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Memento Mundi: Are Virtual Worlds History?

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Memento Mundi:
Are Virtual Worlds History?

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Abstract

In this paper, I consider whether virtual worlds are history in two senses of the word. The first explores the implications of the life-cycle of virtual worlds, especially of their extinction, for thinking about the history of computer-based technologies, as well as their use. The moment when a virtual world "is history" – when it shuts down – reminds us that every virtual world has a history. Histories of individual virtual worlds are inextricably bound up with the intellectual and cultural history of virtual world technologies and communities. The second sense of the virtual world as history brings us directly to issues of historical documentation, digital preservation and curation of virtual worlds. I consider what will remain of virtual worlds after they close down, either individually or perhaps even collectively.

1. Introduction

Electronic Arts' EA-Land, formerly known as The Sims Online, shut down forever at 4.35am PST on 1 August 2008. In a video clip captured by Stanford University's How They Got Game (HTGG) project and preserved as part of the Archiving Virtual Worlds collection hosted by the Internet Archive, we can observe that the precise moment of the shut-down was represented to its former inhabitants in the anticlimactic form of a network error, "lost server connection." A world forever deleted not with a bang, but an error message.

Of course, EA-Land was not the first on-line world to close down. Game and virtual worlds such as Habitat (1986-1988), Phantasy Star Online (2000-2007), Earth and Beyond (2002-2004) and dozens of others have been brought down. Only a few, such as Meridian 59 (1995-2000, 2002-) have ever been resurrected; the vast majority are gone forever. The closing of multiplayer game worlds and other kinds of on-line "virtual worlds" raises important issues for curation, preservation, and historical research. Contrast the banal end-of-days message of EA-Land's final system message to the emotional voice and text messages broadcast by this virtual world's last inhabitants during the last count-down. Degtiar, the HTGG camera-man who captured the final footage, commented in the description of the "Final Countdown" video that "tears are shed, final good-byes are made, and lasting memories are created

before the plug is pulled and the world is brought to an end." (Degtiar) What kinds of digital objects and meta-data associated with these on-line worlds will make future assessments of the technologies, cultures, and communities that they generated and supported? In short, what might participants, curators and the digital preservation practitioners do to help future historians of digital life to assess meanings associated with virtual worlds at the turn of the Millennium?

2. Virtual Worlds are History

Virtual worlds are history. I mean this in two senses of the phrase: They are worlds of historical interest, and they are going to go away. In this paper, I intend to run through some of the implications of the life-cycle of virtual worlds, especially of their extinction, for thinking about the history of computer-based "worlds," as well as their use by communities of players or "residents." The moment when a virtual world "is history" – when it shuts down – reminds us that every virtual world has a history. These histories of individual virtual worlds are inextricably bound up with the intellectual and cultural history of virtual world technologies and communities. They are also venues for historically specific events and activities. An important part of the historical context for virtual world history is the fact that human beings (through their avatars) fill these digital environments with meaning that emerges from their activities in social spaces, regardless of whether the spaces are synthetic (digital) or physical.

An important shift in the use of computers historically was the extension from the calculating engine to more widespread applications for communication, knowledge work, creativity and information sharing. A perhaps less well understood evolution in computing, and one that is closely tied to the development of game technology, is the notion of the computer as defining a space. This notion comprises two key aspects of the use of computers and computer networks since at least the early 1990s: place and presence. When we log on to computer-based environments, we become convinced that we are someplace and also that we "are there" with others who are

likewise present to us. These are perhaps the key characteristics of the digital environments known as virtual worlds. Virtual means something that does not physically exist but is made by software to appear as if it did exist. Consider "virtual memory," a term that goes back to the 1950s. The avatars of synthetic, digital worlds are virtual in this sense. So we -- the typists, players and handlers behind the avatars -- are there and yet we are not there.

