



The Metaverse 2.0

“The Metaverse 2.0 will be a vast collection of millions of interconnected 3D environments built using various 3D authoring products.”

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INTRODUCTION

Over the past two years, there has been a significant resurgence in 3D and virtual worlds. A measurement of this resurgence can be seen in the increasing monetary value of virtual properties.¹ Articles about Second Life, the popular 3D virtual community, have appeared in USA Today, The New York Times, PC Magazine, and Fortune magazine during the last two months², showing not only that their marketing machine is very powerful, but also showing the rising public demand for a 3D virtual world solution.

The development pattern of the Metaverse can be predicted by the development pattern of the internet and the WebPages and sites that make it up. Why do people visit websites? The simple answer is; because they are interested in the content residing on those sites. The same applies to 3D environments. Viewers visit 3D environments that provide content they are interested in. 3D environment designers naturally wish to provide visitors with a rewarding visit, ensuring that the visitor is able to do or find what they came for.

While many 3D solutions exist, comparing these products can seem as logical as comparing chalk and cheese. In the blink of an eye, the world of 3D and virtual environments has changed. The purpose of this document is not to detail the current state of collaborative virtual environments or how products such as Second Life are being used, but rather, to consider some of the problems of the Metaverse 1.0. For those who are planning the future, this document will offer guidance on the key ingredients for a successful Metaverse 2.0

WHAT IS THE METAVERSE?

For those new to the term, the “Metaverse”, it is a concept conceived by Neal Stephenson and described in his book “Snow Crash”³. Stephenson had shown remarkable vision, considering that in 1992, the time of publication, the World Wide Web was only available to limited government and educational establishments. In his book, Stephenson describes a virtual world called the Metaverse which people log into from their computers using special goggles to visualize it. In the world, the people are represented by avatars; 3D renditions of themselves. The center area of the Metaverse is the Street, the main road which loops around the equator of the Metaverse. The Street is lined with buildings and bright neon signs. There are side roads off the Street and people (builders) with planning permission can create their virtual buildings. Everything is there from night clubs to shops and residential buildings. Anyone who is anyone has an address in the Metaverse.

In recent years, many people and companies have spent considerable time and effort trying to reproduce this vision, or variations thereof, with different degrees of success. A few examples of such companies are, Second Life, There.com and Active Worlds. Although Active Worlds was one of the pioneers, it has since been eclipsed by the commercial success of Second Life which reportedly has around 1 to 2 million active users⁴.

Another visionary author that must be mentioned is William Gibson, who wrote eight years earlier in his book *Neuromancer*⁵ about virtual reality and jacking into a matrix grid. His writings have also inspired many of the designers in the virtual reality community.

Stephenson's description of the Metaverse is perhaps how the majority of designers may like to envision the future of virtual environments. His idea, although providing an excellent starting point, does not begin to encompass the true potential of what the actual Metaverse could be. The Metaverse has the potential to be much richer in culture and content than is suggested in his novel. The Metaverse can provide a place for training, education, music, art, theater, commerce, virtual heritage, games and more.

WHY IS IT "METAVERSE 2.0"?

Just as the Web has been versioned Web 1.0, Web 2.0 and now Web 3.0, it is important to version the Metaverse. It helps to define the stage of evolution that we have reached and when new technologies are coming on stream. But just as people can not completely agree on what is in Web 2.0 and what will be in Web 3.0, the same will apply to the Metaverse.

Metaverse 1.0 started around 1995's with VRML 1.0 (Virtual Reality Markup Language), continuing with VRML 2.0 in 1997 and Adobe Atmosphere in 2000 and culminating with Active Worlds and Second Life. It's been a bumpy ride, VRML and its successor X3D has not seen the success that many had hoped for. Adobe discontinued Atmosphere in 2004. Non Web products like Active Worlds came on strong initially, closely followed by Second Life which languished until fairly recently when they added an economy and the concept of Intellectual Property. A more recent entrant has been There.com. Various people have heralded all 3 companies as being the true Metaverse.

In 2007, we are starting to see problems. Active Worlds seems to have been frozen in time, There.com is creating custom versions of their product for MTV and the government and Second Life is suffering from scalability problems, lack of control and dated looks. People are beginning to wonder what's next and the answer is Metaverse 2.0.

What about standards?

People have been trying to come up with standards for Web 3D for over 11 years and the results are less than impressive. Consider this quote from Jaron Lanier who is considered by many to be the "father" of Virtual Reality, "VRML, for example. Utterly useless stuff."⁶ Admittedly he was talking about its use in Virtual Reality but I think he may have a point there.

X3D and its predecessor VRML have been miserable failures, even though proponents would vehemently deny it, there has been much negative critique⁷. With all the new related 3D products that are coming on line, how many are using VRML or X3D?

In order to get around limitations in the X3D standard and, in an attempt to get more companies on board with the standard, the concept of extensions was added. This means that a vendor could add their own extensions to the X3D standard. While this appeared to solve the problem of standards stifling innovation, the result was a non-standard. You needed viewers from different vendors to view environments that contained extensions. So now when surfing the web you need to have multiple web browser plug-ins on hand to handle the different extensions that now exist. From my perspective, this has defeated the concept of a standard.

What is the difference between Web 3D and the Metaverse?

For me, the definition of Web 3D is becoming distorted which is why I do not tend to use the term in this document. People often associate Web 3D with the Web3D Consortium, the people behind the so called X3D standard⁸. I have also seen a number of cases where people have stated that Second Life, There.com and Active Worlds, etc. are all Web 3D. However, as none of them actually run on the Web or in a Web browser, maybe the correct term that should be used to group these sorts of companies together is Internet 3D.

To some, this may seem like splitting hairs. However, as people start to talk about the future of the Web and Web 3.0 and 3D, they need to be careful when suggesting that Second Life is the epitome of Web 3.0. It can never be, as long as it does not run in a Web browser and use Web protocols such as HTTP.

