

The Battle Against Digital Obsolescence:

Exploring Strategies of Digital Preservation in New Media and New Media Art

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New Media Theories

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Abstract

With this paper I attempt to answer the question why digital preservation in new media and new media art is as important as it is difficult. It considers the relation between digital obsolescence and digital preservation, and looks into several strategies to preserve digital information; with a particular focus on emulation. This contemporary issue is first linked back to the historical works of Walter Benjamin's and Hans Magnus Enzensberger's and their ideas on reproduction, thus providing an overview of the importance of (mechanical and technological) reproducibility since its advent.

Keywords: Digital Preservation, Digital Obsolescence, Information, Reproduction, Emulation, New Media (Art).

1. Introduction

It is a paradox: never before have we been able to access, collect and store more information than in this digital day and age. For an important part, the advent of the Internet is to credit for this; every day billions of bits and bytes of information are stored onto online servers by Internet users. Yet the preservation of digital information has proven to be a difficult task. Author and Internet entrepreneur Stewart Brand defines digital preservation as: "keeping the stored information cataloged, accessible, and usable on current media, which requires constant effort and expense."¹ All over the world digital preservation initiatives are constituted in order to come up with a way that makes digital preservation sustainable. A pioneer in this field is the initiative National Digital Information Infrastructure and Preservation Program (NDIIPP), set up by the American Library of Congress. Their 2003 media advisory claims that a Web page has an average life span of 44 days, and nearly 44 percent of Websites that were available in 1998 had disappeared the following year.²

¹ Brand, Stewart. "Escaping the Digital Dark Age" (1999), in *Library Journal* vol. 124. Issue 2, pp. 46-49 6-20-3. <<http://www.rense.com/general38/escap.htm>> (accessed January 17, 2009).

² The Library of Congress. "U.S. Congress Approves Library of Congress Plan for Preservation of Digital Materials", media advisory, February 2003. <<http://www.loc.gov/today/pr/2003/03-024.html>> (accessed January 15, 2009).

Their aim is: "Developing a national strategy to collect, archive and preserve the burgeoning amounts of digital content, especially materials that are created only in digital formats, for current and future generations."³ With this, we can clearly see that long-term preservation is of great importance.

Still, the question *why* digital preservation is so difficult remains. When first considering the preservation of digital information the distinction between different types of information loss should be clear. First of all, there's the deterioration of digital content. Hardware can crash or break and software can fail, thereby destroying its content. When deterioration occurs it usually sets in with a more rapid speed than it would with non-digitally stored media. Once digital media starts to deteriorate it almost immediately becomes unusable. Secondly – and perhaps most importantly – there is digital obsolescence; here digital information is still at hand, but not readable because the media's reader (the hardware or software) is no longer available. The Commission on Preservation and Access and Research Libraries Group reported on this:

"Continued access indefinitely into the future of records stored in digital electronic form cannot under present circumstances be guaranteed within acceptable limits. Although loss of data associated with deterioration of storage media is an important consideration, the main issue is that software and hardware technology becomes rapidly obsolescent. Storage media become obsolete as do devices capable of reading such media; and old formats and standards give way to newer formats and standards. This situation holds both for electronic records derived through conversion from some analog form (paper, film, video, sound etc.) and for records that originated in electronic form."⁴

³ The Library of Congress <<http://www.digitalpreservation.gov>> (accessed January 15, 2009).

⁴ Garrett, John R. "Task Force on Archiving Digital Information", briefing in *D-Lib Magazine*, September 1995. <<http://www.dlib.org/dlib/september95/09garrett.html>> (accessed January 15, 2009).

Indeed, especially digital obsolescence seems to be the biggest problem. When digital formats change over time, but the already existing content that needs to be read doesn't change with it, files become unreadable. Or as senior research scientist of the RAND Corporation Jeff Rothenberg puts it in his report "Avoiding Technological Quicksand": "Not only are digital documents vulnerable to loss via media decay and obsolescence, but they become equally inaccessible and unreadable if the software needed to interpret them – or the hardware on which that software runs – is lost or becomes obsolete."⁵

So the question is: What can be done to stop digital obsolescence? How do we preserve our digital information in a sustainable way? Emulation could possibly be a solution, or at least a good substitute until a definitive solution is found. In any case, it is a step in the right direction. But before I discuss this idea with regards to new media and new media art, I would first like to provide a historical overview by examining the notion of reproduction in the works of Walter Benjamin and Hans Magnus Enzensberger.

