Digital Art through the Looking Glass:

New strategies for archiving, collecting and preserving in Digital Humanities

Oliver Grau, Janina Hoth and Eveline Wandl-Vogt (eds.)

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Introduction

Oliver Grau, Janina Hoth and Eveline Wandl-Vogt

Digital Art & Digital Humanities

Compared to traditional art forms—such as painting or sculpture—digital art has a diverse potential for imaging and visualizing digital cultures; being as it consists of and discusses various (digital) technologies and tools. With digitisation influencing our everyday lives through telecommunication, social media and mobile applications, digital technologies document, organise and shape contemporary societies. By creating with the same technologies, artists investigate our digitised cultures and circumvent the black-boxing thereof. They investigate and mediate the technological influence on socio-cultural development and transformation.

Through transdisciplinary methods at the intersection of art, science and technology, digital art combines artistic creation with innovative research and technological development and thereby bridges art history to digital methods and contemporary socio-cultural phenomena. As such, digital art's development often goes in accordance with the academic field of digital humanities. Digital artists have contributed to the development of computational analysis through the aesthetic and experimental art-science-technology dispositions of their art form. Their artistic creations are developed in parallel with digital methods and tools in the humanities and sciences, which have been applied in art and academia for over half a century now.

While technology is becoming increasingly important in research, the connections between digital art, digital humanities and (digital) art history are often neglected, or only marginally recognized and digital artworks are rarely investigated as research subject. Media and digital art theory was developed as an independent research field and, in consequence, these connections are often not reflected within a transdisciplinary approach (Paul 2013).

In digital humanities (DH), with the TEI initiative, data mining and visualisation tools, most analytical methods so far have emphasized text encryption and digitisation efforts in fields such as archaeology, art history, linguistics, history and numismatics. Visual born digital objects often remain on the margin of research even though they mark a vast amount of online data. Additionally, they are still not incorporated into the art historical canon or exist only as a niche phenomenon rather than a main contemporary art movement.

From text encoding to virtualisation methods to interactive storytelling—digital artists contribute to digital culture with arts-based research and novel approaches to digital technologies through artistic processes. In 2009, Tamiko Thiel began her series of augmented reality installations, bringing her virtual reality compositions from web interfaces into reality through the lens of portable devices (smart phones, tablets) (Fig. 1).[1] Using a Layar augmented reality app, she portrayed "hidden" historic and thematic layers of public spaces—a tool now applied in museums for interactive explorations by seemingly "bringing objects to life." This technology became widely popular through the Pokémon GO gaming app in 2016. Yet, this connection between art-science-technology projects, digital technologies and the commercialisation thereof is rarely reflected in research, which could support computational analysis of this contemporary art form and, in a broader sense, digital cultures.

With regard to their influence on the Digital Age and its technologies, we may regard digital art as "the art of our time" in terms of sociopolitical and cultural relevance (Grau 2013a): thematising complex challenges for our life and societies, such as genetic engineering, the rise of post human bodies, climate, the image and media revolution (Hauser 2008; Borries 2011); and with it the explosion of communication, the change towards virtual financial economies, the processes of globalization and surveillance (Vesna 2007; Mitchell 2011). In *Pic-me* (2014)[2], Marc Lee wrote an Instagram app, which users can install on Google earth, to locate randomly chosen Instagram posts via GPS data. By connecting social media accounts with the real-life identities through the location, Lee highlighted surveillance through user data on social media accounts.

1 https://www.digitalartarchive.at/database/artists/general/artist/thiel.html.
2 http://marclee.io/en/pic-me-fly-to-the-locations-where-users-send-posts.

Figure 1. Tamiko Thiel, *Transformation*, 2012. ©Tamiko Thiel

As response to the rising industrial waste generation and resulting environmental issues, Gilberto Esparza created robots, or *Plantas Autofotosintéticas* (2016),[3] which are powered with toxic waste. As hybrid work between art, scientific innovation and anthropocene research, his work challenges common methods of managing air and water pollution.

In 1997, I/O/D's *Web Stalker* foreshadowed domain crawling and co-link analysis through the artistic and technological development of an alternative web browser (Fig. 2).[4] At that time, Microsoft's Internet Explorer and Netscape's Navigator were the two most commonly used browsers and I/O/D aesthetically explored alternative ways of browsing through the web. Their method of highlighting connections between webpages and hypertexts are now common in computational analysis.

Digital artists today are shaping highly disparate and complex areas, like time-based installation art, telepresence art, genetic and bio art, robotics, net art and space art. They are experimenting with nanotechnology, artificial or A-life art; creating virtual agents and avatars, mixed realities, and database-supported art. Digital art often addresses many senses—visual, aural and beyond. It thereby technically explores and transforms creative process within and outside of art. In a humanist tradition, digital art frequently addresses controversial contemporary discussions, challenges and dangers, and proposes socio-cultural transformations. Thus, it is an art form with a deeply comprehensive potential in the reflection of our information societies regarding the digital revolution. Because it utilizes new technologies, a large number of

3 http://plantasnomadas.com.
4 http://bak.spc.org/iod.

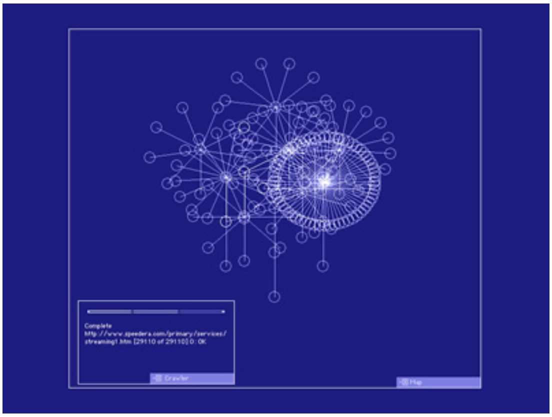

Figure 2. I/O/D, *Web stalker*, 1997. ©I/O/D

innovative visual expressions have been developed and artists increasingly operate transculturally as well as transdisciplinary.

As a research subject, however, digital artworks are still rarely investigated (with digital methods) despite the fact that they are most often born-digital works, generate digital data or document user interaction. Unlike digitized artworks, from illuminated books to ancient architecture to modern paintings, they are rarely collected and analysed in digital humanities projects.

Compared to other born-digital cultural heritage, e.g. websites that can be crawled and documented or online events that are screen recorded, digital artworks are even more elusive in their object hood. With digital technologies as intrinsic part of their medium and subject, they require constant updating. Their collection and preservation is a much discussed topic involving several stakeholders from artists to technicians at collecting institutions. In their modularity, one cannot only document the website of an artwork; in their processuality, one cannot fixate the work, or artefactualize it, in one state of being. Additionally, digital artworks often remediate data generated live from social media and other online sources. In other words, these artworks challenge traditional archive, collection and preservation methods and, consequently, museums and other memory institutions both online and offline still struggle with archiving this “art of our time” for future generations.

The aim of this collection is to focus on how we need to redefine preservation methods for digital art by creating a transdisciplinary dialogue between all the involved stakeholders and how we can archive digital artworks by acknowledging their authenticity and mediality. The discussion goes beyond preservation as such and questions how digital artworks can be further re-used for curatorial and dissemination projects, and as research data. How can we utilize digital art databases and collections for research purposes and which infrastructures do we need for these purposes? Authors discuss ideas of collecting in- and outside of traditional memory institutions, within online databases and for purposes of exhibiting, researching and disseminating digital art presently and for long-term preservation. Archiving in theory and in practice-based approaches are juxtaposed to bring together experts from all academic disciplines and memory institutions involved in preserving digital art as digital cultural heritage. We retrace the discourses and disciplines intrinsic for digital art preservation towards a transdisciplinary theory which combines art history, media art theory, conservation, computer studies, media studies and collection studies.

Digital Art & Preservation

To preserve a digital artwork for future generations—or even beyond software updates and changing system requirements—, many factors theoretically, technically and institutionally need to be considered and combined. As interconnected, "living" entities, digital artworks have surpassed the concept of object-oriented art and necessitate a rethinking of preservation strategies. Through their various technological and co-creative components, documenting and disseminating these artworks exceeds the concept of artefactualisation and restoration towards an archival strategy as continuing process. So far, most museum projects and other initiatives have developed intransitive preservation forms, e.g. emulation and web archiving. They successfully document an artwork's iteration—usually at a stage when it was originally published or exhibited, but negate digital art's mediality in its intrinsically intertwined technology, design and methodology. For example, while web archiving can document the interface design of an artwork's homepage and enable users to continue to access and interact with it, this does not automatically archive the entire artwork, let alone its creative process and technology. Preservation material, then, has to adopt more fluid forms with alternations and (re)iterations and update procedures while still being based upon concepts of artistic intention and authenticity. New strategies on archiving, collecting and preserving require a deeper understanding of the mediality of digital art and its components, adaption to its co-creative process and be re-usable as archival data to create multiple narratives about the histories and futures of digital art.

The discourse on preserving digital art indicates how archival procedures imply underlying questions of authenticity, artistic intentionality and archive theory, to name only a few concepts (Dekker 2018; Rinehart/Ippolito 2014; Fauconnier 2003), and highlights how digital art has put these concepts into question. Simultaneously, technicians need to solve the issue of technical obsolescence in regard to long term archiving. Digital art preservation necessitates a network of collaborations: between the artists and technicians that developed and constructed the work, the institutional staff responsible for collection and preservation, scholars and conservationists. A theory of digital art preservation is therefore transdisciplinary not only due to the collaborative nature of this art's production, but in the necessity of combining theoretical writing with practice-based research by all of the professions involved.

The Roundtable—a DARIAH event at the 2017 Re:Trace Conference, held at the Academy of Sciences, Vienna[5]—introduces the current issues in digital art preservation with special regard to how museums have thus far responded to the challenge and how new infrastructures both off- and online can be established for the future. Renowned scholars pinpointed the main research questions today in regard to digital art theory and preservation strategies in museums and other memory institutions.

Both the histories and futures of digital art in museums are debated with a presentation on curatorial strategies by Francesca Franco, who describes the concept for exhibiting computer art from the 1970s. Alcalá/Escribano demonstrate the institutional history of the MIDE collection with a case study on an artwork's versioning. They argue for the integral relationship between the general, industrial development of digital technologies and early "primitive" media art projects both in terms of their production and preservation. These research-based projects are juxtaposed with practice-based preservation methods from Diego Mellado and Patricia Falcão. From a technician's point of view, Mellado proposes a new documentation method as demo artwork descriptions, which can be reinterpreted without relying on specific software or hardware. Combining documentation and preservation strategies, Mellado co-developed a method which aims at documenting an artwork's functionality and aesthetics to enable the preservation and exhibition of an artwork after the technology has become outdated. Having supported

5 https://vimeo.com/253584186.

many artists on the creation and re-installment of their works, Mellado writes from a practice-based research perspective to conserve media art in its originality as aesthetic while allowing for technological changes. Patricia Falcão introduces strategies in the time-based media preservation projects at Tate. As conservator in a well-established institution for contemporary art, she describes main challenges and best practices for collecting and preserving artworks in this infrastructure.

Digital Art & Archive Theory

Online storage methods enable us to gather more data than ever before. By 2020, our digital universe will grow by a factor of 300, from 130 exabytes in 2005 to 40,000 exabytes and will double every two years, driven largely by the increase in machine-generated digital images and their metadata.[6] The internet is often described as an archive, or archival in the metaphorical definition of the term, due to the (seemingly) easy access for every user to data—from images and videos, sound and music to articles, journals and books.

This has also caused a renewed interest in archive theory and archival practices online and offline. With digital technologies and online data storage, a new archival dynamic has emerged due to the processuality of these technologies in combination with their seeming "archive-ability." In media studies and media archaeology, the necessity for more dynamic archive infrastructures which question the search for origin inherent in traditional archives have been addressed for digital data (Ernst 2003; Zielinski 2014). At the same time, theorists analysed the essential memory functionality in computer hardware (Chun 2008). With input from other disciplines, e.g. gender and queer studies, the debate on the archive as power dynamic was debated for digital data, where the inherent categorization in databases and the appearing objectivity of data analysis is investigated (Wyatt 2008).

In the early 2000s, many scholars celebrated the ability to not only store large amounts of data/knowledge, but to distribute them globally and democratically to anyone interested and with Web access (Galloway 2011). In digital humanities, databases are one of the most important research tools for collecting and re-using data. However, the largest

6 IDC Digital Universe:
http://www.emc.com/leadership/digitaluniverse/iview/index.htm

servers today belong to governments and the industry, e.g. social media platforms, online distributors, and are therefore “dark archives” largely inaccessible.[7] While web technologies function by storing hypertexts and interconnected data, this function is always temporary or cannot be accessed by users without sufficient knowledge and tools. Therefore, the internet as archive relates to the metaphorical meaning rather than the functionality (and usability) of an archive.

For digital art, its accessibility and preservation for future generations remain to be an open question. Do we embrace the ephemerality of digital technologies or do we acknowledge the mediality of Web technology as based on memory techniques, when debating its documentation and archiving? While conservation in museums and other institutions affects financing, technological expertise and collaborations, online archiving was established as an open, easily usable and accessible method to document artworks within a database environment, similar to other digital cultural heritage projects.

Artists engage contemporary digital technologies, leading to the production of artworks that are necessarily processual, ephemeral, interactive, multimedia-based, and context-dependent (Paul 2016). Following academic standards, the preservation of a digital artwork demands the ‘recording’ of these various aspects, including specific appearances, production processes, exhibitions, distribution, institutional contexts, observer response, publications, and research (Grau 2003a). Since the beginning of the Third Millennium, there has certainly been evident promotion of digital art conferences, lexicons, and platforms for the purpose of documenting MediaArtHistories. But even with such progress, as a post-industrial information society in the digital sphere, we continue to be threatened with a significant loss of this critical art form, both in art archives and databases, and for the accessibility of future scholarship and the general public. As recently expressed in an international declaration[8], signed as of 2019 by more than 500 scholars and leading artists from over 40 countries, there is an urgent need to create a stable international platform of interoperable archives.

7 See the Digital Preservation Glossary for a technical definition of the term “dark archive“: https://www.lib.umich.edu/preservation-and-conservation/digital-preservation/digital-preservation-glossary.

8 International Liverpool Declaration “Media Art needs global networked organisation and support”: http://www.mediaarthistory.org/declaration.

Therefore, for digital art, database projects have been developed that went beyond traditional art historical archival methods, e.g. scientific-based (Archive of Digital Art, the Variable Media Questionnaire), collaborative (Artelectronicmedia.com), institutional (V2, Rhizome Artbase, Media Art Festival Archives) and commercial (Sedition, Niio). Most archives document textual and visual data: biographical, bibliographical, indexical, descriptive and often develop tools for recording and re-using archive material. First and foremost, artists self-archive their work on their own homepages. The methods on how to collect and organize vary depending on what to collect (by specific genre, geographic area, technology etc.), conservation type (emulation, rewriting) and documentation (metadata system, data sheets). Many databases today are co-creatively designed and shared, but they can also be (semi-)curated by an editorial team. However, databases are rarely interoperational and often a lack a long-term preservation and sustainability plan. The goal of archiving this contemporary art form for more than a few years is still an open question which needs to be debated between artists, scholars and conservators.

In this book, the transdisciplinary investigation includes an epistemological inquiry on the questions of what we can know and what we want to know about and from digital artworks. Since one major aspect of archiving is the historicization of digital art, we must question how we can narrate artistic, technological and institutional histories for contemporary art in a relation to specific archival methodologies. Once artworks are preserved and thereby embedded into an archival system, they become knowledge carriers for events and experiences in the past as much as individual collection objects. As such archival objects and historical sources, they are central for writing MediaArtHistories.

In this collection, we therefore begin by introducing central works of “historical media art” and the methods of collecting and archiving. Frieder Nake and George Legrady introduce their own pioneering work along with other examples from early media art and its technologies. By comparing the works of artist Harold Cohen and programmer Georg Nees, both pioneers for Computer, or Algorithmic Art, Nake questions the correlation between artistic and technological knowledge. Legrady describes the continuous influence of technical developments in photography and digital imaging for his artworks. Escribano/Alcála retrace the copy machine as a tool for early media art production in the United States and Europe, discussing how MediaArtHistories can be written by following technical procedures as origins of artistic inspiration and progress. The diversity and complexity of these histories challenged new archival projects to document the new art forms as early as the 1980s.

Anne-Marie Duguet chaired one of the very first preservation projects focused on digital art in the mid-1990s—before the publication of Jacques Derrida's "Archive Fever." The research results preceded his archival definitions by investigating the complex question of how to archive an artwork made up of not only many entities, software and hardware, but that incorporates—as a network of ideas—imagery, texts as well as human and technical input. She and her team worked very closely together with the artists to find singular preservation strategies that were approved by the artists. As a consequence, each project was developed and discussed over a long period of time (around six years) and she analyzes central themes of work ethics in regard to archiving non-object art.

The artistic perspective is often still underestimated or negated in this discourse, both due to omission or lack of knowledge by the artist and/or by the host institution. With digital artworks, and digital technologies in general, the need for a continued update is often not considered in a long-term preservation strategy. Artist Rafael Lozano-Hemmer describes from his own experience how memory institutions such as art museums as well as artists can avoid technological issues and discusses how a reiteration of an artwork is in line with artistic intention and authenticity. Since the impossibility of archiving digital art has been proclaimed by artists in the past as a characteristic of its ephemerality—following a radical interpretation of Derrida's archive theory—, artists very often did not take action in the documentation and conservation of their work. However, one must differentiate between the concept of archival power as a method of control, the idea of art as originality and the modularity of digital art entities are essential disparate characteristics.

With net.artworks as case studies, Giselle Beiguelman highlights the difficulty for archival strategies to document the artwork, or a version of the artwork, in a way that can be considered adequate, replicating and functional. Beiguelman discusses the interconnection of frontend/backend and user interaction, how these are essential elements of an artwork and whether they can be documented. She thereby expands archival strategies by separating the outer appearance and frontend functionality from an artwork's origin and concept. The question is reformulated as: Which elements should be considered as essential for an artwork?

Digital artworks redefine traditional art historical concepts of authenticity, object-hood and originality, and as a consequence, also interrupt the archival system towards renewed ideas for documenting and disseminating data for the future. In fact, many digital artists debate archive theory within the framework of digital technologies in their works. Annet Dekker discusses these artworks as counter-practices of the industrialised archiving system online, with companies like Google, Amazon and Facebook as some of the largest archives for digital data. Her article goes beyond the boundaries of light and dark archiving by examining how artists develop alternative ways of online archiving as a collective, networked method. Janina Hoth deliberates the opportunity of online archives for a co-creative knowledge generating system for digital art. By examining the production process of digital art in juxtaposition to the archival infrastructure of online databases, she argues for a restructured archival system, which accommodates the new and innovative creative process inherent to digital art. She further suggests that, by stepping away from the concept of an artefact, archival documents become not only original sources, but also an open process themselves.

As we progress with the question of what needs to be archived in regards to digital art preservation, and which methods are available to us, the question also shifts towards re-usability of (open) data. The documents become not only a source for seeing and experiencing older artworks, but a source of inspiration, research and education as well.

Laura Leuzzi demonstrates how archival methods can also be an artistic experiment for a continued development of media art performances. In addition to a documentation of the "original" works, artists such as Marina Abramović would re-enact their performances with new technologies, often acknowledging the former versions by incorporating them into the new performance. The continued works become embodied and interactive knowledge carriers, where not only the technology changes, but the artist's body is also parallel in their artwork(s).

Finally, the projects *MediaArtResearch Thesaurus* and the *Narrative Book Collection* present methods of dissemination for both research and education. Examining the works as digital data which can be processed, compared and analysed, archiving goes beyond saving documents for collection and exhibition purposes towards their continuing reusability online. The MediaArtResearch Thesaurus project focused on visual comparisons to bridge media art with its art historic predecessors. For the Narrative Book Collection, Miyakita/Okawa examined the online education platform "FutureLearn" for an interactive knowledge exchange.

Digital Art & Collection Strategies

On the Archive of Digital Art (ADA, digitalartarchive.at), over 1,500 institutions are documented as digital art event venues with conferences and summits, exhibitions and performances as well as higher education organizations with graduate programs and teaching platforms. Only a small amount of these institutions have an official program or strategy for collecting digital art. With museums, archives and libraries continuing as the core collecting memory institutions of our societies, as they are publicly funded, they can with certainty claim that digital art has not fully arrived as a main contemporary art form in the main art collecting institutions. Due to the lack of institutional support and rapid changes in storage and presentation media, works that originated ten years ago can often no longer be recovered technically for exhibition or preservation purposes. As debated since the 1990s, museums rarely include digital art in their collections in an encompassing strategy, which can preserve digital art as part of media art histories in regards to both content and technology. Those that do struggle to sustain financial backing, expertise, and technology for the preservation of artworks through strategies such as migration, emulation, and reinterpretation (MacDonald 2009; Ippolito/Rinehart 2014). Hence, in the 2010s, we are facing the loss of an art form in all of its varieties and as part of digital heritage from the early times of our post-industrial digital societies.

Digital art has also changed the venues and media for exhibition and dissemination. Rather than museums and galleries, around 200 festivals and biennials worldwide can be considered as the most important venues for digital art. They have shaped the histories of digital art insofar as their foci on future-oriented technology, and its main discourses and issues supported digital art's position at the intersection of art, science and technology (Waelder 2010). As temporary events, they collect their own histories—Transmediale, Microwave and ISEA all having their own online archives—, but are rarely involved with the collection of digital art. At the same time, digital art has not significantly entered the walls of museums. Which infrastructures online and offline are necessary to collect digital art within public funding methods? Today there are more than 50,000 museums worldwide. Japan and Germany, for example, have more than 5,000 each, among them hundreds dedicated to art only. At the same time, in many other countries, a museum infrastructure is still developing and this challenges established research strategies within museums. With all the diversity and history of the museum in its role as preserving and disseminating cultural heritage, the responsibility of collecting born-digital objects is still an open question.[9]

Digital technologies and cultures have made their own impact in these debates with digitisation methods and their position in “saving” endangered cultural heritage objects as well as enabling new research methods for collection items. In the digital age, new tools to present, to explore, collect and access cultural artefacts; to connect, research, manage and visualize data were established. Which status should be given in museums worldwide to digital-born arts and cultures? Which have their own history of more than five decades?

Howard Besser re-narrates the historic development of museums in the US towards digitisation and using digital tools. Looking at several key technological developments inside and outside of museums from the 1970s onwards, the difficult relationship between museums as traditional knowledge institutions and the progressive new technologies is retraced. Sabine Himmelsbach introduces the collection methods at the *Haus der elektronischen Künste* in Basel—one of the few government supported institutions in Europe with an active collection strategy for digital art. She describes central issues in applied preservation methods at museums and other institutions and thereby offers a comparative view.

Together, the texts in this collection provide a survey of key perspectives and debates in digital art preservation and the histories/futures of archive and conservation methods. Bridging theory and practice, *Digital Art through the Looking Glass* points to new perspectives on how to un/sustain digital art online and offline, and how to analyse it with DH methods. Within Digital Humanities, digital art becomes palpable in its transdisciplinary position in creative tool development, as a critical medium for digital culture and as a research subject. In order to acknowledge these potentials, we need to apply

9 European Charter for Access to Research Infrastructures: https://ec.europa.eu/research/infrastructures/pdf/2016_charterforaccessto-ris.pdf.

preservation methods, find best practices for documentation and conservation and be able to re-use them for future scholarship.

This book results from the 2017 Re:Trace conference, the seventh edition of the conference series *On the Histories of Media Art, Science and Technology* and a cooperation with DARIAH-ERIC. The third day of the conference focused on “Digital Arts, Archives and Museums.” As one main outcome, we discussed the need to bring together all of the involved stakeholders and, hence, it became the main theme of this book. The editors would like to thank all the conference participants and panel members who gave vital input for our research and, of course, the authors for sharing their insights and expertise.

References

Borries, Firedrich von. 2011. *Klima Kunst Forschung*. Berlin: Merve.

Bourriaud, Nicolas. 2002. *Relational Aesthetics*. Dijon: Les presses du réel.

Buschmann, Renate and Tiziana Caianiello (Eds.). 2013. Media Art Installations Preservation and Presentation: Materializing the Ephemeral. Berlin: Dietrich Reimer Verlag.

Chun, Wendy. 2008.” The Enduring Ephemeral, or the Future Is a Memory.” In *Critical Inquiry*, Vol. 35, No. 1, pp. 148-171.

Dekker, Annet. 2018. *Collecting and Conserving Net Art. Moving Beyond Conventional Methods*. Routledge: London.

Dietz, Steve. 2005. “Collecting New-Media Art: Just Like Anything Else, Only Different.” In Bruce Altshuler (ed.) *Collecting the New*, Princeton, NJ; Oxford, UK: Princeton University Press, pp. 85-101.

Ernst, Wolfgang. 2013. ”Underway to the Dual System: Classical Archives and Digital Memory.” In Digital Memory and the Archive, Univ. o. Minnesota Press, Minnesota, p. 81-94.Fauconnier, Sandra. 2003. “Capturing Unstable Media: Summary of Research.” V2-Lab for Unstable Media. http://v2.nl/files/2003/publishing/articles/capturing_summary.pdf [Last Checked: April 2019]

Galloway, Alexander R. "What is New Media? Ten years after "The Language of New Media"." In *Criticism* 53, no. 3 (2011), pp. 377-84. http://www.jstor.org/stable/23133906.

Grau, Oliver. 2003a. “For an Expanded Concept of Documentation: The Database of Virtual Art.” In *ICHIM Proceedings*, École du Louvre, Paris, pp. 2–15.

— 2003b. *Virtual Art: From Illusion to Immersion*. Cambridge, MA: MIT Press.

— (Ed). 2011. *Imagery in the 21st Century*. Cambridge/Mass.: MIT Press.

Hauser, Jens (ed.). 2008. *Sk-interfaces. Exploding borders-creating membranes in Art, Technology and Society*. Liverpool: Liverpool Univ. Press.

MacDonald, Corina. 2009. “Scoring the Work. Documenting practice and performance in variable media art.” In *Leonardo*, 42/1, pp.56-63.

