (i.e., they provide intuitive and efficient access to information and information services).
♦ Sociable (i.e., they support effective communication and collaboration among inhabitants).
♦ Pleasurable.
Among them

- Virtual Helsinki (http://www.arenanet.fi/helsinki)
- Digital City Kyoto (http://www.digitalcity.gr.jp)
- Virtual Los Angeles (http://www.aud.ucla.edu/~bill/ACM97.html)
- Virtual Bremen (http://www.vc.org/deutschland/bremen/bremen/)

make already use of 3-D virtual real estate.

Others are in the works, e.g., Digital City Amsterdam (http://www.dds.nl).
See also
http://www.arenanet.fi/english/demos.html
However, we still travel long distances to attend symposia and workshops.

Let’s have a look at:

- Existing 3-D technologies.
- Standards.
- Discuss how technology influences interactions among inhabitants.
3-D D Technologies: Applications

- Entertainment
- Educational Uses (Support Networks)
- Business E-Commerce Solutions
- Research and Development Applications
3-D Technologies: Systems

- Sony’s Community Place
  http://www.sony.co.jp/en/Products/CommunityPlace/
- Active Worlds Technology by Activeworlds.com, Inc.
  http://www.activeworlds.com/
- Blaxxun's online community client-server architecture
  www.blaxxun.com/community
- Microsoft's Virtual Worlds Platform
  http://www.vworlds.org/
- Adobe Atmosphere
  http://www.adobe.com/products/atmosphere

(Many more are listed at http://vw.indiana.edu/tutorials/browsers/)

How many of you have explored those?
Basic Functionality

3-D Graphics Window

Toolbar for Avatar Actions

List of Worlds

Chat Window

Web Browser

3-D Virtual World Technologies for the Digital Cities of Tomorrow

Katy Börner, Indiana University
Desirable Characteristics

- Low price. Easy and fast download & install.
- Minimal hardware (disk space, processor power), software (multi-platform), bandwidth (modem) requirements.
- Technical stability & continuity.
- Handle large-scale terrain & high number of simultaneous users.
- Easy 3-D building & linking to 2-D Web space.
- User tracking and mapping facilities (log file statistics, world mapping, etc.).
- Personalization features (home pages, personal avatar, etc.).
Sony’s Community Place

Interactive virtual communication place where they can send or receive information freely and openly on a real time basis.

Teaching tool at junior schools and high schools.
Active Worlds Technology

3-D Virtual World Technologies for the Digital Cities of Tomorrow

Katy Börner, Indiana University
Active Worlds Technology

- Fast download, easy install, minimal system requirements.
- Supports large number of simultaneous users.
- Real-time object download based on proximity.
- In-world building (large object library).
- Large user community dating back to mid 90s.
- VLearn3D Conference (VLearn3D 2001 will be on Dec 1st).
- VLearn 3D journal in 2002.
Active Worlds Technology

- The "main" Active Worlds UniServer hosted by Activeworlds.com, with over 30,000 registered citizens, uses approximately 18 megabytes of disk space.
- An Active Worlds UniServer with 10 worlds and 100 users in it simultaneously would typically use less than 5% of the CPU of a 400 MHz Pentium.
- The bandwidth is on average 50 bytes/sec per user. UniServer with 100 simultaneous users requires approximately 5K/sec of bandwidth.
Blaxxun's Online Community
Client-Server Architecture
Blaxxun's Online Community
Client-Server Architecture

- Widely used.
- Will support X3D standard.
- Can't handle large-scale terrain.
- No in-world building.
MS VW Platform

NYU Interactive Telecommunications Program: Explorers of the Ancient World: Egypt

Fred Hutchinson Cancer Research Center: Social Support for Cancer Patients

3-D Virtual World Technologies for the Digital Cities of Tomorrow

Katy Börner, Indiana University
Several user studies have been conducted. (See also Cheng et al., paper on Vchat and VW Platform)

- Source code available for free.
- Active development stopped 01'.
- Install takes 20 mins.
Adobe Atmosphere
Adobe Atmosphere

- Will be used for AVATARS 2001 Conf.
- Browser plug-in is 5MB in size.
- Atmosphere builder requires 64MB of RAM and 24MB of hard disk.
- Can't handle large-scale terrain.
- No in-world building
CitiGrafix (http://www.citigrafix.com/) offers to create very large, high fidelity 3-D models of cities, e.g., 100+ database of the city of Birmingham, Michigan (similar to the database of Los Angeles maintained by UCLA).

Models can be viewed in real-time on a PC.
Viewing 3-D Models

PageDive (www.pagedive.com/)

- Online browser
- OpenGL supported graphics
- Multi-user environments
- Avatar customization
- No in-world building
Viewing 3-D Models

Eaon Reality Browser (www.eaonreality.com)
Viewing Large Scale 3-D Models

- Geonova (www.geonova.ch) demonstrates that a geography-based Web is feasible with today's PCs. Two impressively detailed models of Switzerland - one of the entire nation with 25-meter resolution and another of two central cantons at 50-centimeter resolution.