2. Reproduction according to Benjamin and Enzensberger

In his essay "The Work of Art in the Age of Mechanical Reproduction"⁶ Marxist Walter Benjamin analyses how human perception and consciousness have changed through historical and technological developments. According to him, these technological changes will lead to qualitative renewals in our understanding of time and space. With this, he places himself in Hegelian tradition that sees consciousness - or the conscious self - as historically determined, and is against the (naïve-empirical) belief of unchangeable 'pure perception'.

Benjamin argues that with the advent of mechanical reproduction, works of art can be replicated and spread. Thus making them available to a large number of people, who might not have been able to see or have access to these works otherwise. However, technological developments of reproduction such as film and photography do destroy

⁵ Rothenberg, Jeff. "Avoiding Technological Quicksand: Finding a Viable Technical Foundation for Digital Preservation" (1999). Washington, DC: Council on Library and Information Resources. <<http://www.clir.org/pubs/reports/rothenberg/introduction.html#longevity>> (accessed January 15, 2009)

⁶ Benjamin, Walter. "The Work of Art in the Age of Mechanical Reproduction" (1936). In *Illuminations: Essays and Reflections*, translated by Harry Zohn, 217-251. New York: Schocken Books, 1986. <<http://www.marxist.org/reference/subject/philosophy/works/ge/benjamin.htm>> (accessed January 15, 2009).

the original artwork, or rather: they destroy the aura of the original artwork. The concept of the aura is illustrated by Benjamin as “the unique phenomenon of distance, however close it may be.”⁷ The aura is also the uniqueness of the object, the very essence; that what gives it its value.

In the spirit of Marxist philosophy, Benjamin lauds the aspect of access and availability that comes with reproduction. Even though it might destroy the aura of the artwork, at least now art is available for the masses. Everyone is free to enjoy what previously was only reserved for the bourgeoisie. The destruction of the aura also implies that there is no longer an actual original artifact. However, with most processes of mechanical reproduction this doesn't matter. It is beside the point. As Benjamin writes:

“An analysis of art in the age of mechanical reproduction must do justice to these relationships, for they lead us to an all-important insight: for the first time in world history, mechanical reproduction emancipates the work of art from its parasitical dependence on ritual. To an ever greater degree the work of art reproduced becomes the work of art designed for reproducibility. From a photographic negative, for example, one can make any number of prints; to ask for the ‘authentic’ print makes no sense. But the instant the criterion of authenticity ceases to be applicable to artistic production, the total function of art is reversed. Instead of being based on ritual, it begins to be based on another practice – politics.”⁸

Indeed, this also applies to new media. Like Benjamin's example of photography, there is no sense in asking for an ‘authentic’ print of digital media – a Web page for instance. Different from photography, this is not because any number of prints can be

⁷ Benjamin, Walter. “The Work of Art in the Age of Mechanical Reproduction” (1936). In *Illuminations: Essays and Reflections*, translated by Harry Zohn, 217-251. New York: Schocken Books, 1986. <<http://www.marxist.org/reference/subject/philosophy/works/ge/benjamin.htm>> (accessed January 15, 2009).

⁸ Ibid.

made⁹; rather it is because there's no analog counterpart. Therefore, the 'original' is made up out of code and only exists when it is requested (whether this be on one's own computer or the Internet). To illustrate: if two people would open the same Web page on their own computers, they would both have an original version. This is because the original source code of the page is stored on a server and can be requested by any one, anywhere, any time.

Scholar Starla Stensaas connects Benjamin's work with the current digital day and age. In her publication "The Work of Art in the Age of Digital Reproduction"¹⁰ she links the 'authentic' back to an object existing solely in one time and place; this is precisely its exhibition value. According to Stensaas, mechanically reproduced artwork is led to imitate traditional fine art, because of the emphasis on the exhibition quality. She argues: "A photograph in an advertisement does not usually attempt to portray itself as a precious or 'authentic' object. [...] It is not the medium that suggests itself as a piece of art worthy of exhibition, but the medium used in imitation of traditional art media that does so."¹¹ Furthermore, Stensaas makes the claim that digital art does not significantly differ from mechanical reproduction. She justifies this by writing that digital art too, is one manifestation of a reproduction process. The only real difference is the storage of the medium that the work originates from. While in photography this is the film negative, in digital art it is the binary code on a computer disc or hard drive.

Hans Magnus Enzensberger's "Constituents of a Theory of the Media"¹² shares thoughts similar to those of Benjamin on reproduction. Key elements in his article are the social shaping of technology and the emancipatory use of the media. The latter especially, bears great resemblance to Benjamin's description of the accessibility that came with mechanical reproduction, in the sense that the people were now liberated from the bourgeoisie and were given means to express themselves. Enzensberger (also a German Marxist media critic, like Benjamin was) discusses consciousness as

⁹ Although it is technically possible to make exact replicas of Web pages.