Avatars neither die nor fade away in the Real Life/meatspace sense, but let's talk about their deletion and disappearance. Karyn was a well-known player on the Legend MUD. A former Miss Norway, she was killed in a car crash in 1998, leading to an outpouring of on-line grief that included an important document in the history of early on-line societies, Raph Koster's "A Story about a Tree." (Koster, 1998) Years later, a story on salon.com by Tracy Spaight revealed that the tragic death and the person were both elaborate fabrications – only the avatar had been real. (Spaight, 2003) Or perhaps not. Koster insisted that, "I think it's unfair to say that virtual communities aren't real with a capital R. I'm not going to let anyone tell me that that wasn't real. No one's going to say that the friendship wasn't real because I know the grief was definitely real." In other words, real social interactions, networks and relationships can emerge from notions of place and presence built on technologies of the virtual.

Everything I am talking about is mediated by computer, network, and game technology, even that aspect that Raph Koster insisted is the most real: the social interactions of the players. But there is another sense in which the reality of games and virtual worlds is more than what can be found in software packages and server farms. In *The Study of Games* (1971), their seminal work on the anthropology of games, Elliott Avedon and Brian Sutton-Smith asked, "What are games? Are they things in the sense of artifacts? Are they behavioral models, or simulations of social situations? Are they vestiges of ancient rituals, or magical rites?" (Avedon and Sutton-Smith, 1971, p. 419) Avedon and Sutton-Smith were leading their readers to ponder structural similarities among games, but their question also leads us to a fundamental question for the preservation of digital game and virtual worlds: Are games artifacts or activities? Are games more like authored texts or are they the experiences expressed through interaction, competition, or play? As we preserve interactive media, we must not lose sight of how we will document *interactivity*, which means capturing traces of *activity* in game worlds, that is, gameplay.

The active, performative aspects of games and virtual worlds challenge documentation and preservation strategies. Chris Crawford, the dean of American game designers, has described interactivity this way: "Interactivity is not about objects, it's about actions. Yet our thought processes push us towards objects, not actions. This explains why everybody is wasting so much time talking about 'content.' Content is a noun! We don't need

content; we need process, relationship, action, verb." (Crawford, 1996) The thread that ties together the social and performative aspects of game and virtual worlds is that they lead us away from thinking about the preservation problem in terms of objects and artifacts and focus our attention instead on events, actions and activities. Future historians of virtual worlds will want to understand what people did in early virtual worlds, partly at the level of social and personal experiences, partly in terms of historical events such as political protests or artistic performances, and partly in order to understand issues of identity, law, economics, and governance that connect virtual world to real world activities. Clearly, there is a lot more to the preservation of virtual world history than software and data preservation.

Perfect Capture

The second sense of the virtual world as history brings us directly to issues of historical documentation, digital preservation and curation of virtual worlds. What will remain of virtual worlds after they close down, either individually or perhaps even collectively, i.e., when the technology has become passé?

A death switch is a computer program that alerts a trusted friend or service when it deduces that you are no longer alive. The website of a company, Deathswitch, which offers a "deathswitch subscription service," admonishes us not to "die with secrets that need to be free." (Deathswitch) Several such services exist, with names like Slightlymorbid.com and Legacy Locker. The neuroscientist David Eagleman opened a short essay on the history of death switches with the remark that, "There is no afterlife, but a version of us lives on nonetheless." (Eagleman, 2006, p. 882) Avatars don't die, and they don't fade away-- unless and until they are deleted or disconnected. They can even spread the word of their handler's demise. The problem that death switch programs solve is that of notifying real-life (RL) and virtual friends of the passing of our flesh, if not our bits.

A notion that plays into the preservation discussion is particularly relevant here: namely, that of the potentially perfect reproduction of digital data. Recall that our digital personae, our avatars, and our player characters are ultimately all bits of data on a machine. Death switches count on that. If we can only get access to these data, shouldn't it be possible to copy them … forever?

