Conserving *Portal*: Defining and Documenting the Object

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As the History of Games International Conference has demonstrated, the past decade has seen an exponential rise in video game scholarship and preservation as video games edge their way into cultural institutions, most notably libraries, university archives, and museum collections. Commercially released video games were never intended to be collected for their historical significance, but their cultural impact is undeniable. The saturation of video games in contemporary culture is more evidence of their importance and validates their place in cultural institutions, including art museums. These institutions beginning to collect or acquire complex works, such as video games, are faced with new challenges from acquisition to exhibition to conservation. Conservation is particularly challenging because the choices a conservator or preservationist makes now will determine how, or even if, a video game is accessible to a future audience.

Research on preserving different forms of interactive works has been building over many years, with an increasing amount of attention being paid to implementing preservation strategies previously identified in other fields. Art conservators and preservationists are beginning to merge strategies from adjacent fields, particularly digital preservation and new media art conservation. This merger and blending of skills is essential to video game conservation and preservation.

The Preserving Virtual Worlds (PVW) project, established as part of the Preserving Creative America, an initiative of the National Digital Information

Infrastructure and Preservation Program at the Library of Congress, looked at case studies, identified vulnerabilities, and tackled issues regarding access, copyright, and description or documentation. Although the group emphasized that their research was aimed to help libraries, archives and museums, it was predominantly interested in preserving games for scholarly research, which is higher priority for libraries and archives than for museums. (McDonough, et al. 2010) The research below specifically investigates how a video game can be conserved in a museum setting with a primary focus on documentation.

In November 2012, the Department of Architecture and Design (A&D) at the Museum of Modern Art (MoMA) announced the inclusion of fourteen video games to their collection. (Antonelli) MoMA's acquisition invigorated questions and conversations (Leibovitz 2013; Kilkenny 2012): Are video games art? Do they belong in an art museum? Are video games worth saving? Do objects designed for consumer entertainment have a cultural status outside the marketplace?

Design is about effective communication or lack thereof, and so interaction design is the mutual influence in communication. As such, interaction design builds upon levels of user engagement in digital media. Video game scholar Sean Fenty notes how "as an interactive medium, video games give over a great deal of control to players that other media retain." (Fenty 2008) The viewer becomes engaged when they respond, such as emotionally or physically, to a work of art. The viewer becomes a "player" when they can react with the ability to influence or manipulate the work, making interaction a step in the evolution of viewing. In the case of a video game, the player can manipulate the storyline and the outcome based on their reactions, which essentially makes a video game an assortment of input and output exchanges.

With the A&D exhibition, *Talk To Me: Design and Communication Between People and Objects*, which took place from July 24th to November 7th in 2011, the department began a conversation with the museum audience on human to object interaction and, accordingly, the relationship between humans

and technology. The exhibition included materials such as "interfaces, information systems, visualization design, and communication devices", with a concentration on how these materials invoke an "emotional, sensual, or intellectual connection with their users." (MoMA) In determining what art objects, either material or immaterial, to acquire or present for this exhibition and others, the A&D department follows a set of criteria that aligns with the department's mission as well as the broader mission of the museum: the relationship between form and function; the development process of the work, along with the object's innovativeness and necessity. All of the above qualifications determine the overall cultural impact of an object. When an object is acquired by a museum, the object is no longer a consumer object within the institution; it is an art or design object intended for cultural examination.

When *Spacewar!* was developed on the PDP-1 computer in 1961, it was used to demonstrate the capabilities of the new technology. (Computer History Museum) It was highly praised for its innovative and creative use of programming. Today, video games are considered less revolutionary feats of technological advancement, and more disposable products of the entertainment industry. However, video game development is dependent upon new technologies and how those technologies encourage audience interaction. These technologies are constantly being reviewed and updated, and video games represent an artistic demonstration of how this happens.

Returning to the earlier questions of whether or not video games are art or design and if they belong in an art museum, the answer is yes. By acquiring video games, the department is addressing the evolving and increasingly intricate levels of engagement between humans and technology. Video games are a form of complex art that integrates and often inspires new technologies and forms of interaction and communication, and they belong in a museum as much as any other object recognized for its cultural, artistic, or historical significance. The primary function of a video game—especially as a consumer object—is to entertain. The style of entertainment determines the form of the game, or how it is played. As digital media, a video game can pioneer the use of

new technologies and inspire further innovation. Yet their existence as complex works with both physical and nonphysical components presents concerns for their conservation as art objects.

This paper, as part of a larger research project, addresses the methodological approach to preserving video games once they have been acquired by a museum. It aims to determine what aspects or components, of the process should be emphasized for preservation by examining forms of documentation. Ideally, the conservator would be involved in the acquisition process of a video game in order to advise on the technological components needed for conservation. The case study for this project is the preservation of *Portal* by MoMA, which will be discussed later in this paper.