- TerraVision™ (http://www.tvgeo.com/) enables to browse huge datasets, in the order of terabytes using 3-D VRML and GeoVRML.
2. Existing Standards

- **IRC** (Internet Relay Chat) provides a way of communicating in real time ([http://www.irchelp.org/](http://www.irchelp.org/))
- **OpenGL**: 3-D Standard ([http://www.opengl.org/users/about/](http://www.opengl.org/users/about/))
- Web3D Consortium launched **X3D** open standard as a new-generation successor to **VRML** to bring rich and compelling 3D graphics to the Web for a wide variety of applications and devices ([http://www.vrml.org/](http://www.vrml.org/))
- **WorldForge** ([http://www.worldforge.org/](http://www.worldforge.org/))
3-D Virtual World Technologies for the Digital Cities of Tomorrow

Katy Börner, Indiana University

X3D

Is supported by

♦ blaxxun interactive (www.blaxxun.de).

♦ Nexternet focused on developing Web3D technology and core elements for 3D killer applications (www.nexternet.com).

♦ OpenWorlds™ Inc. developing Web 3D apps and OpenWorlds AppKit for scalable apps for laptops to kiosks to fully immersive VEs. (www.openworlds.com).

♦ ParallelGraphics developer of integrated rich media 3D technologies for the Web and wireless device-based markets (www.parallelgraphics.com).
Massively Multiplayer Online Games

♦ Asheron's Call - an epic, role-playing adventure (http://www.microsoft.com/games/zone/asheronscall/)
♦ Everquest - incredible fantasy and adventures await. (http://everquest.station.sony.com/)
♦ Ultima Online - explore, battle, and enjoy the vast world of Britannia (http://www.uo.com/)

How many of you have played them?
WorldForge

♦ **Aims** to develop a complete system for massively multiplayer online role-playing games.

♦ **Mission**: produce 3-5 innovative, graphically rich games of cooperation and socialization, by the end of 2002, that help blur the distinction between player and maker, and to establish a positive community environment for current and future free game developers.

♦ **Strategy**: Listen to what players wish to do, and put the tools in their hands that makes it possible for them to make it so.

(Source: [http://www.worldforge.org/](http://www.worldforge.org/))
3. Mediating Technology & Inhabitant Interaction

The design and structure of the virtual environment impacts the nature of social interaction of its inhabitants.

3. Mediating Technology & Inhabitant Interaction

Address the unique needs of your community:

- What is the goal of the community?
- Are users looking for entertainment or are they trying to solve a problem or address an issue?
- How much attention and time are the key group of community leaders willing to commit to a virtual world?
- How large is the core user population?

Community Building

The 9 principles of community building by Amy Jo Kim:
1. Define the PURPOSE of the community.
2. Create distinct, member-extensible GATHERING PLACES.
3. Create MEMBER PROFILES that evolve over time.
4. Promote effective LEADERSHIP.
5. Define a clear-yet-flexible CODE OF CONDUCT.
6. Organize and promote CYCLIC EVENTS.
7. Provide a RANGE OF ROLES that couple power with responsibility.
8. Facilitate member-created SUB-GROUPS.
9. Integrate the online environment with the REAL WORLD.

(Source: http://www.naima.com/CS377B/template.html)
Community Building

The 9 principles of community building by Amy Jo Kim:

1. Define the PURPOSE of the community.
2. Create distinct, member-extensible GATHERING PLACES.
3. Create MEMBER PROFILES that evolve over time.
4. Promote effective LEADERSHIP.
5. Define a clear-yet-flexible CODE OF CONDUCT.
6. Organize and promote CYCLIC EVENTS.
7. Provide a RANGE OF ROLES that couple power with responsibility.
8. Facilitate member-created SUB-GROUPS.
9. Integrate the online environment with the REAL WORLD.

(Source: http://www.naima.com/CS377B/template.html)

- Persistent identity contributes to accountable behavior and establishment of trust.
- Synchronous chat requires critical mass.
- (Non-threaded) chatting is ineffective for large scale discussions or exchange of large amounts of information.
- In world building enables user driven adaptation & customization.
- Finding people, information, and activities of interest has to be easy.
Worlds are Like Children

- It is fun and exciting to conceive them.
- It takes hard work to give birth to them.
- Both require considerable amounts of time, energy, and support before they can take care of themselves.

You would not leave a 3 year old child alone. Don't leave a 3 year old user community either.
**Acknowledgements**

Several **graduate students** are involved in this research including Sy-Miaw Lin, Yu-Chen Lin, Min Xiao, Raghu Mukkamalla and students taking L578.

This research is supported by

- AVL/UIITS, IU collaborating with SLIS to bring up an AW universe server for IU faculty in Fall 2001.
- ActiveWorld providing free hosting of 3-D VWs and an active research environment in EduVerse.
First International Symposium on "Collaborative Information Visualization Environments"

Organizers:
K. Börner, Indiana University & R. Navarro-Prieto, Motorola

Program Committee:
C. Chen, H. Chen, J. Leigh, T. Erickson, Y. Rogers, S. Mukherjea

Preliminary Call for Papers

For more information please consult
http://www.graphicslink.demon.co.uk/IV02/