

3D World Competitive Analysis

**Croquet Project Team
George Mason University
November 2007**

**Copyright to Project Team Members
Tiffany Taylor and Kim Duclos**

Purpose

To collect and baseline information about the leading 3D immersive worlds and analyze how they handle typical user interactions. This information is then compared with what we know about Croquet.

Methodology

There are dozens of 3D worlds available to the general public now. We researched the internet to find out which worlds had the most “buzz,” and narrowed that list down to a list of worlds that were a) already established (as opposed to some that generated interest but were not yet running); and b) fit the target audience of educators. The final list consists of 3 contenders to compare to Croquet. Further analysis of that final list consisted of installing and using each environment, and recording data for particular categories. This data provided insight on how current virtual worlds function for an end user and provided valuable first-hand experience on what features an end user might prefer or reject. Additionally, we surveyed educators who are members of a listserv dedicated to using Second Life in education, to get a sense of what current practitioners are looking for in a 3D world. The survey generated 33 responses from experienced educators using an online world, and produced many ideas for features to include in 3D environments.

The Competitors

A) Second Life

We chose Second Life for two reasons. The first is because it is the most famous 3D world currently on the market- when people think of 3D worlds, if they don't think of video games, they think of Second Life. The second reason is that several active communities of educators have already formed around the product, which means this is a product educators have determined that they can and should work with to build new learning opportunities.

B) Active Worlds

Active Worlds is the oldest 3D world on the market. Though it doesn't have the clout that Second Life has, it has a solid interface, over a decade worth of effort behind it, and a small but loyal following.

C) There.com

Besides Second Life, There.com garnered the most amount of hits and “buzz” on Internet searches, indicating it was quite popular. Newer than Active Worlds, but older than Second Life, it falls in the middle of the spectrum. However, further analysis would determine that There.com’s heyday is over.

Contenders Not Included in the Analysis

3D has become very popular, and a number of worlds were considered and ruled out for a variety of reasons.

A) HipiHi

HipiHi is a China-based 3D world, and consequently most of the information is in Chinese. Reports are that the interface is also in Chinese. This makes it unfeasible to analyze.

B) MeetMe

We elected not to evaluate this product because 1) it is not scheduled to launch until December of 2007 and 2) it is a Japan-based world and thus likely to be all in kanji, making it impossible to review.

C) World of Warcraft

Though extremely popular, this was ruled out because it is a game and thus has underlying goals in a way that a 3D environment does not, even if the user does not accept those goals. Goals require a different rule structure, making this fundamentally different from a non-game 3D environment.

D) A World of My Own

This world is designed especially for gamers and would have been interesting to review, as gamers tend to be more sophisticated in interacting with interfaces; however, it has not yet launched to the public.

E) OpenSim

This project has issues similar to Croquet in that it is developer-based. It has not developed a community of end-users; the documentation is hard to read; and no one knows how to install and use the software effectively.

F) Alice.org

Alice.org is a program for teaching programming in a 3D environment, but is not an online collaborative world, so it was ruled out of the analysis.

Suggestions from Educators

We conducted a survey of educators currently using a 3D virtual world (in this case, Second Life educators who are members of the Second Life Educators mailing list). The survey generated 33 responses and we have synthesized that data into recommendations for improvements on basic functionality, requests for new features, and notations on how 3rd party software is currently being used in conjunction with Second Life. This data provides a more complete picture of how educators are currently using virtual worlds and how they would ideally like to use them; and can be used by Croquet developers to build desired functionality in Croquet and avoid functionality issues that are seen as a barrier to effective virtual learning currently exhibited by other virtual worlds.

Improvements on Basic Functionality

- Minimize lag time and server downtime.
- Make it easier for new members to learn the interface.
- Install procedures to deal with “griefers” and other social problems in-world.
- Allow for customized orientation sessions.