Paul, Christiane. 2009. “Context and Archive: Presenting and Preserving Net-Based Art.” In Dieter Daniels and Gunther Reisinger, *Net pioneers 1.0 : contextualizing early net-based art*, Berlin/ New York: Sternberg Press, pp. 101-122.

—. 2013. “A Changing Aesthetics, or: How To Define and Reflect on Digital Aesthetics. An Interview with Christiane Paul.” In A. Dekker (ed.) Speculative Scenarios, Eindhoven: Baltan Laboratories, pp. 16-24.

Rinehart, Richard. 2007. “The Media Notation System. Documenting and preserving digital art/media art.” In *Leonardo*, 40/1, pp. 181-187.

Vesna, Victoria. 2007. *Database Aesthetics: Art in the age of information overflow*. Minneapolis: University of Minnesota Press.

Waelder, Pau. 2010.

Wyatt, Sally. 2008. “Technological determinism is dead; Long live technological determinism.” In E Hackett, O Amsterdamska, M Lynch & J Wajcman (eds.), *Handbook of Science and Technology Studies*. Cambridge: MIT Press, pp. 165-180.

Zielinski, Siegfried and Hans Belting, Eckhard Fürlus, Claudia Giannetti (eds.). 2014. *AnArchive(s)—A Minimal Encyclopaedia on Archaeology and Variantology of the Arts and Media*. Köln: Walther König.

Early New Media Art.
The search for originality in technological art and its challenges for preservation

Georg Nees & Harold Cohen: Re:tracing the origins of digital media

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Keywords

Algorithmic art, Harold Cohen, Georg Nees, generative art, semiotic machine, AARON, origins of digital media

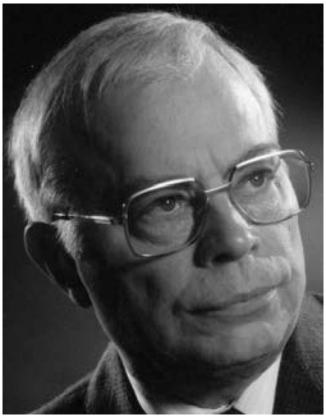

Figure 1. Georg Nees (1926-2016) (first algorithmic art show 1965 in Stuttgart)

Figure 2. Harold Cohen (1928-2016) (first algorithmic art show 1972 in Los Angeles)

One day in 1964, Georg Nees, son of the city of Nuremberg, and as a mathematician working for the Siemens Company in Erlangen (Germany), watched the new Zuse Graphomat Z64 automatic drawing machine as it generated a first short straight line segment and, after a change of direction, continued to do the next, and again, and more of them. Though somewhat fast in its movements, the machine was still slow enough so that Nees could closely observe how it switched direction and continued it for some distance, before it again altered direction for another seemingly straight line segment. And so it went, repeating the same simple operation eight times before closing the funny little figure that meanwhile had emerged. The line segments appeared on paper in black ink as graphic entities, building groups and neighbourhoods forming shapes. An entire array of such creatures (Fig. 5).

Decades later, recalling for the visitor from his memory the scene with the Graphomat, Nees says: “I was standing in awe, overwhelmed by what the machine made me become a witness of. Here was something,” he added, “that would not disappear again.”

Some other day four years later, in 1968, Harold Cohen, young and already a successful British artist, just arrived as a visiting professor to the Fine Arts Department at the University of California at San Diego (UCSD), felt a bit frustrated by Jef Raskin's attempts to teach him programming. Raskin (1943-2005), then a graduate student of music at UCSD, holding several previous degrees, and up to later becoming an important figure in the design of the Apple Macintosh, was concentrating on the fundamentals of programming as he was introducing the forty-year-old artist into the art of computer programming.[1]

Raskin was fifteen years younger than the British artist, but obviously understood very well what his job should be: He required from Cohen some degree of patience when he chose flow-charts as the basic objects to make his student become familiar with. In flow-charts, we may describe a program independent of the intricacies of a concrete programming language. This helps the novice to better understand principles of programming. But Cohen, after a while of growing impatience, said, enough of this, I finally want to get my hands on code. In reaction, Raskin left him and, after a while, returned with a fat handbook for the FORTRAN programming language, dumped it on the table, “here it is”, and left Cohen

1 It is a beautiful co-incidence that the first volume of Donald Knuth's century-project, "The Art of Computer Programming" (Knuth 1968), appeared in the same year.

behind, now alone with the handbook. The artist started reading and exercising, and did not stop doing this before the middle of the night.

Decades later, recalling the scene with Raskin for his visitor, he says: “I was baffled but overwhelmed by the code elements that opened up in front of my eyes.”

Nobody will ever know precisely how the two situations happened in actual fact. But who would care to know them better, perhaps from cameras installed at the Erlangen and San Diego locations, including microphones to record what the two actors did, what happened to them and how they reacted. Both stories are nice stories that Nees and Cohen tried to remember when they told them to the author. He did not change much of what he was told, or even nothing. But who knows, and several media transmissions are responsible for what you, dear reader, are now reading about two incidents that have happened in 1964 and 1968, in Germany and in the USA.

So much for a first meeting of our two heroes. Before I am going to say more about each one of the two, I want to inject a short note about digital media. It is intended as a kind of bracket for what the mathematician and the artist are doing in their very different manners at the two poles of a contradictory spectrum, far apart geographically as well as intellectually. The two men are contributing to, and pushing forward, a field in the history of fine art that is often, unfortunately, called "computer art." Much better, and more precisely, it should be called by names like "algorithmic art" or "generative art."[2]

Both these terms reveal the important fact that the artist in generative or algorithmic art is working from a radically novel perspective. He or she are *thinking their work*, they build it in their head before they describe, in an appropriate way, to the machine what they want it to do. “Think the work, don't make it!” is their revolutionary approach. It entails a dramatic consequence: When you think the work, you never think a single work. You immediately realize that the thinking of works is a thinking of possible realizations, of schemata, methods and techniques to generate works, much more than a thinking of generating an individual work. The creation of an individual work is materials to be combined, melted, attached,

2 When on the 5th of February, 1965, philosopher Max Bense opened Georg Nees' first exhibtion in Stuttgart, he read a short text of his (in German) under the title "Projekte generativer Aesthetik" (Bense 1965). Bense took the term "generative" from Noam Chomsky's "generative grammar" (Chomsky 1956). Much later, it became an attribute of many artistic approaches using self-constructed software to distiguish this from the use of application software.

mixed, piled up, connected, applied, etc. The generation of an entire family of works, however, amounts to transforming signs into materials that the signs stand for. Therefore, it is a thinking of infinities, of literally infinite sets of works. The individual work becomes an instance only of an infinite class of works. The class is described by certain (visual) features that are parameterized. The set of parameters and their ranges of variation determine the variation and changes from one instance to the next.

As a corollary to this, the work of algorithmic art is constituted as a class of works. Each single realization is an indicator only of the class it belongs to. The work of algorithmic art, when viewed in a more traditional way, is reduced to a state of "standing-for." The masterpiece disappears. The permanently changing appearance of the works transforms them into dynamic processes more than into fixed, static works.

Such statements in their style of factuality may not yet convince the reader, or they may appear trivial to her or him. Both reactions are okay. For they depend on how much or how little we have accepted that our time's fabric is determined more by the dynamics of change than the statics of permanence. Peter Lunenfeld has written about similar observations as the *aesthetics of unfinish*[3].

Georg Nees is the mathematician who moves into fine art; Harold Cohen is the artist who moves into computing. Both gain their exceptional creative capacities and their historic positions by emigration into unknown lands. They gain by giving up, and they re-gain what they give up. As individuals, they stand for new sorts of media. They stand for media that require two capacities melting into one in the same person: algorithmics and aesthetics.

Media, digital

Both our stories are about computers. But computers appear in opposing roles. Nees is an expert in program development; Cohen is an expert in painting. When Nees approaches the computer, he knows perfectly well how to do this; but he may be hesitant about what he should ask from the computer. When Cohen approaches the computer, he knows perfectly well what he wants it to do; but he may still be uncertain about how to get it to do just that.

3 "In fact, »unfinish« defines the aesthetic of digital media." (Lunenfeld 2001: 7).

Figure 3.
View of Cybernetic Serendipity,
ICA London, 1968.

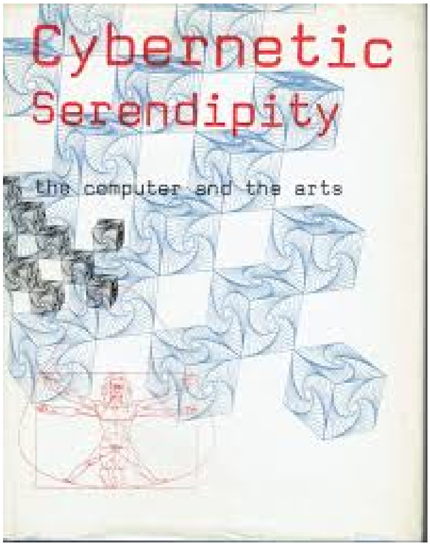

Figure 4.
Catalogue Cybernetic Serendipity,
special issue *studio international*, 1968.

Nees is observing a drawing automaton. He has before instructed a computer to output a punched paper tape such that the automaton, when controlled by the paper tape's codes, generates a drawing of ink on paper that is the result of Nees' thinking. This last sentence, I assume, may read a bit complex. It means that Nees has developed a program that, in the end, draws. He is concerned with computer output that he is going to evaluate from an aesthetic perspective.

Cohen, on the other hand, is eager to learn how to write a program, using a particular programming language for a particular computer. His teacher, however, with the best of intentions, introduces him to general principles. That makes him, the artist, become nervous. For, as an artist, he is accustomed to the particular and single specimen, as opposed to the general and all members of a specification. Cohen's concern is: when do I finally get down to writing code so that I can force that machine, the computer, to do precisely what I want it to do?
Computer input is what his thinking is focussed on and he feels intuitively that it may still take quite a while before he gets to where four years earlier Georg Nees already was.[4]

4 As an aside, to the best of my knowledge, Nees and Cohen have never met. They knew of each other, nothing more.

Georg Nees knows well what one can do with a computer. He plays with it, forcing it to do what he wants it to do and nothing else. He does not know much about how to do art. Harold Cohen knows well what one can do with brushes and paints. He plays with them, forcing them to generate forms and colourings that look the way he wants them to look. He doesn't know much about how to deal with computers.

The first exhibition of drawings claimed to be of artistic interest was displaying works by Georg Nees (in February, 1965, in Stuttgart[5]). A few weeks only, before Cohen left London for San Diego, the large and comprehensive international exhibition *Cybernetic Serendipity. The computer and the arts*[6] had opened at London's Institute of Contemporary Arts (ICA; the opening on 2 August, 1968, Figs. 3 and 4). Of course, Cohen had visited the show. He was impressed, and when he, shortly after, arrived in California, his mind was full of fresh new possibilities opening up to his artistic thinking. At the ICA, he may have seen Nees' work but it may well be that the kinetic creatures of the show attracted his attention more than the computer-generated drawings on the walls.[7] The spectacle[8] of a flower bending over towards the visitor as he or she makes certain noises does not only attract kids much more than a static drawing—adults do not react very differently.

The computer during the 1960s and well into the early 1980s is considered to be a machine and this interpretation can hardly be different. It is a machine of the automaton type of machinery. Like the telephone or the conveyor belt, and many more: machinery that functions automatically. To a large extent, the automaton can operate without much of explicit control by humans. Only in the early 1980s, with the appearance of the Apple Macintosh in 1984, the tool metaphor takes on prominent status. The machine computer is transformed from an investment good into a consumer good. Without tremendous changes in the way of using the machine, the transformation would not have been possible. The computer now becomes a good to be picked up from an ordinary store or supermar-

5 Putting Nees' show in the rank of an "exhibition" may be contested by the strict criteria of art history. The Studio-Galerie was not officially involved. They gave the rooms. However, people came for an opening; the works were on display for two weeks; Bense and Nees spoke; there was reaction in the press. For those who were there, it was an important event.

6 See Reichardt 1968

7 Cohen may also have come aware of Nake's work also on display, and chances are that the two almost met on their different ways from Europe to North America.

8 Should I mention the fact that Guy Debord's Society of the spectacle had appeared only recently? (Debord 1967)

ket. With the breakthrough of the Internet (1994), the "tool" computer, already widespread, but now—by taking on the function of an end-device to access an enormous and rapidly growing mega-machine, the Internet—the computer is gradually seen as a medium.[9] With the additional global storm of the smartphone, the people of the world are now almost slavishly and in permanence engaged in trivial forms of communication that pretend to be greatly liberating and providing access to the knowledge of the world. Part of this is, of course, not really wrong. But the medium's impact is of the kind that air plays for land-based, and water plays for sea-based animals: The medium to sustain their lives.

Georg Nees

As he told us his story, when he first observed the machine drawing lines he had thought before and described algorithmically, Georg Nees stood in awe, overwhelmed by what he saw happening. Was he observing how his own thoughts were taking on material form? A short while before, he had picked up from the computer a punched tape that his own program had generated as output. He had taken the tape to the automatic drawing machine, had inserted its front end into the paper tape reader, had pressed the start button and was now watching the machine doing its jerky job. A cold vibration was running down his spine: "This will never disappear again."

At around the same time, late in 1963, I had been in the same situation of observing the machine as it was materializing my own thinking. Excitement shook me. But the moment I saw the calculating machine mutate into a drawing machine, did not affect me as deeply, as I now feel, my friend experienced it. Independent of each other we saw moments of history when a new medium was born.

9 Heidi Schelhowe's doctoral thesis (Schelhowe 1997) is about the inherent metamorphoses of the computer from machine and automaton to medium.

Figure 5. Georg Nees, *Achtecke*, 1965. ©Georg Nees

Closed polygons of 8 vertices placed into a regular grid. The random variation of placing the vertices inside a small drawing area demonstrates a wild variety of simple shapes. The white areas are a later additional effect in this rendition. The original drawing only shows the black lines of the polygons on white ground.

Of course, history does not happen in the form of isolated moments. History is much more floating than jumping from one state to the next. Separate moments may make great memories for individuals involved in the happening. But we can safely assume that there have always been other persons who have lived through similar kinds of awesome events, a moment or two before, somewhere in the world. Their action, their reaction, all of them collected together as a joint experience, make up the historic moment, collapsing into the very date that may one later day be identified as the beginning of something new.

There were others in the United States who were lucky enough to do their work in environments where the first drawing machines were put to use (in the USA, they are called "plotters").[10] In Germany, the author started developing a basic graphics package for the Graphomat Z64 in 1963.

10 The idea of graphic output devices originates in the mid-1950s. In Germany, Konrad Zuse is reported to have begun such work in 1956. In the USA, such devices or usually called plotters or flatbed plotters, resp. (Hewlett Packard, CalComp, Texas Instruments, and others were manufacturers.) Flatbed plotters can use any kind of (high-quality) paper. Plotters were always slow because of their mechanical operation. They could use professional drawing pens and inks. Plotter drawing is based on vectors. They almost disappeared when large-size raster printers (and, thus, the digital principle) became available.

Our point here is the subtle shift from routine engineering work to artistic creation. None of the early drawing devices was intended and constructed with anything else in mind but outputting results of engineering, or business-type, calculations not only in numerical form, but also (and more appealingly) as drawings of statistical analyses or constructions of machine parts, electric circuits, architectural plans or other engineering designs. The visual-iconic output (instead of the numeric-symbolic output) was almost a side-product only of common engineering work than a drawing whose purpose was the visual appearance of drawing itself and nothing else. To some degree in contrast to engineering, the visual appearance is to the heart of artistic thinking.

Georg Nees' fantastic *ur*-experience must be understood against such a background. The early existence of computer-aided drawings does not devaluate the shiver and foresight caused in Georg Nees' mind by the appearance of a first artistic drawing here, in the Computing Centre of the Siemens Company, some day in 1964. What he, the mathematician, had been experiencing would soon shake the world of art. To be more modest: a small part of that world. But eventually, it came to deeply influence culture, to revolutionize the world of image production and much of our daily perception and, thus, of aesthetics.

In order to make all that happen, Nees had to write software that generates punched paper-tapes that were to control the movements of the Graphomat's ink pens mounted into a container controlled by the xy-movements of the drawing machine. In a way, Nees was watching his "ideas becoming a machine that makes the art." Nees' action was three years before conceptual artist Sol LeWitt (in 1967) would formulate as one of his famous *Paragraphs on Conceptual Art* exactly this insight about the relation between idea, machine and work: "The idea becomes a machine that makes the art." (LeWitt 1967). But here, at the Siemens Computing Centre in 1964, exactly this happened: the drawing machine generated an image that had before existed in form of a human idea. A mathematician had done in his actual practice what an artist would describe in form of words three years hence. The two persons, Georg Nees and Sol LeWitt, did not know anything of each other.

Harold Cohen

Las Vegas was famous, and perhaps still is, for gambling, nudity and other ways of getting rid of your money. Oddly enough, such places also attract scientific conferences. There may be hidden relations and similarities between such diverse activities of culture. Why not think of science and erotics as two kinds of exhibitionism? In either case, you must be willing to freely present something of yourself: your body, your money, your work.

The 1965 Fall Joint Computer Conference (FJCC, 30 November – 1 December) took place in Las Vegas. As was frequent practice at that time, industry displayed their most recent developments and relevant books were announced. But this year, an extra show presented earliest works of computer art by A. Michael Noll from Bell Laboratories (drawings of digital origin) and Maughan S. Mason (analog origin). In April of the same year, Noll's drawings had been exhibited at the avant-garde Howard Wise Gallery in New York City[11].

The New York and Las Vegas events built a remarkable manifestation of newly emerging experiments in using computers and programs for generating aesthetic objects (to avoid the term "art"). At Howard Wise in New York: the art scene gets a chance to take notice. At the FJCC in Las Vegas: technology and science are becoming aware of this. Two different sites, two different audiences, but the same kind of objects: drawings of artistic quality but constructed by technological processes. The bridge between art and science takes on real form, when just one person is applying mathematical and engineering skills intending to generate aesthetic sensation (cf. Schmidgen 2017: 7).

Hardly anybody was taking much notice of the seemingly sudden break by high technology into the world of art. But the fact that Noll presented his works to an art-oriented audience of high rank at the avant-garde gallery, and a bit later again to the international audience of a large scientific and engineering conference, may be interpreted as a new kind of double event. Do those works constitute a new kind of aesthetic reality? In all likelihood, such questions were probably not discussed at the two events. However, the fact that engineers and mathematicians were making public artistic statements was discussed (at times with arrogant undertones by artists or art critics).

We will see later that, in fact, the works on display in New York City and Las Vegas constituted a new kind of aesthetic reality, a reality that is meanwhile dominating large parts of artistic manifestations.[12] At the

11 Howard Wise ran his New York Gallery from 1960 to 1971. He mainly specialized in kinetic, light, and video art. His gallery was considered leading avant-garde. Noll's works appeared together with studies on perception by Bela Julesz.

12 Another double presentation was happening in West Germany. Frieder Nake and Nees exhibited their algorithmic art from 5 to 26 November 1965 at Galerie Wendelin Niedlich in Stuttgart; shortly after, Nake was responsible for the visual works of a show at the

times of the actual events, they were puzzling, creating a weird kind of discussion and attention, but no real understanding of what was actually happening. Some time had to go by before the public was ready to realize the enormous impact that algorithmic techniques could bring to image generation.

Six years later, the 1971 FJCC returned to Las Vegas. With it came a show entitled "A computer-controlled drawing machine". That's what you may find on records of some of the galleries that have later exhibited Harold Cohen's work. At least one of them claimed, Cohen had a solo show in Las Vegas. Others may have copied this.

Experience has told us that what a commercial gallery writes is not often altogether trustworthy. It is true that the FJCC in 1971 took place in Las Vegas from 16 to 18 November. It is also a fact that the industry there showed their products (AFIPS 1971). The name "Harold Cohen" is not mentioned in the proceedings. However, the computer company Tektronix is listed among the exhibitors. Cohen's first drawing machine was controlled by a Tektronix computer. He presented the hardware as part of his 1972 exhibition at the Los Angeles County Museum of Art (LACMA). In a lecture given on 23 September 1980 (Cohen 1980), he shows slides of the 1972 event. There we see the arrangement of the Tektronix plus drawing machine and he explicitly refers to it. It is not impossible that Cohen had been given a chance, at the 1971 FJCC already, to show and, perhaps, even demonstrate his drawing machine.[13]

In fact, it would be marvellous if this were the case. For, if it were, we would have a second case of one person turning himself into the bridge between science/technology and art. This case would be different, more advanced and more convincing than the first experiments in the mid-1960s.

For now it would be an established artist of international renown, who built the drawing machine himself and who would soon start into a long-lasting process of software development that is unparalleled up to this day. I am referring to Cohen's system AARON that he started to construct in 1973 and continued in ever new steps until the end of his life (2016). A unique career of an artist who occasionally turned himself into an engineer without ever lowering his artistic goals and intentions.

Deutsches Rechenzentrum in Darmstadt from 15 Jan to 15 Feb 1966, also presenting computer-generated poems and music, the first of its kind, and again, an explicit approach to the two cultures, the artistic-literary and the scientific-engineering cultures (Snow 1959).

13 Tom Machnik suspects a Data General NOVA 1200 drove Cohen's first drawing machine and a PDP-8 drove the Tektronix Graphic Terminal.

Figure 6. Harold Cohen, *Early work by AARON*, 1974, hand coloured by H. Cohen . © Harold Cohen

In Fig. 6, we see a very early drawing done by the system AARON. AARON is based on rules of the type if <condition> then <action>. Here, <condition> stands for a logical expression that can be "true" or "false". If it is true, then the <action> is executed. Otherwise, nothing is done. The early version of AARON contained rules that would allow finding some empty area on the "canvas", and would put the outline of some closed form into such a space. As we can see, such closed forms may be connected to another one, even several of them. Cohen did the colouring himself, after the plotter had done its job in drawing the shapes. Cohen's interest has always been colour. He took the liberty of adding this decisive component to the image (Fig. 6), which then owes its appearance to a collaboration of human and machine.

Harold Cohen had moved to San Diego, CA, from London, UK, in 1968. Under the Californian sun, first hesitatingly, he became interested in computing. As for anybody else in the early times of algorithmic art, this meant to him to learn how to program. Nobody—and certainly not Harold Cohen—wanted to pass on to some programmer the activity of describing to the machine what it was supposed to do. If there are exceptions to this unwritten rule or mode of conduct, the resulting images would most likely suffer in aesthetic quality or some other feature.

Why would this be so? The answer is quite simple. The act of creation was transformed and the final steps of materialization were moved away from the acting artist in quite a dramatic manner. He or she found herself in the programming lab rather than the painting studio. In the programming lab, the emerging work was first to be transformed into its own description. Before any visual aspect of the work became visible, it was necessary to describe in symbolic terms how the machine should generate the work. In a way, we may accept the description as a different form of the work itself. The "program" is, of course, the instrument to generate the work. But in some (perhaps twisted) way it is the work itself.

The program without which nothing was going to happen was to be the precise description of the work. However, it was not the description of the *one and only* work. The artist was not thinking of the single and unique work she had been sketching and painting and constructing and designing and correcting and changing or, finally, throwing away in half-despair—all those struggles with the canvas and the paints and the lines and the other materials had vanished. These struggles were fights of the artist against the canvas and all the other materials that played a role in expressing whatever the artist wanted to show and, thereby, tell. The canvas disappeared almost, stepping back behind the description of the generative procedure. A transition took place away from focussing on material to concentrating on semiotic processes.

Canvas and other materials, as material, always have the power of resistance. Material does not want to be forced into certain forms pleasing the artist's will. Materials have their own strong will, a will of resistance, of keeping the form they had before the artist starts playing god in following her or his incessant formative will.

With the advent of the computer—i.e. with the program that is needed to force the computer into doing what the human wants it to do—the individual painting or graphic work started to disappear. The individual image can no longer claim the focus of all interest. To write a program or to design an algorithm, in other words: to accurately describe in unforgiving rigor to the machine what it is supposed to do under all circumstances—such a task makes sense only if, what you describe, is an entire class (or set) of images.

As an artist, who decides to develop software to control the operations of a computer, you *think* the image, you *don't make* it. For, the making has now become the computer's task in this relation. Such thinking almost immediately takes you to not think *one* image only, but many. Your thinking leads you to think infinitely many images. Step by step, you put into abstract form more of the concrete individual decisions you would have to take when you force your materials into the form you want to achieve. In other words, everything that can be different in the resulting image becomes a *parameter*. Parameters are allowed to vary and take on concrete values from their associated and given sets of permitted values. The list of parameters defines the degree of arbitrariness, the potentialities the program allows for. This parameter list represents the cardinality of the new type of work. The individual work takes on the status of an instance only of the class it belongs to.

Always already infinities! That's the new ontology of the work of art in times of the generative principle. Only series of works, no individual pieces anymore![14] In particular, no more masterpieces! These are the horizons against which the algorithmic artist develops his or her skills and capabilities: Precision of utmost degree in order to allow the machine to freely fill in the gaps. Accidental surprise within great precision, this seems to be the new aesthetics. It's a jazzy aesthetics: Improvisation framed by computability! Imaging finally reaches the level where music has been for, perhaps, a century already. Thinking the image corresponds to improvising the jazz tune. The latter happens as performance in the dimension of time. Thinking the image aims at the dimension of space. But the image now wants to move. Therefore, thinking the image amounts to thinking the dynamic image. Describing it (the creative act) becomes an act of choreography.

These considerations have taken us far away from Harold Cohen in Las Vegas at the 1971 FJCC. So let us return!

Nees, Cohen, media

The subtitle of this essay promised I would "re:trace the origins of digital media." However, I have given my versions of a few stories and developments of the early history of algorithmic art, by the time mainly called "computer art." Between the lines, the reader may have discovered indications of what would, at some later time, be called "digital media." It seems

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14 Even though, we still want to have and see the individual piece. We can *perceive* only the concrete piece, the representative of its class. The class, we can never perceive. Art in algorithmic times seems to lose its major attraction. It gets reduced to concept, away from percept. This observation may be irritating to some of us. But we don't lose the joy of sensual perception; we gain the joy of algorithmic thinking. It is about abstract concept where perception is about concrete percept.

about time that we get to the announced topic. What are origins of "digital media?"