¹⁰ Stensaas, Starla. "The Work of Art in the Age of Digital Reproduction" (1999-2000), *FATE in Review, Foundations in Art: Theory and Education*, Volume 22, p. 36.

<<http://www.starlastensaas.net/scholarship.html>> (accessed January 19, 2009).

¹¹ Ibid.

¹² Enzensberger, Hans Magnus. "Constituents of a Theory of the Media" (1970), reprinted in Noah Wardrip-Fruin and Nick Montfort (Eds.): *The New Media Reader*, MIT Press: Cambridge, 2003, p. 261-275.

well. More specifically, he uses the term 'consciousness industry', by which he refers to the media business. He addresses the properties of new media stating that reproduction 'at will' can take place because of the nature of electronic media: they are not material. Enzensberger also writes that new media are oriented towards the present and not tradition. Again, we see this bears striking resemblance to Benjamin's statement that reproduction is not based on rituals, but politics. Furthermore, he thinks of new media as a possible vehicle for egalitarianism, potentially doing away with educational privileges. He links the notions of consciousness and media to reproduction, claiming that the consciousness industry makes reproduction at will possible:

"That does not mean to say that they [the media, AN] have no history or that they contribute to the loss of historical consciousness. On the contrary, they make it possible for the first time to record historical material so that it can be reproduced at will. By making this material available for present-day purposes, they make it obvious to anyone using it that the writing of history is always manipulation. But the memory they hold in readiness is not the preserve of a scholarly caste. It is social. The banked information is accessible to anyone, and this accessibility is as instantaneous as its recording."¹³

Enzensberger's consciousness industry has similarities to our current notion of mass media, and he sees new media as a part of the consciousness industry. Arguably the biggest difference between mass media and the consciousness industry is interactivity. Enzensberger makes it very clear that everyone can take part in new media. In technological deterministic fashion, Enzensberger believes that the media have an inherent technological structure and that advancement of this technology allows for social change. And although he feels that the presupposition of the media is manipulation, this doesn't outweigh the good that (new) media can bring. Of course, comparing this conception by Enzensberger to that of Benjamin's, we can conclude that Benjamin also favored reproduction over exclusivity – even though this

¹³ Enzensberger, Hans Magnus. "Constituents of a Theory of the Media" (1970), reprinted in Noah Wardrip-Fruin and Nick Montfort (Eds.): *The New Media Reader*, MIT Press: Cambridge, 2003, p. 265.

meant the aura of an artwork would be destroyed. Furthermore, when we look at developments on the Internet we see that a lot of Enzensberger's ideas concerning interactivity and egalitarianism resemble Internet trends like Web 2.0 and social media, that put the focus on the user's involvement with the Net through sharing and contributing. In this regard, especially the blogosphere is a good example of what Enzensberger would call a means to express oneself.

In point of fact, questions of reproduction are still very much alive today. Particularly when it comes to new media and moreover: the preservation of new media. In "Constituents of a Theory of the Media" Enzensberger sketches a remarkable accurate forecast of current new media development. However, he could not foresee at the time that the loss of digital information would be of such a huge concern. In retrospect his statement: "The banked information is accessible to anyone, and this accessibility is as instantaneous as its recording", seems almost naïve. Although there's nothing wrong with this testimonial in essence, we know now that both accessibility and recording are far from instantaneous. And even if the latter was instantaneous, there is still the problem of digital obsolescence.

3. Digital Obsolescence

It has been established that the preservation of new media is much more difficult than the preservation of older media; physical objects such as books, letters and paintings. Since digital obsolescence – also referred to as media obsolescence - seems to be the biggest bottleneck when it comes to preserving digital information, it is important to know what it entails exactly. According to Rothenberg, digital documents are inherently software-dependent. This means that if the reader of the software is no longer available - for instance because it has been replaced by other readers that run different formats - the software becomes inaccessible. Of course, even if this information is still intact it is 'trapped' within its own format and therefore does not really exist. As Rothenberg writes: "[...] in a very real sense, digital documents exist only by virtue of software that understands how to access and display them; they come into existence only by virtue of running this software."¹⁴

¹⁴ Rothenberg, Jeff. "Avoiding Technological Quicksand: Finding a Viable Technical Foundation for Digital Preservation" (1999), Washington, DC: Council on Library and Information Resources. <<http://www.clir.org/pubs/reports/rothenberg/scope.html>> (accessed January 15, 2009).