Defining the "Object" in Video Game Conservation

As briefly mentioned, video game conservation in a museum setting illustrates an overlapping of disciplines: interaction design, variable media preservation, and digital asset management. The conservator must be aware of this overlap when describing video game preservation.

Art object, Conservation Object

Conservation is "examination, documentation, treatment, and preventive care, supported by research and education." (International Council of Museums Committee for Conservation) More often than not, the goal is to conserve the artwork in its original state, or as close as possible to the original state. With preservation, the conservator takes a more active role in the maintaining the longevity of a piece by treating the work to minimize the effects of chemical or physical damage. (The Australian Institute for the Conservation of Cultural Material) Pip Laurenson, currently Head of Collections Care at the Tate, notes that "art works are commonly conceived as unique physical object" to be conserved or preserved as needed. Since the video game, essentially a piece of software, is not an entirely tangible object, we need to consider ephemeral media as having a physical presence in order to apply many conservation strategies. In this light, the video game now becomes what scholar Salvador

Viñas Muñoz, and Pip Laurenson, refers to as the "conservation object." (Muñoz 2005)

Laurenson further elaborates on this terminology to establish the difference between "the state of an object" and "the identity of a work" for establishing authenticity in ephemeral art, noting how the identity is often less concerned with materiality. (Laurenson 2006) The state of an object recognizes physical presence, which are the potentially the viewable or tangible elements, while the identity is the concept or the essence of the work being conserved. For ephemeral art, the conservator must allow for future interpretations of both.

With regards to digital art forms, art historians, curators and conservators recognize an ambiguity in the "state" of the art object when the "identity" becomes more complex than, for example, an instantiation of a Shakespearean play. (Collins 2013) The "identity" of a play and a video game incorporate nostalgia, aesthetic experience, technical structure, but a video game relies more heavily on interactivity.

Relevantly, other organizations and colloquia are addressing ephemeral art—time-based and variable media—as dynamic works in need of regular care. Initiatives in preservation and archiving of ephemeral art, such as Archiving the Avant-Garde and the Variable Media Network, adopted this perspective and inspired progress. (Berkley; Variable Media Network) This perspective ties in closely with how the life of a digital object is managed.

Digital Object

A digital object is identified by content files, metadata—which can inform us what software or hardware should be used—and the container binding all of this information together. (Jantz and Giarlo 2005) It is intended to facilitate both access and preservation, and because of the fleeting nature of digital objects, they require management and intervention in order to remain accessible. Again, a video game is electronically produced and generates digital elements, such as the source code and the object file, or executable file. There is also the software and hardware, both of which facilitate access to the digital

elements, that also needs to be taken into consideration. Information about these essential elements would be acknowledged in the metadata.

For a museum highlighting the interactive-ness and design of a video game, the definitions of conservation object and digital object need to be combined. The "object," or the artwork being conserved, is all of the components of the game. It is the physical and virtual space it occupies; it is the aesthetic experience as an art piece; it is the interactivity that makes it design. Since this paper recognizes the role of the video game as a complex work of art in the context of a museum, the terms variable media or new media can also be used in describing video games.

The game is not to be understood as a static conservation object, but rather as an object in need of regular management, invoking a level of curatorship on the part of the conservator. The conservator is by default, tasked with responsibility of making the game accessible in the future, a responsibility which is already shared by the curator.

MDA: Mechanics, Dynamics, Aesthetics

A video game is where technological function meets audiovisual form and inspires interaction on the part of the player; again, a series of input and output functions. But interaction is not tangible; it does not exist solely in a physical or virtual space. If a future curator in the A&D department or another department at MoMA wants to exhibit the game or consider it in different contexts, they will need to understand how the game looked and what encouraged the player to interact with it. The elements that facilitate interaction can be preserved.

Based on this project's definition of the "object", a game can be further divided into the technical components, interactive identity, and visual elements. One method that takes all of the above into consideration is the MDA (Mechanics, Dynamics and Aesthetics) approach developed by Robin Hunicke, Marc Leblanc and Robert Zubek at Northwestern University. MDA was developed as a formal approach to game research and analysis, intended to

unite the disparities between game design and the scholarly study of games. It breaks the game down into its design components: the development of the game, how the interaction functions, and the visual results (Hunicke, LeBlanc, Zubek 2004).

Mechanics is defined as the technical components; dynamics is the run-time behavior of the mechanical components as well as player inputs and reactions. The creators identify aesthetics to be the emotional responses the game produces in people (Hunicke, LeBlanc, Zubek 2004). For the needs of conservation, as defined above with regards to the "object", this paper interprets aesthetics as the visual components, which either respond to or encourage player interaction.