Let's turn these rough ideas loose on an actual historical case, that of Chris Crosby, aka NoSkill. Crosby was the first of the highly-skilled players of the on-line multiplayer game DOOM to be recognized as a "Doomgod." An active player from about 1994 to 1996, the young father was killed in a car crash in 2001. His Memorial Site on the web like many others depicts the young man in the prime of life, holding his young son, but it also offers a number of files for downloading. (NoSkill

Memorial Site) These files are demos recorded from games he played between May 1995 and April 1996. A demo, also called an lmp (from its .lmp or "lump" file extension), is a replay file. It is a recording of a game session in the form of a sequence of commands that correspond to input control states during each frame of the game, or "tic." DOOM players could generate a demo file by simply entering the command "-record" in the console, a command-line interface that could be called up while playing the game. In other words, they could create a script -- a sequence of instructions -- generated from game data and save it as a demo recording. A recording in this format is much more compact than video captured from the screen. The catch is that the demo data must be run and executed inside a copy of the same game from which it was generated, and even from the exact same version of that game, if the game engine is to render the action correctly.

When I download Chris Crosby's demo files from his Memorial Site, and play these files inside the correct version of this old game, originally published towards the end of 1993, I am seeing a dead game through the eyes of a dead player. NoSkill comes back to life, as the replay file activates the game engines to carry out the exact sequence of actions enacted by the now dead player. Moreover, in this first-person shooter, I see the game action through NoSkill's eyes. The player is dead, but his avatar lives on through an act of perfect reproduction.

As a historian, I cannot help but contrast the potentially infinite repetition and perfect reproduction of his game-play to the fading memories of his life … and death. At the same time, I know that what I am seeing is not history. It is a remarkable act of software and data preservation, but I am concerned at as we begin to stage early work on preservation of games and virtual worlds, we will frame these projects primarily, or even exclusively, in terms of software preservation and the perfect capture mode of game replays. This would be a barren exercise with respect to the documentation of the events and activities -- the history -- that has occurred in these worlds.

Perfect Loss

Future historians and others interested in the history of virtual worlds will want to know about the things people were doing in virtual worlds, why they were doing them, and what their activities meant to them.

Earlier I mentioned the possibility of perfect event capture with respect to digital data and the replay as a paradigm for perfectly reproducing the past, even seeing through the eyes of players who are no longer with us. From a historian's point-of-view, perfect capture is half of a paradox, for it must be placed alongside the very real possibility of "perfect loss" in digital spaces. If we save every bit of a virtual world, its software and the data associated with it and stored on its servers, it may still be

the case that we have completely lost the history. Direct your gaze to the nearest computer keyboard, specifically the key marked DEL. To date, the virtual world has not yet been produced that offers vestiges or traces of the past after that key has been pressed. When the data is gone, it's gone. That is not the whole problem, however.

A couple of years ago, a series of nasty protests in the virtual world Second Life that led to an attack on in-world buildings owned by the National Front. Like many others, I read about this clash in a blog not long after the events had occurred. After reading a witness's account of the events, of course I jumped into Second Life to see what was going on. By the time that I arrived, there was absolutely nothing to see. Nichts, nada. The National Front had already abandoned its Island and deleted all of the content there, essentially stripping the turf of every trace and artifact.

Timothy Burke describes the difference between game-generated data and historical documentation in terms of what he calls the "proprietary" data of virtual worlds, meaning the data that is owned, or present on the servers that support that world: "... I think the one thing that *isn't* in the proprietary data is the history of unusual or defining episodes or events in the life of particular virtual worlds … The narrative history, the event history, of any given virtual world, may in fact be obscured by the kinds of god's-eye view data that developers have. After all, they often don't know what is happening at the subjective level of experience within communities, or have to react to it after it's happened. (Say, when players stage a protest.)" (Burke, 2006) Thus, focusing on preservation of what Burke calls proprietary data matches up poorly to the likely needs of future scholars of virtual worlds.

