A Second Life for your Museum:

3D Multi-User Virtual Environments and Museums

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Abstract

The paper gives an overview of some of the museum-like activities currently being undertaken in Second Life. Current development is mostly in the hands of pioneers, often interested amateurs engaging in serious leisure to create spaces enabling them to share their interests with others. These efforts are explored in this paper through a systematic analysis of museum visits and a qualitative analysis of interviews with designers and developers of museums in Second Life. Findings identified include the impact of the current technology on what is created, and the importance of

interaction-centric designs.

1. Introduction

Museums have been exploring the use of multi-user virtual environments (MUVEs) for more than a decade, often in the form of proprietary, non-persistent virtual worlds designed and developed for select audiences such as teachers and students. Since launching in 2003, the online virtual community of *Second Life* (*www.secondlife.com*) has attracted over 900,000 dedicated 'residents' who are laying the foundations for widespread adoption of MUVEs by museums, libraries, archives, and other information organizations.

Already there is a range of museum-like activities occurring in *Second Life (SL)*. There are many parallels with the early development of the Web, including how resident-developed museum spaces currently outnumber those created by real-life museums (see Taylor, 1995). These experiments in a new medium can tell us a lot about what 'real-life' museums should consider, as well as how we might want to inform and re-merge with our physical resources. *SL* museums can be about historical re-enactment, such as dressing up and walking around Ancient Rome with other residents acting in character — a variant on real life (RL) re-enactments. There are *SL* museums containing digitized RL artifacts. There are other collections of 'born digital' artifacts created in *SL* that are collected, curated and preserved by in-world museums. There are outdoor sculpture parks, places that are more like art galleries, and venues to support Warhol-

like art happenings. There are labels, lectures, tours, audio guides, docents, even museum shops. Some of the museums created in *Second Life* are now seeking affiliations with real-life artists, museums and others are actively establishing themselves as 501(c)3 non-profit organizations.

This paper presents a selection of the results from our work that attempts to understand the nature, diversity and evolution of current museum and museum-like activities in *Second Life.* Drawing on the experience and lessons learned from past museum virtual environments, non-museum collaborative spaces, and recent research on learning in multiplayer online games, this research can serve as a guide for museums interested in establishing a virtual presence in *Second Life.*

2. Literature Review: What is *Second Life*?

In many ways, the growth of MUVEs mirrors the growth of the Web, as new functionalities and technologies transition from small scale prototypes constructed by researchers at great expense to large scale, rapidly growing mainstream products available to the general public. These products are not only used by many people; they are co-created by them. With the Web, this was a matter of using hypertext to create websites, initially derived from various genres of print media, and soon evolving their own genres. In the case of *Second Life,* users can create 3D artifacts, buildings, and social spaces where people interact. The social nature of *Second Life* is a critical component of understanding what it is and how it can, and should, be used.

2.1 Between First Life and *Second Life*: MUDs, MOOs and VRML

While the scale of *Second Life* is unlike what has come before, the idea of a persistent world that offers users the opportunity for engagement and a role in creating the world with which they interact is not new. In 1978, Roy Trubshaw and Richard Bartle, students at Essex University,

created the first multi-user dungeon (MUD) as a game that allowed multiple players to engage in Dungeons & Dragons-like adventures. In addition to being multi-player, MUDs were also persistent – when a user logged off, the world did not go away, it continued to exist ready for players to enter. MUD users often found the social aspects of MUDs the most important aspect of their engagement, leading to more socially oriented MUDs. In 1989, the MOO (MUD, Object Oriented) was developed to allow participants to create and modify places within a MUD space, enabling the development of various social and educational MOOs (Bartle 1999; Castronova, 2006).