Computers are machines. They are in line with, and continue, the development of machines that govern the era of industrialization: machines of great variety that transform matter and energy into new forms of matter. The societal purpose of the industrial machine is essentially to enhance and expand productivity of manual labour. During the epoch of big industry, *mental labour* still remains with the workers. But by the end of the 19th century, Taylor's *Scientific Management* starts to rigorously investigate the organization of work itself (Taylor 1911). Mental components of work are gradually identified and treated in separation in order to further increase productivity of human labour and of machinic[15] production under the regime of capital.

From this process, mental labour emerged as a special occupation of industrialized labour, and even if the actual action of an individual worker appeared mainly to be of manual character, he could—seen from the purpose of his work—be an element of the totality of mental labour in a given industrial enterprise. It is obvious that a separation of manual from mental labour does not exist in practice. But the organization of labour can, under certain conditions, enforce such separation. Historically, it is an aspect of the alienation of the worker from his work under capitalist economy.

From then on (and this state is reached early in the 20th century with the conveyor belt and the organization of labour that it stands for), mental work itself becomes subject matter of rationalization. The *machinization*[16] of all labour does not stop before mental labour. A bit before the middle of the 20th century, the computer appears as the fantastic machinery to rationalize mental labour, and control all aspects of society that can be described by use of data. The computer's original and fundamental *raison d'être* is, very simply, the machinization of mental labour.

But then the most peculiar character of the computer not just as a machine in general (that it is and remains) but as the *semiotic* machine in particular, leads to unexpected qualifications and determinations of that

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15 The term "machinic" – even though not very common – stands for "done by a machine" or "like a machine".

16 We here use the unusual expression "machinization" (and not, e.g., "mechanization") because the computer (as the instrument of the transformation of mental labor into machinic operation), is not a mechanic machine. It is correctly to be called the "semiotic machine". (Nadin 2007)

machine. The machine computer turns out to be viewed as if it were a *tool*, first, and soon later also as if it were a *medium*.[17] How come?

The view of the computer as a tool becomes necessary when it takes the gigantic jump from being an investment good to becoming a commodity for everybody. This happens around 1980 and a bit before. The PC appears, the “Personal Computer.” Its name already announces that it is owned and used by individual persons. In this transition, the appearance of the Apple Macintosh in 1984 plays an important role in many ways. It was prepared by Alan Kay and his Learning Research Group at Xerox Palo Alto Research Center (PARC) during the 1970s.

This tremendously innovative group invented all the technological components and the metaphorical rhetoric that have led to the ubiquitous human-computer interface and to interaction design that we all became familiar with in daily practice. We all like it, use it and have inhaled it so that, with certain modifications, everyone can now use any computer for a lot of everyday operations. The surface of a computer has become a graphical interface which is a rich and growing collection of small images (“icons” as they are often wrongly called) that grant access to enormously powerful software. It, in turn, uses icons to get at the plethora of operations (“tools,” again) made available by the software.

As with all other (hardware) tools there is a bit of expertise that must be acquired if we want to use the tools. But in relation to the horrendously complex functions available for us, the learning effort is modest.

Only ten years after the first Macintosh, the World Wide Web and, with it, the Internet, had its breakthrough (in 1994). It occurred when the first graphical browsers appeared (Mosaic was one of them and the most successful). Now it became possible that the growing number of users of PCs could easily access all the greatly heralded goodies of the Internet. The powerful machine on everybody's desk at home and, often, also at work, now was to be used as if it were a tool and as the access device to the mega-machine of the Internet. It gained media-character in many ways.

Air is the natural medium that makes possible life of those animals and plants occupying the crust of the earth and the space above it; water is the

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17 It is an interesting coincidence that A. Michael Noll, one of the earliest pioneers of "computer art", in an article of 1967, calls the computer at the same time a "medium" and a "tool" (Noll 1967). Here are two quotes from the beginning of his paper: "This article explores the possibilities of the computer as an artistic *medium* ...". And: "In the computer, man has created not just an inanimate *tool* but also an intellectual and active creative partner ..." (my emphasis). Even the "partner" appears here that has since been dropped but seems to be re-emerging just now as Artificial Intelligence is tooted again.

natural medium of those living in it. Natural media are ubiquitous, and noticed only when missing. Technical media are never unnoticed to the same degree. But they may get close to it. Current digital media are approaching such a state of supporting life. The digital medium was born as an offspring of the semiotic *machine* when humans as individual beings discovered its *tool*-like character, and, as social beings, they also discovered its *media* qualities.

I needed this summarizing view of the semiotic machine as tool and medium in order to now get back to our two heroes, Georg Nees and Harold Cohen. Our visual perception and visual senses (and, to a lesser degree, the auditory senses also) played a decisive role in the creation of the tool-perspective of the computer. Visual perception (combined with symbolic understanding) also played the decisive role when the computer as a calculating machine was transformed into the access device to a ubiquitous medium. Because that medium is based on algorithmic operation and digital storage, it has become the medium of all media. All the media we know keep their specific aesthetic qualities. But transposed into digital code they seem to become accessible without break of medium. We pay for this with a loss of sensuality. But we seem to accept this loss for the sake of a homogenizing convenience in availability, accessibility and perceivability.

All that was in the most innocent way prepared when specialists like Georg Nees and Harold Cohen started to program the computer to generate images that they put up on the walls of galleries, thereby claiming, it was art. The innocent experiments by the mathematician turning to aesthetics, and by the artist turning to algorithmics turned out to prepare for a cultural revolution of such enormous impact that we even nowadays struggle to fathom the floods that were created.

It is purely a coincidence, but it is true that, in hindsight, these two sorts of experts had to move at almost the same time: the mathematician and the artist. Both had to leave their professional homelands and intrude the other's land: It is between, and in, both algorithmics and aesthetics that digital media appear.

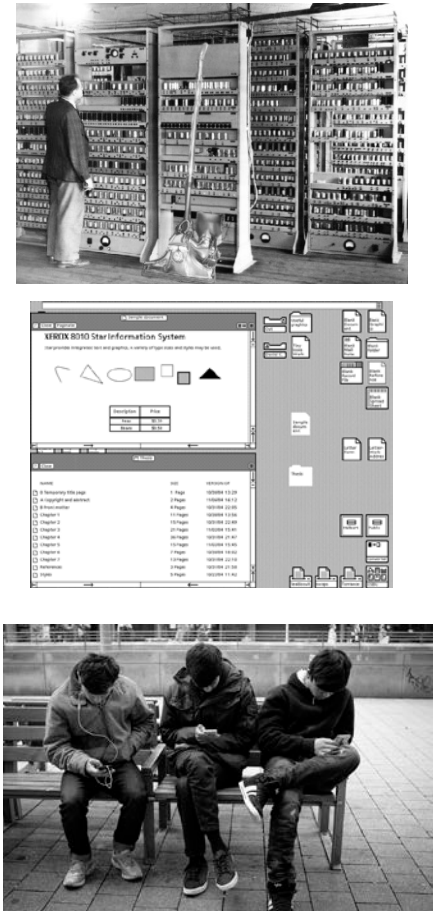

Figure 7. Three levels of computer development.

Mainframe computer: machine (late 1940s); Personal computer: tool(mid 1980s); Hidden computer: media device.

The medium was the message

Marshall McLuhan's famous, then forgotten and only recently revived publication *Understanding media* (1964) may be read as a book to propagate one short slogan: "The medium is the message." The book's main title announces that reading it may help the reader understand what media are. If we additionally observe the subtitle, we learn what media are: "Extensions of man." And the heading of chapter one then offers the slogan, "The medium is the message." More you don't need to read.

Even though the work thus appears as a hard to top masterpiece in brevity of its content, let us still read the first sentence!

> In a culture like ours, long accustomed to splitting and dividing all things as a means of control, it is sometimes a bit of a shock to be

> reminded that, in operational and practical fact, the medium is the message. (McLuhan 1964: 23)

Each extension of ourselves—which amounts to "any new technology"—results in a "new scale that is introduced into our affairs" (ibid.: 23). Other authors (e.g. German anthropologist and sociologist Arnold Gehlen) derive from their observations that the human being lacks many preconditions necessary for survival and, therefore, the necessity for technology exists.

But McLuhan's interest is simpler. He studies technology as medium at a time in human history when the media of radio and television and the light bulb exist, among many more. The light bulb is the first example of a medium he studies: "The electric light is pure information. It is a medium without a message ...” (ibid.). So the example serves him well for the slogan that the medium is itself the message. More traditional authors might claim that a medium is used to transport a message from one location or actor to another location or actor. McLuhan's claim, however, is that "the 'content' of any medium is always another medium." As if media where a never ending self-perpetuating medium.

An old medium as content of a new one, according to McLuhan, is so for any medium irrespective of time and space: The content of the medium of writing is the older medium of speech, and the written word becomes the content of a new medium, print. The development of media follows a path from the naturally given to more and more refined technical media. But as this happens (and in our times, it happens at an accelerating pace), the new medium itself takes on the role of the content. The content gradually seems to evaporate, lose interest, become unimportant. Communication for the sake of communication. That's our time, isn't it?

Where ever you go, you must hold in your hand a smartphone in order to be ready immediately to answer any incoming signal. But more: You hold the physical gadget in your hand to signal that there is that gadget and it is yours. You are, perhaps, on your way to meet some friends of yours, and when you meet, you all stand in a circle or row demonstrating to the others that you are online. Is this then the message, the one and only message, permanently sent around?

Georg Nees and Harold Cohen had to describe in algorithmic form the schema that would be capable of generating a drawing. They then had to trigger a computer that was supposed to execute the algorithmic description. The execution resulted in a drawing that before did not exist. However, it was in some way contained in the space of possibilities the algorithmic description stood for.

That very description, as a description, was a medium. A medium of a high level of technological existence. It had to be sent to the computer which, thereby, was used as a simple storage medium. The act of "starting" the computer (triggering it) was interesting: The storage medium was turned into an operating machine. The machine was taking the stored description (insofar as an object), read it and interpret it. The act of interpreting the description meant that the computer (under the control of its operating system) would turn itself into a special-purpose computer generating a drawing which was, of course, another medium whose content were lines and marks on paper.

The human looking at the lines and marks that were generated in this intricate way by a process of several levels of media becoming their own content which again became a medium etc., this human visitor would save her disturbed mind from insanity by saying: Okay, an abstract drawing, geometric at best; I see squares and circles and also fancy lines.

Harold Cohen, however, developed AARON to a point where it could generate foliage and human figures stepping out of the jungle. Having reached this level of expertise, AARON was made to draw men and women in their homes with flowers on the table. They did not look photorealistic, as did the images by some other artists at the same time in the 1990s. But Cohen's images were clearly representing something we all would immediately recognize as woman and man and vase with flowers. So now, under Cohen's mind and hands, the medium re-gained content. Georg Nees did not follow this line.[18] What happened?

Harold Cohen had manoeuvred himself into a dead end. He wanted visitors to recognize what the black lines and coloured marks stood for. This had been his goal when he started his fantastic tour of developing AARON. His goal was to answer the question: What does it take as minimal conditions for an arrangement of graphic marks to be recognized as a figure? This was his problem of representation.

In the forty years of his unique journey, he had solved the problem. He had solved it in a fantastic way with many extra results along the tour.[19] But now he realized that the audience was more interested in watching the machine paint then in the image it painted. The medium had become

18 A bit later, Nees did turn to the figurative, islands, and landscapes, and persons. He was then doing image processing.

19 As his constructions of drawing and painting machines, solutions to algorithmic issues of shape and, to some extent, also of color.

the message even though the audience had no problem recognizing the contents of the images.

We might be inclined to judge as tragedy this recognition of Harold Cohen's at the end of the 2000s. But Cohen would not be Cohen if this would be his conclusion. He pushed to the side the large set of rules he had come up with and started anew all over! He quite easily found an algorithmic solution to the problem of lines he wanted to see and continue to work with. He also recognized that the colouring problem was algorithmically hard, if not untraceable because of its subjective implications. He now let the computer generate arrangements of lines in fantastic forms. They were projected onto a huge touch-screen. He himself interactively selected colours from a smaller display unit which then almost miraculously became the paint at his finger's tip to do finger-painting digitally, in the 21st century! The black lines became his inspiration for the choice of colours and the way of placing them onto the "canvas". *Conversations with my other self*, Cohen called his last exhibition. The medium no longer was the message.

Acknowledgement

I want very much to thank Tom Machnik, Harold Cohen's assistant of many years. He helped me greatly and made me aware of how difficult it is to write in a second language.

References

AFIPS. 1971. “Proceedings of the 1971 Fall Joint Computer Conference”. In *AFIPS Conference Proc.*, Las Vegas, Nov 1971. Vol. 39, pp.16-18.

Bense, Max. 1965. “Projekte generativer Aesthetik.” In *rot 19*, Stuttgart: Elisabeth Walther private publication, pp. 184-199.

Chomsky, Noam. 1956. “Three models for the description of language.” In *Information Theory* 2/3, pp. 113-124.

Cohen, Harold. 1980. *The program and art behind the museum's murals*. Lecture Sept. 23, 1980. www.youtube.com/watch?v=U1DbaUATNtY&index=1&list=PLAl91JHaOGs3766Kx8R58G7h4NIbp4MFh .

Debord, Guy. 1970[1967]. *The society of the spectacle*. London: Black&Red.

Knuth, Donald E. 1968. *The art of computer programming*. Vol. 1: Fundamental algorithms. Reading, MA: Addison-Wesley.

LeWitt, Sol. 1967. “Paragraphs on concepual art.” In *Artforum* International, Vol. 10, pp. 79-83.

Lunenfeld, Peter. 2001. *The digital dialectic*. Cambridge, MA: MIT Press

McLuhan, Marshall. 1964. *Understanding media. The extensions of man*. New York: McGraw-Hill.

Nadin, Mihai. 2007. “Semiotic machine.” In *The Public Journal of Semiotics* 1/1, pp. 85-114.

Nake, Frieder. 1992. “Informatik und die Maschinisierung von Kopfarbeit.” In Wolfgang Coy et al. (eds.): *Sichtweisen der Informatik*. Braunschweig: Vieweg, pp. 181-201.

Noll, A. Michael. 1967. “The digital computer as a creative medium.” In *IEEE Spectrum* 4/10, pp. 89-95.

Noll, A. Michael. 2014. *First hand. Early digital art at Bell Telephone Laboratories*, Inc. ethw.org/First-Hand:Early_Digital_Art_At_Bell_Telephone_Laboratories,_Inc .

Reichardt, Jasia (ed.). 1968. *Cybernetic Serendipity. The computer and the arts*. Special issue of studio international, London. Reprinted in 2018.

Schelhowe, Heidi. 1997. *Das Medium aus der Maschine. Zur Metamorphose des Computers*. Frankfurt: Campus.

Schmidgen, Henning. 2017. *Forschungsmaschinen. Experimente zwischen Wissenschaft und Kunst*. Berlin: Matthes & Seitz.

Snow, Charles P. 1959. *The two cultures and the scientific revolution*. London: Cambridge University Press. Reprinted in 2001.

Taylor, Frederick W. 1911. *The principles of scientific management*. New York: Harper and Brothers.

Shifts in the Photographic Paradigm through Digitality & the Aesthetics of Noise

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Abstract

This paper traces the author's early digital media projects from the mid-1980s to the present that are based on computer processing and the integration of noise as an aesthetic element in the author's evolving digital photographic projects. Building on his background in photography, the projects explore the relationship of noise-to-signal and the influence of Claude Shannon's Information theory in the author's work.

Keywords

Computer processing, noise, aesthetics, digital photography, information theory

From analog to digital

The Langlois Foundation for the Arts, Science, and Technology published online in 2006 a CD-ROM realized by the author as the catalogue for his solo exhibition at the National Gallery of Canada in 1997. Titled *George Legrady: From Analogue to Digital* (Fig. 1), the exhibition and CD-ROM traced the transition, over a twenty-year period, of the author's work from analog to digital processes in photographic representation and practice to interactive media.

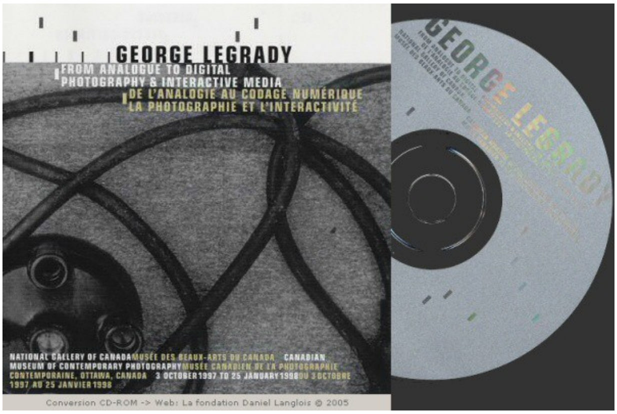


Figure 1. George Legrady, *From Analogue to Digital: Photography and Interactive Media*, 1997, CD-ROM. ©George Legrady

The first digital works created in the mid to late 1980s focused on the deconstruction of the pixel-based photograph through the exploration of noise as an aesthetic element in the creation of still images. The subject of noise became a means to understand the power of image processing and the critical issues of how computation may impact on representation and belief, given that the digital photograph became so easily manipulable at the pixel level in comparison to the chemical-based image. The digital still images I produced at that time required the acquisition of computational programming skills, a new form of artistic practice, exciting in its capabilities to precisely define procedures, to layer sequence of processes and to undo as needed without damage to the original. Creating images through computer code was a major discovery as it seemed a natural next step to someone coming out of a photographic background, where the exploration shifted from recording images through an optical-mechanical device to constructing images through staging in front of the camera, and then the manipulation through post-production assembly. A bonus procedural component consisted of the world-transforming “undo” button which allowed for correction, and infinite reconstructing through the re-compiling of code.

I became aware that aesthetic decision-making procedures could be formulated in terms of a sequence of logical conditional statements not unlike rules of language.

Figure 2. George Legrady, Studio with Targa System, Los Angeles, 1988. ©George Legrady

The process had a familiarity that I immediately connected to precedents in the sequential and modular artworks of Sol LeWitt and the syllogistic propositions of Lawrence Weiner, Doug Huebler, Joseph Kosuth and others associated with conceptual art. My engagement with image processing by which to transform the digital image through mathematical procedures defined in computer code seemed to me an esoteric practice until I came across two resources from the engineering field that created contextual framework. Claude Shannon's *Theory of Information* (1949) provided the conceptual framework by which to make sense of signal in relation to noise, opening the way to powerful metaphors and aesthetic visual narratives. An ingenious publication titled *Beyond Photography* (Holzmann 1988) published at Bell Labs by Gerard Holzmann and some of the Unix team, offered numerous examples with mathematical formulas to transform images that pushed my skillsets up an extra notch.[1] Resource and references were limited but I discovered articles in *Byte Magazine*, Clifford Pickover's articles such as "From Noise comes Beauty" (1988) and other earlier Bell Labs works such as Bela Julesz and Leon Harmon's "Recognition of Faces" (Harmon 1973) published in *Scientific American*.

1 http://spinroot.com/pico/front.pdf.

Figure 3. George Legrady, *Syringe, 64% Value Free*, 1988, digital media, custom software. ©George Legrady

Transitioning to digital: Truevision Targa System (1986)

In contrast to the field of electronic music composition the exploration and use of noise in the visual field had a late start, to a great degree constrained by the limited development of display screens and image capture boards which only entered the market in the mid-1980s. Prior to that, standard computer displays could only deliver up to 16 colours and without tonal variations.

Having learned programming in the studio of the painter Harold Cohen in 1981,[2] I had to wait until 1986 to gain access to hardware technology that allowed for capturing, digitizing and transforming of multiple tone-scaled digital images. A University of Southern California Innovative Research Grant and an IBM Project Socrates grant in 1986 provided the funding for an early, affordable digital imaging system, the Truevision Targa 16 graphics system (Fig. 2) by which images could be digitized and reworked through computer code.[3]

2 www.aaronshome.com/aaron/index.html.
3 https://en.wikipedia.org/wiki/Truevision_TGA.

Figures 4 & 5. George Legrady, *Beneath the Surface, Scratching the Surface*, 1988, digital media, custom software. ©George Legrady

Early projects (1987–1991)

The still-image experiments that I first engaged in on the Targa system, explored the processing of images from the perspective of removing information, or augmenting visual noise. These were featured in a number of ground breaking venues. They include a solo show *From Noise to Signal* at the USC Atelier Gallery at the Santa Monica Mall in 1987,[4] and inclusion in a number of influential ex-

4 http://articles.latimes.com/1987-07-05/entertainment/ca-2234_1_george-legrady.

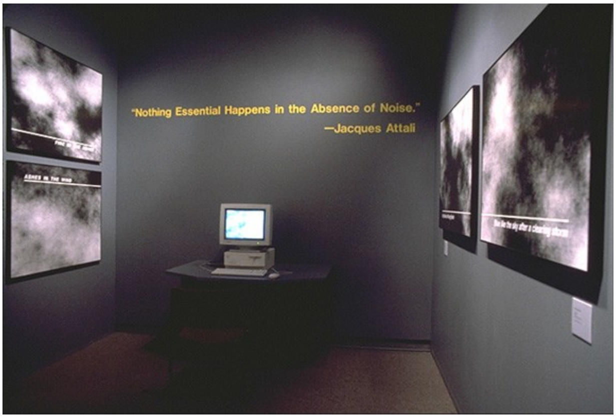
hibitions such as *The Photography of Invention* at the National Museum of American Art (1987) (Smith 1989), D*igital Photography: Captured Images, Volatile Memory, New Montage* (Gillett and /Pomeroy 1988: 19) at SF Camerawork (1988), and an exhibition curated by artist Jim Pomeroy, considered to be the first exhibition addressing the intersection of digital photography in relation to cultural critique. In 1988, my artwork *News Beirut* received an honourable mention at Ars Electronica (Weibel/Hattinger 1988).

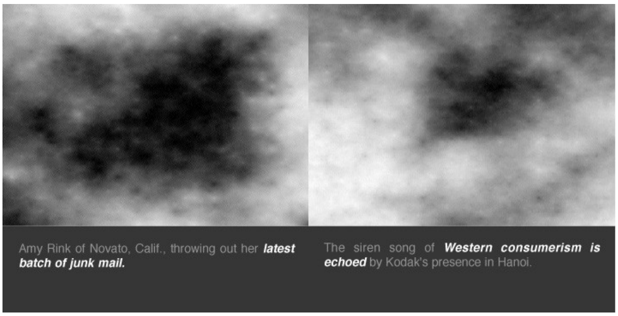
The challenges and conceptual questions discovered through the process of investigating the potential of digital transformation in relation to the social impact at both the production and reception level were brought into focus in a paper “Image, Language, and Belief in Synthesis” presented at the College Art Association and later published in the *CAA Art Journal* (Legrady 2014) and in *Critical Issues in Electronic Media* edited by Simon Penny (Penny 1995).

Digital noise, algorithms & interactivity

The introduction of hardware and software in 1992 such as QuickTime and Macromedia Director’s lingo’s scripting language, by which to introduce time-based interactivity for broad multimedia resources from image to text, documents, movies and sound, pushed my projects toward cultural narrative and interactive digital media installations. Nonetheless, the topic of visualization and noise has re-occurred on a regular basis.

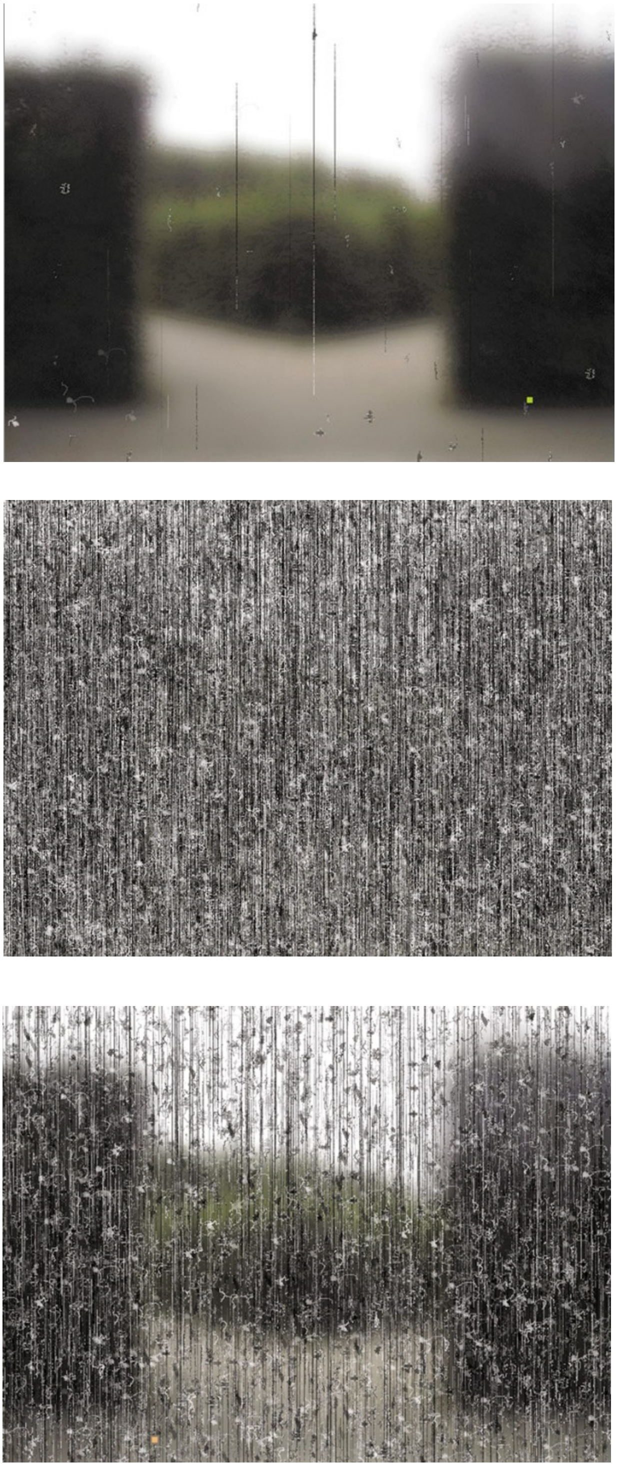
Equivalents II (1992, Figs. 6-7) exhibited in the *Iterations* exhibition curated by Tim Druckrey at the International Centre of Photography (1994) eventually followed to travel in multiple venues in the Siemens-sponsored *Photography After Photography* exhibition curated by photography historian Hubertus von Amelunxen. The installation consisted of a computer into which the public would type a phrase and the software generated a cloud image using a two-dimensional fractal algorithm. At the end of the image creation, the program would bring up all other phrases that had similar words in them. The title referred to the Twentieth-century photographer’s Alfred Stieglitz’s work realized in the 1920s of creating intentionally abstract photographs of clouds which he described as forms not of the world but of the photographer’s state of mind. *Transitional Spaces* commissioned for the opening of the new Siemens Headquarters in Munich in 1999 consisted of three motion-tracking projections. *Garden Entrance* was positioned at the transit security gates separating the public exhibition space from private offices. A blurred image of a garden began to oscillate when an individual approached the gate. As the individual continued their movement towards the gate, the image became more focused becoming recognizable as the entrance to a garden (Figs. 8-10).