Consider another example that illustrates this point. In the first hours after the WTC and Pentagon attacks on 11 Sept 2001, on-line communities used online, multiplayer games such as massively-multiplayer role-playing games as a medium for responding to the attacks. In games such as *Everquest* and *Asheron's Call,* players read news alerts either via in-game text or system announcement, while outside the world but still on-line, other players caught up via player community websites. Of course, others watched television, heard from friends, or even experienced the events up-close and personal. Within hours, players organized candlelight vigils for the victims of the attacks, using glowing weapons or other objects, taking screenshots and posting online to document their in-world activities and discuss what they meant in the context of the dramatic historical events unfolding around them. For a vigil held on *Everquest'*s Luclin server on 12 September in response to "yesterdays disheartening display of events," players were invited to "mourn and discuss" on the Everlore website. Players commented on the meaning of this action to them; one of them, with the player name Keeter, argued that, "Just because you are in a game doesn't mean the world outside doesn't effect [sic] you. Many people would like to mourn and share peace along side [sic] people they have

battled long and hard side by side with. Yes, I can go to a church to mourn, but I would like to do it with my comrades around the country/world, which is impossible everywhere else. If you don't want to be a part of it, then dont [sic]. You can choose not to do it. But respect the people who would like to. We don't bother people that want to run naked gnomes through the country, so don't bother people that want to gather and discuss something important to us all." (re: Candlelight Vigil; Lowood, 2008) Documentation such as this quotation is necessary both for a full description of an event and for a rich interpretation of what the activities associated with that event meant to participants, no matter what kind of world we are talking about.

There are three important points here with regard to a preservation project focused on software and game-produced data. First, inside *Everquest* today there is no trace of these events. Assuming that the game world has not been deleted, erased or remade (untrue), that we are on the right server or shard of the game, and that we are standing on precisely the spot where such a vigil occurred, it is generally not possible to dig beneath the surface, scratch underneath a poster, or find a file cabinet of documents or an old newspaper in a nearby building. There are exceptions, such as the monument on an Asheron's *Call* server that commemorates a unique achievement by its players, but such exceptions are rare.

Second, this lack of in-world artifacts and documentation clearly has implications for long-term preservation that focuses on game software and server-side data. Assume that we are able to capture every bit from a virtual world server, everything from 3-d models to account information, that we are able to reverse engineer or disable authentication and log-in controls after the original server is no longer live, and that we have received permission from every rights holder ranging from game developers to third party developers and players to copy, store, and use what they created, show their avatar, or reveal their identity and activities. Your chances of all this actually happening are near zero, of course, but assume that it could all be done. Then assume that you can sync up every state or version of the software to the matching states of databases. It might then be possible to run a simulation of the virtual world as an archival time-machine, flying around on a magic carpet in spectator mode but never interacting with events run by the game engine and player data, much like a game replay. Turn the dial to 12 September 2001, and you might find a group of players standing around with brightly colored weapons and wands in their hands. But what are they doing, and what does it mean to them?

The third point then is that the documentation that is a pre-requisite for future historical studies of virtual worlds may not be located on game servers at all. The most important qualitative documentation may be somewhere else, on a blog or a wiki, in a player-created database or

Flickr screenshots, or a YouTube video. The same may be true for some of the contextual information desired under whatever set of transfer protocols or preservation specifications a project is using, even sometimes for technical aspects such as software dependencies or relationships among objects. Game researchers such as Dmitri Williams have extracted and analyzed a wealth of quantitative data from virtual worlds; they have used these empirical data to explore social and economic aspects of these worlds. Such research rarely has access to server-side data, but instead relies generally on surveys, participant observation or data harvested on the client side using bots or automated characters. (Williams, et al, 2006) The point is that writing the history of virtual worlds on the basis of software and of associated data would be a barren exercise. Installing Everquest in 2050 will not reveal much about the virtual world that emerged from the software, even if future writers and historians have access to everything needed to run a fully functioning version of the game. Certainly, there are still important reasons for preserving this software, whether as artistic or cultural content, for technology studies, or for forms of scholarship that treat aspects of digital games and virtual worlds as authored texts or artistic objects. Still, we need to think more about virtual world history in terms of events and activities, much as an archivist or historian would in the real world, and attend more carefully to preservation of forms of documentation in digital form that are external to virtual worlds as software environments.