While the development of 3D rendering technologies, such as Virtual Reality Modeling Language (VRML) paralleled MOO development, it lacked the capability to create multi-user environments (Durbridge, 2004). In the place of multi-user VMRL, companies such as Blaxxun (*http://www.blaxxun.com*) and ActiveWorlds (*http://www.activeworlds.com*) created persistent multi-user environments, worlds that offered many of the affordances that social MOOs had offered, only in 3D. Limitations of available bandwidth, lack of active development, and ultimately the collapse of dot com funding prevented these early worlds from having more than limited success. At the same time, graphic role playing games, the successors to original text-based MUDs, were migrating online. RPGs initially offered the ability to connect via local area networks, migrating to full online-based networks in 1997 with the launch of *Ultima Online*. Participation in massively multi-player online games (MMOGs) grew rapidly as domestic access to broadband increased, and by mid-2006 exceeded 13 million subscriptions to various MMOG environments (Castranova, 2006; *http://www.mmogchart.com*).

Although *Second Life* represents only a small percentage of the total number of participants in MMOGs worldwide, it is the largest and fastest growing of the new generation of persistent

MUVEs. *There* (*http://www.there.com*) offers similar features, but unlike *Second Life* moderates user activities to allow only 'PG-13' content. Linden Labs created *Teen Second Life* (*teen.secondlife.com*) that requires adults aged 18 and over to complete a background check before they enter. *Multiverse* (*http://www.multiverse.net*) is creating an open platform for the development of both MUVEs and MMOGs through a common set of standards and clients. A consortium of academic institutions is developing the *Croquet* project (*http://www.opencroquet.org*) as an open-source environment for building collaborative virtual learning environments. Lastly, the Acceleration Studies Foundation has established a Metaverse Roadmap Project (*http://www.metaverseroadmap.org*) to forecast and shape the development of the new 3D web.

2.2 Museums and Collaborative Virtual Environments

In the early 1990s several MOOseums were constructed and museums were early adoptors of VRML for display of 3D artifacts (Corcoran, 2002; Fernandes, 1998). Museums also explored emerging 3D multi-user environments such as Blaxxun and ActiveWorlds, although museums have mostly favored custom developed non-persistent environments under their control (Barbierie, 2001; Di Blas, 2005, 2006; Lucey-Roper, 2006). Many of these virtual environments were developed with museum education and K-12 students as their primary audiences, placing the emphasis on traditional learning activities and pedagogy (e.g. Economou et al. 1999). These experiments have stressed the need for carefully structured and controlled activities in order to make MUVEs successful as educational tools (Di Blas, 2003). Museums have also been concerned about accurate representations of their collections, sites or spaces in virtual worlds (Johnson, 2005; Tolva 2005). However, a very different focus is needed if the goal of a MUVEs is social interaction and not authentic modeling of virtual artifacts (Di Blas, 2003; 2005).

2.3 *Second Life* as a 'Third Place' for Serious Leisure

Second Life presents some challenges for the traditional museum model of working with virtual environments. The residents in *SL* (and *Teen Second Life*, *There*, etc.) are independent actors within the world. Like the real-world environment, *SL* residents also have many choices for engagement, learning, and fun. At present, little hard evidence is available about how residents spend their time in-world (data we are accustomed to seeing in Web server logs are still scarce in *SL*) and requires some thought about how to evaluate museum activities in *SL*.

Past evaluations of MUVEs have drawn from the literature of computer-supported cooperative work (CSCW) and studies of online virtual learning. Recent research involving MMOGs (Castranova, 2006; Dieterle & Clarke, 2006; Ducheneaut, 2005; Steinkuehler & Williams, 2004; Yee, 2006) suggest that such a clear separation between work, learning and play may not always apply to multi-user virtual environments in which participants invest a great deal of 'work' in return for tangible or pleasurable benefits. These studies also suggest that instead of creating alienated individuals; MMOGs are vibrant communities that can serve as 'third places' for social interaction.

Fortunately, museums are not unfamiliar with adults who engage in challenging tasks that provide them personal rewards. Volunteers provide an important supplement to museum professional activities, even though they are not officially employees or students of the museum; "Volunteers are...involved participants rather than consumers" (Orr, 2006; Stebbins, 1992). For these volunteers, the museum may often function as their 'third place' where serious leisure pursuits can take place. If it is possible to connect 'third places' and serious leisure activities in both virtual worlds and museums, this might suggest a course of action for the creation of virtual museum spaces that engage adults interested in serious leisure. If museums can engage

SL residents as individuals interested in serious leisure with whom they can collaborate, rather than treating them as consumers, museums may help establish new uses for platforms such as *SL.*

Figure 1. The Second Life client interface, showing a sample of primitive objects.