Figures 6 &, 7. George Legrady, *Equivalents II*, 1992, George Legrady, digital media, custom software, works on paper., Installation at the International Center for Photography, NYC. ©George Legrady

When an individual would stop, the image would be covered with visual noise reminiscent of film dust, rapidly building up to completely obliterate the image with the film dust noise. Any movement would erase the dust. Whenever an individual would walk through the turnstile from public to private or vice versa, the projection would then be replaced by the circular light beam of a night guardsman's flashlight.



Figures 8, 9 & 10. George Legrady, Garden Entrance, 1999, digital media, custom software, works on paper. ©George Legrady

Voice of Sisyphus (2011) realized in collaboration with spatial sound engineer Ryan McGee and composer Joshua Dickinson is an installation that is a time-based study of a single photograph, realized as a continuous performing audio-visual composition (Fig. 11). It is presented as a multimedia installation with a large cinematic projection and four-channel audio, specializing sounds by speakers positioned in each of the four corners of the exhibition room. The photographic image taken at a formal ball sometime in the past has been chosen for its emblematic quality of the theatricality of the image.

The composition unfolds as regions of the image are selected, filtered and transformed into audio waves which are then shaped through software. The artwork's distinctive feature is that the sound composition is created in real-time out of the analysis of visual regions in the photograph through the sampling of pixel clusters. The installation artwork began as an experiment to explore the potential of engineering processes such as image processing and frequency filtering to create visual noise implemented in real-time through custom software to result in a combined visual and sonic multimedia experience. This was then translated into an artwork which could operate on its own over time, continuously transforming the texture of a single black and white photograph (Figs. 12-14).

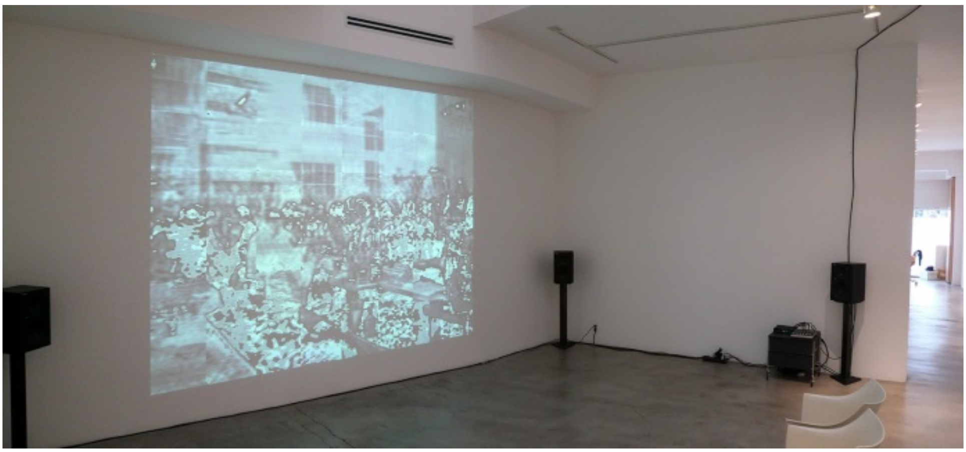


Figure 11. George Legrady, *Voice of Sisyphus,* 2011, digital media. Installation at Edward Cella Gallery, Los Angeles. ©George Legrady

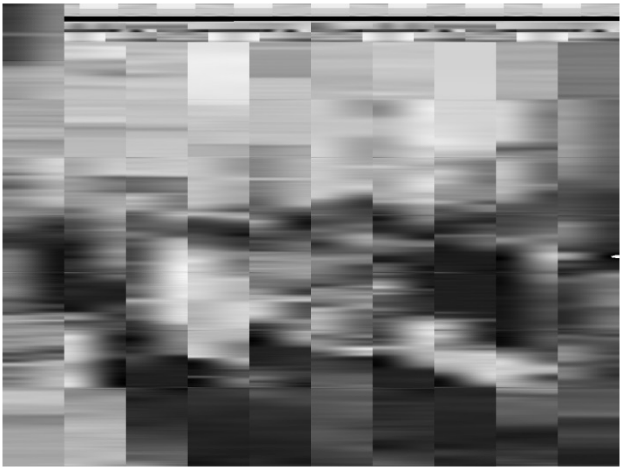


Figure 12, 13 & 14. George Legrady, Voice of Sisyphus, 2011. Animation screen shots, digital media, custom software. ©George Legrady

The translation of sampled data from an image to sound in the *Voice of Sisyphus*, and the transition from text to image in the *Equivalents II* both propose the potential of an aesthetic equivalence from one medium to another but such simulated synaesthetic modeling is significantly challenging as the perceptual experience of an image, sound and text cannot fully be transferred, either at the literal or metaphorical levels, through the movement of a set of digital data from one domain to the other.

The repetitive nature of the composition and sequences provided the title for this work, bringing to mind the Greek myth of king Sisyphus' dilemma, who was compelled to ceaselessly roll an immense boulder up a hill, only to watch it roll back down repeatedly.

Conclusion

In his clearly formulated book *Composing Electronic Music: A New Aesthetic* (2015), composer Curtis Roads draws on a rich history of contemporary electronic composition to highlight noise as one of the most vital compositional tools in the field of electronic music. He quotes the 19th nineteenth-century acoustic pioneer Hermann Helmholtz (1885) to define noise as "the sensation of noise due to non-periodic motions" (Roads 2015: 97.) In the digital image, noise may be assumed to be extraneous, unwanted, out of context, disruptive, positioning it as something to be purged to purify the quality of the image. The noisy image came to be discovered in parallel with the evolution of the age of the machine in the late nineteenth century, an integral component of the process by which technical devices functioned. Scratches on a film, dust on a negative, chemical stains and all such things that were in the way of the perfect image have been reconsidered for their aesthetic value, extending the complexity of how we decipher images.

References

Dubin, Zan. 1987. “George Legrady will be minding the store.” In LA Times, 05-07-1987, p. 289. http://articles.latimes.com/1987-07-05/entertainment/ca-2234_1_george-legrady .

Gillett, Marnie and Jim Pomeroy.1988. *Digital Photography : captured images, volatile memory, new montage*. San Francisco : SF Camerawork.

Harmon, L. D. 1973. “The Recognition of Faces.” In *Scientific American*, 229/5, pp. 71-82.

Holzmann, Gerard J. 1988. *Beyond Photography, The Digital Darkroom*. Upper Saddle River: Prentice Hall.

Legrady, George. (2014). “Image, Language, and Belief in Synthesis,” In *Art Journal*, 49/3, pp. 266-271.
DOI: 10.1080/00043249.1990.10792701.

Penny, Simon, (ed.). 1995. *Critical Issues in Electronic Media*. Albany, NY: State University of New York Press.

Pickover, Clifford. 1988. “From noise comes beauty: textures reminiscent of rug weavings and wood grains spring from simple formulas Computer Graphics World.” In *Computer Graphics World*, March 11/3, pp. 115- 116.

Roads, Curtis. 2015. *Composing Electronic Music: A New Aesthetic.*, Oxford: Oxford University Press.

Shannon, Claude and Warren Weaver. 1949. *The Mathematical Theory of Communication*. Champaign, IL: Univ of Illinois Press.

Smith, Joshua P. 1989. *Photography of Invention. American Pictures of the 1980s*. Cambridge, MA: MIT Press.

Weibel, Peter, and Gottfried Hattinger (eds).1988. *The Art of the Scene.* Ars Electronica Festival Catalogue. Linz: LIVA.

The Artistic Contribution of Electrographic Practices to the Archaeology of Electronic Art

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Abstract

Nowadays, it is almost a fact that electronic art and, therefore, media art was not born without inheritance. This research presents a return to the past through media archaeology as a methodological approach in order to study the role of artistic electrographic practices of (re)production, transmission and printing out of images as underground movements.

Our research assesses artistic practices such as Copy Art or Fax Art. The study analyses their historical development as essential part of (historical) media art. By suggesting a new analytical perspective, we aim at discussing and understanding phenomena, art paradigms or art forms that became visible in the analog and digital materiality of the photocopy and fax artworks.

For this purpose, the research is based on the original artistic documentary and bibliographic materials, as well as artistic collections held by the International Museum of Electrography (MIDE) in Cuenca (Spain) since its opening in 1990.

Keywords

Media Art Histories, Media Archaeology, Electrographic art, Copy Art, Xerography

Introduction

The 1960s is a unique period, not only in its political, social or economic significance, but as the decade when Media Art emerged. It was the year 1968 when social protests began to spread out at US universities' campuses through youth and feminist movements with liberating, anti-consumerist and independent ideas and demands. Those same movements spread throughout Europe and ended in the May 1968 events in France, among universities' students and staff, and the general population.

In that period and in that historical context, two automatic technologies of the image reached the market: the Personal Computer and Portapack video camera. In light of the 1960s countercultural movements, a group of pioneering and experimental artists began to investigate in a technology they found mostly by chance, as "found media" (McCray 1979:6), usually in universities, offices or copy shops. This technology was the photocopy machine, which became widespread with the commercial purpose of making copies in a more agile, fast, cheap and instantaneous way with the Xerox 914 model in 1959. This technology involved a genuine revolution at the artistic level, especially because of its instantaneous nature and multiplicity, both in functional process and in the materialization of the artworks (Fig. 1).

In the United States, pioneering artist Sonia Landy Sheridan got involved in the creation of posters for the democratic convention together with her students and discovered the photocopy machine as the perfect tool for the creation and distribution of this type of works as well as a creative tool. But she was not the only artist who found in the photocopy machine the potential to be an artistic medium,

> [...] In the early sixties, artists began to work with copy machines, whether located in offices or installed in public places. For these artists, copiers were truly 'found media', personal discoveries uncovered in setting not previously recognized as associated with art-making activities. (Shanken 2009: 206)

N'ima Leveton, an engraver from San Francisco, produced her first series of prints on a coin machine she found in a neighbourhood supermarket. In 1964, Barbara Smith rented a Xerox 914 photocopy machine that was installed in her dining room; it was usual for her family to eat while she was working with the machine. Artist Esta Nesbitt discovered the photo-

Figure 1. Lieve Prins creating one of her artworks with a model on the Canon Color NP photocopy machine. ©Artist´s personal collection, Amsterdam.

Figure 2. Jürgen O. Olbrich simulating the handkerchief registration process with the photocopy machine and surrounded by part of his works. ©Artist´s personal collection, Kassel.

copier at the Parsons School of Design, where she was a member of the faculty and, later, she continued the work within the machines at the company Xerox in Manhattan, organizing her schedule in relation to the sales demonstrations that the company made. In the Seventies, German artist Jürgen O. Olbrich discovered this machine in the office where he worked and made his first records of the used handkerchiefs that he kept in his pocket (Fig. 2). Similarly, Klaus Urbons and Amal Abdenour discovered the photocopier at their workplace, where they began to use it covertly. These are some examples among many others.

Although digital technologies were established in the 1980s, these analogue and electronic tools answered to new creative needs which reflected some of the changes that were taking place in economic, social and political fields and predicted many of Media Art's features. These three technologies and their artistic practices have been described as "underground experimental avant-gardes" or "alternatives" (Alcalá 2015: s/n), specifying their extremely experimental character and developed in parallel to the general art movements of the time. Moreover, in 1981, French artist Christian Rigal considered these three technologies, along with the Polaroid, as guilty of the great change in the artistic creation (Rigal 1981) and this idea was also defended by Frank Popper and Marie-Odile Briot at the large *Electra. L'électricité et l'électronique dans l'art au XXe siècle* exhibition in 1983. Two years after the publication by Rigal and also in France, this officially manifested the significance of these three technologies in the field of art and new technologies since the exhibition was divided into three central areas: electrography, computer and video.

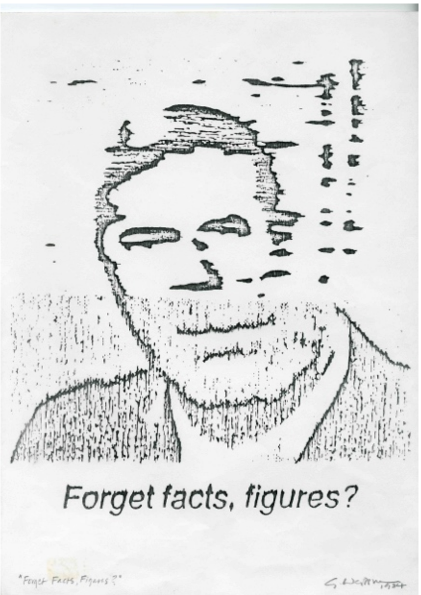

Figure 3. G. Weissmann, *Forget facts, figures?, 1984*, monochromatic xerography, 42 x 29,5 cm. ©MIDE Collection

Of these experimental techniques, especially those practices relating to the computer and the photocopy machine have been kept in different places, establishing their own spaces for exhibitions, workshops and even archives or collections. Following the words of Professor Kate Eichhorn,

> Although most researchers have spent a substantial amount of time using and fixing copy machines at some point in their career, few have considered the machine´s epistemological, aesthetic, political, and social impacts in their research. (2016: 8)

In the case of the photocopy machine as an originally electric and later digital technology, it had a number of technical and functional features as well as restrictions that made it unique for creative use by becoming its graphic language. But one of its significant art historical contributions, which at the same time made theorists not consider it as Historical Media Art, was the establishment of new parameters in art-making through a material production which would become the conceptual, aesthetic and discursive foundations of contemporary art.

When the photocopy machine made art

Historically, it was the US-American inventor Chester Floyd Carlson who patented the electrophotographic reproduction process after making his

Figure 4. MIDE team is assembling a photocopy machine's Interface Processor Unit. ©MIDE documentary archive

first electrographic copy in Astoria on 22 October 1938. That copy consisted of a text written with graphite pencil in which the date and place of the event was indicated: "10.-22.-38 Astoria." The result of his process was denominated Xerography, that is to say "dry writing", because it used dry electrostatic for copying documents. The first electrographic machine came on the market in 1950, but its process was manual until the Xerox 14 appeared in 1959.

As a technology linked to the market, it was marketed as a Xerox company product and distributed worldwide, where it came to be used artistically. The first artists who adopted this technology were mainly North Americans, who started a trend to create with this machine that led artists to explore all its possibilities. Since then, this technology was used by many artistic avant-gardes movements, such as Mail Art, Pop Art or Conceptual Art.

The machine became a "centre" which gathered many artists using it to go beyond the use of a simple artistic technique and turning it into an artistic movement. Known as *Copy Art*, it possessed a recognizable style with graphic characteristics influenced by the diverse countries where it was developed; and evolving with the progress of the technology itself.

Copy Art is a term that produces distortion in its artistic practices and a representation of a time period when artists, obsessed with highlighting the pioneering use of technology, decided to define their art by its new tool in order to emphasize that technological quality. The same happened with Polaroid (*Polaroid Art*), video (*Video Art*), or computer (*Computer Art*), as quoted by the Italian theorist Domenico Quaranta alluding to a commentary by the writer and curator Francesco Bonami, which summarizes the problem this way:

Figure 5. Marik Boudreau, *Untitled*, 1984, Monochromatic xerography, 33 x 20 cm. ©MIDE Collection

> [...] those who talk about computer art haven't a clue what they're talking about, and confuse the medium with the content, the idea, the result, mistaking the tool for the work of art. Art is not like Formula One, where the car counts more than the driver. (Quaranta 2013: 31-34)

Beginning in the 1960s, this fruitful artistic production lasted for more than 30 years and was extended through different geographic areas with the idea of exchange. All of these artistic-technical works established creative parameters that due to the mediality imposed by all electrographic production connect with the general parameters of contemporary Media Art: the relevance of the artistic process itself; the interest in the error which is directed to the current digital culture of Glitch Art, and its search as a form of originality; or the artist closer to a researcher who collaborates with scientists and technicians. In addition, the procedural interface appeared, which in the case of the photocopier is the glass where the light sweep took place in order to trap the objects and translate them into machine language. In this way, creative development ceases to be an undeniable path towards a final object, passing from the traditional "image-object" to the "image-process."

One of the most important potentialities and the radical change that Copy Art provoked deals with concepts of the original and the copy, uniqueness and multiplicity. This is where the greatest subversive power resides, which caused rejection by the market, critics and art historians. Although the photocopier was introduced to the market for copying documents, the artists used it to generate original artworks, where the act of photocopying deformed the academic approach of artistic creation. Many artists were attracted to use the degenerative technique that can be considered as a logic of reproduction which reproduces itself and ends up being a different reproduction. Artists created works with infinite self-generation which represents their own mechanism of reproduction. This can be observed in the artworks by Miguel Egaña, Marik Boudreau or Giorgio Nelva.

It should be clarified that the machine has an attribute as producer of multiples that transgresses the idea of uniqueness. This does not devalue the original, but transforms the market value of a work into a value of exhibition and dissemination. The latter produced a change in the dissemination mode of the electrographic work, since normally it did not —and still does not—occupy the space of a museum that maintains its traditional cult to the original and to the classic parameters of art. For this reason, this art form is located directly in private archives managed by independent collectors or the artists themselves.

Historical milestones in the context of media art

Artists linked to electrography have been relegated outside the general history of contemporary art, even though it spread internationally and the contributions influenced the main artistic contexts of what is considered as historical Media Art (Escribano 2017: 1039). For example, this technology was presented at the *XX. Biennale di Venezia* in 1970 by Italian artist and designer Bruno Munari. The Biennial changed its traditional curatorial strategy and set out to show an experimental approach to art, inviting artists who worked with new materials and technologies. In this Biennial, an Italian pavilion of *Ricerca e Progettazione. Proposte per una Esposizione Sperimental* was established, where a selection was included which showed the first experiments with computers, and which overlapped with the contributions of Bruno Munari. He installed the Rank Xerox in one of the rooms, called *Laboratorio per la Produzione Manuale e Meccanica*, so that the public could experiment with it. During this event, the Italian artist took the opportunity to present his publication *Xerografia. Documentazione sull'uso creativo delle macchine Rank Xer-*

Figure 6. General view of the exhibition *Interconnexions copigraphiques*, with the work *F.I.N.* by Alcalacanales, 1993. © José R. Alcalá´s personal collection, Valencia

ox, which was a kind of catalogue that worked as a recipe book on the potential applications of this technology.

The same happened at the *Software Information Technology: Its New Meaning for Art* exhibition (1970) curated by Jack Burnham at the Jewish Museum in London which explored the 'epistemological break' through a series of experiments carried out by various research teams and scientists outside the field of art. It was an exhibition where innovative technology was used by focusing on the relationship between people and their electronic and electromechanical surroundings, encouraging the use of electronic means in unconventional ways. Among those participating artists was Sonia Landy Sheridan, one of the pioneers in the use of the photocopier since the photocopier was an electronic domestic medium transgressed for artistic purpose. Sheridan, one of only two female artists invited to participate in such an exhibition, asked a 3M Colour-in-Colour photocopier to be installed and available to the public during the exhibition. Sheridan named the result "Interactive Paper Systems" (AA.VV. 1970: 8) and visitors had the opportunity to interact in different degrees and levels with the various technologies.

Professor Kate Eichhorn stressed that aspect in Sheridan's involvement with the public, saying that the "interactivity of photocopy machines" (Eichhorn 2016: 48) or the potential to engage an active participant in the process was something Sheridan explored as a pedagogical tool in exhibitions and in the Generative Systems Programme at the School of Art Institute in Chicago.

It is important to also highlight the *Ars + Machina I: Infographismes, Photographismes, Reprographismes* exhibition in 1980 and *Electra. L'électricité et l'électronique dans l'Art au XXe siècle* in 1983, both in France and divided into main thematic blocks: computer graphics, video art and artworks made with photocopy machine. The aim of these exhibitions was to make a compilation of the new directions that artists had taken thanks to the use of new technologies.

In 1989, the Brazilian artist Luiz Guimaraes commissioned a large exhibition dedicated to Copy Art for the XX. Biennial of Sao Paulo, bringing together a wide range of works from some of the most renowned international artists of the time. In 1992, at the prestigious and significant Media Art Festival *Ars Electronica* in Linz, the Austrian artist Peter Huemer organized the exhibition *Copy Bites* in the Galerie MÆRZ. Huemer prepared the exhibition with artists from the 1970s, 1980s and 1990s who used the photocopier as an artistic medium, including works by the German artists Georg Mühleck and Albrecht/d. And one year later, Monique Brunet-Weinmann curated the exhibition *Copigraphic Interconnections* (1993; Fig. 6), within *Montage'93. Festival International d'Image,* which took place in Rochester. Since 1987 this festival tried to take a step forward by becoming an annual event for new media. The exhibition was intended to show the relationships and cultural crosses between artists from different countries whose artistic practices used the photocopy machine for creation. To that end, she invited artists from all around the world. This exhibition, which was specifically focused on artistic creations that used the photocopier, was part of a large festival that contained 16 different exhibitions with such diverse media as photography, video, computer graphics, painting, sculpture and installation.

Two years later, Monique Brunet-Weinmann and Jacques Charbonneau co-curated the exhibition *Photocopy Art—Who were the Pioneers? (Que sont les Pionnières devenues?*, 1995), in the Gallery Motivation V/Centre Copie-Art in Montreal as part of the well-known Media Art symposium ISEA—International Symposium of Electronic Art[1]. The curators wanted this exhibition to show what had happened to the pioneering artists of Copy Art, exhibiting works from their initial period together with other works they were doing in that period. In this way, the photocopy machine and the different artistic creations that were formalized as a result of its artistic use were part of two of the annual events that are considered cardinal in Media Art: Ars Electronica in Linz and ISEA (Interna-

1 http://www.isea-archives.org/symposia/isea95/.

tional Symposium of Electronic Arts), which every year takes place in a different city. The fact that these artistic practices were part of these two prestigious festivals, placed them within the recognized field of historical Media Art.

Furthermore, these artistic practices have been mentioned in publications which are considered to be milestones in the history of electronic art such as the book *Art of the Electronic Age* (1993) written by Frank Popper, who was a very important figure for the recognition of xerography in France. This French theoretician, who participated as an artist in the exhibition *Copy Art-Electrographie-Electroradiographie-Telecopie* held in Dijon in 1984 considered Copy Art as part of the art of communication. Another landmark publication is *Postmodern Currents. Art and Artists in the Age of Electric Media* (1996) by Margot Lovejoy, who was an artist of the First Generation of Copy Art; or the publication *Sintopía(s). De la relación entre Arte, Ciencia y Tecnología* (2007), in which Spanish artist Marisa González wrote one of the chapters dedicated to Electrography-Copy Art. Also, Edward Shanken quoted in his book *Art and Electronic Media* (2009) the pioneers Bruno Munari and Sonia Sheridan, and the contributions of German Timm Ulrichs.

Sheridan also published her texts and reflections in places within the field of art and new technologies, such as the magazine *Leonardo*, as the article "Generative Systems versus Copy Art: A clarification of terms and ideas"[2] in 1983, which sought to clarify the confusion that was emerging between the terms "Copy Art" and "Generative Systems", since the latter referred to her teaching and research program dedicated to art made with tools that lead the human being to ruptures in art and democratization.

Conclusion

The relevance of this research is to demonstrate that our considerations of these practices in the context of Historical Media Art are not based on evasive connections, but demonstrate how Copy Art and Electrographic Art were an integral part of its history. Artworks were exhibited and discussed in the most relevant places and festivals which are now references of Media Art and its Histories. Our aim is to make art historians, curators, theorists, critics and other experts aware of this fact, especially when

2 http://arteca.mit.edu/journal/10.1162/leon.1983.16.2.103.

tendencies which relate to the materiality and the new materialism of the digital are on the rise.

It is precisely now important to do media archaeology to give light to the origin and development of our most recent art history. To that end, critical reviews of the unpublished documentary materials, which MIDE and other public and private museums, archives and collections have preserved for years, are needed to safeguard the works created with these new technologies. We produce in-depth analyses to recover all these experimental practices and to reclaim the place that all these processes truly deserve within the well-known official art history.

Finally, thanks to collections such as those owned by MIDE in Cuenca (Spain) or the *Museum für Fotokopie* in Mülheim an der Ruhr (Germany) or to documentation owned by art and research centres such as the Daniel Langlois Foundation in Montreal (Canada), interested researchers will be able to demonstrate the quality and interest that all these forgotten practices have had, allowing the establishment of the theoretical and critical bases that allow to review the history of these artistic practices at the transition from the XX. to the XXI. century, from analogue to digital art.

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References

Alcalá, José R. 2015. “El artista y la máquina automática. Un nuevo enfoque para su análisis historiográfico.” In *ASRI - Arte y Sociedad. Revista de Investigación*, 9: s/n.