3. Preserving Virtual Worlds

The How They Got Game Project was created at Stanford in 2000 to begin work on the history and preservation of digital games and interactive simulations. The founding of the project was stimulated by Stanford's acquisition of the Stephen M. Cabrinety Collection in the History of Microcomputing three years earlier. The Cabrinety Collection is perhaps the largest collection of microcomputer history held by a major cultural repository, with roughly 20,000 software titles, roughly 85 percent of which are digital games, some 75 hardware platforms, publications, ephemera, and archival materials. How They Got Game also continued earlier work in software history and archives carried out under the auspices of the Silicon Valley Archives at Stanford. In 2008, The How They Got Game Project, as part of the Stanford University Libraries, joined the University of Illinois, the University of Maryland, and Rochester Institute of Technology to form Preserving Virtual Worlds, a multi-institutional project funded by the U.S. Library of Congress.

In the How They Got Game Project at Stanford and the Preserving Virtual Worlds Project, we have identified some possible approaches to documenting activities and events in virtual worlds. In the discussion that follows, I will divide these activities into two broad areas. The first

covers efforts to specify the sorts of born-digital data and metadata that will need to be captured or created in order to document the history of virtual worlds. The second topic will touch on new ways to think about access to certain categories of virtual world objects.

Data, Documentation and Teamwork

In an essay I wrote nearly a decade ago, called "The Hard Work of Software History," I tried to come to grips with the some of the then emerging difficulties of collecting software that cultural repositories were beginning to face. (Lowood, 2001) As I noted then, debates about the best methods for preserving software "are partly stuck on different institutional and professional allegiances to the preservation of objects, data migration, archival functions, evidentiary value, and information content. I fear that these issues are not likely to be sorted out before it is necessary to make serious commitments at least to the stabilization, if not the long-term preservation, of digital content and software." (p. 149) Historians, librarians, archivists, records managers, and museum curators have different ideas about the formats and forms of digital content, the materiality of digital media, uniqueness, custody of original media as opposed to bits, documentation, evidentiary value and many other issues that affect long-term preservation of software and digital content.

The Preserving Virtual Worlds project, because of its participants and its problem-set, highlights the importance of finding solutions for problems such as identifying significant digital artifacts or developing standards for metadata through the collaboration of individuals and teams with different perspectives on software preservation, archives, and history. Before citing about a few specific examples, allow me to speak to a few characteristics of this project. The division within Library of Congress that is funding our project is NDIIPP, which stands for the National Digital Information Infrastructure and Preservation Program. NDIIPP's missions of preserving significant collections of digital content and developing a viable technical infrastructure of tools and services to support such activities is well-known, but a third leg of the NDIIPP stool is perhaps less familiar: "Building and strengthening a network of partners." (NDIIPP Program Background, 2007) Thus, most of the NDIIPP projects involve multi-institutional collaborations, usually with a lead institution and multiple institutional partners. In the case of Preserving Virtual Worlds, for example, the lead institution is the University of Illinois at Urbana-Champaign. The other three institutions are funded project partners. In our project, as in others, some of the work is also carried out by external partners; in our case, these include Linden Lab, the developers of *Second Life,* and the Internet Archive. Moreover, it should be noted that the four internal partners offer a diverse set of institutional settings

and intellectual commitments for digital preservation work. The mix includes a library school and library group with expertise in digital preservation theory, repository development, and schema development (Illinois); a humanities research center with expertise in textual scholarship, electronic literature, and notation systems (Maryland); a library-based group and game research project with special expertise in history of digital games and software archives, as well as digital repository technology (Stanford); and an academic department in game design and development with expertise in game design, game engines and emulation. I have believed for many years that the problems of digital preservation can only be solved through collaborative work. This is not only due to issues of scope and scale but primarily, in my view, because solutions demand intense negotiation among experts who are likely to see the problems differently.