3. Methodology

Our research began by trying to create a list of all museums or galleries currently available in *Second Life.* This delightfully difficult task was made all the harder not only by the frequency with which new museums are added to SL, but also by the number of real-life museums or related organizations exploring the potentials of SL by developing private museums not open to the public. Eventually, we decided that the best approach was to conduct a straightforward search, using *SL*'s in-world search engine, for all locations self-identifying as either a "museum" (43 locations) or a "gallery" (102 locations). By combining the results of this search with online lists of favorite museums and galleries in *SL* — some publicly available, such as in Wikipedia, and some not, e.g. *SL* note cards passed around to residents in-world, we produced a list of more

than 150 museums.

We next visited each of these museums 'in person', touring the entire installation as best as possible, and making notes about the nature of the museum, the type of exhibits displayed, and the special features available for the visitors. Resources and descriptions about these museums available on the open Internet were also consulted to round out the available data for the researchers. Based on these observations, and drawing upon existing approaches for describing virtual spaces (Castronova, 2006), we developed an extensive list of characteristics about museums in *SL*, and then used a qualitative analysis process of coding and memoing (Straus & Corbin, 1998) to create a conceptual framework for classifying and characterizing *SL* museums (see below).

Based on this framework, we identified several exemplars of museums in *SL* for further analysis and study (see below for descriptions of these exemplars). Informal interviews were conducted with selected developers of these museums using *Second Life* Instant Messaging sessions. Further details of our ongoing research are available at: *http://www.isrl.uiuc.edu/~rjurban*.

4. Characteristics of Museums in Second Life

This section presents nine characteristics that we believe are helpful in discussing and comparing the variety of different museums and museum-like places in *Second Life*. The characteristics are illustrated by particular *SL* museums that are discussed in more detail in section 5 .

4.1 Scale

Museums in *SL* vary tremendously in terms of size and scale, ranging from single installations to extended complexes where exhibits are arranged over an entire island (such as the

International Spaceflight Museum). While the majority of museums in *SL* maintain a RL metaphor by displaying artifacts on walls or in cases in rooms, there is no explicit need to do so in *SL*. In a world where the sun always shines, there is no reason not to display artifacts in the open air or even floating in mid-air; since *SL* avatars are able to fly, museums in *SL* can take innovative approaches to displaying artifacts that maximize vertical space as well as horizontal. With no need to worry about artifact theft or deterioration over time, developers of museums in *SL* may choose to display their collections in vast open spaces rather than forcing visitors to move from room to room in a single building. Not only does this openness enable more visitors to observe exhibits simultaneously, it cuts down dramatically on the feelings of claustrophobia users often feel in MUVEs, especially when moving around in small spaces.

4.2 Setting

Just as in RL, how a museum chooses to display its collections matters tremendously in *SL*. Exhibits may be displayed in one or two small buildings, one very large building, or in the open air, and the setting in which visitors encounter the museum's exhibits matters as much as the exhibits themselves. The developers of some *SL* museums, such as the Second Louvre Museum, work very hard to create a setting that duplicates, at least partially, a RL museum or location. Such an approach, however, raises the question of whether the setting is more important than the artifacts contained therein, or even whether the setting itself is on display rather than the artifacts. So as not to detract from the displayed collections, some museums, particularly galleries of born digital art, present their exhibits on relatively blank walls in relatively undecorated spaces. On the other hand, some museums seem inspired by a 19th century exhibit mentality, displaying large walls covered with a multitude of paintings as far as the eye can see.