AA.VV. 1970. *Software. Information Technology: its new meaning for art*. Nueva York: The Jewish Museum (catalogue of the collective exhibition held at The Jewish Museum, New York, 16/09 - 08/11/1970)

Eichhorn, Kate. 2016. *Adjusted Margin. Xerography, Art and Activism in the late twentieth century*. Cambridge / London: The MIT Press.

Escribano, Beatriz. 2017. Copy Art Histories: the emergence of the photocopy machine in the 20th century art and its role as Historical Media Art. Tendencies and thematic cartography of Copy Art. Doctoral Thesis, University of Castile-La Mancha.

McCray, Marilyn. 1979. *Electroworks*. Rochester: International Museum of Photography at George Eastman House.

Munari, Bruno. 1977. *Xerografie originale. Un esempio di sperimentazione sistematica strumentale.* Quaderno di design 4, Bologna: Zanichelli,.

Munari, Bruno. 1970. *Xerografia; Documentazione sull'uso Creativo delle Macchine Rank Xerox* . Milan: Ed. Rank Xerox.

Quaranta, Domenico. 2013. *Beyond New Media Art*. Brescia: LINK Editions.

Rigal, Christian. 1981. *L'artiste et la photocopie*. Paris: Édition Galerie Trans-Form.

Shanken, Edward. 2009. *Art and Electronic Media*. New York: Phaidon.

Sheridan, Sonia Landy. 1983. "Generative systems versus Copy Art: A clarification of terms and ideas." In *Leonardo,* 16/2, pp. 103-108.

The “anarchive” Series as a Challenge between Art and Information. A singular approach of media art history

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Abstract

Based on examples from the anarchive series of digital monographs with artists such as Muntadas, Snow, Kuntzel, Otth, Nakaya, Fujihata and Campus, this presentation will discuss the incidence of digital technologies on the ways we elaborate, think and practice art history today and more precisely the history of time-based works. Notions such as document and context, speed and connectivity, database and visualization, or augmented reality are at the core of these hybrid projects.

Keywords

Anarchive, time-based artworks, media art history

Introduction

It is a pleasure to discuss here a few topics about anarchive which is an interactive multi-media series on contemporary art, based on artists’ archives and documentation about their works, initiated in 1994-95.

Each title is dedicated to the entire work of an artist and is produced with his/her collaboration, under his/her art direction. The titles published so far are:

- Muntadas, *Media Architecture Installations*, an Interom: a CD-ROM with access to an Internet site (1999)

- Michael Snow, *Digital Snow*, an artist book and a DVD-ROM, today available on the Internet (2002)[1]
- Thierry Kuntzel, *Title TK*, a book of his notes about cinema and image with a DVD-ROM (2006)
- Jean Otth, *…autour du Concile de Nicée*, a DVD-ROM and a DVD Video (2007)
- Fujiko Nakaya, *FOG*, a book, a DVD-ROM and a DVD Video (2012).
- Masaki Fujihata, *anarchive 6* (2016), and Peter Campus, *anarchive 7* are both 'augmented books'.[2]

In 23 years we have just published seven titles! They are long-term research projects (sometimes six years), what might not be possible anymore in the politics of academic research today.

We were not thinking of media art history at the beginning, quite few writings about media art (not yet identified as a domain) were published, and often messy or missing documentation about the artist's works. But the topic of archives was very insisting in theory following mainly Michel Foucault and Jacques Derrida, as well as in several artworks of that time.

"anarchive"

The term *anarchive* has become a common use and this is fine.

Derrida coined it in 1994 in *Mal d'archive*. We had not yet read this book and we found the word through a very simple, non-theoretical way, wanting to produce one archive of an artist each time. It had to work in French and English. *Une archive*, an archive.

Of course as anarchy was resonating, we liked this quite relevant idea, as first some disorder is necessary for defining other perspectives, rethinking the existing categories and finding other meanings. Then the negative prefix underlines that a digital archive is not an archive in the traditional sense of the term: no dust, no smell, no specific place, building, basement, no definitive format. By nature it can be constantly transformed, extended, indefinitely recombined and it can migrate to various kinds of supports.

Nevertheless the first step consists of working with the concrete archives of an artist: Notes, drawings, photos, press articles, interviews, programs, catalogues, invitation cards, hotel bills etc.

1 http://www.fondation-langlois.org/html/e/page.php?NumPage=92.
2 http://www.anarchive.net.

Why does it take so long to produce each project?

Each project is at once research and an artwork based on a few principles:

THE INVOLVEMENT OF THE ARTIST...

... working in collaboration with a young team including an art historian, a programmer, a designer and other researchers. This "implicate history" is an immediate one in which the artist is the object and the subject of the research. We work with human beings first, not only with abstract data. We confront not just missing documents, but loss of memory or wishes, forgotten parts of life activities. This process triggers affects and time operates as an unpredictable parameter. I became aware slowly of this responsibility of the research rarely addressed, asking the artist to recall, to reconsider a whole life.

BEYOND THE DATABASE, A CRITICAL APPROACH

The constitution of a database is an important resource and a very demanding part of each project. But to build it has never been our main goal. From the first project until the last one we developed an analytical level usually defined by keywords which were discussed with the artist. They are main concepts, constant principles in his/her work, such as for Antoni Muntadas: media, project, visible/invisible, archetype, context, and so forth; or for Peter Campus: duration, perception, lumière, je, convergence, nature, etc.

Works are connected through these words and this level of interpretation deals with the entire œuvre of an artist. The quick establishment of multiple relations between the works by jumping from one data to another one, from a work to another one, from an image to a text, to a sound, contributes to produce a kind of "analytical simultaneity". This ease and speed in the production of quasi instantaneous associations is a fundamental component in another way of making and reading art history.

In the elaboration of "documents" about works or art attitudes, the description is a very important issue. The kinds of works we consider first are highly variable, unreliable, time based and machine/software dependent, such as installations, performances and interactive works. When beginning this project, as a teacher and an art critic in the field of video art at the beginning of the 1970s, the need to describe such works was urgent. I was confronted with a serious lack of information as well as its dispersion and poor photographs, if any existed at all. It also became clear that descriptions were a relevant way of preserving such artworks as installations.

In all our projects we insist on the process of production, gathering all kinds of preparatory drawings, technical sketches, notes and producing new documents like 3D models. The purpose then is not to offer a substitute of the work, but to develop a comment, an interpretation of how the *dispositif* functions, to make it explicit. Sometimes it becomes another version of the work as in Masaki Fujihata's project. Visualization with computer technology is a particularly interesting concept. We visualize processes, potentialities, more or less abstract phenomena. It is free from realism and illusionism, free from details.

AN EXPERIMENT BY OR UNDER THE DIRECTION OF THE ARTIST

There is no graphic chart for the Anarchive series. Each interface and each design are singular. Just an example: Michael Snow has chosen a fifteen minutes long sequence in his film *Rameau's Nephew by Diderot (Thanx to Dennis Young) by Wilma Schoen* (Canada, 1974, 270 min). The objects moved by the artist's hands constitute active zones of groupings from which we get access to the description of different works. One interest of this interface is that it keeps its own evolution: the duration and transformation of the film sequence itself.

Obsolescence and updating

The anarchive's projects are confronted with the need for constant updating. Firstly, the updating of the database's content, as most of the artists are still active in producing new works; secondly, due to the obsolescence of the computer systems and the evolution of the equipment similar to other projects from this pioneering period for digital art. Older DVD-ROMs and DVDs can hardly be played on new machines.

We are using a few strategies to solve this problem, such as emulation (Muntadas) or re-programming for Internet (Michael Snow). But we are also moving towards recent technologies such as Augmented Reality. The two last titles of Masaki Fujihata and Peter Campus are 'augmented books' from which we access the digital databases.

Augmented books

By choosing to use an augmented reality app for accessing videos, photos and other data on his artworks, Masaki Fujihata was not just thinking of the technical obsolescence (- who knows how long we will able to read these apps !). Augmented reality doesn't provide an immersive experience, but it maintains both a distance toward illusion and plays with it. It triggers a contradictory experience. Fujihata has always been working with this kind of simultaneous confrontation on two levels of reality, the one of the virtual image and the actual one, the physical space that we share and which remains perceptible. This is precisely the kind of « relevant » interface that Anarchive is looking for, relevant to the artist's approach.

Six Decades of Digital Arts & Museums. A new infrastructure

Six Decades of Digital Arts and Museums. A new infrastructure *DARIAH Connectivity Roundtable*[1]

The panelists reflected on six decades of digital arts as part of our contemporary cultural heritage and discussed what new infrastructures are needed to include this art form into museums and other cultural institutions.

Discussion Chair

Wendy Coones, Department for Image Science, Danube University Krems

Discussants

Giselle Beiguelman, Faculty of Architecture and Urbanism, University of São Paulo

Howard Besser, Professor in the Moving Image Archiving and Preservation, Department of Cinema Studies, Tisch School of the Arts, New York University

Patricia Falcão, Time-based Media Conservator, Tate Modern Museum

Oliver Grau, Chair Professor, Department for Image Science, Danube University

Sarah Kenderdine, Laboratory for Experimental Museology, École polytechnique fédérale de Lausanne

Marianne Ping Huang, Development Coordinator, Institute for Communication and Culture at Aarhus University

Christoph Thun-Hohenstein, Director-General and Scientific Director, MAK Museum of Applied Arts Vienna

1 This is a transcript from the Re:Trace Conference for Histories of Media Art, Science and Technology, which was held at the Austrian Academy of Sciences, Festsaal, 25 November 2017. http://www.mediaarthistory.org/retrace. Transcribed by Devon Schiller.

Introduction (by Wendy Coones and Oliver Grau)

We would like to welcome you today to the DARIAH Connectivity Roundtable. We are celebrating and discussing six decades of the digital arts and museums, and talking about what new infrastructures might be possible. We will introduce the topic for the session. We will introduce the panel of discussants. Then, each discussant will give a short statement in answer to the main question. Afterwards, we will have about 20 minutes for discussion among the panelists. And then we will open up the roundtable to questions from the audience. The worldwide museum community is more than 55,000 institutions strong. The US alone has more than 17,000, Japan 5,700, Germany 6,300 and so forth. It may seem that this infrastructure in all its diversity and history is such a mighty monolith that drastic change would be difficult to imagine.

But the digital age enters with force and alters that status quo. It comes with new tools to present, collect and access cultural artefacts as well as to connect, explore and visualize research data. And it comes with its own digital-born art and cultures, as we all know, which have their own history of now more than five decades. Yet, while digital arts and cultures play a role in 200 biennials around the world, and more than a 100 specialized festivals, they do not so far significantly enter into the walls of the museum world.

The museum setting in our contemporary world has diversified, not only due to the digital revolution that has come to permeate global culture and interaction, but also due to many non-digital transitions that have come about alongside and due to this digital development. Digital technology has introduced new multifarious ways of expression and also changed the nature of the way that objects are collected, as well as changed the expressive methods available for displaying and archiving collections. These new objects and techniques used to preserve and interpret digital arts and cultures embrace interactivity, make use of linear as well as nonlinear structures equally and encourage new methods of ever-deepening participation.

The massive developments in digital-born media art and popular culture have been growing exponentially for decades. Consequently, this requires that among the thousands of existing museums for traditional art media, a significant percentage of new museums dealing with the arts and cultures at our time must be dedicated to fulfill the fundamental functions to collect, preserve, explore, mediate and taxonomize digital culture. But how could that be done?

Figure 1. [from left to right] H. Besser, S. Kenderdine, C. Thun-Hohenstein, M. Ping Huang, O. Grau, G. Beiguelman, P. Falçao and W. Coones, Roundtable at the Austrian Academy of Sciences, Re:Trace Conference Vienna, 27 Nov 2017. © Elmar Elbs

Historically, *Wunderkammer* (cabinets of curiosities) and *studiolo* (study rooms) were places of play where the practice of *ars combinatoria* (combinatorial art) created something new through each viewing and its recombination, chance or instant-linkage and inspiration. Creative process and knowledge production were essentially driven by comparison and interactive combination. Today, the interactive component–which was later restricted by the object-oriented museum–is reentering the digital museum and archive. In the current setting wherein digital media and the enveloping windowlessness of dark space which functions again now as a precondition and enforcement of digital *ars combinatoria*, digital artworks, object representations and clusters of digital worlds can now be partly experienced interactively, as well as influenced by the audience and recombined.

Digitisation also offers new possibilities for cultural heritage with computational big data methods. Today, as over two billion people create global digital culture by sharing photos, videos and links as well as writing posts, comments and ratings, etc., it is possible to use the same technology to study this universe of contemporary digital culture. Also, the future archive will connect the object or document with other archives, artefacts, information, people and events. Perhaps the archive will progressively absorb duties and features from other institutions and

cultural entities, such as databases, installations, games, networks, knowledge tools, etc. On the other hand, many new instruments such as gaming systems or cell phones already come with their own archival functions and amalgamate seamlessly with other archives. Museums and archives use these technologies as interfaces for engagement and empowerment. Ironically, the United States National Security Agency (NSA) runs the most extensive archive. As we know, they collect all personal data, phone calls, Skype conversations, emails and even shopping lists of all citizens from, basically, all countries in the world (except for the Five Eyes countries, as became known in 2013, when Edward Snowden leaked NSA information).
The main questions that the discussants are going to address in their statements are:

– How do museums and archives need to evolve in order to collect, preserve and also show the digital art of our time?

– And what kind of strategies and concerted preservation tools might be necessary to move forward?

First, we will give quick biographical information for each discussant. Then, we will hear statements from each.

Panelist introduction

Giselle BEIGUELMAN (BR) is on the Faculty of Architecture and Urbanism at the University of São Paulo. She is an artist, curator, professor and researcher. Her work encompasses interventions in public spaces, network projects and mobile apps. Beiguelman's artistic and investigative practice is based on a critical approach towards digital media and information systems. She specializes in digital art conservation, intangible heritage and interface design. Author of many books about digital culture, she recently co-edited *Possible Futures: Art, Museums and Digital Archives* (Editora Peirópolis, 2014).

Howard BESSER (US) is Director of the Moving Image Archiving and Preservation (MIAP) master degree program in the Department of Cinema Studies at the Tisch School of the Arts, New York University. He is a scholar of digital library science and the preservation of film and video. Besser is a prolific writer and speaker, and has consulted for many governments, institutions and arts agencies on digital preservation matters. He was also closely involved in the development of the Dublin Core Metadata Initiative[2], and Metadata Encoding and Transmission Standard (METS).[3]

Wendy COONES (AT/US) directs the Exhibition Design and Digital Collection Management post-graduate certificate and graduate programs in the Department of Image Science at Danube University, where she has served on the academic staff since 2005. She is responsible for curricular development, graduate teaching and research initiatives (such as the Media Art History Archive).[4] Coones is also primary coordinating staff for the low-residency program Media Art Histories[5], as well as the EU-funded Erasmus Mundus Joint Master Degree (EMJMD) in Media Arts Cultures.[6]

Patricia FALCÃO (UK/PT) is Time-based Media Conservator at Tate in London. For the previous eight years, she has been doing intensive research on the preservation of software-based artwork. Falcão also is an international faculty member in the Media Art Histories and Media Arts Cultures programs at Danube University.

Oliver GRAU (AT) is Chair Professor in the Department for Image Science at Danube University, the first chair for Image Science in the German-speaking countries. He has given more than 280 lectures and keynotes at conferences worldwide. Grau's book *Virtual Art: From Illusion to Immersion* (MIT Press, 2003) is the most quoted art historical monograph of the last decade (H-Index). His scholarship is translated into 15 languages, and he most recently edited *Museums and Archives on the Move* (De Gruyter 2017). He conceived the first international Archive of Digital Art (ADA, since 1999) as well as other new scientific tools for Image Science. And he is founding director of the international Media Art Histories Conference series.

Sarah KENDERDINE (CH/AU) in 2017 joined the École polytechnique fédérale de Lausanne (EPFL), where she has established the new Laboratory for Experimental Museology (eM+).[7] There, she explores the convergence between aesthetic practice, cultural data and visual analytics.

2 Dublin Core Metadata Initiative http://dublincore.org/.
3 Metadata Encoding and Transmission Standard http://www.loc.gov/standards/mets/.
4 Media Art History Archive http://pl02.donau-uni.ac.at/jspui/.
5 Media Art Histories graduate program https://www.donau-uni.ac.at/en/studium/medienkunstgeschichte/index.php.
6 EMJMD Media Arts Cultures graduate program http://www.mediaartscultures.eu/mediaac/.
7 Laboratory for Experimental Museology https://emplus.epfl.ch/.

Kenderdine also researches at the forefront of interactive and immersive experiences for archives, galleries and museums. And she gave the keynote here at Re:Trace on "Postdigital Pasts."[8]

Marianne PING HUANG (DK) is Development Coordinator at the Institute for Communication and Culture at Aarhus University. She recently collaborated on the European Capital of Culture (ECOC) Aarhus 2017. And she serves on DARIAH European Union, is co-head for DARIAH Research and Education, and organized the DARIAH Innovation Forum 2017. Since 2015, Huang is a member of the Europeana Research Advisory Board.

Christoph THUN-HOHENSTEIN (AT) is since 2011 the Director-General and Scientific Director at the MAK Museum of Applied Arts Vienna. Previously, he was the director of the Austrian Cultural Forum New York (ACFNY) from 1999 to 2007.[9] Thun-Hohenstein is also head of the Vienna Biennale, founded in 2015.[10] He lectures and publishes on the topics of European integration and contemporary culture in art.

Panelist statements

Patricia FALCÃO: I think back to the diagram I showed during my presentation of time-based media in the Tate collection.[11] And I think that is where the problem starts. I think from within the museum and there are a limited number of institutions that actually have any kind of responsibility for digital artworks. Actually one of the key problems there is that, at least in my experience, there is significantly less overlap between different areas that are interested in collecting digital-based arts than one would hope for—at least between media art festivals, contemporary art museums, archives, etc. My feeling is that these are all separate worlds. But I think with regards to the digital, the problems will end up being very similar for everyone.

8 Sarah Kenderdine, 2017, "Postdigital Pasts," Re:Trace http://pl02.donau-uni.ac.at/jspui/handle/10002/906.
9 Austrian Cultural Forum New York http://www.acfny.org.
10 Vienna Biennale http://www.viennabiennale.org/en.
11 Tate's "Things Change," http://www.tate.org.uk/about-us/projects/pericles/things-change-conservation-and-display-time-based-media-art.

Figure 2. M. Ping-Huang, O. Grau, G. Beiguelman, Panelists Statements. Roundtable@Re:Trace Conference Vienna. ©Department for Image Science, DUK

In practical terms, I think that people *within the institutions* need to be confident that they can deal with these kinds of issues. And it has made a huge difference to me as a curator to be able to go in and say "yes, we can do that," as a conservator or a registrar, "it might take us a little bit longer, but we can do that." For this, you need to have a staff that knows what they are doing.

It could take a little bit longer. They may need a chance to learn. And there is a need to develop that knowledge. This is what has been going on within the very limited area of museums of contemporary art. And it is also going on with digital preservation and for digital archives. Like I said, the strategies are very similar. If you are thinking about software and emulation, there is no reason why there cannot be a series of software libraries that people can access, share or copy. I don't think there is a lack of solutions, but I do think there is a lack of coordination. That is the key point.

Giselle BEIGUELMAN: With my statement, I will focus more on online art than on digital art in general. Obsolescence in dysfunctional equipment and files-not-found seems to be the perfect image of net culture and the paradigm of online life. Perhaps this eminence of disappearance justifies the apocalyptic tone that is suggested by the most elementary comments of digital editing programs, which continually invite us to save files and not simply to store them. And that is why I revisit here some considerations I have made in my book *Possible Futures*.

My answer to the main question, “how do museums and archives need to evolve in order to collect, preserve and show the digital art of our time,” is that the reinvention of memory is now necessary. One of the adages of the contemporary world is “the Internet does not forget.” But social networks do not *let us* remember. The information architecture for these floating data spaces does not favor retrospective queries. This does not mean that the data is not there. On the contrary, it is. The data is simply not accessible by search engines. If you go now to the Internet Live Stats website[12], you will see in one second that there are 800 pictures uploaded to Instagram–which is more or less 48,000 pictures in one day. This amount of data production all day, every day is part of our effective memory and this memory is becoming something that we cannot retrieve anymore. And part of this memory is also part of our digital heritage and part of artworks.

So from my point of view, we must learn how to negotiate collection and preservation tools in a moment when memory is also a corporate issue and everything can disappear in one second from one moment to another. What if Facebook just decided to end or Google stops today? What would happen to our memories that are stored there? And how many artworks would go with those systems and apparatus? So, there is the question of how these services track us, but also a very important question that our memory is also a corporate issue. Our memory deserves a kind of ethical code that our archives must elaborate and answer.

Oliver GRAU: As we know, compared to traditional art forms like painting or sculpture, digital media art has a multifarious and fairly complex potential due to its ability to use databases, three-dimensionality, interactivity and all of these complex image forms. And as we know, digital art uses those to deal also with very complex topics of our time, like climate change, to visualize the surveillance problem, the media and image revolution, even the virtualization of financial markets, which as we all know is such a powerful development that affects us. We can also show these topic clusters with the Archive of Digital Art,[13] but also through empirical analysis of the some 150 digital art festivals around the world,

12 Internet Live Stats http://www.internetlivestats.com/.
13 Archive of Digital Art https://www.digitalartarchive.at/nc/home.html.

as we all know–such as Ars Electronica. But then it is like a wall. And digital art does not enter the museum world so far. There are many reasons for that. The basic reason is that the museum is a bit outdated. Its structure is now 200 years old. It was very qualified for paintings and sculpture, but it was not made for the digital age. And so we have to think of new structures.

First, I want to say that our society is able to do such things as the NSA archive, for example, where data is stored on every human being. I do not want to propose such an archive for art. But I just want to say that if our society wants something, then it can achieve it. But on the other hand, the digital art of our time, which we have all seen at festivals—as tens of thousands of people go to these festivals—but only for a few days or weeks. But it is not entering our museum or archive systems.

Maybe federalism, which we have in Germany, Austria and many other European countries, can help. As we know, Germany for example, has 6,500 museums. If only one percent of them, so 65 museums, would be dedicated to digital art–and even that we say that the Free State of Bavaria build up a technological framework that guarantees the preservation of interactive arts and then Baden-Württemberg build a competency network for bio art, Brandenburg for net.art and so on–then we would cover the entire field of digital art. Then even the old and often small structure of the museum, where you have curators, but not many people who can preserve technology, could be integrated with this larger framework more appropriate to the digital revolution. This could allow a democratic society, which has a duty by law to preserve and present the art of our time, the ability to reflect on big issues like climate change or surveillance society, through the very institutions that are supported by us as taxpayers.

Marianne PING HUANG: First of all, I would like to thank Patricia Falcão for her presentation today. She showed that digital art collection and preservation is in fact going on, it is going on meticulously and it is going on with stamina from inside the museum. Digital art collection, preservation and showing are happening, but ever so slowly. And this is going on, as well, with a big prestigious museum like Tate. But we museums are a widespread landscape with hierarchical distribution. I think you need to take that into consideration as well in order to evolve the collection and preservation of media art. I also think that we need to address how media art in institutions would need a new field of crossexpertise, which was also something Patricia pointed to. So, I would also like to turn the table and ask: "What can we learn from media art?"

Media art has through its history of at least 60 years been involved in impacting society in various ways and is now through the digital transformation really spreading this impact—through festivals and so on. I think the presentations at this conference have shown that media art is also teaching institutions, is altering archival formats and is altering the way that we consider infrastructures. And I think that is really important to take into account. Museums should evolve. But museums should also learn from all the ways in that media art has pushed archival formats, collection infrastructures and the ways by which the public is engaged.

That might be the next step, to ask: "How would we preserve and collect the media art that is, well, 'dancing the archive,' and also 'playing the infrastructures'?" Using the sensor-rich architectures that are collecting or potentially collecting audience data, how could media art bridge the institution, the society and the audience? I think that is already going on. It is going on with *Persona Non Data*, exhibited at Somerset House and the Courtauld Gallery in 2015.[14] But this is a learning process.

Christoph THUN-HOHENSTEIN: The MAK is the Vienna Museum of Applied Arts, which also collects contemporary fine art. But we, obviously, do not have the obligation to preserve, collect and show digital art. We can be more eclectic, which is in a way right and true, and in a way wrong. I will tell you why. We were the first museum in the world to acquire a piece of art with Bitcoin, *Event Listeners* (2015), a limited-edition screensaver by Berlin-based Dutch artist Harm van den Dorpel.[15] But what is really interesting for me is trying to promote the dialogue between art, architecture and design, also with science, the academic world, research technology and civil society.

For achieving this, our main method is to make people and our society aware that for the last ten years we have lived in a new modernity, which started with the first smartphone. This new modernity changed everything. And we have to shape this new modernity. We need all the ideas and input that we can get, and from everywhere, because if we do

14 Persona Non Data http://artisopensource.net/persona-non-data/.
15 MAK, 23 April 2015, "MAK purchases digital art work by Harm van den Dorpel with Bitcoin," http://www.mak.at/jart/prj3/mak/data/uploads/downloads/presse/2015/Harm_van_Dorpel_e.pdf.

not shape this modernity actively, then its technologies will shape us. Such a phenomenon is what we are currently experiencing. That is the reason I also founded the Vienna Biennale (which is the world's first biennale on art, architecture, and design) to work for positive change in digital modernity, and to really deal with robotics, artificial intelligence, the future of human work and so on. I think that the most important question is: "What is the truly relevant digital art out there?" Of course, you have to curate art. You have to make a selection. "What is the art of our time that is really representative of this new digital modernity that we live in?"