It is high time to review a few of the issues that have surfaced in the Preserving Virtual Worlds Project with respect to data and metadata. Let me emphasize a few points before I begin here. First, the opinions that I am presenting here are my own, although it would have been impossible to arrive at them without the intense collaboration of the project partners. Second, my perspective is that of a historian and curator, which means I hope that my experience and expertise are strongest in areas of selection, assessment, description, and access, as well as the content and technical contributions of game developers and, importantly, players. On the other hand, my background is much weaker when it comes to issues of repository design; or technologies of virtualization, emulation, data extraction and migration; and I am a complete noob when it comes to schema development or -- God help me -- interpreting RDF (Resource Description Framework) triples, even if represented as a graph.

The first issue has already been set up in the discussion of virtual worlds as history. What exactly are we trying to preserve? Specifically, is virtual world preservation focused on the software and server-side data that in some sense defines or encompasses the "world" as a created artifact, or are we looking for materials in digital form that document the activities of players or residents of these spaces? There are two other ways to think about this distinction. The first is to separate developer-created or -managed materials from those created or managed by players. The second is to separate thinking about repositories of virtual world data as essentially libraries or museums of created artifacts or texts, as opposed to archives of documentation about events. I have set up these ways of thinking about the problem as binaries -- developer vs. player or artifact vs. archives. However, depicting virtual world preservation as an either-or proposition in these terms is unnecessary and counter-productive. Still, these different ways of thinking do matter in terms of collecting focus, evaluation of digital content objects, organization of content transfer packages,

metadata creation, and access strategies.

Consider a problem that might seem to be entirely a matter of treating the essential task of game preservation as software preservation, but turns out to have crucial implications for documenting player behavior and history: versions. Due to the bleeding-edge nature of the Preserving Virtual Worlds project, we decided early on to limit our attention to a dozen or so representative case studies, rather than a gigantic collection of software or data. One of our key cases has been DOOM, originally released by id Software in December, 1993. DOOM is a multiplayer, first-person shooter, and while now is not the time to delve into game history, suffice it to say that this game immediately transformed competitive, multiplayer gaming into the leading-edge genre for computer games through the 1990s. There are two other things you need to know about DOOM. First, it was distributed first and throughout its history in shareware versions that featured a limited number of episodes of the game; the idea was that the shareware version would hook players, who would then purchase the full version of the game. The second aspect of DOOM has best been described by media theorist Lev Manovich: "Here was a new cultural economy that transcended the usual relationship between producers and consumers …: The producers define the basic structure of an object, and release a few examples as well as tools to allow consumers to build their own versions, to be shared with other consumers." (Manovich, 2001, p. 245) The developers of DOOM openly embraced revision of the notion of game authorship and modification of its software by the player community, which right away de-stabilizes the notion of a canonical version of the game. Defining a version of the game DOOM therefore involves considerable attention not only to a sequence of patches and versions, but also to combinations of developer-produced software, third-party add-ons and player-developed modifications, or mods.

De-stabilizing the notion of a fixed version of software is not the only impact of players on preservation. If, as I suggested earlier, documentation of events and player activities is at least as important as software in preserving game culture, what sorts of digital objects would meet this goal for games and virtual worlds? A crucially important category of objects are produced by players' efforts to capture their experiences through replays, screen captures and screenshots. In the case of DOOM, we have already seen how NoSkill's demo files make it possible view the games of one of this game's best competitive players. Again, DOOM demos were essentially replay files, saved sequences of instructions from a previously played game that, when executed by the game software, would show the same game from the same (first-person) perspective of the original player. As one guide put it, "in the DOOM/DOOM II universe, the term 'demo' refers to a file that contains a recorded session of gameplay." (Ledmeister) The same is true of replay files in later games, such as Blizzard's