Figure 2. WPA Poster Exhibition at Artsplace

4.3 Persistence and Evolution

While not uncommon to MUVEs, the fact that all locations in *SL* are persistent can be challenging for first-time visitors to *SL* museums. Individuals who may be more used to playing computer games, where each time they return to a game they can pick up where they left off, may find it confusing to have a virtual world that persists and evolves even when they are not present. When visitors return to a previously visited museum in *SL*, they may find the museum to be completely different. Even visitors accustomed to RL museums changing collections and rotating galleries may be unnerved by the way virtual buildings can so easily change their shape or size from one visit to the next. To address this, some *SL* museums developers maintain a distinction between permanent and temporary galleries.

4.4 Media Richness

Even within an intensely graphic 3D environment such as *SL*, there can be great differences between how museums employ multimedia and other media rich technologies. When interacting

in MUVEs, the fact that one is constantly working within an extremely rich media environment leads visitors to consider that environment to be the norm, thus making examples of multimedia applications *within* the multimedia environment stand out. For instance, visitors to the Sci-Fi Museum can visit a "Star Trek Holodeck", selecting from a menu of possible objects and then entering the Holodeck to view the object they 'created'. Other examples of media richness in *SL* museums include live video feeds from outside sources such as NASA TV shown in the International Spaceflight Museum, live Flickr streams shown in *SL* art galleries, and 3D representations of live weather data, courtesy of the National Oceanic and Atmospheric Administration (NOAA), displayed in the Science Center on Info Island II. Given the nature of the available technology, the concept of media richness takes on all new meanings for online museum visitors and raises visitor expectations when visiting museums in *SL*.

4.5 Visitor Engagement

Like museums in RL, successful museums in *SL* try to encourage visitors to return again and again. Opportunities such as special events, lecture series, group activities, and so on allow for community building among visitors, and encourage them to feel like an integral part of the museum itself. The International Spaceflight Museum, for instance, has a regular lecture series covering topics ranging from the space shuttles to the Mars missions that are extremely well-attended and well-publicized in-world and in RL. Special events and similar activities can be powerful tools for building a strong community of regular visitors who feel intimately involved in the museum's activities. It is important for developers of museums in *SL* to find some way of drawing visitors into the museum experience and building a community among the museum's many virtual visitors.

Figure 3. Blasting off at the International Spaceflight Museum

4.6 Social Interaction

In order to take advantage of the multi-user aspects of MUVEs, many *SL* museums offer visitors opportunities for social interaction, providing areas to congregate such as cafés, places to exchange memorabilia such as gift shops, settings for special events such as conference rooms, etc. The mere fact that someone might visit a gift shop in a *SL* museum, and purchase a t-shirt for their avatar to wear around a virtual world thereby advertising the fact that they visited a virtual museum is a good indicator of how strongly visitors value these opportunities for social interaction. Visiting a museum in *SL*, interacting with other individuals with similar interests (individuals who in RL may be located anywhere in the world), and discussing the museum's artifacts and collections in real time can be a powerful incentive for encouraging museum visits. When developing museums in MUVEs such as *SL*, it is important to provide suitable

opportunities for social interaction among visitors.

4.7 Intended Purpose

The majority of museums in *SL* fall somewhere on a continuum between existing primarily to display artifacts (e.g. virtual galleries such as the Bayside Beach Galleria) and existing primarily to display a space or environment (e.g. replicas of historical settings such as Paris 1900). For developers of *SL* museums, the museum's intended purpose influences numerous choices such as the arrangement of gallery space for tours and teaching purposes. Museums designed for the explicit purpose of displaying a historical location face particular challenges, as it can be difficult to exactly recreate an entire location, given the technological limitations of building in *SL*. Replicated environments such as Paris 1900 or Casablanca must therefore focus on extracting key elements from the RL location and then re-positioning them in *SL* to convey the look and feel of the original without necessarily creating an exact copy. Recreated historical settings also face difficulties if they wish to use non-player characters to add realism, and may enforce certain rules (e.g. flying is not allowed in Paris 1900) to keep visitors from performing in ways that violate the spirit of the exhibit.