For me, the term Web 3D should be used for 3D products that actually run on the Web using Web protocols and inside a Web Browser. Web 3D can be used to describe a single isolated 3D environment on the Web. However, when multiple 3D Web based environments are linked together they start to form the Metaverse 2.0.

THE METAVERSE 2.0 DEFINED

I believe that the Metaverse 2.0 will be cosmopolitan, meaning: it is not a single, monolithic 3D environment like Second Life or There.com. Rather, it will be a vast collection of millions of interconnected 3D environments built using various 3D authoring products. When we created Blink 3D, it was with this view of the future in mind but, given the nature of the Metaverse as described, will surely be joined by other software tools in the future as they catch up to this concept.

The 3D environments themselves will be as varied as the 2D Web is today. 3D environments for education will be added, in addition to games, chat, virtual heritage environments, collaboration areas, pre-visualization, personal home environments and many others. There will also be 3D environments that are non-immersive, environments where an object in the environment can be viewed and rotated but nothing more. These environments could showcase commercial items such as the latest footwear styles or mobile phones to 3D representations of historic artifacts.

There are already thousands of 3D environments in existence today, some linked to each other and some not. Over time, as the numbers increase, they will start to clump together. This phenomenon has been seen before in a little something called the Web. The clumps will form around vertical applications, games, virtual heritage, education, training, art, music, video, etc. As these clumps start to get bigger, they will join with other vertical application clumps. This process will continue until critical mass is achieved. This critical mass is the Metaverse 2.0, and it is already beginning to take shape.

Critical mass is the point where users can surf the Metaverse for hours each day and not visit the same 3D environment twice. Critical mass is the point at which it becomes nearly impossible to keep track of all the new 3D environments coming online, just as it became hard to keep track of all the new websites that have come online.

There will be concentrators, used as jumping off points to other environments. These concentrators will be 3D environments with links to other 3D environments. These will be grouped or categorized, just as Web portals are now.

Because, the virtual worlds that comprise the Metaverse 2.0 will be created using a variety of different software products, the Metaverse will not be owned by any one company or individual. The failure of a single environment or a software company will not destroy the Metaverse. Just as the failure of one website or HTML editor does not jeopardize the entire World Wide Web.

Learning from the history of the Web

There are a mind boggling number of Web sites in existence today with more being added every second. Those Web sites contain an even more mind boggling number of pages. I don't even think Sir Tim Berners Lee in his wildest dreams imagined that the Web would have grown as large and as quickly as it has done to date.

In my vision, the Metaverse will grow, but not as rapidly as the Web has done. 3D is not right for everything and not everyone is ready for 3D. Plans for surfing the Web in 3D are, I believe, premature at this stage.

If we take a step back and look at just some of the reasons why the Web has been so successful, I think it provides a roadmap for the success of Web 3D, i.e. the Metaverse.

Lessons learned from the Web	Application to the Metaverse
Creating Web pages by hand was fairly easy. However, in the early days before there were GUI tools, it tended to be more the domain of the programmer.	Make it easy for people to create 3D content without the need to program.
Anyone who had the time, money and inclination can have a Web site.	Remove barriers to entry for the users creating 3D environments.

Lessons learned from the Web	Application to the Metaverse
Websites are loosely coupled together using hyperlinks.	Support linking between 3D environments.
Searches can be performed to find web sites of interest.	A searchable directory of available 3D environments.
There were different tools and browsers available from different vendors which drives competition and innovation.	Open to all, the Metaverse should not have a single owner.
The transition from phone dialup connections to broadband was like pouring gasoline on an already raging fire.	Broadband is key to future success, but the pipes are going to have to get even bigger. At some point, the Internet will be fast enough to handle video streams from everyone's desktop, etc. But until that point, it needs to keep growing. All the additional bandwidth that has been added recently is being consumed by people streaming video from places like YouTube, etc.
There are no rules or regulations to govern the way a web site looked or worked. If people liked it, it became popular, if they did not, it died.	People should be free to create whatever sort of 3D environment they want.
The content available on the web is as varied as life itself.	Variety is the spice of life. With no single owner and different software vendors offering different tools to different people, there will be diversity. Diversity will also help to fend off the evil doers in the world, the virus makers, etc. An exploit found in one software vendor's implementation will not affect the rest of the Metaverse. You know they will come, that is their nature, and it is just a question of time.
No single point of failure.	Everything must be scalable; the failure of one 3D environment should not affect the entire Metaverse.

THE STORY SO FAR?

As discussed previously, the Metaverse 1.0 has been in existence for over 10 years. But there has been resurgence in interest recently, due in part to Second Life. In the last 2 years Second Life has gone from relative obscurity to being featured on morning TV shows, magazines and a huge number of blogs. Now, Second Life differs from the other companies mentioned because it has its own currency which allows members to buy virtual land and build on. Members can also build and sell other things such as clothing for avatars. There.com also has a currency but purchases are pretty much restricted to clothing. The money made in Second Life can be converted to real cold hard cash. Almost all the content in Second Life is created by its users which places it into the category of user generated content in Web 2.0 terms.

However, there is trouble in toy town; things are not as rosy as they may seem. Second Life closely mimics real life and in real life there are lots of issues, and some of them are really nasty. To give you a taste, here are just a few that have been reported in the press about the goings on in Second Life.

- Where there is money there is corruption. Where there is a monetary system with few checks and balances there is even more corruption. There have been reports of sweatshops making people work in Second Life to earn money but only paying them a fraction of what they earn⁹. Sure, government employment rules should handle this but when it's going on in Cambodia maybe not. There are also reports of organized crime doing their financial laundry in via Second Life.¹⁰
- There are hi-jacking, car-jacking and now I have heard reports of avatar-jacking. That's right, some enterprising people seem to have figured out how to take control of your avatar in Second Life and transport you to somewhere you did not choose to be. How kind of them?
- Recently, some militants protesting the corporate influx into Second Life shot at peoples avatars outside the Reebok store and then set off virtual nuclear bombs that caused every avatar in the vicinity to have a "bad hair day"¹¹.
- Finally, it is not surprising that the "oldest profession" has taken root in Second Life in various forms¹².