A striking example of this is Microsoft software. Over the years Microsoft has been improving, upgrading and developing (new) software to run on PC's, thereby changing formats. This ensured that old information processed with Microsoft Works from before Microsoft Works 4.5 cannot run on Windows 2000 or newer operating systems (such as Windows XP and Vista). The software has become obsolete and therefore the information is inaccessible. While this case illustrates how quickly a massive amount of information can get lost (this happened over a relatively short period of time), of course digital obsolescence includes more than the demise of Word documents. It also concerns various other data, such as governmental, environmental, corporate and medical records. And needless to say, this also greatly affects electronic artworks, and new media art in general.

This increasing loss of digital information leads us to believe that we are living in a Digital Dark Age. Brand writes in his essay "Escaping the Digital Dark Age"¹⁵ that digital obsolescence is so important it has become a civilization issue. If nothing is done to solve this problem, then increasingly meaningful information will get lost and there'll hardly be a future for any new material at all.

However, as of yet there is no viable technical solution to the problem. According to Rothenberg it is clear that the solution should focus on longevity, should be completely neutral to the form and content of the digital materials it preserves, and should not be limited to text only formats.¹⁶ The latter is important because of the amount of multimedia and hypermedia that already exists and is only expected to grow much larger in the future.

¹⁵ Brand, Stewart. "Escaping the Digital Dark Age" (1999), in *Library Journal* vol. 124. Issue 2, pp. 46-49 6-20-3. <<http://www.rense.com/general38/escap.htm>> (accessed January 17, 2009).

¹⁶ Rothenberg, Jeff. "Avoiding Technological Quicksand: Finding a Viable Technical Foundation for Digital Preservation" (1999), Washington, DC: Council on Library and Information Resources. <<http://www.clir.org/pubs/reports/rothenberg/scope.html>> (accessed January 15, 2009).

4. Strategies of Digital Preservation

The question remains if there is truly nothing that can be done to stop digital information from becoming inaccessible? To examine this, I will discuss a few (technical) approaches that have been proposed to solve the problem of digital obsolescence.

4.1 Hard Copy

Firstly, there is of course the reliance on hard copy. This entails that all digital information be printed – thus turned into a tangible object – and stored. However, there are a few errors to this solution: while the printing of text only formats would perhaps be doable, there is still a large amount of multi- and hypermedia that simply cannot be converted to hard copy. It would destroy the very nature of this interactive media. Imagine for instance a film recording being printed onto paper; even if every scene would be visible, the story most likely wouldn't come across as it should. This has everything to do with the time- and narrative based nature of film. Printing would eradicate both. This aside, even printing just text formats would be a never-ending task; taking into account all the text that exists today and will be added to it in the future.

4.2 Computer Museums

Rothenberg's report discusses computer museums as a possible means for digital preservation. Such a museum would keep old machines that can run original software, in order for obsolete documents to be accessed. However, there are fundamental flaws to this approach as well. As he suggests: "It is unlikely that old machines could be kept running indefinitely at any reasonable cost, and even if they were, this would limit true access to the original forms of digital documents to a very few sites in the world, thereby again sacrificing many of these documents' core digital attributes. [...] Furthermore, this approach ignores the fact that old digital documents (and the original software needed to access them) will rarely survive on their original digital media."¹⁷ Considering this point of criticism: indeed, even if computer

¹⁷ Rothenberg, Jeff. "Avoiding Technological Quicksand: Finding a Viable Technical Foundation for Digital Preservation" (1999), Washington, DC: Council on Library and Information Resources. <<http://www.clir.org/pubs/reports/rothenberg/inadequacy.html>> (accessed January 15, 2009).

museums would be created, they are buildings one would physically have to go to. Therefore, access would be limited to those who can and are willing to make the trip. Another flaw is that computer hardware –a computer chip for instance – does not last forever. What would happen if a computer chip broke and the information on it had not been transferred in time to another storage medium? So we see; despite these computer museums, hardware still has the unattractive quality to fail, thereby destroying its content.

4.3 Migration

The Netherlands has also been active in the field of research on digital sustainability. The National Library of the Netherlands (Koninklijke Bibliotheek) initiated e-Depot in 2003, a national archive environment where permanent access to digital information is pursued. Their focus is on four coherent themes: permanent access, technology watch, the preservation of metadata and new services for the e-Depot.¹⁸

A year later the National Library collaborated with the National Archive of the Netherlands (Het Nationaal Archief) on a project about emulation. In 2007 they put forth the report “Emulation for Digital Preservation in Practice: The Results”¹⁹ in which they describe the digital preservation methods emulation and migration, and what they entail exactly. On migration they write: “Migration is focusing on the digital object itself, changing the object in such a way that software and hardware developments will not affect its original representation. By converting the format of an object, it is possible to render these objects on current systems.”²⁰ In short: it is the transfer of a format to a newer system. An example of this would be the conversion of a Word document to a PDF document. While the content of the information (and even the lay out) stays the same, the format has changed. To use a previous example as illustration: if a Word document from before Microsoft Works 4.5 had been converted to PDF, it would still be readable today, even though the software is now obsolete and cannot be read by Windows 2000 and newer operating systems.