Requested New Features

- Ability to set up a “class” of avatars to use that the teacher can set up and create to their specifications.
- Ability to work with a whiteboard, and other programs such as financial spreadsheets, word processors, wikis and blogs in-world.
- Concurrent editing of in-world tools.
- Ability to open a portal into another place and go there (like Croquet).
- Technology improvements (low spec hardware, low bandwidth, server overloads, security, open-source)
- No constraints for users such as teen grid/main grid segregation.
- Ability to use a mouse or a joystick to move through the world.
- Ability to prepare builds out of world and then import them into the world.
- Ability to export builds from the world for use in out-of-world contexts.
- Ability to transfer avatars among 3D environments.
- Language-specific GUIs and real-time translation.
- 24/7 presence 'bot' representing the instructor to the students that they could interact with at any time
- Translation of emoticon commands from user into visual facial expressions on avatar.
- Functional, fictitious bots that could interact with students during role-play scenarios.

Tools Currently Used in Conjunction with Second Life

- Babblar - A mashup between Second Life and Yahoo! Pipes that allows chat sessions to be translated.
- Skype – A program that allows users to make telephone calls from their computer to other Skype users free of charge, or to landlines and cell phones for a fee. Additional features include IM, file transfer, short message service, video conferencing and its ability to circumvent firewalls.
- Vivox – A service that provides online games, virtual worlds and other online communities with robust, integrated voice chat, video, Instant Messaging (IM) and in-world presence.
- Moodle – A free, open-source content management system.

Conclusions

The ideal virtual world would include features that educators are asking for- some features which Croquet has already built. This feature set would be combined with the sophistication and marketing of Second Life and the ease of use of Active Worlds. Croquet should take lessons from Active Worlds in making the program easy to navigate for novices and comfortable for users to participate in. It should also incorporate from Second Life the variety of advanced tools and ways to build objects that are currently supported by that world, the effectiveness of an attractive interface that draws the user into the world, and lessons learned from the Linden Lab team about effective marketing and community building.

Comparison Chart

	Croquet	Second Life	Active Worlds	There.com
Launched	Still in development	2003 (according to http://secondlife.com/whatis/)	Beta began in 1995. Officially launched in 1997 (according to http://www.virtualworldsreview.com/activeworlds)	2003 (reconstructed timeline based on information from the press releases at http://www.there.com/press.html)
Website	http://www.croquetconsortium.org	http://www.secondlife.com	http://www.activeworlds.com/	http://www.there.com
Overall ease of use for beginner to access	Difficult. Requires being very comfortable with your computer. If your graphics card isn't quite right, it requires having enough computer savvy to edit the registry. Even once it is installed, it can be confusing to use and there is little documentation for an end user.	Somewhat difficult to get started as many people get stuck on Orientation Island. Even with years of gaming experience, the program took some time to get used to. The Orientation Island feature borrows from the "training level" of video games, but is poorly implemented.	Relatively easy to get started in. There is no tutorial such as Second Life's Orientation Island but the interface is much simpler.	Mostly okay but to read the privacy policy one has to leave the registration screen and the program won't allow one back in, unless one goes back to the homepage. Thankfully, it remembers where in the session one was and continues from that point. Also, after registration it doesn't launch the application as other sites do. It leaves one in an interface that looks similar to a browser but not exactly. When one clicks on a link from there it tells one that it is necessary to have the 3D client open already, which requires a re-launch of the program. This is not the easiest implementation for users who are not technically inclined.
System type	Open-source	Proprietary	Proprietary	Proprietary
Membership costs	Free to join for end users.	Free to join for a basic account. A premium account (for a general user) costs 9.95/month or 72.00/year and gives you the ability to own land and access to premium user support services. Discounts are available for educators and non-profit organizations.	Free to join for a basic (tourist) account and 6.95/month or 96.95/year for a citizen account that allows a permanent user id, unlimited access, ability to own and build property that persists over time, more avatar choices, more options for communicating with other citizens and rights to post on community message boards.	Free to join for a basic account. A premium account is a one-time 9.95 charge.
Starting point	The Croquet menu screen from which one picks what world one	Orientation Island for first-time users. Every time after, the user starts	AWGate world	There.com Visitor's Guide webpage shows up but otherwise one is stuck in a no-man's land when one first begins.