It may sound to some like I am picking on Second Life. Well, yes and no. Unfortunately due to Second Life's high visibility, it is hard for even the smallest thing to go unnoticed. I am sure that Active Worlds and There.com also have issues but they have received less publicity.

Second Life is a Metaverse pioneer. I take my hat off to them. Philip Rosendale, the founder of Second Life had a vision and executed on it, even when everyone around him thought he was a couple of chips short of a circuit board. In reality, he was completely plugged in and it was his detractors who did not get it.

Big business takes note

One of the reasons Second Life is in the news so frequently is the number of large corporations that have become involved. They are not interested in making money directly from the Second Life economy, per se, but rather from the large member population of 18-35 year olds with lots of disposable income that hangs out there. These large companies see Second Life as another way to get their name, brands and products in front of more eyeballs. These companies have wisely decided to get their feet wet in the Metaverse and have purchased land and built their own stores. For example, Reebok, Dell, IBM and Sun now have a Second Life presence.

Protecting the corporate image

Tarnish, an appropriate word here: to dull the luster of; to diminish or destroy the purity of; to become sullied; a stain or blemish. That's the risk that companies take when setting up shop in Second Life or any other virtual world that they do not control. They risk having their name or brand associated with a nuclear bomb, or money laundering or the pornographic industry. Companies work very hard to protect their good image because once lost, it's very hard to get it back.

So, with solutions like Second Life, companies have a lack of control. It is not like a brick and mortar store or their Web site that they control almost 100%. Their image is in the hands of the Metaverse populace and some of those hands are very grubby.

WHAT'S NEXT?

So far we have looked at what my vision of the Metaverse is. We have also looked at what people are using today to try and create the Metaverse, including some of the problems that are occurring.

I think the problem with Second Life is that 2 critical things were not sufficiently taken into consideration: the nature of people and the impact of success on a bad design. We have already talked about the effect that people can have in virtual worlds. That with out controls anarchy takes over.

In the next section, we will look at the scalability issues related to design and at the key ingredients required to create a sustainable and scalable Metaverse that fulfills the stated vision and how Blink 3D can be used to achieve that vision.

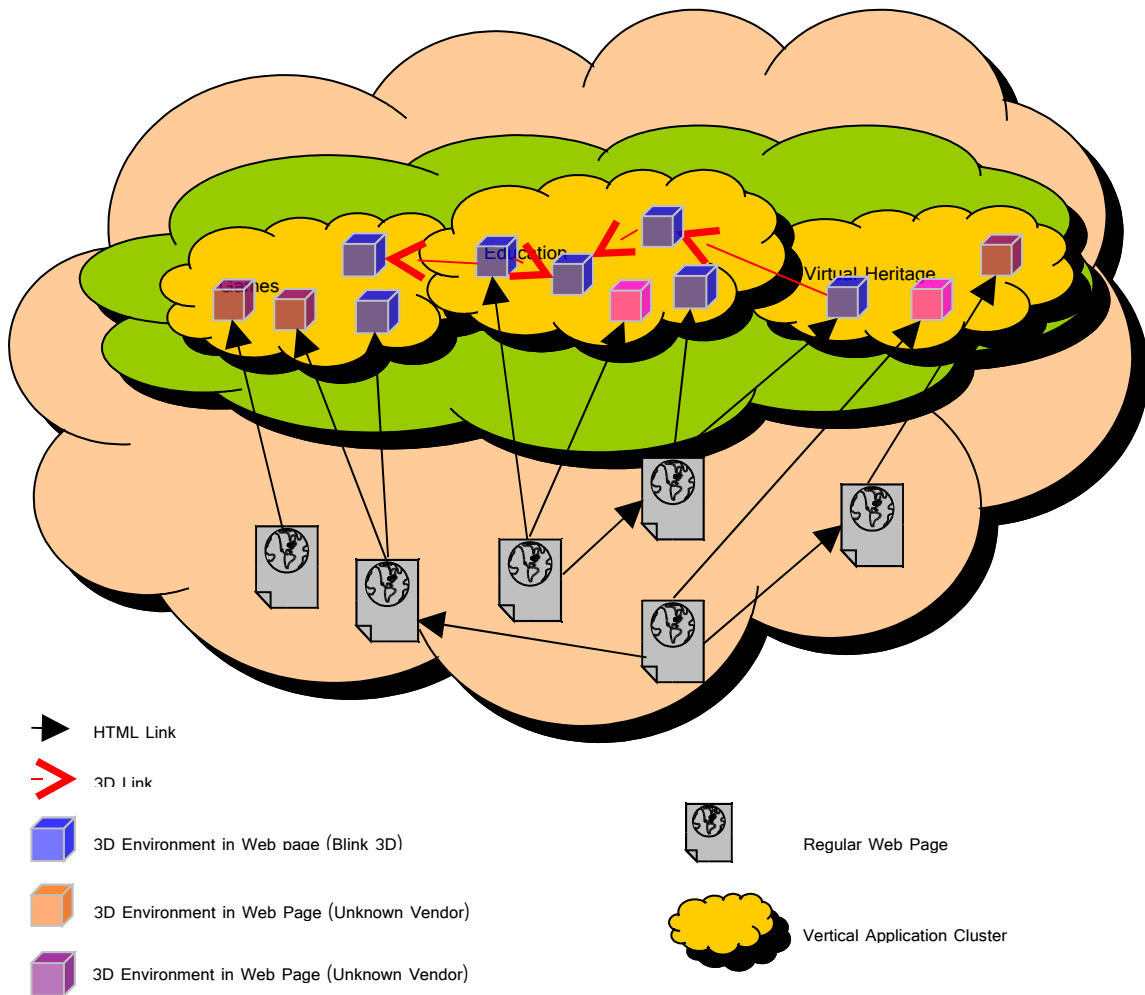


Diagram showing how the Metaverse, i.e. Web 3D connects to the Web.