Figure 4. Exhibit on Malay culture at the Fort Malaya Museum

4.8 Collection Types

While everything in *SL* is digital by necessity, *SL* museums display digital representations of many different types of objects, from classic works of art to the latest scientific models, in both permanent and temporary exhibits (there is even a History of *Second Life* Museum in *SL*). Built-in multimedia technologies provide opportunities for displaying unique types of collections that may be physically impossible to display in RL museums. The International Spaceflight Museum, for example, offers a solar system simulation where visitors can stand in the middle of a model of the solar system, calibrate it to any date in history, and watch the planets revolve around them. Museums in *SL* can offer unique experiences that would be prohibitively expensive in RL museums, allowing visitors to find out what it would be like to be caught in a tsunami (at NOAA's Meteroa Island), take a rocket ship ride into space (courtesy of the International

Spaceflight Museum), or parachute from the top of the EiffelTower (in Paris 1900).

4.9 Target Audiences

Identifying and targeting specific audiences in *SL* can be challenging. Not only is access to *SL* limited to people over the age of eighteen (there is a teen version of Second Life, however), but the nature of interacting with individuals in *SL*, combined with the typical *SL* citizens' reluctance to give out information about their RL identities, makes it very difficult for museum professionals to administer surveys or conduct needs assessments in *SL* (and indeed raises the question of whether one should collect data on visitors' first or second lives). Beyond counting the number of visitors who come through the door and encouraging visitors to leave comments in a guestbook, there is little at this point that museum professionals can do to learn more about their visitors in *SL*. As more museums experiment with developing exhibits and identity in *SL*, it will likely be necessary for museum professionals to work with the developers of *SL* (Linden Labs) on improving mechanisms for learning more about their target audiences.

5. Exemplars of Museums in Second Life

This section presents several exemplars of museums in *Second Life* specifically chosen to illustrate the range of possibilities inherent to the above conceptual framework. Selecting these museums for discussion does not necessarily mean they are the best possible museums in *Second Life*, but only that they are illustrative of the diversity of content and experience that can be created.

5.1 International Spaceflight Museum (Spaceport Alpha 48, 78, 24)

The International Spaceflight Museum is an example of a large-scale *SL* museum with many

opportunities for social interaction. The museum's exhibits include a replca of the lunar landing module, photo galleries, and a large ring circling the island on which a series of rockets and other spaceflight vehicles are displayed. The rocket ring, which is simply breath-taking in its scale and scope, is the centerpiece of the museum; as visitors walk around the ring from rocket to rocket, they have the opportunity to witness firsthand the evolution of space exploration technology. In addition, there are numerous examples of rich media and interactivity, including a solar system simulator, a planetarium, and a rocket ride into space, at the end of which visitors can teleport from planet to planet to observe models of the various spacecraft that visited each planet (including a special field trip to the surface of Mars). The museum also offers a number of opportunities for social interaction, including a large open-air auditorium for lectures and presentations, small conference areas, and plenty of places for groups to gather and discuss the museum's exhibits. The combination of detailed exhibits, elaborate multimedia displays, and frequent opportunities for interaction has contributed to the museum's success at building a community of regular museum visitors.

Figure 5. International Spaceflight Museum

5.2 Second Louvre Museum (Tompson 153, 97, 100)

The Second Louvre Museum is an example of a traditional museum installation displaying both classic and modern works of art in a setting specifically designed to replicate a wing of the Louvre Museum in Paris. The exterior of the museum is exquisitely detailed, with colonnades, statues, fountains, and other features carefully designed and developed to evoke the grandiloquence one feels when standing in front of the Louvre in RL. Inside, the museum is divided into different galleries, and the artifacts on display often cover the walls vertically as well as horizontally thereby requiring visitors to fly up to the ceiling to get a good look at the works of art. While the historically accurate yet closed-in design of the museum can make it hard to