	wants to enter.	off where they finished their last session or the user can set a “home” starting point.		Every session after the first one starts the user at the place they ended their last session.
Community of practitioners	Community of developers established. There is not yet a cohesive community of end users or educators.	Many listservs, wikis, websites and forums.	A few wikis and forums.	None established.
Used for education	Yes. Several schools have projects in development.	Yes. Educational listservs, an educational wiki, and many in-world projects run by educators and accredited institutions are available.	Yes. There’s an educational version called Active Worlds EDU that has 61 worlds. It did not appear that any were run by institutions though a few looked like they might be run by a particular class. However it was hard to tell as the names are only 8 letters and there are no descriptions for the worlds, and most of the worlds were empty or inactive.	Possibly. Press releases report a partnership with New York Law School to offer classes through stateofplayacademy.com . However, exploration of that website shows no updates since spring.
Organizing spatial metaphor	Worlds accessed by portals.	Islands	Worlds	Places. These are on islands and categorized by landmark, hotspot, hangout, neighborhood, waypoint, fun zone.
Basic avatar customization	Demos show a girl and a giant rabbit as possible avatars, which indicates that full avatar customization will likely be possible.	Can choose from 4 male and 4 female choices, and then customize hair, skin, facial features, etc. Can find free clothes or non-human avatars at free shops quite early on.	Start out with either a male or female tourist. All are dressed in khaki shorts, Hawaiian shirts and a hat. To get avatar customization, one must upgrade to the pay service, then pick the avatar from the ones offered for that world. To get a fixed avatar available in all worlds, must buy a Personal Avatar (PAR).	Upon starting, one chooses from 3 female and 3 male avatars and the only choices are blond, black or brown hair and vanilla, caramel or chocolate skin tone. Further customization can happen later at a spa. However, no spa was found during research to determine how much one could customize their avatar’s appearance.
Non-human avatars	Yes	Yes	Yes	Cannot verify with certainty, but evidence indicates no.
Can run 3rd party software in-world	Yes. Can run any 3 rd party software inside because it is a virtual OS.	No. Audio and video can be streamed through it, and people have made games to play inside it (for example, Tringo), but there is no inherent ability to play other applications in-world. Even web browsing is done separately from the Second Life window.	Web browser runs in a window on top of the screen for accessing web.	No

Content levels	No info available, but given the educational nature, adult content levels can be reasonably excluded from possibility.	In theory there are PG worlds and Mature worlds, but in reality there are no clear boundaries and mature content can be found on all islands.	G, PG, PG-13, R, X, though there are no worlds above a PG listed on the tourist index and during the conversations I participated in, the cultural norm was to discourage any talk or behavior that can be construed as offensive. Clothes cannot be removed from the avatar.	No discernable content levels. Out of the 2 places and 5 people I found, mature topics and profanity were evident.
Inventory	No clear evidence of inventory capabilities.	Yes, for clothes, objects, scripts, vehicles, houses, note cards, etc.	No	For clothes, makeup, accessories and gear.
In-world currency system	No	Linden Dollars	Shopping is available according to the website but is nonexistent according to participating members.	ThereBucks
Voice chat available	Yes	Yes	Yes, though up to the world owner to enable it. It is very rare for a world to use voice chat in Active Worlds.	Only with a premium membership
Video support	Yes. Supports streaming video and webcams.	Supports streaming video through QuickTime.	Supports streaming video through Windows Media Player, though it is not widely used.	Not able to verify.
Machinima	Yes	Yes	Yes	Not able to verify.
Sound files supported	Yes	Yes	Yes	Yes
Ability to customize	High, based on information from the developers and the website.	High. Tools are available for building objects and scripting actions.	High. Tools available for building objects.	Low. No evidence of ways to “mod” objects.
Bandwidth issues	With a peer-to-peer network, the pipeline will be shared among all computers, thus reducing bandwidth issues.	Huge lag times on islands that are heavily visited and frequent outages. During one test, the lag was so bad it slowed down the whole application to a crawl. No way to check how many people were in-world, but every place visited had at least 15 people in the immediate vicinity, which is crowded for a virtual world.	Very minor lag in some conversations, comparable to what one would find in a text chat room. This is likely due to the fact that there were only 156 people in the entire environment at the time.	No lag, but in 2 hours I only found 5 people and there’s no way to check to see how many people are in-world.
Listed system requirements	Runs on all major platforms (Windows, MacOS, Linux). Graphics card: 32 MB	Broadband internet Computer memory: 512 MB or more. PC: Microsoft Windows 2000, XP, or Vista with an	Broadband internet Microsoft Windows 98, NT, Me, 2000, XP or Vista (The Active Worlds browser does not work on Mac or Linux).	56k Internet connection IE 5.01 or later Microsoft Windows Vista, XP, 2000 with 256MB RAM and 500MB free hard disc space and a graphics card