Figure 3. S. Kenderdine and C. Thun-Hohenstein, Roundtable, Re:Trace Conference Vienna, 27 Nov 2017. ©Department for Image Science, DUK

Our approach at the MAK would be that we have to act as a platform that asks the relevant questions and tries to get the most relevant artists, designers, architects and others that are associated, as well as commission projects that answer those questions that we need to ask. We also need avenues on how to address those questions. (The question of preservation I would leave to others. It is a tricky issue.) But I think that the selection of digital artworks is very important. For example, the next big things out there are virtual reality and artificial intelligence. I refer now to a talk between artist Douglas Coupland and curator Daniel Birnbaum, in the

November 2017 edition of *Artforum*.[16] And one thought that we should always remember: the art in a new technology becomes really interesting when that technology has been overtaken by yet a newer technology. So now we have really interesting art that relates to TV. And we have very advanced education and above all entertainment in VR. But I think that the time that VR will be a big topic for relevant art is really when the next technology will overtake VR.

Sarah KENDERDINE: Because I make things, big things that could be collected, maybe it is interesting to reflect on those processes. Often these digital artworks involve clusters of computers, not a single computer. To install one of our works requires a team of specialists and software engineers that we know and that we train–that train us actually. The nuances of keeping such works on tour around the world are quite significant. And I am always in sleep at night wondering: “Oh, God! What if the plane crashes with Damien on it–that single person who is the sole insight into how this whole thing will come together in the end?” That is certainly one issue. What we do is a lot of documentation. We do not document code in the ways that we probably should. But we document experience of the work. And we document the technical infrastructure that is involved in putting it together. I think this is a useful practice for people who make stuff. The people who are making things need to take on that responsibility, so that when people collect it is a lot easier. I think that would be a useful strategy and preservation tool moving forward.

Actually, the Media Art Histories conference session right before this was quite interesting. Richard Reinhart, Director of the Samek Art Museum at Bucknell University in the United States, mentioned this idea: We do not have a language that describes new media accurately to a non-specialist audience. It is a really big problem and this idea skirts around the issue of standards.

There might be need for a tool like the Getty Research Institute’s Art & Architecture Thesaurus[17] for new media art. Does it exist? I’m not sure. But this could be a really useful approach.

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16 *Artforum*, November 2017, “Wildest Dreams: Douglas Coupland Talks with Daniel Birnbaum about Art and Virtual Reality,” https://www.artforum.com/print/201709/douglas-coupland-talks-with-daniel-birnbaum-about-art-and-virtual-reality-71774.

17 Getty Art & Architecture Thesaurus www.getty.edu/research/tools/vocabularies/aat.

Figure 4. Besser, Kenderdine, Thun-Hohenstein, Panelists Statements. Roundtable@Re:Trace Conference Vienna. ©Department for Image Science, DUK

The issue of documentation flows into other aspects of the work, where there is no standard for the work that we're doing. There are no standards for 3D motion capture data of a Kung Fu master.[18] I think that the standards issue is really critical in a preservation sense, for how digital artworks can be accurately described, and ultimately preserved, collected and shared. And the network of people, between universities that can solve particular hard challenges and the GLAM sector who need these solutions and develop in-house their own solutions, this needs to be helped along.

Howard BESSER: In 1987, 30 years ago, I wrote an article called "The Changing Museum."[19] To quote from that: "Eventually new areas of research, such as pattern recognition, will be applied to these museum systems, allowing the computer to do some preliminary syntactical analysis of works of art. The computer will be able to give statistics as to quantities of various colors used and their distribution around the canvas.

18 Hong Kong Martial Arts Living Archive, www.scm.cityu.edu.hk/research_project/14.
19 Howard Besser, 1987, "The Changing Museum,"http://besser.tsoa.nyu.edu/howard/Papers/newpapers/asis87changingmus.html.

Later it should be able to analyze angles and line of sight flows through paintings and moving images. Finally, the computer should be able to view the composition of the work of art as a system similar to a language, and break it down into its interrelating components to see how they work together, much as computerized language analysis does." Essentially, this is semiotics. Something like that we have seen reflected in the analysis of Wes Anderson's films by Mehul Bhatt in his conference presentation "The Shape of the Moving Image: Perspectives from Spatial Cognition and Artificial Intelligence" at Göttweig Abbey yesterday[20], and I think this feeds to what George Legrady in his presentation on "Projects in Visualizing Da ta 1992-2017" was talking about earlier today.[21] Certainly, it is a trend among cultural institutions–all types of institutions, actually–to participate in big data. Here, the kind of information you have in your own institution becomes fodder for doing something else–for analysis, even for the creation of new works. Appropriation work is based on things that exist in our cultural institutions already.

I also went back and looked at two chapters (in a very poorly named book) I wrote 20 years ago. It was edited by Katherine Jones-Garmil and published in 1997 by the American Association of Museums and it is called *The Wired Museum: Emerging Technology and Changing Paradigms*. (That was not thinking very far ahead, apparently...) Spinning off of what Sarah just said about the call for standards in digital art, in those chapters I focused on what standards would allow others to work with the contents of artist, researchers, developers and visitors to build upon museum collections with new art, new visualisations, new curations–things like that. That feeds into a lengthy paper I wrote 12 years ago with Steve Dietz, Ann Borda, Kati Geber, and Pierre Lévy, called the "Virtual Museum (of Canada): The Next Generation."[22] One of the key elements of this paper was that, in order to be a museum in the future, you have to really engage with the audience in very new ways.

Taking these ideas and focusing on the heart of the question, from my own perspective as someone who trains people to be conservators in this area, I really think that we need more training and specialization

20 Mehul Bhatt, 2017, "The Shape Of The Moving Image: Perspectives from Spatial Cognition and Artificial Intelligence," Re:Trace, http://pl02.donau-uni.ac.at/jspui/handle/10002/904.

21 George Legrady, 2017, "Projects in Visualising Data 1992-2017," Re:Trace http://pl02.donau-uni.ac.at/jspui/handle/10002/942.

22 Virtual Museum (of Canada): The Next Generation http://besser.tsoa.nyu.edu/howard/Papers/vm_tng.doc.

particularly in this area. And that is pretty complex. To be a time-based media conservator requires knowledge about media art history, technology and documentation standards (metadata–things like that). Museums really have not made it a priority with funding and procedures to handle these. There are not many institutions with time-based media programs, with time-based media conservators, curators–there are more curators than anything else. We made a lot of progress. One of the things that advanced museum has done, is that before the work is acquired, a whole team from all the departments in the museum get together to look at the piece.

Panel discussion

COONES: We now have time for discussion to go deeper into these issues and open it up for questions to the audience as well. First, I would like to take a few moments to mention some points that I noticed as being shared between you. One is that conversation has been continuing for a long time. There is a long-standing body of research and body of work that can be drawn and built upon. But every time there is new technology that takes over the old technology, that has to be learned from, that has to be updated, there has to be people that understand it and bring it up-to-date into the next phase. We are constantly pushing definitions in language and also definitions in how we understand what the parameters of the works are. This means that we need to be able to teach institutions as well as teach the makers. This, of course, then requires curation and documentation. This requires people to make decisions about what is going to be looked at, how it is going to be looked at, what kind of standardization and documentation strategies are going to be there, as well as also looking at collaboration and communication both on an international and institutional level. I think these are some of the commonalities between all of you. I would like to first open up to the panelists to discuss amongst themselves, perhaps if you have questions for one another. And then we will open up to the audience Q&A.

THUN-HOHENSTEIN: I would like to address the issue that we have to show art that is relevant, relevant to the people. For me a huge issue is "remix." We live in an age of remixing. Museums have some huge collections. What I have always found very interesting is to commission artists to remix existing works using new technologies. I will give an example. At the MAK, we have one of the most important works by

Gustav Klimt, with nine panels, a cartoon for a mosaic that is in Brussels. It is a fabulous piece that you can translate. It would be great in Virtual Reality. And next year we are going to do that. We are working with a filmmaker Frederick Baker, who works in VR. Next year is a big Klimt year. We are going to remix Klimt, create a new work of art, and take that as the point of departure.[23] This is just an example. But I think that museums should also think about existing works of art, non-digital works, and how you can then use digital technologies to get these artworks across to a new audience, in new guises, and also then as a way of newly evaluating the original.

KENDERDINE: So then, are you going to collect in the museum the very artwork that you commission?

THUN-HOHENSTEIN: I think that is the idea, yes.

GRAU: I also want to add to that. The work that you do at Tate, Patricia Falcão, and what is also done at the Guggenheim, the MoMA, and also the ZKM (Center for Art and Media Karlsruhe, Germany), is fantastic. It is totally needed, but it is not enough. When I talk to people from the preservation field, they say: "Most of the case studies are made but now we need concerted action." We need all of these individual museums somehow to work together. We need a higher structure. If you talk to cultural politicians, for example, such as the German Minister of State for Culture, and ask her–there was recently a conference at the Jewish Museum in Berlin–"Do you intend to archive the art of our time?" And she said: "Yes, we have the ZKM." She does not know. And you laugh, but this is the truth, this is the political situation. Somehow there is not enough knowledge in this area. We tried to invite some cultural politicians from Austria, but due to all the coalition building at the moment, they said not now.[24] But it is an important question and we need to address it. We could start with a simple questionnaire, sent from the ministry to all the museums in Austria, Germany, etc. "How many digital artworks do you have in your collection, and what are you doing to preserve them?" And the result, well I can tell you, is 0.001. As we all know, we lose all of the art of our time, all digital artworks. Digital artworks more than 10 years old, you cannot show anymore. The systems are not successful. We

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23 MAK, "Klimt's Magic Garden: A Virtual Reality Experience by Frederick Baker," https://www.mak.at/en/program/exhibitions/exhibitions?event_id=1516070722321&article_id=1514946430999.

24 The conference was held a month after the 2017 Austrian legislative election and during the time of government coalition building.

need to rethink. And we need to push the development, so we don't lose another five decades of digital art.

PING HUANG: I think that maybe a survey would be interesting as a kind of proof about the situation in museums and archives as regards to collecting, preserving and showing digital art. Surveys of digital practices have been done in arts and humanities research and actually make visible really interesting transnational results. But I was also thinking: Could we find leverage from outside cultural politics, by looking at something where artistic practices or artistic research is now being highlighted in collaboration with science? There was just a festival in Oslo on Technology & Emotions where the artist was invited to talk about his work with CERN.[25] That might be a way to leverage the action by cultural policy makers so as to move this debate forward.

BESSER: In terms of the problem that Oliver Grau just mentioned, I think we are up against two opposite issues. The reasons museums do not collect digital art is either a) they know too little (and think that digital lasts forever, so why bother collecting it); or b) they know too much (and think that it's going to cost an awful lot, so who has the resources to preserve). Addressing those problems is completely different. If it costs too much, then that is a funding and resource issue. That is why you talk to your minister or governmental representative or we take actions such as the Liverpool Declaration. But the other problem—the idea that digital lasts forever—,this has to be addressed in a different way by a group broader than ourselves. It is just not true. And most people have experienced their own digital files–their word processing documents–no longer being able to play. But they still don't recognize that digital *does not* last forever.

BEIGUELMAN: I totally agree with you about these two problems. But I think there is a third one: that memories are a kind of commodity and corporate issue. The problem is that many institutions decide to keep the equipment and to store everything. So, if you keep the VHS player, everything is solved. If you keep your old computer, then everything is solved. Preservation does not work like this. Everything changes. And if you keep all those technologies, then you would need a museum just for those technologies. There is an interesting book by Ricardo Piglia, an Argentinian writer, called *The Absent City*. It is a story of a city, where

25 Technology & Emotions 2017 www.techem.live.

they move the city inside of a machine. The machine is a museum and everything goes there. At one point, the city is empty, because they store everything in the museum. And everybody dies at the end. This is something that you must think about. If we keep all the technology, what will we do? How much space will we need? How long will it live? Who will keep this equipment running? Is it possible to keep it if we do not have standards? And if you keep everything following the rules of companies, what happens? I think we must have some kind of syndicate, a common decision or cultural policy that is more international and addresses digital culture as it is.

KENDERDINE: Just one brief comment, an "ethical framework" may be what you mean...

COONES: I would like to draw back a little bit to the word that we used in the question that is the word "evolve." So if you could perhaps address a little bit about how museums and archives, our notion of them perhaps, or how they work, might need to evolve?

KENDERDINE: It is a commonly discussed topic: emulation. Do you preserve the computers and the screens and the software? Or do you document the digital artwork to the degree that you can reproduce it on new frameworks as a similar experience? If so, you have to understand the nature of experience, which is critical to archiving the work. And this is something that comes up at the Tate, Patricia Falcão, when you discuss it–because I know that you are discussing specific works. If you at the museum were not able to collect the bits and pieces that make up the artwork, would you adopt a different approach? For example, I have this nice machine for one of my digital artworks. The machine has 59 projectors and 26 computers–you are never going to collect it? But you could say "it's a panoramic system that does 'x'," yes?

FALCÃO: That is the approach. That is what we do in an acquisition process. We understand what we need to keep or have in our hand to preserve the work, and what can be changed. This applies to media, but also... I was joking about a computer, because it is something that the artist gave us. We call this an "artist-verified proof." This means that the artist themselves installed the artwork. The artist says: "This is what it should look like." But we also make lots of copies. But we are conservationists in a museum, so we also know that this is not the solution. I am not trying to remove the responsibility of the museum. However, I think that all the success of video-based art, for example, artists and artist cooperatives achieved themselves. Museums have some responsibility, yes. But are there similar artist cooperatives nowadays where they themselves are working to preserve their own artworks?

BESSER: Yes. In New York, my students created something called Transfer (XFR) Collective.[26] This is an organization that works directly with artists to preserve their works, to reformat their works and keep their works alive. Transfer Collective started out as a project in the New Museum where museum staff just made appointments with artists to come in and the “transfer” was part of the exhibit. So there were two sides to it: on the one side was video transferred to digital, and on the other side was old visual media transferred to newer. But yes, museum staff does go around to artist festivals for recruiting artists to preserve their own works. This is filling a gap that museums aren’t filling. And so far it has been very successful. It’s been about five years. Now there are other Transfer Collectives.

GRAU: I would like to add to what you said, Howard Besser. As we know, there are artworks like *Osmose* by Char Davies. It is a classic work of digital art with some 200 articles published about it. But you cannot see this artwork in any museum anywhere in the world. Davies herself even had to reconfigure it, from a supercomputer to a personal computer level. In the end, as a society, we have to think: Do we want digital memory? The NSA is doing that. And of course we should not follow the NSA. But this is something we can achieve. I would like to ask you, Marianne Ping Huang, what could Europeana do? Is digital art included in your data model?

PING HUANG: Europeana is a transnational institution that, to large extent, aggregates from other institutional projects. I looked at if something like the Europeana networks, which is more community-based than libraries, could be an actual possibility for digital art. There is the Archive of Digital Art, ADA, and others. But I think such a network transnationally between museums and archives could in a way develop through the Europeana organization.

THUN-HOHENSTEIN: I think there is also a strong case for “co-ownership” of digital art between several museums across countries. Though, I think that this might be more difficult to carry out than with an expensive oil painting. But digital art really lends itself to co-ownership.

26 Transfer Collective https://xfrcollective.wordpress.com.

That way, museums could show these works more often, etc. Of course maybe this is also about showing less works. You have to curate. But really outstanding works should be owned by several museums. If the digital artwork is in editions, then it is a different thing. But, in general, there is a strong case for co-ownership, because these museums could then look to each other as a kind of peer-review in terms of conservation.

BESSER: This was one of the reasons for the creation of Matters in Media Art[27] in the first place: to figure out what would happen if one particular collector was thinking of giving their work to multiple museums, and they wanted to see what would happen, and how that could work.

Audience question & answer

Patricia ENGEL (audience): First of all, I would like to thank you for this great conference. Second, I would like to address the question of conservation. I should say that I am a conservator of traditional cultural heritage. And I especially saw a connection between what I learned here today and my field in terms of the conservation theory. Despite the fact that we have many approaches to conservation theory in our traditional field, I just had attended a huge international conference on conservation where conservation theory led to a wide debate. My suggestion is, or my question to you is, if you would see a benefit in interdisciplinary discussion on conservation theory?

BESSER: Two of us are in the conservation field: Patricia and myself. We are heavily involved in the world of conservation. She was trained as a conservator.

FALCÃO: What do you mean by interdisciplinary? I do not see any other option than interdisciplinarity, actually. The way that I think about conserving the works and how requires one to adjust traditional conservation theory to this different reality that you have in media works. In what way would you want interdisciplinarity to happen? I think that you are right about finding the right literature. But there is quite a lot published about collecting and displaying media arts. I do not think they are explicitly about the theory of media conservation, but there is a lot there.

27 Matters in Media Art http://mattersinmediaart.org.

BESSER: If you look at CoOL (Conservation Online),[28] there's plenty there, and lots of literature there on media conservation. The North American Conservation Association (AIC) has a group that is focused on media art.[29]

COONES: I think that is one reason why this Media Art Histories conference series is international and though it might be held in one continent more often than the next, there are representatives from most continents here in the people that are coming. We need to make sure that we are all reading each other's literature as well, across nations and languages.

Sjoukje van de MEULEN (audience): First of all, thank you so much for this panel. I am really happy this is taking place. This is a very import topic. And I heard very different point of views on these issues. I do want to add two points. By the way, besides my university job, I work at two museums in the Netherlands, the State Museum and the Van Gogh Museum. First point is if we want the digital art of our times to somehow come into the museum, then I think it is also important to think about the different states that involve museums today. Since digital art was introduced in the 1990s, museums have been changing enormously. And here I am just limiting myself to the Netherlands. Museums are pushed into becoming moneymaking machines. And so "the museum is a mass media." We have to take this into account, because if we want to achieve something, we have to think about sources of money. Museums do not see only what it cost them, but also what it brings them. Otherwise they will not do it.

The second point is that I am working as a museum editor and just two weeks ago there was a big, big conference for museum educators in the Rijksmuseum in Amsterdam. Speaking about priorities, all the money flows there, the more commercial museums become by going into public, and away from art, in a sense. So, you have to somehow know all the factors and priorities in museums in order to get digital art into museum collections and recognized. Maybe I can end with one example. The Van Gogh Museum has made a virtual reality of the bedroom of Van Gogh. It works wonderfully well. In China, they know, people want to see this, and go, and enter the virtual space. But of course, that's not Van Gogh digital art. But that makes money.

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28 CoOL Conservation OnLine http://cool.conservation-us.org.
29 http://www.conservation-wiki.com/wiki/Electronic_Media.

George LEGRADY (audience): Thank you for the panel, it is great. I would like to throw in a couple of perspectives from the practice end of things. I'm an artist and I've been doing interactive media art for nearly 30 years. Some of the challenges that I see in terms of negotiating the space of museums and collections are, first of all, much of the new media projects are experimental in nature, and therefore fragile in terms of their actual makeup. So the challenge is actually how we resolve that. And, on the other end, there is the challenge of who makes the selections. One of the big things I've learned from Oliver Grau is the focus of the Danube University Krems program to train curators in media art. One of the challenges that I notice is that curators do not have the specialized background to discern things. So, there is a reliance on the commercial gallery situation, and basically the commercial gallery is a shopkeeper, not necessarily an intellectual or someone who is looking at the future of this field. And so I just want to throw that out. So I think that's what we end up seeing. A lot of the works that end up in collections, based on my observations, are the more simple works–let's say for lack of better terminology. They're simple in terms of maintenance and simple in terms of ideas. Meanwhile the really complex works never enter the discourse. So that's something I think we need to consider in the long-term situation.

Diego MELLADO (audience): Hello, I am a student of the Media Art Histories program. My question is for all the discussants: Given into how fast things change in media art, especially with computer-based artworks, what do you think standards should look like? What kind of requirements should a standard fulfill?

FALÇAO: We have started to see this actually, with artist using open-source techniques. So one thing is to make sure that what an artist is doing is open and documented. That is not a standard, but it is a start.

KENDERDINE: I think that you need to make a distinction between the artwork and its media. These are different things. We are not talking about artworks being a standard. Hopefully they are not. They're the opposite, yeah, very idiosyncratic. Also this conversation is a bit muddy because it goes out into archival stuff, as opposed to artworks made of archives [...]. So media artworks must be set aside from the archive, let us say. When I talked about standards, I meant that as related to certain types of media involved in them. And why you need standards is so that you can share. It is a simple metadata thing. And linked open data means the more datasets can be shared the more enriched we become.

BESSER: We have worked a lot with individual artists. They're really surprised when we tell them that their artwork would be more preservable if they used underlying standards–open source software, standardized software, things like that. A number of them just change their practice for their future projects to be like that. The artists are just not aware.

THUN-HOHENSTEIN: I think that it is really important that art museums have curators for digital art and digital culture. I mean curators who kind of on-the-job specialize on digital art, but at the same time also eminent specialists in contemporary art in general, and then find a specialist curatorial position to give digital art the appropriate space in the exhibition program as well as the collection schedule. It is very important. We just appointed a digital cultural curator at the MAK in Vienna and it makes a difference.

Morten SØNDERGAARD (audience): I would like to address the question of the institution and institutionalization of media both from inside and outside the museum. Is the museum the right place for media art? I am in doubt. I am not sure. Actually, I do not think so. But that might just be my personal opinion. As I have been discussing with Marianne, we've been speaking about a broad infrastructure that goes across institutional competences. But I think there is a more irritating and very important decision to make for the museums before we can move ahead: do we really want media art as part of the museum? And if you do, then that actually means that the institution might change. It needs to run on a different paradigm. I would suggest that media art runs on a different paradigm than contemporary art for instance. But this is a different discussion. I tend to say that the most stable things in this situation are the instabilities. We have these key instabilities that we can all think of: the documentation, the situation of these obsolete technologies, the context that evolves, our aesthetic judgments and all of these things. They are always coming in and these are the challenges. Maybe this can be the starting point of the discussion–and it is of course. What is the best infrastructure for meeting these challenges? I am not sure it's the museum.

KENDERDINE: I don't think that this panel is suggesting that either. I think that everyone is looking for a network solution in that sense. So there will be instances in the museum but equally in other contacts. And the infrastructure idea that could support the archive-ability of this material is definitely a multi-institutional type of thing. And a European-type framework is possible in that kind of network.

José ALCALÁ Mellado (audience): First of all, congratulations for the great conference. I am a museum director of the *Museo Internacional de Electrografía* in Cuenca, Spain. We have a lot of interactive artworks in our collections. We have over 120 pieces done with obsolete programs like Director or Flash, that really there are no machines today that can run them. So we have a special computer dedicated to that, for example, Max Use System 9.0 that can run these CD-ROMs. I spend a lot of money on programmers that can actualize or update these things. But the question is: "Who is interested in it?" So there are two questions: first, we must create the desire in people to really be affected, to really love these pieces. This is the first thing we must do. To do that, we must create an artistic theatre that specializes in it, a story told that everybody understands and is in love with the artist, with the work, etc. In that case, maybe, someday using that program, the exhibition of media art will have this huge cue like Picasso. When we get it, I'm sure that managers of museums will be really interested, in having, in getting, in buying, in showing and in conserving; Then the second problem, which is conserving and restoring. The restoration of media art as a scientific practice is very new. That's not true if you go to the Prado Museum, where you have a special department dedicated to preserve works from whatever–the 17th, 18th or 14th centuries. It has a lot of money to spend on it. And this is a science practice; so there are many specialized conferences where these guys go to. This is the best way of doing that. Can you imagine a department specialized in conserving digital art? If I could get one of those guys into my museum, and pay him every month, then there is no problem. They will always be updating systems, hardware, software, etc., and going all around the world to congresses focusing on what is the best way of doing these things. So it is clear: first create the desire in the people.

Artistic, Collective & Curatorial Methods for Digital Archiving

#Best Practices for Conservation of Media Art from an Artist's Perspective[1]

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Keywords

Preservation, artist's perspective, institutions, collaborative practices, best practices

Dear colleague,

For most artists I know, "Art conservation" is a troubling affair: we are already too busy maintaining operations as it is, we think of our work as a "living" entity not as a fossil, we are often unsure if a project is finished, we snub techniques that may help us document, organize or account for our work as something that stifles our experimentation and creative process. In addition, especially when we are resentful that institutions are not collecting and preserving our work in the first place, we reject the whole concept of an Art collection—agreeing with critical historians for whom collecting and preserving contemporary Art represents an obsessive-compulsive vampiric culture of suspended animation and speculation that is grounded in a neo-colonial, ostentatious, identitarian drive: Nietzsche's "will to power" mixed with Macpherson's "possessive individualism."

For this text, let's assume you are already at peace with the contradiction that is conservation: you are now interested in both creating the work and overseeing its death or zombiefication. Perhaps despite being a staunch democratic socialist you now have your own Art collection. Or maybe you have met a few collectors who take risks with you, acquire your

1 This article was first published on Github on 28 September 2015: https://github.com/antimodular/Best-practices-for-conservation-of-media-art/blob/master/readme.md.

work and help keep your studio afloat financially. Most importantly, especially if you are an insecure megalomaniac like me, you don't want to disappear from history like so many great artists who are not collected by important Museums.

So here we are, thinking about the topic of conservation in media art. As you know, there is a plethora of existing initiatives to preserve media artworks, but these are always from the perspective of the institutions that collect them. While most institutional programs include excellent artist-oriented components like interviews and questionnaires, the programs are all a posteriori, almost forensic, as they look at the work in retrospect, as a snapshot of time.

This text is written to outline what artists may choose to do on the subject in order to i) simplify our life in the long run, ii) generate income and iiii) take ownership of the way our work will be presented in the future. I welcome variations, additions and comments. Yes, it is absolutely unfair for the artist to have to worry about conservation of their work. Now let's get on with it.