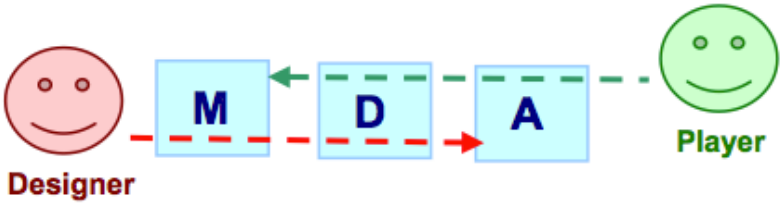

Figure 1. MDA Model, Robin Hunicke, Marc LeBlanc, and Robert Zubek

The MDA approach unites the contrasting definitions of the conservation object and digital object and it also recognizes overlapping strategies for preservation. Therefore, this was adopted as a framework where the dynamics is the fundamental artwork, the intangible interactivity, being preserved. The mechanics and aesthetics are the avenues of approach to preserving the dynamics. Incorporating Laurenson's concept on the state and identity of the object can expand upon this idea. If, at its core, the identity of a video game is interactivity, then the mechanics and aesthetics are states of the object. By looking at the mechanics and aesthetics as preservable, we can begin to understand the intrinsic risks and develop strategies relevant to both areas.

Portal

One of the fourteen games to be exhibited and preserved by MoMA is *Portal*, developed by Valve Corporation and released in 2007. The game concept was designed by a group of students at DigiPen Institute of Technology who were hired by Valve to bring the project to full fruition. (Barnett) *Portal* is a single-player online puzzle game. The description from the Valve website: "Set in the mysterious Aperture Science Laboratories, players must solve physical puzzles and challenges by opening portals, maneuvering objects, and moving themselves through space in ways that used to be impossible." Players work their way through different levels (also referred to as rooms or test chambers), with each level building on the skills learned in the previous levels. Throughout the game, a computer named GLaDOS promises a reward of cake at the end of the testing, while writings and scratches on the wall warn the player "the cake is a lie." "The cake is a lie" became a catchphrase in the *Portal* gaming community and helped promote the game to wider audiences.

In the game, the player is in control of a portal gun which, as the name suggests, creates portals through which the player teleports to otherwise inaccessible spaces, such as around obstacles or across wide gaps. The player is also required to maneuver cubes onto large buttons in order to open doorways and move ahead to the next level. At first these are seemingly a simple concepts, but the process forces the player to recognize unique ways of traveling through the three-dimensional space and consider the consequences of angle and momentum. The unique combination of a first person shooter and puzzles in such a way results in such unique spatial relations is what sets *Portal* apart from other games.

Understanding Significance, Assessing Risk, Identifying Strategies

The curators in A&D conduct the necessary research to acquire or exhibit any work based on the six assessment criteria—form, function, innovation, necessity, process, and cultural impact. (Antonelli) For the curator, this information establishes the significance of an object. In identifying the significance of a video game, questions to consider include what makes a game

qualify for conservation or preservation? How does it fit in with the curatorial mission of the institution? For the First 14, the curators worked with game scholars, historians, and critics as well as digital conservators and legal advisors to select the games for acquisition (Antonelli). Although curators may recognize the cultural and historical impact of video games, they may not be well versed in the technological components or necessary steps in conservation.

Having already explored the significance of *Portal*, the next steps are to identify and document the aesthetic elements and technical components that contribute to the significance of the game, define the inherent risks, and consider strategies. This information relies on the agreement established between the developers and the collecting institution, specifically what the developers will be providing the institution. It is best to identify specific vulnerabilities within the general risks to video games. Regarding *Portal* for example, a vulnerability to the risk of software obsolescence would be source code becoming outdated and no longer readable on new hardware.

Although it should be considered throughout the process, documentation should take precedence in the early stages of conservation. The collecting institution should then take the opportunity to analyze what is being received and what forms of documentation will best preserve the significance of the work but also invite future interpretations. Documentation will also acknowledge and may bring to light additional technical components for preservation and more information potentially relevant to the game's preservation. In some cases, documentation may be the only suitable route for preservation (Becker, Kolar, Kung, Rauber 2007).

Using MDA as an approach, the documentation can be broken down into the aesthetics and the mechanics. To reiterate: aesthetics is how the game is supposed to look while mechanics defines how the game is supposed to work. From a museum's perspective, all of these elements are equally important because they are, essentially, the game, the conservation object. Examples from *Portal* are provided next.

Documentation: Aesthetics

Documentation of the aesthetics and examples of the interactivity should be approached first, because the aesthetics demonstrate how a game can be characterized. This can consist of still images, and demonstration videos of noteworthy puzzles within a game or other important human computer interactions. For aesthetics, documentation is preservation. Why is the game significant and how has this been determined? What unique elements relate to the statement of significance? Should the genres or themes of the game be addressed? Many of the answers to these questions are concerned with aesthetics.