	<p>of memory with hardware/driver support for stencil buffers and at least 16 bit depth buffer (32 bits better) while under OpenGL 1.3 and higher. Must install OpenAL.</p>	<p>800 MHz or better processor. Mac OS: Mac OS X 10.3.9 or better with a 1 GHz G4 or better processor Linux: 32-bit Linux environment with an 800 MHz or better processor.</p> <p>Graphics card: nVidia GeForce 2, GeForce 4 MX, or better or ATI Radeon 8500, 9250, or better</p>		<p>with 32MB of VRAM and supports DirectX 8 (Mac and Linux not supported).</p>
<p>Identity Authentication</p>	<p>Plans are underway for authentication servers that would require student authentication for entry into the world.</p>	<p>No. Users can have multiple accounts. Though the site says that Linden Lab may require you to submit proof of identity in the account registration process, in reality if you register for a free account you do not provide a credit card, and thus there is no way to identify you as a unique individual.</p>	<p>No. Users can change their name and email address every time they log on.</p>	<p>Users can sign up for multiple accounts. It's not tied to a credit card or any other verification system.</p>
<p>Method of movement</p>	<p>Walking is the only method seen in demos, and it is done through keyboard. To drive your avatar around, press and hold the right mouse button within the Croquet window, at some distance from the center of the window. The closer your mouse is towards the top, the faster you move forward. The closer your mouse is towards the bottom, the faster you move backwards. Similarly for turning</p>	<p>Movement is done only through the keyboard. The arrow keys control direction. When flying, page up and page down control altitude. Users can walk, fly, sit, or drive a vehicle. Ctrl-R will make the user walk faster (doesn't affect flying). User can also select "Movement Controls" from the "View" menu to see an 8-part movement interface that allows for slightly finer control and can be used by clicking on arrows.</p>	<p>Users can use either the keyboard or mouse, or both simultaneously, to move. Holding the Ctrl key will make the user move faster. Users can walk, fly or use a vehicle, called a "Mover." When using the keyboard, the up and down arrow moves the avatar forward and back. The left and right arrow keys shift the camera, and the user then pushes the up arrow to continue forward. To move side to side, hold down the shift key while using the left and right arrow keys. To stop instantly (used for precise positioning), push the 5 key on the keypad. Can move through objects by holding the shift key and pushing the number keys.</p>	<p>Users can use the keyboard to move. Users can walk or float or drive a vehicle. When using the keyboard, the up and down arrow moves the avatar forward and back. The left and right arrow keys shift the camera, and the user then pushes the up arrow to continue forward. To move side to side, hold down the shift key while using the left and right arrow keys. To run, hold down the ctrl key while walking.</p>