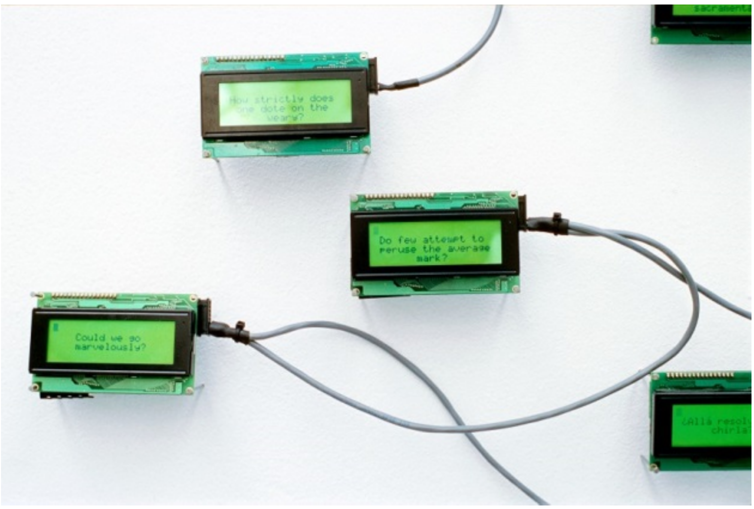

Figure 1. Rafael Lozano-Hemmer, *33 Questions per Minute, Relational Architecture 5* (detail), interactive installation, 2000. ©Rafael Lozano-Hemmer

Before Making

Mistrust anyone who has a “method” for conservation of Media Art. Anyone, such as myself, who offers a set of rules is someone who is not considering the vast range of disparate experiences, methods, constraints and dependencies that can arise even within the work of a single artist. All we can do is suggest a bunch of tips, wait for an artist to prove those tips useless, and then review the tips.

Study instruction-based art, in particular Moholy-Nagy Construction in Enamel 2, his 1923 painting reportedly ordered over the telephone, and then study the instructions of established artists who pushed and are pushing the boundaries of the art of instructions like Sol LeWitt, Felix González Torres and Tino Seghal. Citing these precedents, and Duchamp of course, will immediately relax the concerns that may arise with your own work’s materiality because this discussion already has been happening in the artworld for a hundred years.

Study precedents of technological art. I find that underlining connections between my work with historical experimental traditions is much more productive (and honest) than pretending what I do is “new”. Quote meaningful precedents that allow the collector to contextualize your work. For example, I often cite the pioneering use of radio broadcast technology by the Estridentista poets in Mexico in the 1920s, or the first use of neon lighting by Gyulia Kosice in 1946, or the first use of a live video feed in art installation by Marta Minujín in 1965 (50 years ago! How can we pretend what we do is “new” media?).

Decide if the work you are about to make will be a one-off ephemeral performance, a computer virus that is meant to multiply in ways you cannot control, a happening that is so site- and time- specific that it can never be owned, restaged or reproduced. If you decide this is the case then do not ever think about conservation, not once, and work with reckless abandon with the certainty that the death of your creation may be the highest form of beauty and experience. Some voyeur, flâneur, dilettante, opportuniste (or other person who can be described with a French word) will try to capture your piece and sell it or get a PhD, but really all that does is say “you had to be there.” If on the other hand you are interested in conserving the specific work you are making right now then read on.

While Making

Keep a notebook and/or electronic document where you put any sketches, prototypes, parts lists and bits of research on the project. Work in any development platform you feel is best for the project or for you, but if you have a choice always go for open source tools. At my studio we have often used closed commercial systems, such as "FaceAPI" for face recognition and "Shout3D" a proprietary online 3D API, only for the companies to go bankrupt or orphan the software leaving us with the task to re-engineer the work with more open equivalents (OpenCV in one case and Google Earth in the other).

Consider using versioning systems, like Git. These allow your software projects to be traceable incrementally and they are a great repository for fundamental information on how a project evolves. Of course code can and should have comments to help follow the code, but Git gives conservators a more global view. In my studio we are only now starting to use Git but I really wish we had started earlier. Versioning is important also in schematics, prototypes and manuals. In fact the whole idea of Versioning can be applied to the artwork itself as suggested in the next section.

Your software is your "score", the fundamental instructions that create your work, so back it up! At my studio we have a less than stellar system, which is basically a central repository of files in a drive which gets mirrored to an identical drive that is offsite. I also run Apple's time machine in my laptop to two drives: one at the studio and one at home. I do recommend a cloud-based solution as it can scale up, is (almost) always available and is cost-effective; however, you do need to feel comfortable that a corporation has your data (they always do anyhow) and that you can continue paying monthly fees, which is a big if. Some Museums are starting to have dedicated servers to hold all of their software collections, in the future all Museums will have to have this kind of data repository and conservation will be very linked to IT. If you keep your own server with all your data this may eventually also be co-located at a place for archives such as a particularly forward-looking library.

As you work, say on a complex installation with hardware, software, manufactured and found components, prepare a "Bill of materials" (BoM), which is basically a list of all components of a piece. List each separate component, writing its brand and model, its function, the URL for information, and a small picture.

Next to each item in your BoM, write whether the element is replaceable or irreplaceable. An irreplaceable element is for example a Nixie tube that you feel is crucial to the look or functioning of the final piece. If future conservators can't find an exact replacement the piece should have an honourable death. A replaceable element is everything else; but for every replaceable element there should be notes on what is acceptable, e.g. "this motor can have any specification so long as it fits in the cavity and it can spin the mechanism 5 times a second" or "this screen can be any CRT, LCD, LED, OLED or other technology provided it is between 15 and 17 inch diagonal, has a brightness of around 500 nits and can show XGA resolution" or "this cover is made of acrylic but it can be changed for glass so long as it is tempered and can stand the vibration, please do not use polycarbonate as that is not transparent enough."

When choosing hardware, try to limit any moving parts as much as possible, these are the parts that tend to fail most over time. An example is using solid state rather than spinning platter hard disks or heat sink cooling instead of fans. Another example is using a solid-state relay instead of a contact switch. A final example is choosing a wide-angle camera with virtual pan and tilt using region of interest rather than a motorized pan/tilt camera.

If you have a choice, use "off-the-shelf" components that are abundant. At my studio we developed our own computer vision tracking systems using industrial cameras for 15 years but now we have moved to Microsoft Kinect2 whenever possible as these are readily available. Another example is microcontrollers, as my studio now mostly develops with Arduinos, which are widespread, open and friendly. Your own developed systems of course should be used if they deliver better results, but then you need to document those appropriately.

Make global choices in your procurement. For example, choose gear that can function in a range of voltages 100-240V ideally with auto-switching circuitry; or if you are Canadian never use Robertson screws despite how great they are, as no one outside of our proud country has drill bits for this screw head. All your measurements should be metric and all your notes in English (yeah, I said that).

Program an "Idle mode" and/or an automatic shutdown for your piece. Collectors sometimes just leave a piece operating while they go on a holiday for two months. You need to detect if no one has interacted with the piece for a certain time for it to go into an Idle state that stops or slows down motors, shuts down or dims displays, and in general protects the piece. An auto shutdown is another way to save the piece unnecessary cycles, but ensure that you have a programmable power bar so that all hardware is turned off in the right sequence.

After Making

Make a video of the project, ideally with you speaking over it and explaining proper functioning. If you are shy then get someone to interview you. Install the project in a variety of computers, operating systems and/or devices and test for any SW or HW dependencies. Note these very carefully in a “Read Me” document that is in a way a version of the BoM for hardware. Bundle the Read Me file with installers for every single item on the list. For example include operating system, DirectX, any graphics drivers, APIs, programming environments, etc.

Prepare one or several flash drives with all the source code for your project, including firmware, binaries, media assets, schematics, 3D print files, EVERYTHING. Then add all the installers for the dependencies from the previous point. These flash drives are meant to be like a time capsule that hold all the instructions required to reproduce the work. Do include a document that explains that they should make a backup copy of the contents of the flash drive and ensure the integrity of the data from time to time.

Write a manual with the following parts: i) a “meta” narrative describing the key concepts and elements of the piece and how it works; ii) a detailed set-up procedure, including pictures of example installations, wiring diagrams, museographic notes such as desired lighting or acoustic conditions, sample layouts showing what is and is not allowed; iii) maintenance section on how to clean the piece and turn it on and off; iv) preservation section with the Bill of materials, all schematics, comments to the code.

Set your computers to perform uninterrupted for a long time. Ensure you are not defeating fans so it is cooled properly, no screen savers, disable automatic software updates for operating system and java for example, no virus checkers, monitor temperature inside boxes or enclosures, stop all notifications, stop all login passwords, etc. Prepare a toolkit with any drill bits, special tools, adapters and with spares of components that you think are most hard to come by.

Dealing with a Collector

Take the video, the flash drives, the manual, the toolkit and the spares and make a BOX. Give the box to the collector explaining how important it is and warn them that replacing it will cost $750 (or choose a number that is profitable). Many collectors will quickly lose this box. When they come to you asking for a replacement make a buck for godsakes.

Explain the concept of digital copy to your collector. Most do not understand that an original file is identical to a copy. And if they do, they are so completely absorbed with the aura of authenticity that I have heard of artists having to destroy a digital file once they print copies of a digital picture. This is absolutely absurd and unnecessary for work like mine (and yours). If a collector buys an image from me I want to give her the Tiff file with colour looking tables and printing instructions so that she can reproduce the work in the future when the UV rays wash the colours out or when a child takes a knife to the image. So long as you copy the data from the flash drive onto other future media, as USB dies, the work that you own will be perfectly reproducible, like the instructions of a Sol LeWitt or a González-Torres. In this sense, digital prints are orders of magnitude easier to preserve than any other print.

Once the collector understands that they have the digital files needed to reproduce most or all of the work they might panic asking how their investment is protected from reckless reproduction. The answer is centuries old: with a signature. For each of my pieces I give a certificate of authenticity that is the tradable commodity of my work. In my case, the certificate is an A5-sized doubly anodized aluminium ingot that shows the details and picture of the work. I sign the certificate by hand, adding the edition number. The certificate is also engraved with our studio numbering system, has three digital watermarks and soon it will also have a blockchain unique signature. This is what you keep in the safety deposit box as it is completely irreproducible. If you do not have this certificate the piece you have is completely worthless. This certification system is retroactive, and we are slowly giving one of these for each piece acquired in the past. Running a personal certification system also has the side benefit of protecting you from potential fraud from gallerists or intermediaries who may be reproducing your work behind your back. This has not happened to me but I have heard many stories. Another benefit of personal certification is that if the collector does not pay you in full you simply do not hand-over the certificate. He or she may have the work after paying an advance, but the purchase is not complete until the work is fully paid and the collector is in possession of the unique certificate.

Unless the piece is very simple, the price of acquisition of a work should include an honorarium for you or a technician to help with installing the work on site (what is not included in the acquisition price is the flight, accommodation and per diem for you or the technician). Make it clear to the collector that their installers need to follow your instructions on how to hang the work physically, run the wires and provide electricity. You cannot do those things because you are not insured. You are there only to supervise and to calibrate the system.

Once you or your technician calibrate the work, show it to the collector, teach them how to turn it on and off and clean it. Then ask them who you should train for a full technical run through of the piece, e.g. the collector herself if she is nerdy, her installer, the IT department, the conservator of the collection, etc. Do a complete walk through of the work with this person and show them the manuals, spare parts, and so on. This person will be the first one that the collector will go to when the work malfunctions so he or she is very important for your own peace of mind. Once you have trained the collector and the technical person, make them sign a document that simply says that the work has been installed to their liking, that they received training on the operation, maintenance and preservation of the piece.

Install VNC or, better, LogMeIn and explain how you can log in remotely to fix problems if needed. Show the collector how to disconnect the piece to the net if they want privacy. Depending on how fancy the work is, you can consider also using networked power bars to cycle the power remotely if necessary.

Have the collector install surge protection and grounding to the power that is supplied to the piece. Many problems we have seen throughout the years come from bad power: fixing a burnt transformer is often a tedious and expensive job and often the circuitry is also affected.

Talk about maintenance. To the best of your ability give a specific Mean Time Between Failure (MTBF) estimate, which is basically the time it will take for components to break, on average. For example if the piece has a projector quote the number of hours that it will work for before a bulb needs to be changed and specify how much that will cost to replace. I typically use two metaphors to explain maintenance on a media artwork, depending on the collector and situation: 1) The artwork is like a car—you should drive it from time to time, change the oil and tune it, but the more you drive it the more it will cost to preserve; and 2) The work is like a fountain—you have a capital investment but then there is a maintenance budget for changing rusty valves, chlorinating the water, etc.

Talk about warranty. You should let the collector know about whatever warranty there is on the individual components of the piece, for example a computer usually has a 1-year warranty. But you should under no circumstances guarantee that the work will function a given amount of time. You are not a corporation, you do not control the conditions of the exhibition or the handling of the piece after you depart. The spirit of giving the collector all schematics, software and code, plus the training, spare parts and manuals, is that you are now delegating conservation to his or her collection. When the collector is uncomfortable about the lack of warranty clarify the technical support you are willing to give.

Providing technical support can be a nightmare in Media Art. Not providing it is even worse. If a piece fails the collector needs to know exactly who to call and have a support network. If they don't it is possible they will never invest in media art again. Often artists make networks that include their galleries, trusted technicians or AV companies. In our case here is what we ask the collectors to do in case of failure:

- i) Read the manual. Over 95% of failures are something simple like a power cable that is not nestled in fully.
- ii) Contact the installer who was trained by you or your technician, he or she should be able to troubleshoot at a higher level.
- iii) Contact the gallery in case they have a technician who can help.
- iv) Call or email my studio and we will try to fix the problem remotely for free, over the phone and remote login if available.
- v) If the problem is not solved, we are happy to go on site to solve it. The costs are: return flight for you or the technician to go to the city, accommodation and per diem, any parts that needed replacement, and $750, or some other daily fee you establish, for honorarium. Please note a travel day is charged at half the daily rate. It is my experience that collectors rather get direct support from the artist studio even if that may be costly. This money helps the studio maintain operations and instead of technical support being a nightmare it is now a source of income.

Provide a migration path and explain versioning for artwork. When collectors acquire a media artwork they need to know they are getting an "event-based" living piece that is closer to a performing arts commission than a traditional visual artwork. Many conservators understandably cringe at the possibility of an artwork changing over time, but that is exactly what Media Art should aspire to do. In an epic conversation with Tate expert and friend Pip Laurenson, I realized that what she was after was completely different but not entirely incompatible with what I envisioned. Tate acquired my work "Subtitled Public" made in 2005. In this work you enter an empty room, are tracked by computerized surveillance, and a random verb is projected on your body which follows you everywhere—the only way to get rid of the word is to touch somebody and exchange words with him or her. The project was written in Delphi, using firewire cameras, IR illuminators and XGA projectors. Using an impressive and comprehensive method Pip ensured that the piece that is at Tate can be performed using these original technologies, giving the public a snapshot of what computerized tracking was like in 2005. So far so good. Ten years later there are hardly any Delphi programmers, firewire is dead, projectors now have over 10x the pixel resolution and Kinect2 tracking is orders of magnitude faster, more accurate and easier to install. I am now planning a migration path for "Subtitled Public" to work with these new technologies because this particular project is not about the specific tracking and projection used but about the experience of words branding the public. I am eager to see the project in a second version because the experience will be more ominous. The cost for this migration is relatively low, especially if you consider that you would not need to stockpile older gear or interpret Delphi code. Versioning is almost as if a collector buys a piece of software for an initial amount, then the artist improves this over time (in a way the artist provides a Conservation path for the artwork) and charges a small upgrade fee. Like in industry, versioning can also be a source of income for the studio. Of course in the future, Tate can choose to exhibit either version or both. It depends on the show. The key is not to think that both these approaches are mutually exclusive. Obviously, the artist cannot go and offer version 2 to a different collector, a migration is available only to the collector who originally acquired the work.

Versioning should end with the death of the artist unless you leave specific instructions on what you need your estate to accomplish (like González-Torres did). A collector should be free to decline migrating their piece along the artist or estate suggested path. If in the future the piece is acquired by a different party the new owners can decide to pursue a migration. Should the collector attempt to preserve the work with a migration path that is egregious and not approved by the artist or estate, the title of the work will be automatically void and the artist will be able to sell it again (I learnt this from James Turrell's practice! It is so smart: you need to be protected from someone adding or taking away an element to the piece that you did not approve of).

Final Notes

Trust conservators! They are absolutely fundamental for your work to have a future performance. They also have a lot of experience in preserving the most diverse things you can imagine. Establish a dialog with them and work out a migration plan, they tend to be relieved when the artist has thought through these issues. Above all, you don't want the collector to think they are acquiring a future conservation problem (though admittedly every work, even a painting, is a future conservation problem).

Trust curators, but not as much as conservators. In the future the curator is the person who will stage your work in a variety of different contexts. Try to explain in your documentation what is and is not possible with the work. Many curators are sadly too rushed to read manuals, which is why you must trust conservators more.

Keep a website! For each piece that I have ever made I have a webpage with videos, photos, descriptions, bibliography and most important: the manual for the work in PDF and a list of credits of the people who worked on the project. Giving public credit to engineers, programmers and other assistants is an honest thing to do but is also a way for future conservators to track projects by different coding styles, for example.

This final note is not for everyone, but it is something that makes sense for my work: In my upcoming monographic show in Mexico City's MUAC Museum we will publish a USB flash drive which will contain absolutely all the source code and schematics of every single artwork on display (there are 42 pieces!). We already have a GitHub account where we share some of our programming to the open source community, but this new idea is designed to be more radical. We want to make software and methods something more dialogical, less precious, more open, more viral. If my servers crash and no museum has backup copies my work will already be in the forks of dozens or hundreds of other projects that other artists-programmers have developed from my studio's code. Infecting future projects is our new strategy for preservation. To our knowledge this will be the first time that a comprehensive art show will be made available with an open source code.

Version 0.9.1

PS. The cover image is “33 Questions per Minute” a piece from 2000 which ran on Windows 98 and was programmed in Delphi. In 2006 MoMA acquired the work and used my source code to port it to C++ and run it on Linux, thus proving that stockpiling old PCs was not necessary to assure conservation. That was some next level shit right there and a big relief for all. I have only now found this new initiative from the Museum and I shall look at it closely
http://www.moma.org/explore/inside_out/2015/05/13/open-sourcing-momas-digital-vault/[2]

PS2. I want to acknowledge the talks I have had with numerous friends and colleagues, most notably my studio assistants and the great Kim Brickley whose interviews helped me put some order to it all; but also Steven Sacks, Patricia Ortiz Monasterio, Zimoun, Daniel Canogar, Pip Laurenson, Glenn Wharton, Christiane Paul, Ben Fino-Radin, Kate Lewis, Sarah Cook, Beryl Graham, Matthew Biederman, Kathleen Forde, Rudolf Frieling, Barbara J. London, Pablo Helguera, Colin Griffiths, Alain Depocas, Jean Gagnon, Abigail Susik, Steve Dietz, Erkki Huhtamo, and other artists, collectors, historians, curators and conservators who like talking about this kind of thing.

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2 The link is no longer active. See here for the archived version: https://web.archive.org/web/20151104013918/https://www.moma.org/explore/inside_out/2015/05/13/open-sourcing-momas-digital-vault/.

Museums of Losses for Clouds of Oblivion

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Abstract

This paper describes the overdose situation of documentary production fostered by social networks and its impact on the traditional forms of storage and the contemporary memory culture. It situates the specificity of net art in its connection to dynamic and systemic environments of flow, over which there is no control, implying new conservation parameters and investigates the particular aesthetics. It problematizes the political instances that have turned the Internet into a surveillance environment, denying access to older sites and affecting the preservation of online art. In the end, it presents how we are working with Museum of Contemporary Art of the University of Sao Paulo (MAC-USP), in the development of a methodology to deal with net art pieces in the museological universe. The discussion is based on the case of *The Book after the Book* website (1999), which required a series of updates and reprogramming of codes in the process of migration to the museum collection. Based on this experience, we suggest a reflection about net art museums as museums of the unfinished, unrepaired and unrecovered. This strategy may allow dealing with irreversible losses, without counting on the following process of disappearance of the artworks.

Keywords

Net art conservation, post Internet, digital patrimony, digital museums, surveillance

There have never been so many records, and yet it has never been so difficult to access our recent past. We are on the verge of a documentary overdose, covering all media formats. But there is also an undeniable intensification of obsolescence processes, which wreck equipment and distribute broken links everywhere. This phenomenon is rooted in the “conflation of memory and storage that both underlies and undermines digital media’s archival promise.” And this is not a result of technical characteristics of the medium itself, “but rather due to how everyday usage and parlance arrests memory and its degenerative possibilities in order to support dreams of superhuman digital programmability." (Chun 2008: 148-149)

The issue goes beyond the emergence of different storage scales and the pace at which content is made available online. Taking as a reference the current imagery production, it is estimated that every two minutes the world produces more photos than the total shot by humanity in 150 years and that every minute 300 hours of video are made available on YouTube (Eleveth 2014).[1] It is a whole new culture of memory that subverts the principles of traditional archiving, based on the logic of document selection, disposal and organization. How to deal in the field of preservation and conservation with files that disappear, works that stop functioning, services that vanish from one day to the next? How do these impact art museums?

Transmission aesthetics

I speak from the artist's point of view. Of someone who has been working on the web since the 1990s. At that moment, the web was believed to be a field of open possibilities, new formats of creation and circulation. Artistic production was done independently, appropriating elements from other websites, open to public participation and incorporating features offered by networks and their infrastructures. A set of attributes that was later conceptualized as "database aesthetics" and "information curation" which caused some of the major problems for the conservation of the first net art works such as *The Book After The Book*[2] (1999) by myself.

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1 http://www.internetlivestats.com .

2 *The Book After The Book* was released in the exhibition NET_CONDITION in ZKM (Center for Art and Media Karlsruhe, Germany) in 1999, as a result of a scholarship granted by Fundação VITAE, which does not exists anymore. It is considered a pioneering work of net art, in the studies on the presence of women on the Internet and in the field of cyberliterature. There are many references to this work in different university programs around the world, as well as in books, exhibition catalogues, and academic research. For a detailed approach, see Anne-Marie Boisvert, “Das Buch Nach dem Buch,” in *Im Buchstabenfeld: die zukunft der literature*, ed. Peter Weibel (Graz: Neue Galerie Graz, 2001), 67-76 and Kimberly Knight’s essay at *Transliteracy Project* webpage by University of California (2006).

The Book After The Book is a net art work that reflects transformations suffered by literature and reading in the context of the Internet. It centers on non-linear narratives, works that give programming language textual and aesthetic contents and creations that discuss and problematize the condition of reading, the book and the reader in the passage from print interface to the web (Figs. 1-2). As Knight (2006) describes, it brings into focus

> [...] the ways in which the machine alters reading and the multiple roles of the machine in the reading process—the machine as reader (browsing tools, etc.), the machine as writer (automatic text generators, etc.) and the machine as interface between the reader and the text.

```
<html>

<head><script LANGUAGE="Javascript">
<!-- Original:  Fred S. Tucker (Slurpie_Tucker@yahoo.com) -->
<!-- Web  URL:  http://members.tripod.com/~Slurpies_Page  -->

<!-- This script and many more are available free online at -->
<!-- The JavaScript Source!! http://javascript.internet.com -->

<!-- Begin
function makearray(n) {
this.length = n;
for(var i = 1; i <= n; i++)
this[i] = 0;
return this;
}
hexa = new makearray(16);
for(var i = 0; i < 10; i++)
hexa[i] = i;
hexa[10]="a"; hexa[11]="b"; hexa[12]="c";
hexa[13]="d"; hexa[14]="e"; hexa[15]="f";
function hex(i) {
if (i < 0)
return "00";
else if (i > 255)
return "ff";
else
return "" + hexa[Math.floor(i/16)] + hexa[i%16];
}
function setbgColor(r, g, b) {
var hr = hex(r); var hg = hex(g); var hb = hex(b);
document.bgColor = "#"+hr+hg+hb;
}
function fade(sr, sg, sb, er, eg, eb, step) {
for(var i = 0; i <= step; i++) {
setbgColor(
Math.floor(sr * ((step-i)/step) + er * (i/step)),
Math.floor(sg * ((step-i)/step) + eg * (i/step)),
Math.floor(sb * ((step-i)/step) + eb * (i/step)));
  }
}
function fadein() {
fade(0,0,0,255,240,232,223);
}
fadein();
window.location="redefinicao.htm";
// End -->
</script>

<title>O Livro Depois do Livro: Favoritos</title>
<meta name="GENERATOR" content="Microsoft FrontPage 3.0">
</head>

<body>
</body>
</html>
```

Figure 1. Giselle Beiguelman, *The Book After the Book*, 1999, original code of the “interval pages.” ©Giselle Beiguelman

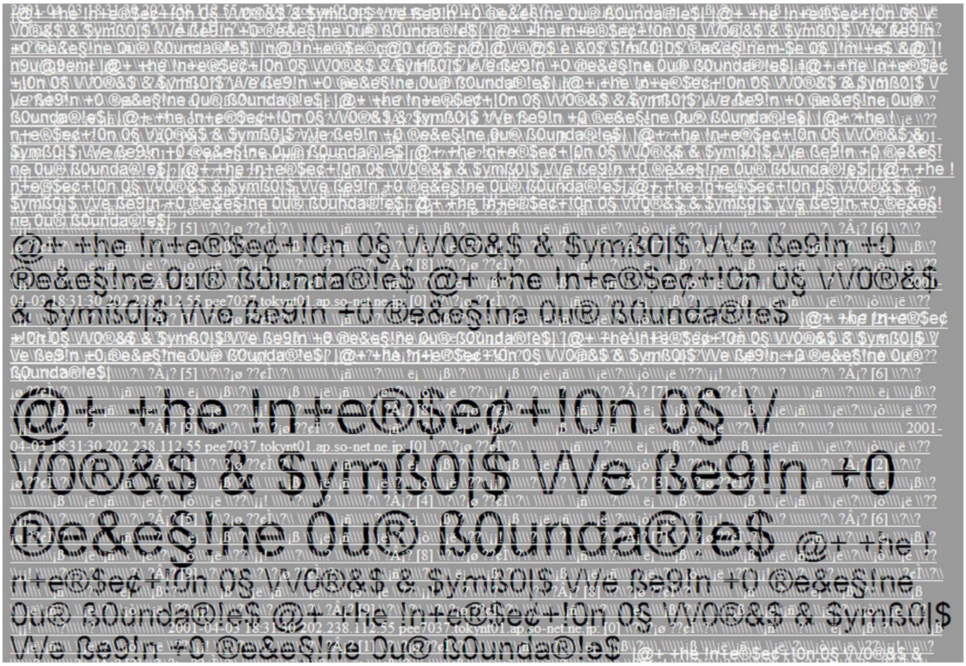

Figure 2. Giselle Beiguelman, *The Book After the Book*, 1999. ©Giselle Beiguelman

The website features an imaginary library whose bookshelves, which accommodate cyberliterature and web art sites, are intercepted by reading intervals. These intervals are empty pages with no endpoints that vanish from gray to white and their role was strategic. Placed between the "shelves pages", the intervals main function was to prevent the return to the shelves through the browser arrows, forcing a reading that would break the orientation parameters of the print environment. Today this transition, despite its relevance to the work, is imperceptible, given the speed of the nowadays connections.