navigate in large groups, the structure does a fabulous job of replicating the sense of visiting a grand European art museum. Like many other museums in *SL*, the Second Louvre Museum does not provide much, if any, descriptive information about the artifacts on display. In this respect, the museum seems to concentrate more on presenting works in an evocative, artistic setting than on educating the visitors about the artifacts and images on display.
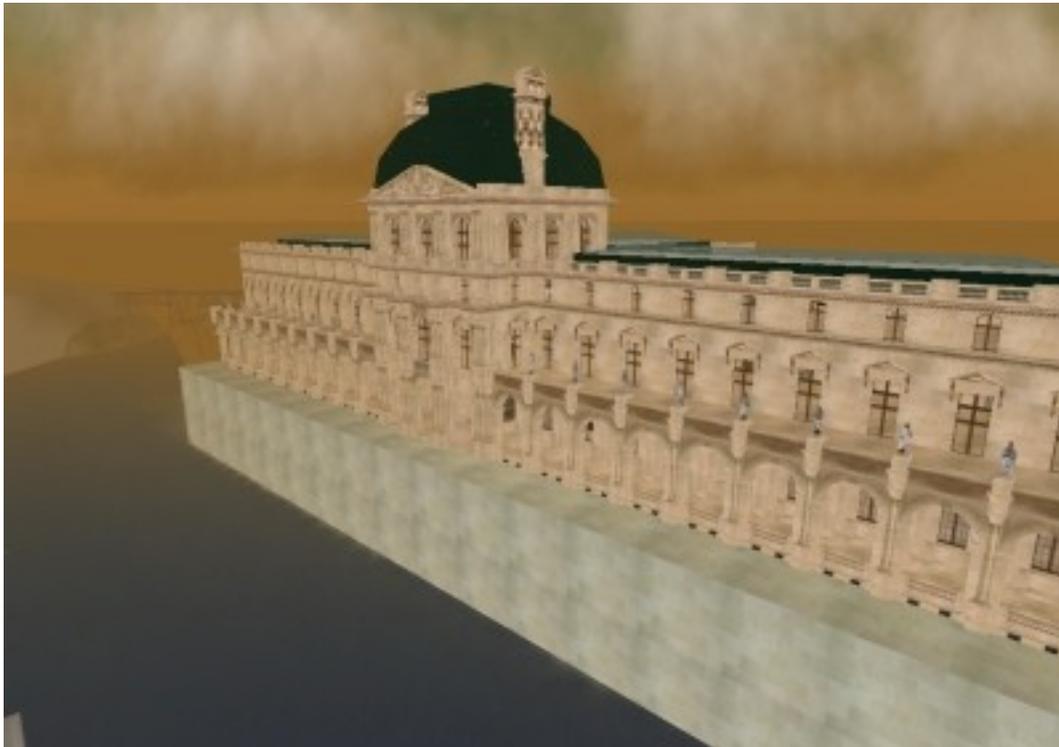
Figure 6. The Second Louvre Museum

5.3 Sci-Fi Museum (Indigo 75, 213, 22)

The Sci-Fi Museum is an example of an interactive museum using rich multimedia technologies as part of its displays. The museum's exhibits focus on science fiction in TV and movies, including a sizeable collection of TV show posters, and a movie theater that shows a regular rotation of science fiction films. Floating above the museum are replicas of the USS Defiant and a Klingon Bird of Prey (Star Trek spaceships) which visitors can explore in detail by using a Star Trek-style

transporter that teleports them to and from the ships. One particularly engaging exhibit is a multimedia simulation that allows visitors to select from a number of preset displays (including such Sci-Fi staples as a Star Wars Tie Fighter, a Dalek from Dr. Who, and H.G. Wells' Time Machine) which is then displayed in a room designed to look like a Star Trek Holodeck. In a fascinating example of the problems that can occur when working in MUVEs, the Holodeck simulator warns visitors "Please do not sit on the holographic exhibits or you will end up underground when they dematerialize." Museums in *SL* similar to the Sci-Fi Museum include the Star Trek Museum, the Science Center, and the Computer History Museum (which features a slightly aggressive and somewhat insistent robot docent).