In order to understand the full breadth of interaction in *Portal*, it was recommended the full game be recorded for conservation in order to demonstrate the style of activity the player is engaged in throughout. MoMA can either take advantage of existing documentation or create new documentation that highlights specific areas.

For example, IGN offers walkthroughs of each test chamber, which may be of interest for documentation efforts (IGN 2012). There are also player videos available on YouTube and other video hosting sites, which provide screen recordings of game play.

A more lengthy and involved process would be for MoMA to generate its own documentation. Video documentation can be accomplished by recording a screen capture while someone plays through the game on a computer. A variety of screen record programs, both proprietary and open source, are available for all operating systems. For example, Screen Record Utility is available on Mac OSX and generates an H.264 compressed video. As far as the author is aware, there is not an application to capture archival quality video, specifically uncompressed 10-bit, from a computer screen. As this is the case, duplications of the H.264 file would be wise.

If recording a full game is not an option for an institution with interests outside of research, another course of action would be to record portions of the

game: identify examples of significance, such as movement through portals, and record these levels or actions. The most informative levels would likely be the first level where the player is taught how to move through the space, a number of significant middle levels, which demonstrate advanced challenges, and the final showdown with GLaDOS.

While this paper often discusses visual interaction within a game, audio is also a substantial element to inciting action from the player. Some game developers incorporate unique music and there are conferences and concerts devoted solely to video game music. If the audio is deemed significant, conservators should create audio files or clips.

Creating descriptions of what is in the various documentation formats also provides additional support if access to images or video is unavailable. These descriptions should exist outside of the media files, preferably a PDF-A document, in the event the visual and audio media files are no longer accessible.

Documentation: Mechanics

The mechanics are the technological components that make interaction possible: the source code, the executable file, and hardware. The developer may provide none or all of these components, which again, raises questions of authenticity and how an institution determines what the "original" work is. In documenting the mechanical aspects of a game, an important step is taking in the source code if it is provided. The source code is the original computer instructions in a human readable form; while both the executable file and the source code can be defined as the original work, or states of the identity, the source code provides more robust information as to how the game functions (McDonough et al 2010).

Conservators could also go beyond collecting the source code as is. The majority of programming languages offer a function for commenting, which can be scattered throughout the code and programmers often utilize this feature for personal notes, to communicate information between a team of

programmers, or for various other reasons. When a game can consist of tens of thousands of lines of code being developed by a team of programmers, comments help the developers recognize how the features work or provide information on how and why it was developed in case a flaw, or bug, needs to be fixed or edited. For preservation purposes, identifying these comments provides insight on how the programmers created the game and what sections of the code create or influence interaction. But the comments are mixed in with the code and not easily discernable. Pulling these comments out would help create more user-friendly documentation.

Additional documentation of *Portal* would include the source code with an annotated version of source code, similar to the strategies described above. Together, comments and annotations can assist in understanding how interactivity is implemented.

This paper stresses that the source code is the original form of artwork. But without context, such as information on the software and hardware environment or information on the compiler used to process the code, the act of preserving the code begs the question—why? Most companies or developers would never release their code if they continue to believe it gives them an advantage on the consumer market. Also, as the reader is certainly aware, technology moves at a rapid pace. The source code may or may not be useful in the future but either way, if a conservation department has the source code, they should make an effort to preserve it.

Source code files can be saved as text or .csv (Comma-separated values) files, which can store information in plain text and is easily accessible, human readable, and is normally a small file size ("CSV"). A copy of the .csv file should be saved as a master copy, with no edits or annotations. Derivative access copies can also be made available. In parsing out information from the code, it was originally suggested that comments are separated from the source code and displayed to sit adjacent to the original code. This was a suggestion for *Portal* since it was described as possessing a great deal of commentary and communication between the developers (Barnett).

Conclusions

As demonstrated, the boundaries between digital preservation practices and variable media conservation are blurring, as are the responsibilities for the stakeholders, especially those charged with managing the materials. Yet although their responsibilities are merging, they have different concerns and needs regarding the video games. Both the curator and conservator should be in contact with the developer. With the influx of digital materials being collected by museums, conservators are taking on more responsibilities of the art works and fine-tuning their roles within the institution. If the conservator is in charge of managing access to the digital repository, then they are also responsible for how the information is dispersed. Due to this, the conservator may want to establish a reference file or access document providing information to terminology and taxonomies used by the conservation department and the video game realm.

This paper concentrates on defining video games in a museum setting and strategies for documentation. There are other strategies to preserving video games, such as migration and emulation, explored in the fuller version of this research paper, as part of a thesis presented in May 2013. These strategies are also being explored by initiatives such as the Preserving Virtual Worlds 2 project, but as with part one, they focus on libraries and archives. Museum conservators not only want to document the history of a game, but also make it accessible in the future and open to interpretation by utilizing a variety of conservation and preservation strategies.

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