A RECIPE FOR THE METAVERSE 2.0

Based on my vision of the Metaverse 2.0, I have tried to highlight below some of the key elements needed for the Metaverse 2.0 to exist. It will also look at how our product Blink 3D can be successfully used to implement the Metaverse 2.0. Blink 3D is a complete system for creating and viewing 3D environments that can be published and viewed on the Web. Although not required, it is helpful if readers have an understanding of the basics of Blink 3D, in order to better understand this section.

No barriers to entry

3D Environments are ideal places for companies to exhibit and sell their wares. However, one needs to be careful not to setup barriers that prevent potential customers from entering the environment. There are two main barriers that often exist.

The first is that the potential customer may be required to download additional software if they do not already have it installed. This barrier will exist until such time as the chosen technology becomes so popular that the majority of potential customers have already installed it for other reasons.

This is the chicken and egg problem, one that Macromedia faced with Flash. The approach was not to force people to download flash but to offer them a choice of the Flash version or the regular HTML version. The same approach can be applied to Web 3D, in fact it is probably easier to implement.

The second issue is that the potential customer may be required to register before they can enter a 3D environment. This means they have to fill out a form, divulge more personal information and probably respond to an email to confirm their email address, all before they can visit the 3D environment. This is certainly a buzz killer!

Because Blink 3D environments are placed on a regular Web server, anyone with the Blink 3D plug-in installed can enter them. Of course controls if needed can be put into place to restrict access.

Programmable & customizable

Virtual worlds, i.e. the Metaverse, are not just about static 3D images; it is about the richness of animation and interaction. Software used for creating the 3D environments must have a way to add interactivity and animation. This can be done using point and click style interfaces in conjunction with Behaviors or with a programming interface.

Blink 3D includes over 80 Behaviors with more being added. But not all programming interfaces or API's (Application Programming Interface) are created equal. Some implementations only offer very limited functionality where others, such as Blink 3D, have extensive API's.

For example, the Second Life API only has a few functions for physics, mainly for applying a force to an object. The Blink 3D API exposes 17 classes for things like physical materials, joints, motors, springs, dampers, sensors, wheels and collision handling. This sort of functionality is essential for anything but the most basic of games.

This ability to have a very granular level of control over the 3D environment becomes very important when trying to create complex 3D environments and especially games. But the API must also be subtle enough for simple applications such as displaying a Mayan vase or a molecule that users can view and rotate with a mouse and cursor keys.

Richness and variety of content

When looking at some of the 3D environments that exist today, two words come to mind: Dull and Boring. Many 3D environments look the same; they use the same colors, the same lighting techniques, the same shadowing techniques. In fact they look like they were all built by the same person with only 10 working crayons left in their Crayola box.

The Metaverse is sometimes a virtual reflection of the real world. We need to look at the richness of the real world and see what it is that we like about it. Why do people travel? One reason is to see the richness and diversity of other cultures. This will be the same reason that attracts people who want to explore the virtual world. Make it all look the same and people will soon get bored. Oh and by the way, adding a palm tree and some wooden huts does not count as richness and diversity. Just imagine exploring a 3D version of Diagon Alley from Harry Potter, complete with all the color and richness that was in the film. That would be worth a visit.

There are a couple of keys to the creation of interesting and varied 3D environments.

- **Support for shaders.** If you have not heard of them before shaders are small programs that execute in real time and adjust the look of materials that have been applied to objects. Shaders are responsible for making games look so realistic by using bump and parallax mapping to make flat surfaces appear to be 3D.
- **Allow people to create 3D models using proper 3D modeling packages.** Do not force them to create things with just primitive objects: cube, sphere, cylinders, etc. Primitives are fine for beginners but not suitable for the pros or where detailed quality meshes are needed.
- **Allow designers to control the lighting and shadowing in the 3D environment.** Allowing them to implement night time scenes or dark dungeons or light and airy offices.
- **Support features like fog and particle systems.** These can be effectively used to add mood to an environment.

And in case you were wondering, Blink 3D supports all this and more. Look at some of the examples on the Pelican Crossing Web site and you will see that there is quite a variety and richness to the environments already available to visit.

The richer and more varied the environments are with architectural influences from around the world, the more inclined people will be to explore them. This is a great time for young up and coming Frank Lloyd Wright wannabe architects to strut their stuff.

To create a variety of different types of 3D environments requires a very flexible product, such as Blink 3D.

Linkable

If you ask yourself what the key to the success of the Web was the answer would have to be linking:

- The ability to link from one page to another on the same Web site.
- The ability to link to other pages on other Web sites.
- The ability for other Web sites to link to your Web site.
- The ability to have links in emails and documents to your Web site.

That's a lot of links! Links also provide the way that search engine web crawlers move around the Web.

Similarly, one of the keys to the success of the Metaverse will be linking. This becomes even more important if you share my vision that the Metaverse is a vast collection of thousands and at some point millions of interconnected 3D environments built using different software products.

Any 3D content embedded in a Web page automatically has HTML linking. You can go from one Web page hosting a 3D environment to another, etc. If the 3D environment is not embedded in a Web page, linking becomes a little more difficult. For example, take the way Second Life has to handle linking. When Second Life is installed on your computer it registers a new local Internet protocol that works with your browser IE or Firefox. You are probably already familiar with the http:// and ftp:// protocols, well now there is a secondlife:// protocol. If you enter a URL that looks something like this: secondlife://reuters/127/99/25 in your browser it will start the Second Life client and then take you to the Reuters Atrium at the specified coordinates. Now, if you do not have the Second Life client installed, all you will get is an error. To get around this problem some links will route you though www.slurl.com which will first ask you if you have it installed and give you an opportunity to install it. So the full URL would be www.slurl.com/secondlife/reuters/127/99/25 With this approach, Second Life has managed to coble together a way of linking from the Web to a Second Life location, which is referred to as "Teleporting".

Blink 3D environments do not need to be viewed in a Web browser. The Blink 3D Standalone Player allows users to view environments offline. There are additional Blink

3D Viewers in the works as well. Note, however, that even when using non-Web-based viewers, 3D linking still works. You can load an environment into the Standalone Player and that environment can link to another and another, etc.