Warcraft III. Unlike video files captured from the screen or video-card output, demos or replays allow different views and settings as permitted by the game software and the best visual quality that the software will produce. However, this all means that they also require a running version of the game engine in order to be viewed. Not only that, the version used to view the demo or replay nearly always must correspond exactly to the version that was played when it was created. Therefore, any decision about which version of the game will be preserved determines which replay or demo files will be viewable in the future. Likewise, any decision about which demos or replays are historically significant in terms of game culture or history, will pre-suppose preservation of the appropriate version of the game software. Treatment of the software artifact affects documentation, and selection of documentation affects treatment of the software artifact. At least in the realm of virtual world or digital game history, separation of these treatment decisions into specialized areas or departments may lead to disastrous consequences for future archivists and historians.

My other example with respect to virtual world data and metadata also speak to the necessity of maintaining contact between collections and their contexts, as well as between projects of software preservation and historical documentation. This example suggests that documentation can also serve as a category of metadata for virtual world data.

As part of the Preserving Worlds Project, the How They Got Game group at Stanford has created two collections to document virtual world events using largely player-generated content. The first is the Archiving Virtual Worlds collection hosted by the Internet Archive as part of their Moving Image Collections. This collection consists in large part of video footage made with real-time screen capture tools such as Beepa Software's Fraps. The "Final Countdown" video discussed earlier is an example of the content preserved in this collection. How They Got Game has also established a subscription with the Internet Archive's Archive-It service, through which we have been crawling game- and virtual world-related websites since the beginning of 2008. Between these two collections, we have seen to the preservation of collections of virtual world videos, weblogs, wikis, player-created websites, maps and many other forms of documentation that provide information about player activities. These activities might include modifying game software, demonstrating skills through superior game-play, events such as protests or artistic performances, or a great number of other things.

An interesting quality of virtual and game worlds is that many of them can be navigated by in-world coordinate systems, much like real-world cartography. Two well-known examples are SLURLs in Second Life and the UI coordinate system in *World of Warcraft*. Just like we can attach GPS coordinates to real-world maps, photographs, and other media, these virtual world coordinate systems

might make it possible to match documentation we have assembled in our virtual world collections not only to locations in virtual worlds, but also to each other. Currently, the Internet Archive only allows us to input metadata at the seed level for crawls, though future development efforts may soon make it possible to tag individual webpages. In the case of the video collection, however, the metadata scheme based on Dublin Core already provides the "coverage" element for individual objects. As the Dublin Core specifications tell us, this element can be used "for the use of multiple classification schemes to further qualify the incoming information" such as latitude and longitude or other "native coordinate representations." (Becker, et al., 1997) Using virtual world coordinates might help us bridge the gap between documentation and mute server-side software and data with respect to "event history," perhaps offering a solution to the problem of Perfect Loss.

A use scenario might be involve a cultural historian who is interested in the in the use of game worlds for scholarly communication and learns about the first science conference held in *World of Warcraft*, in May of 2008. She would find videos documenting this event in the Archiving Virtual Worlds collection, but they are a bit grainy and she is curious about the locations chosen for the event. So as part of her "fieldwork" she installs and fires up the game world. Then, using the coordinates provided by the collection metadata, she ports to the location where the conference was held and walks the terrain depicted in the video, so to speak. This scenario will work better in game worlds, where developers maintain relatively stable environments with respect to content, than in virtual worlds such as *Second Life,* where residents such as the National Front are free to delete everything they created. However, if we are able to maintain backups of content as part of a package of data associated with a virtual world, this problem will be alleviated. I will have a bit more to say about models of access that effectively support such use scenarios in the next section of this paper. For now, it is sufficient to observe that, as in the case of DOOM demos, useful connections between documentation and data will only be available if curators and archivists work closely with software preservation specialists.