¹⁸ Koninklijke Bibliotheek, Nationale Bibliotheek van Nederland. “Speerpunten Digitale Duurzaamheid”. <http://www.kb.nl/hrd/dd/dd_onderzoek/uitleg_probleem_dd.html> (accessed January 18, 2009).

¹⁹ Van der Hoeven, Jeffrey, Bram Lohman and Remco Verdegem. “Emulation for Digital Preservation in Practice: The Results” (2007). In *The International Journal of Digital Curation*, Issue 2, p. 123-132. <<http://www.ijdc.net/index.php/ijdc/article/viewFile/50/35>> (accessed January 18, 2009).

²⁰ *Ibid.*, p. 124.

However, this strategy is neither completely reliable. As the research paper “Ending Digital Obsolescence”²¹ states:

“Even if data migration is flawless across intermediate media with repeated reading and writing using differing technologies (very unlikely), the time spent idle between migrations will take its toll on the stored data bits. Data migration success rates are never 100% and successive storage/migration cycles accumulate failures and expose the data to corruption and loss. And there isn’t any way to repair the damage. Because storage and migration is not 100% reliable, trying to avoid digital obsolescence through a strategy of store and migrate is a plan to lose data. Storage Hardware and Media obsolescence cannot be avoided as long as new hardware is developed that obsoletes older hardware.”²²

Rothenberg adds to this: “[...] the nearly universal experience has been that migration is labor-intensive, time-consuming, expensive, error-prone, and fraught with the danger of losing or corrupting information.”²³

4.4 Refreshing

A less time-consuming and expensive way of saving digital information is refreshing. Assistant professor at the School of Information, University of Texas, Megan Winget defines this method in her research paper “Digital Preservation of New Media Art Through Exploration of Established Symbolic Representation System”²⁴ as: “the upgrade of storage mechanisms.” It means that information from one storage medium is copied on the same type of storage medium; from one CD-RW to another

²¹ Quick, Ken, and Mike Maxwell. “Ending Digital Obsolescence” (2005). Affiliated Computer Services, Inc. (ACS) Dallas, Texas, USA. Reprinted with permission of IS&T: The Society for Imaging Science and Technology. <<http://microfilm.net.au/pdf/ACS%20Data%20Insurance%20White%20Paper.pdf>> (accessed January 18, 2009).

²² Ibid., p. 3.

²³ Rothenberg, Jeff. “Avoiding Technological Quicksand: Finding a Viable Technical Foundation for Digital Preservation” (1999), Washington, DC: Council on Library and Information Resources. <<http://www.clir.org/pubs/reports/rothenberg/inadequacy.html>> (accessed January 15, 2009).

²⁴ Winget, Megan. “Digital Preservation of New Media Art Through Exploration of Established Symbolic Representation System”, final doctoral research paper, presented at JCDL 2005 Inaugural Doctoral Consortium, June 7-11, 2005, Denver, Colorado, USA. <<http://www.ischool.utexas.edu/~megan/>> (accessed January 18, 2009).

CD-RW for instance. Of course, while this is helpful in preserving information in a specific format, it doesn't really solve the problem of obsolescence. For if CD-RW's would become obsolete hardware, the information stored on them would also become inaccessible.

4.5 Reinterpretation

Needless to say, research on preservation techniques in new media art has been conducted as well. Winget names reinterpretation (which accordingly she spells re-interpretation) as one of them. According to her, it is a radical method developed by and for the new media art community. She states: "Re-interpretation allows preservation professionals to make decisions about the characteristics of an object's presentation or performance within some pre-defined boundaries."²⁵

The method of reinterpretation works with written questionnaires that artists need to fill out, this way a work of art can be re-created each time its original form is rendered obsolete.

In the battle against digital obsolescence the Solomon R. Guggenheim Museum in New York undertook the project Variable Media Initiative in 1999, which uses reinterpretation (among other strategies) as a primary weapon. Explaining how this process works exactly, the Guggenheim Website reads: "The idea to describe a work of art, not only as a list of components and materials, but by the way it behaves, is crucial to the Variable Media methodology. The behaviors are not permanent or fixed, but they give conservators and curators guidelines for discussing the more ephemeral qualities of a work of art."²⁶

²⁵ Winget, Megan. "Digital Preservation of New Media Art Through Exploration of Established Symbolic Representation System", final doctoral research paper, presented at JCDL 2005 Inaugural Doctoral Consortium, June 7-11, 2005, Denver, Colorado, USA.