5.4 Bayside Beach Galleria Museum of Contemporary Art (Flyingroc Chung 109, 118, 22)

The Bayside Beach Galleria Museum of Contemporary Art is an example of a museum designed with an explicit focus on displaying works of art in a neutral setting with few instances of media richness or social interaction to get in the way of enjoying the art (one notable exception being the museum's location only a few steps away from a nude beach). The museum comprises a series of interconnected rooms, where rotating collections of contemporary art are displayed on mostly blank walls. Like many other art galleries in *SL*, the museum exists in the middle of an extremely busy neighborhood, with plenty of excitement to distract visitors after they leave the museum. The museum seems to exist on the virtual equivalent of the Las Vegas Strip, and is surrounded, among other things, by a castle, a windmill, and numerous rotating spotlights. These issues illustrate the problem of building museums or galleries on non-private land, where developers cannot control what other people build around them; designers who wish total control over their museums will need to purchase their own, private island. Museums in *SL*

similar to the Bayside Beach Galleria include Artsplace, the Crescent Moon Museum, and the Bolinas Museum of Art (which also exists in an extremely busy and distracting neighborhood, surrounded by neon signs).

5.5 Paris 1900 (Paris 1900 9, 174, 16)

Paris 1900 is an example of a replica historical environment, where the purpose of the museum is to display a particular setting and to provide opportunities for social interaction within that setting. To that end, there are a number of cafes, nightclubs (including a replica Moulin Rouge complete with elephant and full service bar), and shops selling fashionable clothing from wedding gowns to lingerie; Paris 1900 also features a small art gallery that puts on regular exhibits by *SL* artists. While avoiding allanachronisms is impossible, the designers of Paris 1900 work very hard to encourage their visitors to act in ways appropriate for the historical setting; flying is disabled, for example, and visitors are encouraged to use an underground Metro station when teleporting to and from the island. By contrast, as an example of the innovative experiences available only in *SL*, , visitors to Paris 1900 who climb to the top of the replica Eiffel Tower will find a box of free parachutes, thereby enabling them to jump off the top of the tower and parachute to the ground. Museums in *SL* similar to Paris 1900 include the Xibalba Maya Museum, Fort Malaya History Museum, Tudor Village, and Casablanca.

6. Interviews

This section contains a few results derived from interviews with owners and builders of *Second Life* museums. These residents were excited to share what they learned from their experiences in *Second Life*. Just as early websites set the tone for subsequent efforts on-line, museums considering their own projects will find that they have much to learn from these *SL* pioneers.

Like other on-line communities, *SL* residents take pride in their activities. They strongly believe that they are engaged in is hard, creative work and *not* "just playing a game." For this reason *SL* residents have been wary of being the subject for game studies research, however many of them are likely visitors to our RL institutions and are interested in seeing museums have a greater presence in *SL*.

6.1 Building Museums is Serious Leisure

With the exception of one participant, all of the museum owners interviewed were doing so in the context of serious leisure. Some found the prospect of creating virtual architecture compelling while others saw opportunities to share interests that they were passionate about. Not only do these activities require a significant investment of personal time, it often included real and ongoing financial support (in some cases in excess of $US 200 per month for land rent). Resident builders felt these costs were offset by the opportunity to have positive social interactions with visitors, who also provided donations of exhibits, collection objects, or Linden dollars to support a museum's existence. Smaller scale museums were often the responsibility of a single owner/builder and larger scale museums were collaborations between well-organized groups where the costs and responsibilities could be shared.

6.2 *Second Life* Isn't the Real World

Most builders acknowledged that their activities are still very much in the experimental stage. Many sites began by emulating real world conventions simply because these metaphors felt comfortable and intuitive. Most builders recognize that what is intuitive in the real-world does not always translate into *SL* settings and are tweaking as they go along. Many residents recommended thinking carefully about the purpose behind the metaphors used in creating a

setting in order to select those that are appropriate for intended goals. In some cases it is possible to literally turn convention on its head. For example, if making an optical illusion work normally requires inverting the image, in *Second Life* it can be much more engaging to invert the avatar instead.

6.3 Interacting with Visitors

As noted above, there are limitations in the kinds of information that is automatically logged in comparison to the more sophisticated web analysis possible today. However, one of the major attractions for *SL* museum builders was the ability to observe or interact directly with visitors. One builder experienced in web site development noted that *SL* was different for exactly this reason and that an *SL* space was more rewarding than looking at anonymous web logs. This suggests that visitor studies methods might be adapted to studying virtual museum spaces in ways that we cannot study our web sites. The development of synchronous and social activities, such as lectures, collaborative builds, and accepting feedback from visitors is a hallmark of *SL* museums. As one participant noted "If you build it they will come once, if they build it, they keep coming back."