Access

Now that I have introduced a potential user for our virtual world collections, let me say something about access. Access is perhaps not a core concern for digital preservation per se. In this case, however, we are working on an approach to access that may lead to an alternative model for preservation of 3-d artifacts built for games and virtual worlds. This work depends once again on collaboration, in this case, on an allied project at Stanford in the Stanford Humanities Laboratory and the Computer Science Department to develop the next-generation, virtual

world platform called Sirikata. Sirikata is a BSD licensed open source platform. The development team aims to provide a set of libraries and protocols which can be used to deploy a virtual world, as well as fully featured sample implementations of services for hosting and deploying these worlds. An alpha version has just been used for a mixed reality performance at the MiTo Intenational Festival of Music in Milan, 12-13 September 2009, and is currently live for an installation at the Bornholm Art Museum, in Denmark. So it works.

Think about the assets and content that go into the creation of a virtual world: models, maps, geometries, textures, and so on. We are not sure yet how future scholars will visualize, analyze, and understand these artifacts in a digital repository consisting of data files and metadata. In administrator mode, which is what we have today, the Stanford digital repository is essentially a file directory. Now think about another model of access to artifacts from an historical world, also largely models and suitable spaces for these models, say, a natural history museum showing dinosaur skeletons in a set that takes the visitor to a prehistoric savannah. Access to the information preserved there is visual and is reinforced by immersion in the world of the artifacts. We are proposing to do something very similar with 3-d artifacts from virtual and game worlds.

We are investigating the use of the Sirikata platform for the creation of a new kind of repository, one in which 3-d objects are stored as 3-d objects. This means that we would like to be able to move original geometry and texture data – archival assets – from their original environments into such a repository. The two cases we are investigating are (1) digital artifacts such as maps or levels from 3-d games, beginning with early titles such as id Software's *DOOM* and *Quake*, and (2) exhibitions created in virtual worlds such as *Second Life* by cultural institutions, including libraries and museums. Can we move these objects into an instance of an open virtual world platform such as Sirikata? If so, might we think of these instances as virtual wings of a library, rather than file repositories, places where the historical artifacts are deposited, preserved, found and investigated in an environment that puts documentation and narrative alongside the artifacts?

Maps are incredibly important in game development and in player cultures. Players analyze them, re-create them as mods in other games, and build viewers and projections. As spaces in an archival repository, historical maps would not just be artifacts, they also could provide spaces in which to site other objects and documentation – such as models, screenshots, videos, or documentation – that provide information about what took place in these settings. This might be where our future historians goes to check out the locations used for the science conference held in World of Warcraft, for example, without having to assemble, install and figure out how to use the original

movement and navigation systems of the game's user interface. Thus far, we have successfully exported levels (maps) from id Software's Quake (1996) to the open VRML format, from which we can move unaltered geometries and textures from this historical digital artifact to other environments, whether Maya, 3DS Max, or Sirikata. If we take the artifact into VRML, we can move around with a VRML viewer called Cosmo. When the pipeline to the Sirikata-based virtual repository is done, it will be possible to drop in to Sirikata and see 3-d objects with the same geometries and textures they were given in the original game. In fact, these artifacts will be created from certified copies of original game data used to produce them in the first place, thanks to the Preserving Virtual Worlds project and the forensics workstation recently installed in the Stanford University Libraries. And with Sirikata we get some affordances for free, such as a completely functional Chrome browser. Anything you can do with the browser – view video, play a flash game, search an index or a finding aid – you can do in Sirikata while looking at a model or map of interest. The affordances of a standard browser offer options for adding content to the repository, from panels and videos, to search engines and interfaces for selecting and viewing objects on display.

4. Conclusion

Virtual worlds are history. When they go away, we will be left with software artifacts, proprietary data, and documentation. The Preserving Virtual Worlds project is only the first to explore the many problems associated with preserving virtual worlds and digital games as complex digital artifacts. Thinking of virtual worlds as history reminds us that our solutions to these problems will need to provide access not just to software, but to materials that document the events and activities that took place in the virtual spaces created by that software. If we are to succeed in these efforts, we will need to forge a deeper understanding of how work on software preservation and documentation are inter-related. Only then will we be able to put together successful teams of specialists with complementary skill-sets in history, curation, and preservation technologies.

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