HTML linking means that 3D environments created by different software products can be linked together. However, this does mean that every time you link to a new 3D environment you load a new Web page. This means that the user may no longer be on your Web site which may be a issue if your site gets its revenue from advertising.

There is an alternative to HTML, 3D linking. Blink 3D supports this approach which allows the Web page to remain static but the 3D content to change. The only requirement is that the 3D link points to a 3D environment that was also created with Blink 3D.

3D linking offers the following:

- The ability to link from one 3D environment to another without changing the Web page.
- The ability for other 3D environments to link to your 3D environment without changing the Web page.
- The ability to create concentrators or portals that allow a user to access other 3D environments directly from within a 3D environment preserving the “in world” 3D experience.
- The ability to load new areas of the same 3D environment providing a 3D experience that is, in theory, endless.

3D linking is the key to never ending, immersive Blink 3D environments; HTML linking on the other hand is the key to a cosmopolitan Metaverse.

Scalable and reliable

When thinking about the Metaverse, it does not take long before the issue of scalability comes up. Scalability can also mean different things to different software vendors as it relates to their implementations. Here are 2 approaches to the problem: Client and Server or Distributed.

Client Server approach

One popular approach is to use what are known as simulators, which is the approach that Second Life uses. Essentially, the 3D environment is simulated on a server somewhere. It receives input from all users that are logged in, mouse clicks, mouse moves, keyboard input. All this information goes into a big melting pot and a view of the 3D environment is produced. This view is sent to all the connected users and their client software renders the view. The advantage of this approach is that interactions between your avatar and a soccer ball, for instance, can be seen. Everyone would see the same snapshot of the 3D environment. This means that the content on the user’s machines is synchronized. When one user kicks the ball, the ball is actually where the user thinks it is, there is no latency or lag in the synchronization.

This is ideal for multiplayer games, etc. However, there are a number of drawbacks.

- There is a single point of failure, the server. When it goes down, everything connected to it goes down.
- The server is a finite resource. As more users join, more mouse and keyboard input has to be considered before a view of the environment can be produced.
- Throwing another server at the problem does not necessarily help the simulation. Additional code would need to be written that would share the data between the servers. If, for example, you had 5 servers together in what is known as cluster, information being received by each server would have to be shared with all the other servers. If a server in the cluster failed, the client would do what is known as failover. This means it would have to know that the server it was communicating with was no longer responding and would switch to one of the other servers in the cluster.
- With the speed at which the Metaverse could grow, adding new servers starts to become a significant problem. Second Life is already experiencing this as they try to add 123 servers a week to keep up with demand. At the last count, they had around 2,000 servers just for simulators¹³.
- With so many servers, maintenance starts to become a big issue as well. Taking machines off line to update software, replacing out of date hardware with new hardware. Replacing crashed hard drives, etc.

The cluster approach is probably quite doable. However, it still uses the same mentality of “throwing” more hardware at the problem. When dealing with something the size of the Web, that could end up being a huge amount of hardware. Can you imagine the equivalent of trying to host 25% of the Web servers in the world?

Now, factor in reliability and do some “what if” scenarios. What if the data center storing all these servers went off line for whatever reason: flood, tornado, earthquake, etc? The clusters that we spoke of earlier would have to be distributed between 2 or more locations to provide true reliability. As a result, sharing the data between the servers requires more effort to manage.

Now, factor in cost. None of this comes for free. Someone somewhere is going to have to pick up the tab and, oh boy will it be a big one!

Distributed approach

Now let’s look at another approach, a distributed approach that takes advantage of the hardware that already exists out there. This is the approach that Blink 3D uses.

When a user opens up their Web browser, Internet Explorer, Firefox, etc. and opens a Web page containing a Blink 3D environment, the Blink 3D plug-in is loaded and, in

turn, checks its local cache for the requested environment. If the plug-in determines that it either does not exist or is out of date, it requests the specified Blink 3D environment which is a single compressed file from the Web server. (Second Life does not have a caching mechanism; everything is downloaded every time you connect.) It does not have to be the same one that served up the Web page initially. The Web server serves the file like any other file to the plug-in using HTTP which is the same protocol used for serving Web pages. Once the Web page has been served, there is no longer any connection to the Web server from the plug-in.

For highly trafficked sites, the Web servers can easily be placed in a cluster using off the shelf load-balancing hardware and software.

The 3D environment is then loaded by the plug-in and the user is able to enter the environment. If the environment is multi-user, the plug-in connects to the specified room on an XMPP (Extended Messaging and Presence Protocol) chat server. The servers are Instant Messaging servers that use XMPP which is a standard, the same one used by Google Talk.

Next, the plug-in queries the room to find out who is in it. The plug-in represents the users that were found as avatars in the environment. As a user moves, so does their avatar.

When a designer creates a Blink 3D environment they can specify the maximum number of occupants allowed in any one instance of the environment. When this number is reached the environment is considered to be full and another chat room is created and the user is connected to that.

XMPP servers like Web servers can take advantage of load balancing technologies that allow a number of XMPP servers to appear as one. Just like when connecting to Google or Microsoft, there are a large number of servers that you can end up connecting to. XMPP servers can handle huge numbers of users compared to the same server trying to handle a 3D simulation. This makes them far more scalable.

The actual 3D simulation is performed on the user's computer, taking advantage of its CPU. Now, if we take a critical look at this approach, here are the problems:

- There are still potential scaling problems with the XMPP servers but they are trivial compared to the alternative described above. The XMPP servers are also distributed across the Internet so there are no data center hosting problems.
- This approach does not work particularly well for games that must be tightly synchronized like a car racing or soccer game. Blink 3D does have the concept of shared objects but they are not suitable for fast synchronization as there is likely to be a half second time lag. Blink 3D's shared objects are however, very suitable for basic simulations. For example, when I open a door in my version of the 3D environment, the shared object would send a message to your environment telling it to open the door. The same approach can be used for other things such as the

position of an elevator. When I take the elevator to the fifth floor, you will not be able to get into the same elevator at the first floor until it comes back down.