<<http://www.ischool.utexas.edu/~megan/>> (accessed January 18, 2009), p. 2.

²⁶ The Guggenheim Museum New York. "The Variable Media Initiative."

<<http://www.guggenheim.org/new-york/collections/conservation/conservation-projects/variable-media>> (accessed January 18, 2009).

Jon Ippolito is an associate curator at the Guggenheim Museum. In the report “Permanence Through Change: The Variable Media Approach”²⁷ he writes about the importance for artists to partake in the questionnaire. With this method artists no longer need to rely on archivists and technicians when it comes to the preservation of their work. They themselves can moderate the process of the artwork over time. Ippolito describes the questionnaire:

“The questionnaire is not a sociological survey, but an instrument for determining how artists would like their work to be re-created in the future - if at all. In contrast to one-size-fits-all technical fixes, this instrument is meant to be applied case-by-case, one artwork at a time.”²⁸

To be more specific, the questionnaire for Nam June Paik’s video installation “TV Garden” – that portrays several television sets lying amongst a garden of tropical plants - featured questions on the ideal installation place (‘fine art or museum gallery’), lighting requirements (‘a darks as code allows’) and distribution of elements (‘mass of televisions and plants should be in a 1:40 ratio’).²⁹

However, as Ippolito mentions, the questionnaire is applied case-by-case. Therefore, it is very likely that a different artwork would feature different questions.

While reinterpretation is a relatively successful way of preserving digital art, it does know failures. Winget points out that artist questionnaires are problematic for two reasons:

“First, and this should come as a surprise to no one; the artist questionnaire is complicated. Artists find it difficult to answer the written questionnaire, and when being orally questioned, their answers are almost always qualified, with “you’d have to ask me if that situation arose,” sorts of answers. The second notable challenge with artist questionnaires is the fact that artists were almost universally appalled at the technology available for preserving and reproducing

²⁷ Depocas, Alain, Jon Ippolito and Caitlin Jones. “Permanence Through Change: The Variable Media Approach” (2003). Published by The Solomon R. Guggenheim Foundation, New York and the Daniel Langlois Foundation for Art, Science and Technology, Montreal.

<http://www.variablemedia.net/e/preserving/html/var_pub_index.html> (accessed January 18, 2009).

²⁸ Ibid., p. 47.

²⁹ Ibid., p. 48.

their work. [...] The artists, particularly the older ones, whose art is ageing, would assert that the thing being displayed was merely a “record” of the art, not the art itself.”³⁰

Looking at it this way, it seems as though these questionnaires only deal with the physicality and representation of the artwork. But what happens to the preservation of hardware and/or software that a piece of art might need to work? The television monitors in “TV Garden” for instance, play a video with a corresponding soundtrack. Since this installation is from 1974, one could ask what would happen if the videotape would break or deteriorate? Perhaps this video has already digitally been converted to DVD? The same question can be applied to the television sets that are used. It would not be the first time digital obsolescence got the better of one of Nam June Paik’s works. In 2004 his installation “Video Flag Z” from 1986, acquired by the Los Angeles County Museum of Art, was put in storage when the 84 television sets broke down and could not be fixed because of obsolete replacement parts.³¹

After addressing several strategies that are used in the battle against media obsolescence, I will discuss one final strategy (though there are more methods I haven’t discussed, such as storage and standards): emulation.

5. Emulation in New Media and New Media Art

In “Emulation for Digital Preservation in Practice” emulation is defined as a method that: “[...] does not focus on the digital object, but on the hard- and software environment in which the object is rendered. It aims at (re)creating the environment in which the digital object was originally created.”³² An emulation is created when the functions of one system are reproduced or duplicated so it can to run on another, completely different system, yet it looks and appears to be exactly like the first

³⁰ Winget, Megan “Digital Preservation of New Media Art Through Exploration of Established Symbolic Representation System”, final doctoral research paper, presented at JCDL 205 Inaugural Doctoral Consortium, June 7-11, 2005, Denver Colorado, USA. <<http://www.ischool.utexas.edu/~megan/>> (accessed January 15, 2009), p. 2.

³¹ Pham, Alex. “Art That Goes on the Blink”, article in Los Angeles Times, October 4, 2004. <<http://articles.latimes.com/2004/oct/04/business/fi-art4>> (accessed January 18, 2009).

³² Van der Hoeven, Jeffrey, Bram Lohman, Remco Verdegem. “Emulation for Digital Preservation in Practice: The Results” (2007). In *The International Journal of Digital Curation*, Issue 2, p. 123-132. <<http://www.ijdc.net/index.php/ijdc/article/viewFile/50/35>> (accessed January 18, 2009), p. 124.

system. An example of such an emulation is Office for Mac; duplicated Microsoft software that's able to run on Apple Macintosh's operating system. Though not flawless, emulation is widely considered to be the most viable method for the preservation of digital information yet. Rothenberg asserts: "The best way to satisfy the criteria for a solution is to run the original software under emulation on future computers."³³ He feels that emulation is the only reliable way of recreation the document's original functionality, look and feel.