SL museum builders also noted the more interactive nature of *SL* as a motivating factor of their work. Many hoped to create more than a static space for visitors by including interactive features (such as those mentioned in the descriptions of exemplars above). The ability to develop sophisticated interaction is dependent on the mastery of the Linden Scripting Language (LSL) or the ability to acquire scripts through purchase or donation.

6.4 Prim Economy

One of the largest challenges to builders are limitations on the number of primitive objects

(prims) allowed on a single parcel of land (see

http://secondlife.com/knowledgebase/article.php?id=055). These limitations force creative

choices about how a simulation is constructed or what types of labeling a museum offers (since

label cards can double a prim count for a museum of objects). Certain kinds of objects, such as

particle emitters and flexible prims can also decrease the performance of a simulation and

introduce unwanted lag and jerkiness.

7. Conclusions

Second Life currently has many parallels with the early days of the web. It is an exciting place that

participants are co-creating while simultaneously trying to understand what it is, what it might

be, and what it is good for. It has many potential contexts of use, but just as in the early days of

the web, cultural heritage applications are part of that pioneering exploration. The preliminary

results of this research do more than indicate the opportunities and challenges of using *Second*

Life as a platform for museums; they suggest that it is equally important to understand how

museums may become collaborative partners in an already evolving community. Even more so

than the web, *SL* is not just about providing information and artifacts, it is about facilitating

interaction. Because *SL* residents have already decided that museum-like activities need to be an

important part of their second lives, a study of how they construct these activities may provide

museums important clues about how they might engage virtual audiences in ways that they have

not been able to in the past.

Referenced Second Life Locations

The following Second Life URLs (SLurls) are provided for the convenience of readers. With your *Second Life* client logged in, these SLurls will take you directly to the listed locations.

Artsplace *http://slurl.com/secondlife/Pak/109/41/102/?title=ArtsPlace%20SL*

Bayside Beach Galleria Museum of Contemporary Art *http://slurl.com/secondlife/Flyingroc%20Chung/72/124/35/?title=Bayside%20 Beach%20Galleria*

Bolinas Museum of Art *http://slurl.com/Bolinas/130/107/66/*

Computer History Museum *http://slurl.com/secondlife/Info%20Island%20II/225/51/23/?title=SL%20Comp uter%20History%20Museum*

Crescent Moon Museum *http://slurl.com/secondlife/Taber/198/97/21/?title=Crescent%20Moon%20Mus eum*

Fort Malaya History Museum *http://slurl.com/secondlife/Ocean%20Pines/135/155/22/?title=Fort%20Malaya %20Malay%20History%20Museum*

International Space Flight Museum *http://slurl.com/secondlife/Spaceport%20Alpha/48/75/22/?title=International% 20Spaceflight%20Museum*

NOAA Meteroa Island *http://slurl.com/secondlife/meteroa/178/159/26/*

Paris 1900 *http://slurl.com/secondlife/Paris%201900/9/174/16/*

Second Life Historical Museum

http://slurl.com/secondlife/Phobos/216/166/32/?title=SL%20Historical%20Museum

Second Louvre Museum

http://slurl.com/secondlife/Tompson/153/96/100/?title=The%20Second%20Louvre%20Museum

Sci-Fi Museum *http://slurl.com/secondlife/Indigo/75/213/22/*

Science Center *http://slurl.com/Info Island II/97/206/24*

Splo (Exploratorium) *http://slurl.com/secondlife/Midnight%20City/178/54/26/*

Star Trek Museum of Science

http://slurl.com/secondlife/Ocean%20Pines/37/215/25/?title=Star%20Trek%20Museum%20of%20Science

Virtual Morocco/Casablanca

http://slurl.com/secondlife/Casablanca/141/89/26/?title=Virtual%20Morocco

Xibalba Maya Museum

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