If you are trying to build a game that must be tightly synchronized between players, you should use software that supports this functionality, but be aware of its limitations.

This, I believe, illustrates why Blink 3D is effectively very scalable but, maybe not ultra scalable.

Access control

Not everyone wants the world and their dog traipsing through their 3D environment. Sometimes a level of access control is required. Maybe the environment is geared towards children and controls need to be put in place to ensure that only children enter the environment or vice versa.

Blink 3D controls access to environments by using XMPP IM groups. Non group members can access the environment but cannot see or chat with the other people in the environment. The advantage here is that only people that are known are added to the group.

Controllable

Companies are in control of their bricks and mortar establishments; they are also in control of their Web sites. Disruptive elements can not picket a web site or put up posters, or shoot visitors to the site, etc. If the Web site has a forum this could be a vehicle for the disruptive element but they can be quickly controlled and shut down.

The same needs to be true of any 3D environment. Companies have very expensive images to protect and cannot normally afford to be involved in bad press. This means that corporations need to be in charge of their own destiny. As a result, they must have control over their 3D environment just like they have over their other corporate presences.

Control can take various forms. For example, are visitors to the 3D environment allowed to wear their own avatars? What damage or disruption can they cause to other visitors? This type of control is about controlling the access that an avatar's code has to the rest of the 3D environment and other avatars, essentially putting an avatar in its own sand box. This is something that Blink 3D does, disabling access to API functionality that an avatar could abuse. Avatars run in one of two contexts, local and remote. The local context is where the avatar belongs to the user visiting the environment. The remote context is where the avatar is representing a user remotely i.e. the other avatars you see in the 3D environment. With this additional level of control, avatars have fewer capabilities when the context is remote.

Brand-able

This really is an extension of Controllable. Corporations looking to use Web 3D as a marketing vehicle have to be in control of the look and feel of the 3D environment. After all, this is an extension of their Web site, their shop window.

Companies must be able to make the 3D environment match their branding. This also ties in the Barriers to Entry; forcing a potential customer to go through a third party login process to be able to access the 3D environment is a dilution of the branding.

Any 3D environment created with Blink 3D is completely brand-able. Apart from the installation of the Blink 3D viewer you can hide the fact that you are using Blink 3D. So you can customize download screens, disable the ability to do a right click in the environment and select “About” from the popup menu, etc.

But branding is more than that; it is about people coming to your Web site, staying on your Web site and being immersed in your brand, not someone else’s. Blink 3D environments run inside your Web pages. It is not about visiting your Web site and then leaving it again via a link to a 3D environment hosted by a third party with their Web page and a separate login screen, etc. Blink 3D is really about ownership, you design it, you host it and you own it.

Ease of Use

Historically, 3D Environments take considerably longer to create than Web pages. The initial look and feel of an environment can directly influence a viewer’s desire to explore the environment further. Designers strive to create a scene that will hold the viewers attention and create an amount of residual stickiness. For the Metaverse 2.0 to be successful, the creation of 3D environments must be easy. It should be no harder than it is today to create a Web page with Cascading Style Sheets and Dynamic HTML.

Blink 3D has been designed from the ground up to be easy to use. It can, therefore, be used by children of 10 all the way up to professional 3D designers. Of course, the results may be different; the professional designer will hopefully produce a better looking 3D environment. But the environment produced by the child will be a valid, explorable 3D environment.

To make things even easier, Blink 3D comes with a wide range of Behaviors that can be used by non-programmers to quickly add interactivity and animation to the environment.

Importing 3D Models

If you are a company that sells tangible goods and the goods you sell are based in part on their looks, you are going to want to be able to display the goods in the 3D environment. Your designers will have spent months perfecting the look. In your company’s 3D environment, you want the user to be able to interact with the product in 3D. But if the technology you are using forces you to build the 3D version of the product with primitives such as cubes, spheres, and cones, etc., it would not be surprising to see the design team go grey over night.

3D environments should allow you to import 3D models created using industry standard 3D modeling packages. For example, use the CAD files from the design department and

export them to the appropriate format for the 3D environment. Even extremely complex CAD models can be used by first putting them through a polygon reduction process.

Blink 3D has exporters for 3DS Max, Maya, Softimage, Lightwave, Blender, Google Sketchup, Milkshape, Deled, AC3D, Fragmaotion, Wings 3D and RenderMonkey.

If you are not a professional 3D modeler, Blink 3D also allows you to create 3D models from primitives such as cube, sphere, cone, cylinder, torus etc and also from prefabs which are things like rooms, corridors and tunnels.

Locking up 3D assets

If you are a designer of 3D assets, you may see yourself selling them. However, you may want to consider whether you can technically take the 3D model that you have created and sell it or use it in a 3D environment that was created using different software. Essentially, are your 3D assets locked in a proprietary format? If the technology you are using does not support importing 3D models in standard industry formats, you maybe be restricting the salability of your hard work. Second Life states that you own everything you create, but that does not mean you can take what you own to any other 3D environment. Your assets are locked in Second Life. The Second Life license agreement states that they own your account which means if you fall foul of their rules you could lose all your money and 3D assets. Currently there is an ongoing court case about this very subject¹⁴.

What artist would accept only being allowed to sell their paintings in one shop when there are thousands of shops they could sell through if they used a different brand of paint?

User generated content

People often point to Second Life's support for user generated content as a factor in their success to date. The other driving factor in their success is that the users own what they create. People who have created 3D models in Second Life can not take them to There.com or Active Worlds or Blink 3D, so do they really own it? I would say they do not.

Second Life does not allow you to import 3D models. It only allows you to create 3D content using their primitives. In contrast, when you create your 3D model in a popular modeling package you can import it to Blink 3D or anything else that allows you to import models.

In the Blink 3D Builder, users can import existing 3D models or they can create the content using primitives. Unlike Second Life there is no requirement to buy land to put the published 3D environment on. The user is free to do what they want with it. Typically they place the 3D environments on a Web site and allow anyone with a Web browser and the free Blink 3D plug-in installed to view it. The user completely owns what they create and if needed, can control who can see it or use it. Unlike a lot of companies creating

virtual worlds, people do not have to be a member of anything to explore Blink 3D environments; they are free just as people are generally free to visit most Web-pages.