Van der Hoeven, Lohman and Verdegem corroborate this idea when they write: "The importance of each attribute may vary depending on the requirements. If the original 'look and feel' of a WordPerfect 5.1 document is crucial, then the presence of the original WordPerfect application, version 5.1, is essential, in which case emulation is the best option."³⁴

As has been made clear earlier in this paper, digital preservation strategies also apply to new media art. Emulation is used in the keeping of digital artworks. Indeed, the Guggenheim Museum also puts its focus on emulation. In 2004 the Variable Media Network (which was spawned from the Variable Media Initiative) researched and organized the symposium "Echoes of Art", in combination with the exhibition "Seeing Double: Emulation in Theory and Practice." The symposium was concerned with the questions how the technique of emulation could best be applied to software, hardware and ephemeral materials. What the relationship is between the original hardware and meaning; and the changing roles of the artist and the institution in relationship to the preservation of contemporary art. The participants (among them several artists such as Cory Arcangel and Mary Flanagan, but also Jeff Rothenberg and Jon Ippolito) of the symposium provided an overview of emulation culture and the impact it has. They compared the strategies available to them for resurrecting obsolete technologies and analyzed a "Seeing Double" survey for signs of consensus from experts and the success of emulation from the uninitiated public. In particular,

³³ Rothenberg, Jeff. "Avoiding Technological Quicksand: Finding a Viable Technical Foundation for Digital Preservation" (1999), Washington, DC: Council on Library and Information Resources. <<http://www.clir.org/pubs/reports/rothenberg/preface.html>> (accessed January 15, 2009).

³⁴ Van der Hoeven, Jeffrey, Bram Lohman and Remco Verdegem. "Emulation for Digital Preservation in Practice: The Results" (2007). In *The International Journal of Digital Curation*, Issue 2, p. 123-132. <<http://www.ijdc.net/index.php/ijdc/article/viewFile/50/35>> (accessed January 18, 2009), p. 124.

the participants examined emulation among gamers and the importance of a decentralized and deinstitutionalized process for the preservation of digital culture.³⁵

Especially when it comes to the preservation of digital media in new media art, it seems as though it breaks down into several motives. First, for the sake of the artwork itself, electronic art should be properly kept from decay and obsolescence. Artworks might easily become stored and rendered as no longer 'useable' or presentable, as we have seen with Nam June Paik's "Video Flag Z". If digital obsolescence was reversible, or if there would be a viable method at hand that ensures digital artworks to be properly kept and displayed in the future, a museum like the Guggenheim would surely greatly benefit. We must consider what the implications are of the goals that the Variable Media Network has set. One could argue that it is not merely about keeping the works around in perfect state, solely because of the importance of the piece. Obsolescence might potentially change the desirability for the museum to continue displaying electronic art. After all, too many obsolescent art pieces might render a collection worthless. Furthermore, the purchase of a work might not outweigh the possible disadvantages of dealing with a broken installation and the inherent financial setback. Secondly, working with emulation and other preserving techniques can be a goal in itself for artists. If we examine the work of Cory Arcangel we see that he uses this method mainly to recreate artworks, or rather: create new artworks. His work "I shot Andy Warhol" was featured at the "Seeing Double" exhibition. It portrays a video game in which the user has to aim a plastic light pistol at the screen in order to shoot several Andy Warhol targets, it also shows images of Colonel Sanders, Pope John and Flavor Flav. Arcangel created this artwork by hacking the Nintendo game "Hogan's Alley." The Variable Media Network describes Arcangel's process as follows: "To hack the Nintendo game cartridge, Arcangel pried off the chip corresponding to the game graphics, rewrote its programming to include new game characters, and soldered it back onto the original cartridge. Arcangel left unchanged the chip that controlled the logic of the game itself, as well as the light gun used to interact with it."³⁶ Arguably, his focus is less about the battle against digital obsolescence and more about

³⁵ Variable Media Network. "Echoes of Art: Emulation As a Preservation Strategy" <<http://www.variablemedia.net/e/echoes/index.html>> (accessed January 19, 2009).