	left or right. If you also hold down the shift key, you will look up and down rather than moving forwards or backwards, respectively.		When using the mouse, push the mouse forward and backward to move, and left and right to pan.	
Movement between locations	Users can open a portal to a new world anywhere.	Users can teleport between islands by typing in a SLURL or by searching for a site and clicking “teleport” in the dialogue box	Teleport by clicking Teleport and typing the name of the world, or opening the teleport tab and choosing a world.	Multiple methods- can click “Places – Find a Place” to see common places; “Places – Map” or “Explore the World” to get a map from which you can click on a place to teleport there.
Viewpoints/Camera angles	3 rd person: the camera is behind the avatar. No information available about how customizable camera angles are.	3 rd person: the camera is behind the avatar (default). Mouse Look: the camera looks through the avatar’s eyes. Also, can use “Camera Controls” to customize a view of the avatar along the x, y and z axes, however, once the avatar moves, the view reverts back to 3 rd person.	1 st person: the camera looks through the avatar’s eyes. This is the default. Overhead: the camera is behind and above the avatar. Chase camera: the camera is directly behind the avatar. Front camera: the camera is in front of and facing the avatar.	Aerial view: the camera looks down from above; the avatar isn’t even visible. There are 5 zoom levels in this view- low, medium, high, super, world. Standard: the camera is behind the avatar. Body mirror: camera several feet in front of and facing avatar- can see whole body. Face mirror: same thing as body mirror but zoomed in to show only the face. 1 st person: through the eyes of the avatar.
Gestures	Demo video shows gestures. Screen shots don’t show an inventory of movements but movements will likely be scriptable.	There are 30 standard gestures for men and 36 for women. Other gestures can be scripted.	There are a handful of gestures. They change depending on the world and there are never more than 10 at a time. No evidence of whether they can be scripted or not.	Gestures are broken down into “flirt (8),” “banter (9)” “gestures (9),” and “movement (5).” Cannot be scripted, but movements can be combined together to create hybrids.
Text communication with others	Whisper, chat windows	Typing in a chat window to chat and click “say” (or hit enter) to talk to those nearby or click “Shout” to talk to people a distance away.	Typing in a chat window to chat and hit enter for others to see it. Anyone within 200 virtual meters can read what you “say.” To say something to only one person, you can use “Whisper” mode which allows only the person you specify to hear what you said. There’s also a telegram feature that allows you to send a message to a buddy in another world.	No chat window, just start typing. It appears automatically in a balloon above your head as you type. Chains of balloons with your conversation show over your head and anyone within a several meter radius can read the conversation. This is problematic for anyone who wants to think about what they are typing before they telegraph it. For multi-party conversations there actually is a chat window.

				Conversation members can be distant enough from each other that they are not visible to each other.
Keeping track of people	Contacts List. Can also lead people, follow people, or join groups.	Create friends lists and join groups.	Create a “users” list.	Communicator list; join groups.
Interacting with objects	Click on them.	Click to view notes, websites and videos. Right-click for a context menu to use or edit objects.	Click to use. Right click to modify.	Click to use.
Proximity-based volume	Yes	No	No	Yes
Finding places within a world	Can search on people, places or things	Search dialog allows searches by people, places, or groups.	Opening the teleport tab and choosing a world.	Multiple methods- can click “Places – Find a Place to see common places; Places – Map or “Explore the World” to get a map from which you can click on a place to teleport there.
Member numbers	Not available	10,678,556, with 999,667 logged in during the last 30 days (as of November 1 st , 2007 according to http://secondlife.com/whatis/economy_stats.php)	70,000 reported registered citizens (according to http://www.activeworlds.com/info/index.asp). 603 worlds with 156 users in the main active worlds and 61 worlds with 3 users on the educational side (direct observation).	1 million registered users, according to http://www.kzero.co.uk/blog/?p=961 (July 2007).
Overall impressions	Due to the focus on education and the determination to revolutionize computing rather than making a profit at the expense of innovation, they have the potential to do well. However, currently they are hampered by a product that is only semi-functional, difficult to use and primarily supported by developers.	There were many things to do and see. The glitches in Orientation Island made it feel more difficult and overwhelming than it needed to be. There were people everywhere I visited. However, the racy content even in PG sections can be a turnoff. However, it shows great potential for allowing personal creativity. The question remains whether the “wild west,” “anything goes” extreme of creativity that is evident now will overwhelm it, or whether the creativity can be harnessed constructively	This world felt very comfortable to use and move around in due to its simple interface, but it was clear from talking to residents that there were many opportunities to build your own worlds and objects without programming help. The differentiation between visitors, citizens and public speakers made it very easy to seek out live help, so I got answers right away. The clear establishment and social enforcement of conservative social norms by established members can either be seen as creating a safe harbor for educational ventures or as stifling depending on context and viewpoint, but it looks like it can be a good educational medium.	There were no apparent tools to build or radically customize objects. The lack of a central point or hub, the numerous categories for places and the multiple ways to access places made me feel quite lost. Also, again perhaps due to lack of a central point, I could not find a single soul to talk to. When I tried to teleport to a conversation, I got an error message. This platform feels more appropriate to teenagers looking to chat and hang out than as a venue for a serious educational venture.

		<p>through current and future educational and commercial partnerships. Unfortunately, having no clear way to distinguish mentors or older residents from novices makes it harder to find information.</p>		
--	--	---	--	--