Pelican Crossing makes its money by selling the Blink 3D Builder and provides free viewers allowing anyone the ability to view published 3D environments.

Controlling the avatar

There are numerous stories of people wearing outrageous avatars, some looking like genitalia. I have seen people wearing a house as an avatar and causing everything to slow to a crawl.

Some flexibility is needed here. Different 3D environments will have different requirements. Here are some questions that you may want to ask:

- Can I force people to use a specific avatar? I have built a themed 14th century village and I want the avatars to stay in theme.
- Can I hide everyone's avatars because with a large number of people gathering for a meeting, the additional polygon count is forcing the frame rate (FPS) to an unusable level?
- Can I give a new visitor a default avatar?
- Can users easily change their avatar?
- Can users easily customize their avatar?
- Can I set a limit on the maximum number of polygons that an avatar can have and force people to use a default avatar if their avatar is too big?

With the exception of the last 2, Blink 3D supports all of the techniques described above. Support for limiting the number of polygons is on the road map for Blink 3D and we are also looking at avatar customization functionality.

Universal Avatar?

Being able to move from one world to another using the same avatar is often touted as the holy grail of 3D environments¹⁵. People want to be able to wear an avatar in one 3D environment built using software product A and then portal to another 3D environment using software product B and still be able to use the same avatar. The call is to have a standard for avatars.

While this may be a laudable goal, in reality it is:

- Impractical
- Technically complex
- Unnecessary

Not all 3D environments are created equal. The Metaverse is more than just chat-enabled 3D environments. However, the Metaverse will be a complex and diverse set of 3D environments. Some of the environments will not even use avatars; some will require that only their avatars are used, some will require that certain polygon restrictions be met in order to support more users. So this makes the idea impractical because most of the time, unless you are going from one chat-enabled 3D environment to another, there is no point.

Different software vendors approach avatars differently. With some vendors, the goal of having avatars is to have a place to hang clothes that the user purchased. With others, the avatar is used in its purest form as a 3D representation of the user. In a 3D game-oriented environment, the avatar is a place to hang belts of bullets and an AK47 machine gun. Each approach has a different technical requirement for the underlying mesh. To force the software vendor specializing in games to make their avatars capable of wearing the latest fashions and to force the software vendor of 3D chat environments to make their avatars capable of holding a rocket launcher is, to my mind, very amusing. Does my pink T- shirt clash with my ammo belt?

Lastly, it is not even needed. There is no requirement that states you must look the same no matter where you are in the Metaverse. After all do you wear your work clothes on the weekends?

Blink 3D uses the concept of user profiles. Stored in the user profile are the user's nickname for chatting and a URL pointing to their avatar. When entering a Blink 3D environment, this profile is read and the specified avatar is invoked. If the 3D environment has placed restrictions on the use of avatars, the restrictions are, of course, respected.

How many is too many?

When reading about various implementations of virtual worlds, I often see mentioned the number of people that can be on line at once. I read one report about an unreleased product that claimed to support up to 10,000 people on an island at once. The first question that comes to mind is what do they mean by support? Can I see all 10,000 people at once, a massive sea of heaving avatars? I hope not!

At the end of the day does it really matter? To my mind, 50 people in a 3D environment are quite enough. Yes, it is fun when watching a concert or a film to have the feeling of watching in a group, "togetherness". But how big does the group have to be? If the user was told that there were 10,000 people online with them does that make them feel better? If they can not see the other 9,999 users, does it make a difference? If there were actually only 50 users on line and they were told that there were in fact 10,000 would they believe it? Would that knowledge give them that same sense of "togetherness"?

In order to achieve these massive numbers of concurrent online users, tradeoffs have to be made. Can you imagine 10,000 people all chatting at once? To get around this problem, filters are put in place so that you only see or hear the chat from people within

20 feet of you, for example. As you move through the 3D environment, people move in and out of earshot, as it were.

Now can you imagine the processing power required to render the polygons from 10,000 users? One way to get around this problem is to cull the avatars. If the avatar is more than 50 feet away don't bother rendering it.

So are there really 10,000 people on line if you can only see 50 or so of them at any point in time?

Here in the US, restaurants and public places have a stated maximum occupancy. This is the number of people that the fire department feels can safely and comfortably coexist in that space at once.

Blink 3D applies the same logic to its 3D environments. When you define a Blink 3D environment as multi user, you can specify the maximum number of concurrent users. If someone tries to join an environment and it has reached capacity, then a copy is made and the user joins that one instead. Again, when that one gets full, another copy is made. This can go on forever, as long as the chat servers have been configured to be scalable.

Imagine it this way. You walk up to a restaurant and ask for a table for one. You are told the restaurant is full and that you should go to the one next door. The restaurant next door is exactly the same as the first one, it is a copy. You again ask for a table for one. You are again informed that the restaurant is full and that you should try the one next door. This goes on until you find a new copy of the restaurant that has just opened.

It's the economy, stupid!

One of the things that quickly come up when talking about the Metaverse is money. Some people believe that it can only be called a Metaverse if it has its own economy with its own currency. I'm not sure why they feel this way. Why not use the dollar, euro, pound, yen, etc. These currencies have served us well for more than a few years, why do we need to have a special currency for spending and earning in virtual worlds?

I think one answer that would come back is that the existing payment systems (PayPal, etc.) are too heavy for economies where micro payments are used. Paypal would charge \$0.35 per transaction and if the transaction was only worth 10 cents someone is going to be out of pocket.

The micro payment system is interesting. But why are people charging so little for their time and products? I can understand a newspaper charging 10 cents to read its paper. However, what is the point of working all day in a 3D environment if you only take home \$3 before tax. I'm not an economist but to me this shows that there is a flaw in the economy. It is an artificial economy if people in it can not earn a decent living.