³⁶ Variable Media Network. "I Shot Andy Warhol" , Seeing Double. Cory Arcangel/BEIGE (b. 1978) <<http://www.variablemedia.net/e/seeingdouble/>> (accessed January 19, 2008).

emulation as an art form. In an interview published at the Variable Media Network's Website he states:

“For me the whole point of the work was the hardware intervention, the fact that I slaved over this ridiculous 6502 Nintendo language. If I hadn't been able to make a cartridge that ran the original code, I wouldn't have made the work. [...] The reason I make works based on game consoles is that all you have to do is see the cartridge to understand what happened. (Of course, I'm influenced by Nam June Paik's experiments with magnets and TVs).”³⁷

Similarly, in 2002 Arcangel hacked the game “Super Mario” for the Nintendo NES console and manipulated it by putting in a self made chip that displays nothing but a blue sky and white clouds, naming it “Super Mario Clouds.” All other characteristics of the game, such as Super Mario himself, the labyrinths, landscapes and obstacles had been erased. Arcangel then posted the source code of this hacked game on line in order for fellow hacking enthusiasts to partake in the tinkering. Seeing as that these examples of emulation used in new media art were also displayed and exhibited in several museums, it shows that emulation is not merely used as strategy for preservation, it is now in itself presented as an art form.

³⁷ Variable Media Network. “Interview with Cory Arcangel”, Seeing Double. New York City, January 30, 2004. <<http://www.variablemedia.net/e/seeingdouble/>> (accessed January 19, 2009).

6. Conclusion

As I have stated in the abstract and introduction, the aim of this paper is to answer the question why digital preservation in new media and new media art is as important as it is difficult. As we have seen, digital obsolescence – the inaccessibility of information due to obsolete media – is a serious problem we are facing. Today, there is no technique, method or strategy available that completely ensures for digital information to be properly preserved in its entirety. Furthermore, there is no method to reverse digital obsolescence either. If this development continues to follow the rate it has been going, there is no telling what - and how much- valuable information might get lost in the (near) future.

This contemporary issue can be traced back historically to the notion of reproduction as employed by Walter Benjamin and Hans Magnus Enzensberger. Both believe in the empowerment of reproducibility and the good it can bring. Benjamin states that the aura of an artwork is destroyed by reproduction, therefore there is no authentic print. As I argue; the same applies to new media. A Web page does not have an authentic print either. This has everything to do with the very nature of electronic media and the lack of an analog counterpart. When a Web page is opened in a browser, it always shows the 'original' page, no matter who requests it (even if it is more than one person) or when and where. In a similar fashion, Enzensberger also discusses reproducibility; providing a glance into the future, where he claims that new media do away with privileges. Indeed, the Internet is the most well known example of an informational providing system that is accessible to anyone.³⁸ The craft of mechanical and technical reproduction has been of great influence on society. The increasing loss of information due to obsolescence has flamed the discussion on what preservation strategy is best. Reproduction (in multiple forms) has always been high up on the list. The reliance on hard copy for instance, would mean making a physical reproduction of a digital-born document. Migration, refreshing and reinterpretation all involve the information in its current form to be reproduced on a different (storage) medium. Even though these methods are by no means a definitive solution to digital obsolescence, they help in better preservation management.

³⁸ Although we should bear in mind the digital divide; there are still millions of people who do not have access to the Internet.

Finally, it seems as though for the present, emulation is the most complete and reliable preservation strategy. With regards to the question *what* exactly should be emulated, Rothenberg argues this should be the hardware platform and not so much the applications or operating system (although this is also possible). He gives the example of the platform emulator MAME (Multiple Arcade Machine Emulator) that supports emulation of a large number of different platforms.³⁹ According to MAME's official Website its main purpose is to be: "a reference to the inner workings of the emulated arcade machines. This is done both for educational purposes and for preservation purposes, in order to prevent many historical games from disappearing forever once the hardware they run on stops working."⁴⁰ Rothenberg purposely chooses MAME as an illustrative example because it is an emulator that already runs on an existing hardware platform, thus proving "that emulation is an effective way of running otherwise obsolete software."⁴¹

³⁹ Rothenberg, Jeff. "Avoiding Technological Quicksand: Finding a Viable Technical Foundation for Digital Preservation" (1999), Washington, DC: Council on Library and Information Resources. <<http://www.clir.org/pubs/reports/rothenberg/criteria.html>> (accessed January 15, 2009).

⁴⁰ MAME <<http://mamedev.org/>> (accessed January 19, 2009).

⁴¹ Rothenberg, Jeff. "Avoiding Technological Quicksand: Finding a Viable Technical Foundation for Digital Preservation" (1999), Washington, DC: Council on Library and Information Resources. <<http://www.clir.org/pubs/reports/rothenberg/criteria.html>> (accessed January 15, 2009).

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Note: this online report by Rothenberg begins with the above URL, each chapter has its own new URL, as I have documented in the footnotes.

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