The real reason that companies like Second Life have an economy is so that they can make money. They either take a cut of each sale or they take a cut when the in world

currency is exchanged for real money. There is nothing wrong with this but, it should be seen for what it really is.

Revenue streams from 3D environments fall into one or more of the following categories:

- Subscription
- Web site advertising
- In world advertising
- In world economy
- Purchase of development software

There are pros and cons to each approach from the company's perspective and the user's perspective.

A quick look on www.tubosquid.com and www.renderosity.com and you will find people selling 3D models and avatars, and avatar clothing. But you will not see them selling anything for 10 cents. The reason is that their time is real, their effort is real and even though their products are used in the virtual world their bills are real.

Now, let's look at some of the businesses that have opened up in Second Life. I visited a shoe store and tried to buy a pair. I was instantly transferred to the company's Web site to process the transaction, and why not? Companies have spent a lot of money creating shopping carts for their Web sites. The systems take orders, check stock, process order confirmations and handle the payments. Shopping cart systems for 3D environments will exist in the future provided the software used to create the 3D environment is capable of supporting it.

This is not to say that these sorts of systems could not be integrated into a 3D environment. Certainly they could easily be integrated into a Blink 3D environment. But the issue is that I suspect most companies (especially their CFO's) loath the idea of having to deal in a second non standard currency of the 3D environment.

My guess is that the majority of the people using the use Second Life payment system are:

- People who have created business in Second Life and that do not have a regular Web site to handle payment processing.
- People who are selling their goods and services for very small amounts.

I'll hold off going into the tax implications, capital gains on land sales, capital gains on exchange rate gains and not to mention the good old tax on income. It is tax time in the US right now and I wonder how many people are listing income from Second Life activities.

Because my vision of the Metaverse is one of a collection of 3D environments created using different technologies, a single economy across all of them is probably not feasible,

nor needed. Microsoft has announced plans for opening up its points based payment system called Microsoft Payment Framework (MPF). It's the same system Microsoft has been using with its Zune and Xbox live offerings. The intent is to bypass the traditional credit card clearing houses. Love or hate Microsoft, it is a good idea and I would hazard a guess that others will follow with their own implementations.

SUMMARY

The following summarizes the main points of this document, the key factors needed for the Metaverse 2.0.

Philosophy

- The Metaverse is not a single, monolithic 3D environment. It is a vast collection of millions of interconnected web-based 3D environments.
- The Metaverse will be cosmopolitan in nature consisting of technologies from various software vendors.
- The Metaverse will not be owned by any single person or corporation nor dominated by any single vendor's technology.
- The Metaverse will be open to all; anyone can create a 3D environment.
- The Metaverse will be based on hyper-linking and 3D linking virtual environments together, mirroring that of webpages on the World Wide Web.
- There must be no requirement to purchase land unless that land adds needed value, (i.e.: areas with high traffic and visibility).
- 3D environments will be embedded in WebPages and will be able to communicate with WebPages and Flash documents using their Application Programming Interfaces (API's).

Look and Feel

- The Metaverse will mimic the richness, color and variety of the real world.
- 3D Environments will be explorable and as engaging as any town or city.
- 3D Environments do not have to be reflective of the physical world. Fictitious worlds, real-world representations, and historical settings can co-exist. Designer imagination will be the only limitation.
- 3D environments with high graphics quality will be the norm. Environments using basic coloring and shadowing will be surpassed.
- The quality of graphics in 3D environments will continue to improve to a point where it is hard to tell real from virtual.
- Voice and video will become standard in 3D Environments.
- Virtual Reality hardware will make resurgence as prices fall and technology improves. Thus creating an even more immersive Metaverse.

Economy

- The Metaverse will not have its own economy. The economy of the Metaverse is the same economy as the Web. The Metaverse will use same the payment processing systems available today.
- The price of goods and services in the Metaverse should reflect their real costs.

- Micro payment systems will be available for goods and services when necessary. Newspapers are an example of this necessity.

Technology

- The Metaverse will not have a single point of failure.
- Different technical implementations of the Metaverse will be available; the ones that are the most usable, graphical, scalable and reliable will be the most successful.
- The Metaverse will use standards where they add value or simplification. Standards that impose restrictions or stifle innovation will be bypassed.
- The ability to use a single avatar in any 3D environment is neither practical nor needed. 3D environments should be free to implement avatars in a way that best serves their needs.
- Although a 3D environment may be able to handle 10,000 concurrent users does not mean it should. Concurrent user capacity is starting to become an invalid measure.

Control

- There is no anarchy on the Web and there should be no anarchy in the Metaverse.
- Visitors to the Metaverse must feel safe and where needed, be protected from sex, violence and theft.
- Companies and individuals building stores or a presence in the Metaverse must be able to control what happens in and around their store; they must be able to protect their public image just like they can on their Web sites.
- Companies setting up stores in the Metaverse must have the ability to brand their 3D stores just like they brand their 2D web-based stores.
- While the Metaverse is open to all, some areas will need to have limitation. Educational environments are one example of this. Designers of educational environments must be able to control access by a specific school or age group.

Designers

- Metaverse designers should be able to import 3D models and not be restricted to using primitives that prevent model usage in other 3D environments.
- Metaverse designers should have access to extensive programming interfaces allowing them to easily add interactivity and animation.
- Metaverse designers must own what they create and they must be able to move what they create into 3D environments built with various software products.

CONCLUSION

This is a long document and I applaud you for hanging in there with me. Hey it could have been even longer! Hopefully, it was a worthwhile, enlightening and thought-provoking read.

The Metaverse 2.0 needs to accomplish many tasks some we know about today and some we do not. To prevent ultimate control, no single software vendor's product should be

used exclusively to create the Metaverse 2.0. From its diversity in content and creation to the diversity of its users, the Metaverse 2.0 has to be cosmopolitan, and it has to be as free as the Web.

Very few people have sat down and articulated their vision of the Metaverse 2.0. Committing thoughts to paper can sometimes come back to haunt you. You may not share my vision; you may even hate my vision with a passion. It is a vision none the less, and it is the vision that Pelican Crossing is executing on with Blink 3D.

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