Not only would every return to the library imply a new reading itinerary, but also any selection would mean taking the risk of changing the path, losing the starting point and redirecting the reading. By advancing to a selected work, the reader would be forced to leave the website of *The Book After The Book*. In that sense, the library was a node in a net, a set of revolving shelves, working as a new reading machine. It assumed that it was somehow necessary to break with the culture of the page, by proposing other interface compositions, to read in a data environment. One had to "get lost" on the site in order to move through its shelves of sand (the reference to Borges' work here is explicit.)[3]

For conservation, artistic projects like *The Book*... are somewhat tricky works. They involve systems impossible to control for both the artist and the institution. Their preservation would require the possibility of managing the external websites that make up the work and this is unfeasible. It would also need, as we will see later, the recovery of a series of auxiliary scripts incompatible with current web security standards. Besides, it is not possible to recover the earlier Internet context, as this would require restoring the flow of a given moment.

At best, it is possible to locally emulate the ideal rate of data transmission at the time, as was done at the 20th anniversary commemorative exhibition of Olia Lialina's *My Boy Friend Came Back From the War* net art work, held at MU in Eindhoven in 2016, curated by Annet Dekker. One of the most important works of online art, *My Boyfriend*... is a nonlinear narrative, structured in hypertexts, that tells the story of a couple trying to communicate after the war. The work was presented on an old computer with a Windows operating system, equipped with an 800 x 600-pixel resolution monitor, a Netscape browser and a server controlled to slow down local Internet speed to 28.8 kbps (current networks operate with Megabits units—1,000,000 bits per second—as a minimum). Needless to say that this slow connection was not dialed, like the originals from Internet's early days, but rather the result of a technical maneuver on the specific server of the artwork. As Olia Lialina said, "everything is emulated, simulated and fake, but the work is alive in its most precious state" (Lialina 2016).

It is true that the readability of any artwork is changed by its context. However, the Internet creates a brand new situation, in which "through transfer and transmission processes, the context can also become content" (Lovejoy 2004: 223), as is the case of the interval pages of *The Book After The Book*. In this sense, discussing the preservation of net art implies discussing its transmission aesthetics and new archiving models. In Christiane Paul's words:

> The contextualization and archiving of net art require new models and criteria for documenting and preserving the process and insta-

3 *The Book of Sand* is a short story by the Argentinian writer Jorge Luis Borges. It describes an infinite book called "The Book of Sand"... "because neither the book nor the sand has any beginning or end."

> bility of works that are often created by multiple authors and constantly develop over time. (Paul 2014: 297)

Accessing an art work conceived for the web, outside its speed, resolution, and technical standards and without its minimum technical features compromises the enjoyment thereof. In an interview to critic Tilman Baumgärtel in 1997, the JODI duo emphasized the relevance of the context as content, and the role of data unpacking speed in net artworks, especially those designed in the 1990s. "We work with the speed of transmission on the internet, or rather the slowness of transmission. That would get lost, if it was on a CD-ROM. None of the pages of our site has more than 30 kilobytes to make it accessible. Yet we think: The slower, the better" (JODI 1997).

These aspects reinforce the demand for new conservation procedures in the field of media art, which tend to give up media storage to focus on the preservation of the artwork (Rinehart and Ippolito 2014: 46). We can mention some of them: migration processes between equipment, emulation of systems and updating of the work's source code. Migration procedures involve replacing media and exchanging similar material. Emulations are processes through which routines and behaviors are transferred from one object to another momentarily, "operating as a sort of facsimile of digital files in a new medium," as Jon Ippolito describes it. Finally, it is also used to update the artwork code, which sometimes has to be recreated in order to re-operate in new media environments, a central issue in net art and computer-based works. Some of these procedures, especially those of migration, are more suitable for physical artworks. However, all of them involve a series of exercises of reinterpreting works that are directly linked to their hardware in the process of symbolic construction.[4]

These practices can hardly be viewed in "pure" format. Exhibitions like *The Art of Participation: 1950 to now*, held at the San Francisco's Modern Art Museum (SFMOMA) in 2008, curated by Rudolf Frieling, and *Waldemar Cordeiro: Exact Fantasy* at Itaú Cultural (São Paulo, 2013), curated by Analivia Cordeiro, are good examples. Besides an opportunity to see historically relevant works of art, interesting experiments in assembling these works were presented that required procedures for migration, emulation, and reprogramming of their codes (Beiguelman 2014: 16-19). Nevertheless, despite the instrumentality of those methodologies for the

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4 For a detailed description and examples of these processes with many cases, see Richard Rinehart and Jon Ippolito, *Re-collection: art, new media and social memory* (Cambridge/Mass.: MIT Press, 2014).

recovery of several media artworks, net art continually defies their conventions. In the online system, the obsolescence of machines and programming languages like JavaScript of the 1990s or Flash from the beginning of the 2000s coexists with the absence of the dynamics that characterize most works.

A series of initiatives and projects for archiving and preserving the memory of Internet in general and net art, in particular, have been tested based on the fact that much of the culture created between the 1990s and nowadays has been lost. With regard to projects developed by institutions related to the archiving of net art, there are some pioneer actions. Some of them are: the Rhizome Art Base of 1997, the Variable Media Initiative project, started at the Guggenheim in New York in 1999, and the Whitney Art Port, which commission works and then incorporates them into the museum's collection since 2001.

Independent platforms such as Taxonomedia, coordinated by Vanina Hofman (operating since 2005) and net art latino database, created by Brian McKern, which has already closed its activities, are also relevant. Last, but not least, we draw attention to the Archive of Digital Art 2.0. The project, conceived and directed by Oliver Grau, is not exclusive to works of net art and counts more than 5,000 cataloged works. Started in 1999, it is a continuously expanding database, the result of the joint work of artists, archivists, curators, and publishers.

Other some major examples are the Internet Archive's Wayback Machine[5], a search engine that enables browsing older versions of websites, and the development of the WARC, "a file format that specifies a method for combining multiple digital resources into an aggregate archival file together with related information that assembles metadata" (Library of Congress 2017). In line with this approach, more focused on dynamic archiving design than on website conservation itself, are Rhizome.org's award-winning Webrecorder[6] and Old Web Today[7].

The Webrecorder is not intended for the recovery of websites that have been disabled or stopped working but instead helps to collect what is produced today for the future. It allows dynamic versions of online content to be recorded. Its main specificity is that it preserves the interactivity of web pages, "recording", as they say, "network traffic within the browser while the user interacts with a web page." Moreover, it allows the user to

5 Internet Archive. *Wayback Machine*. http://archive.org/web.
6 *Webrecorder*. https://webrecorder.io.
7 *Old Web Today*. http://oldweb.today.

keep a copy of their material on the project website to download the file in WARC format and browse the content offline.

Old Web Today works like a time machine that enables browsing in older versions of websites in browsers of the time when they were designed. This access, however, means to reframe the interface design of the time and not recovering the contents. This is a lot of work given the various structural changes in HTML (the language interpreted by browsers) from 1995 to the present, which prevent us from even being able to view older works. However, this type of tool is not enough to put resources that have become obsolete and inadequate to current standards of network speed and security into operation.

Clouds and walls

After September 11, 2001, the Internet changed a lot. The Twin Towers attack revealed networks to be double-edged swords, causing the once common speech about them being "essentially good" to collapse (Chun 2004: 149). But this perception created the conditions for the logic of the "unknown unknown"[8] threat to expand rapidly, imposing a state of paranoia on all instances of everyday life, and infiltrating the most basic routines of the online experience (Galloway 2006).

In this period also emerged what we call Web 2.0. This 2.0 does not refer to the emergence of a new Internet protocol, but to novel information architecture that enables a different use of it. Instead of being just content available for consumption, the Internet becomes a database-based platform for development and creation, using Content Management Systems without demanding technological backgrounds from users. The system, which promises the era of consumer-generated content (CGC), delivers unprecedented concentration in the hands of a few companies. If it is a fact that "databases facilitate access by the many," it is also true that “the connection of so many websites as there are now on the WWW today is only possible through highly connected, automatically operated centers", which only big corporations have the structure to maintain (Warnke 2012: 86).

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8 The statement by Donald Rumsfeld, US Secretary of Defense (2001-2006), became famous at a press conference at which he justified the US invasion of Iraq, despite the lack of evidence of chemical weapons that would threaten world peace: “(...) that is to say we know there are some things we do not know. But there are also unknown unknowns -- the ones we don't know we don't know.”

This architecture consolidates the model of cloud computing based on the sharing of servers interconnected via Internet. Social networks such as Facebook and Twitter operate in the clouds, but also software companies like Microsoft, stores like Amazon, iTunes, Google Play, services such as email and virtual drive storage, like Gmail, Outlook, and Dropbox programs, besides governmental organizations of open data.

Usability may be the reason for the success of this model of Internet, but it is also what has turned it into a space populated by fortified "citadels," where people live within a few dominant websites and accessible services. Anyone can participate in them, but only according to the rules prescribed by previously programmed algorithms. The use is costless (not free). Payment is our data that we make available in exchange for the right to use the services of the databases (Warnke 2012: 89).

This wealth of information feeds new surveillance devices, such as those embedded in the controversial 2001 Patriot Act, which by claiming to counter terrorism gave the US government the right to access data stored in several American companies (Metahaven 2012). In this respect, the collective Metahaven states:

> Where and by whom sites are registered and data is hosted matters a great deal in determining who gains access to and control over the data. For example, all data stored by US companies (or their subsidiaries) in non-US data centers falls under the jurisdiction of the USA Patriot Act, an anti-terrorism law introduced in 2001. This emphatically includes the entire US cloud—Facebook, Apple, Twitter, Dropbox, Google, Amazon, Rackspace, Box, Microsoft, and many others. Jeffrey Rosen, a law professor at George Washington University, has established that the Patriot Act, rather than investigating potential terrorists, is mostly used to spy on innocent Americans. But the people being watched need not even be Americans. Via the cloud, citizens across the world are subject to the same Patriot Act powers – which easily lend themselves to misuse by authorities. (Metahaven 2012: 3)

Since these companies, such as Amazon, Microsoft, Google and Facebook, have planetary dimensions nowadays, a new "Platform State" has been created based on a surveillance model, performing as a "mega search engine" (Bratton 2016: 120-121). This has led to the strengthening of usage and behavior patterns that cause independent, open and free applications, without any certification, to be potentially suspicious.

Platforms such as Google, Amazon and Facebook, mediated by sophisticated algorithms, have become the Internet itself, expelling everything that does not fit the cloud model into a limbo of not being recognized as standard. This unrecognized standard includes a gallery of scripts and programs that are suddenly "outcasted" from the orbit of browsers and operating systems.

The association between free software and a malicious program is a prerogative of all antiviruses. On the website of Norton Antivirus, one of the most popular programs of its kind, an article explains the risk of installing a free and independent program: “There is no such thing as free lunch. So check out what the motive is behind why the freeware you want is free to begin with. Are they testing the software for bugs or did they make it for fun? Is the freeware simply a guise to trick you into opening your computer up to a virus or spyware?” (Wasserman 2015)

It would be naïve to believe that there are no programmers who use freeware to infiltrate malicious code that can capture user data and infect computers. However, many developers, who do not act within the corporate parameters of the software industry, develop for research reasons, ideological commitments, and aesthetic affinities—freeware to be applied in works of net art. In the algorithmic horizon of the post-Internet world, however, works using these kinds of programs are now doomed.

Dutch artist Constant Dullaart poses the problem by questioning whether art can still play an active role in PRISM times[9], when "identities are managed by commercially driven algorithms; the URL has died; SLL is broken; most communications are recorded and analyzed for reasons beyond our access” (Frieze 2013). This makes us think that in the post-cloud Internet world, besides technological obsolescence, the conservation of net artworks also deals with ideological obsolescence.

Second-generation originals

The Book After The Book is one of many 1990s websites created with open-source programs and free, independently developed, uncertified applications. Today, all this is considered suspicious by the security parameters of the main Operating Systems. Since 2015, it belongs to a museum, the Museum of Contemporary Art of the University of São Paulo (MAC-

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9 PRISM is the name of the electronic surveillance system of the United States Security Agency (NSA). It allows you to monitor and retrieve information from phone calls, emails, Facebook posts, Google Drive files, Skype conversations, and a myriad of online activities. The system surfaced following reports by former systems analyst Edward Snowden to the English newspaper The Guardian in June 2013.

USP), which has a tradition of working with ephemeral and multimedia artworks, since the pioneering work of professor and curator Walter Zanini who led the museum in the 1970s (Freire 2014).

The difficulties of accessing the website, due to new security standards, raised a discussion about conservation procedures and insertion of this type of work into a museum collection. We decided that this website project, as well as the other net artworks authored by me in the collection[10], would be preserved in their entirety, also by replacing the currently "forbidden" programming resources with open source with certified programs. This new original or "second-generation original" (Lunenfeld 1996: 97), and those that will come later is how the work is made available to the public. As research documentation, the website also includes a zipped file with all folders of the first version of *The Book After The Book* and an emulated release of its 1999 edition (Figs. 3-4).

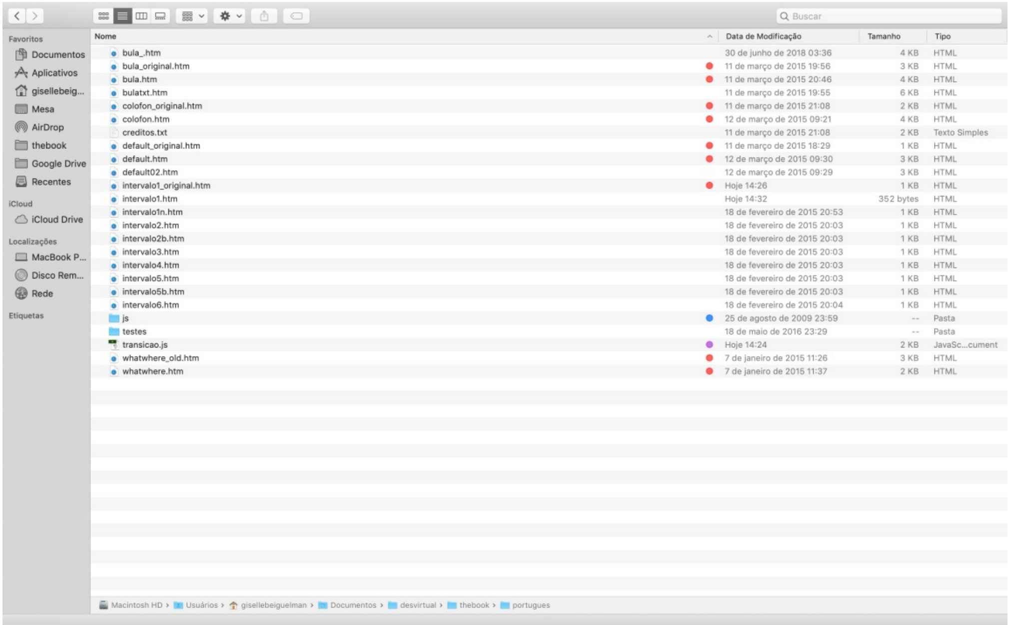

Figure 3. Giselle Beiguelman, *The Book After the Book*—Rebuilding process, 1999-ongoing. In red, original files which demanded new code implementation (structure_the_book_after_the_book), screen shot. © Giselle Beiguelman

10 Thanks to the initiative of Professor and Curator Ana Gonçalves Magalhães, MAC-USP has now in its collection *The Book After The Book*, which we discussed in this article, the video installation *Cinema Lascado 1: Minhocão*, as well as the following net artworks authored by me: *Wop Art [WAP + Op art]*, one of the first works of art for mobile phones (2001), *Ceci N'est Pas Un Nike* (2002) and web app *I Lv Yr GIF* (2013), with all its previous versions for desktop and printing.

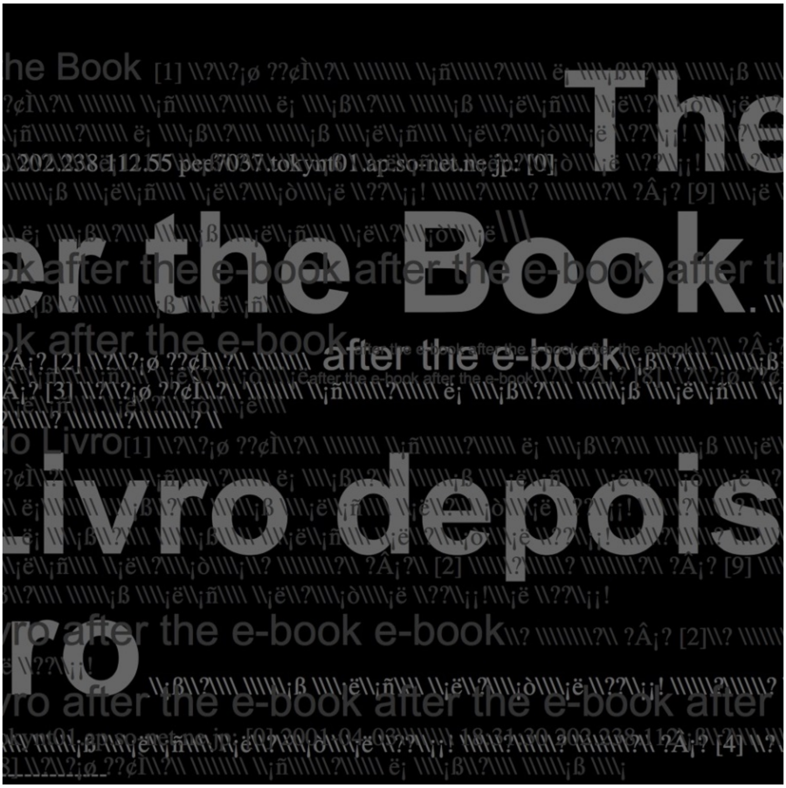

Figure 4. Giselle Beiguelman, *The Book After the Book*, 1999. ©Giselle Beiguelman

The artwork thus becomes a kind of an open palimpsest of recoded layers and rewritten programming languages. Since it is impossible to be recovered due to its contextual nature as well as technological and ideological obsolescence, alternative conservation formats based on updating and emulation procedures need to be taken into consideration. Unlike simulations, which pretend to represent an absent model, mimicking the lack of something, emulations constitute a presence and only exist during the behavior transfer process. [11] Updates, on the other hand, assume the need to recycle codes—irrespective of an attempt to recover them—in order to adapt them to new network contexts. This is the method we are working with to preserve it.

Memory is always dynamic and one has to presume that many updates

11 In name and function, emulation processes return to a practice current in the context of 16th-century humanism, *aemulatio*, a form of exegesis and interpretation of texts. It operated from a relation of resemblance "liberated from the law of the place," acting as a sequence of duplicate mirrors, within which things could be imitated without being chained or close to each other (Foucault 1992: 25).

will reach, one day, a profile very different from their first versions. These earliest versions can become completely inaccessible. How will museums respond to these challenges?

If the option is to look for ways to freeze, in some way, the net art environment of a given moment—a task that seems utterly impossible to me—, there is a risk of thinking of the museum as a strange cabinet of curiosities of the future of past. At best, it is an echo of a warning made by Adorno who wrote that the association between museum and mausoleum is not just phonetic. It is the result of a political and ideological work of neutralizing culture (Adorno 1962: 173).

Another possibility is to give up this type of conservation and to think that instead of celebrating a progressively more stable future, by preserving fragments of the past, net art museums tend to be the museums of the unfinished, unrepaired and unrecovered. By doing so, they will allow us to deal with the irreversibility of losses—of hardware, software, and all the affective bonds that social networks increasingly entail—without an imminent process of disappearance. And that does not mean replacing missing files, or simulating previous Web standards. Instead, it assumes that the new original (the "second-generation original") is the main object of collections; the absence, the obsolete and what is impossible to recover as the research target. In a sentence, a museum of losses for clouds of oblivion.

References

Adorno, Theodor W. 1962. “Museo Valéry-Proust.” In *Prismas*, Barcelona: Ariel, pp. 187-200.

Beiguelman, Giselle. 2014.“Reinventing Memory is Necessary.” In Giselle Beiguelman, Ana G. Magalhães (eds.) *Possible Futures: art, museums and digital archives*, São Paulo: Edusp/Peirópolis, pp. 12-33.

Bratton, Benjamin H. 2016. *The Stack: On Software and Sovereignty*. Cambridge: MIT Press.

Chun, Wendy Hui Kyong. 2008. “The Enduring Ephemeral, or the Future Is a Memory.” In *Critical Inquiry*, n. 35 (Autumn), pp. 148-171.

Eveleth, Rose. 2015. “How Many Photographs of You Are Out There In the World?” *The Atlantic*. 2 November 2015. www.theatlantic.com/technology/archive/2015/11/how-many-photographs-of-you-are-out-there-in-the-world/413389. (Accessed 27 April 2018).

Foucault, Michel. 1992. *As palavras e as coisas* [Les Mots Et Les Choses]. 6th edition. Translation: Salma Tannus Muchail. São Paulo: Martins Fontes.

Freire, Cristina. 2014. "Museus em Rede: A dialética impecável de Walter Zanini/A Network of Museums: The Impeccable Dialectic of Walter Zanini." *Art Journal* 73/2, pp. 20-45.

Frieze. 2013. *Beginnings + Ends*. Nov. 1st, 2013. https://frieze.com/article/beginnings-ends (Accessed 27 April 2018).

Galloway, Alex. 2016. *Warcraft and Utopia*. February 16. http://www.ctheory.net/articles.aspx?id=507 (Accessed on April 27, 2018).

Jodi. 1997. "We Love Your Computer." Interview by Tilman Baumgärtel. *Telepolis*, October 06, 1997, https://heise.de/-3446080. (Accessed on April 27, 2018).

Lialina, Olia. 2016. "A celebration of twenty years on the Web: My Boyfriend Came Back From The War." Interview by Annet Dekker. *MU TXT*, February 19, 2016. www.mu.nl/en/txt/a-celebration-of-twenty-years-on-the-web-my-boyfriend-came-back-from-the-war. (Accessed 27 April 2018).

Library of Congress. 2017. "WARC. Web ARChive file format". July 27. https://www.loc.gov/preservation/digital/formats/fdd/fdd000236.shtml

Lovejoy, Margot. 2004. *Digital Currents: Art in the Electronic Age*. 3rd Edition. Nova York: Routledge, 2004.

Lunenfeld, Peter. 1996. "Art Post-History: Digital Photography and Electronic Semiotics." In Stefan Iglhaut et. al (eds.) *Photography after Photography: Memory and Representation in the Digital Age*, G+B Arts, pp. 92-98.

Knight, Kim. 2006. "Giselle Beiguelman, The Book after the Book." In *Transliteracies Project*, 12 Jan 2016. web.archive.org/web/20070907165628/http://transliteracies.english.ucsb.edu/post/research-project/research-clearinghouse-individual/the-book-after-the-book-2.

Metahaven. 2012. "Captives of the Cloud (Part I)." In *e-flux Journal*, n. 37 (September 2012), pp. 1-14.

Paul, Christiane. 2014. "Archiving Context: Preservation Strategies for Net-based Art (A Case Study)." In Giselle Beiguelman, Ana G. Magalhães (eds.) *Possible Futures: art, museums and digital archives*, São Paulo: Edusp/Peirópolis, pp. 292-302.

Rinehart, Richard and Jon Ippolito. 2014. *Re-collection: art, new media and social memory*. Cambridge/Mass.: MIT Press, 2014.

Vesna, Victoria. 2017. *Database Aesthetics: Art in the Age of Information Overflow*. Minnesota: University of Minnesota Press, 2007.

Warnke, Martin. 2012. "Databases as Citadels in the Web 2.0." In Geert Lovink, Miriam Rasch (eds.) *Unlike Us Reader: Social Media Monopolies and Their Alternatives*, Amsterdam: Institute of Network Cultures, pp. 76-88.

Wasserman, Elizabeth. 2015. "Why Free Software Downloads Aren't Always Safe". *Norton Antivirus*, February 20, 2015. [Retrieved from WaybackMachine]web.archive.org/web/20150220002721/https://us.norton.com/yoursecurityresource/detail.jsp?aid=freewarerisks.

Between Light and Dark Archiving

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Abstract

Some people argue that the digital archive is an oxymoron (Laermans and Gielen 2007) or more akin to an anarchive (Ernst 2015, Zielinski 2014). Derrida used the word *anarchive* to signal that "what remains unvanquished remains associated with the *anarchi*." Ernst relates it to the digital archive and describes the anarchive as something that cannot be ordered or catalogued because it is constantly re-used, circulated, and expanding, and thus only a metaphorical archive. Similarly, Foster describes how the *anarchival* is about obscure traces rather than absolute origins, emphasising the incomplete, which may offer openings to new interpretation, or 'points of departure' as mentioned by Foster (2004). These various descriptions imply that digital archives, and in particular Web-based archives, function less as a storage space and more as a recycling centre in which the material (the archival document, if one can still use this term) is dynamic. In other words, the default state of the digital archive is re-use instead of storage, circulation rather than centrally organised memory, constant change versus stasis. How to capture and retrieve all this data, information and documentation, but more importantly, in what way does archiving take place on the Web? In what follows I examine projects by artists who in various ways explore the challenges of online archiving. These examples show how information and data is captured and archived on the Web. In particular, how it becomes a networked environment, or performance space characterised by the transition from objects to processes. This new situation, I argue, means moving between dark and light archiving, and it's the place where a new method of *networked co-archiving* emerges.

Keywords

Online archive, networked data, curation, preservation

A tension between light and dark, or heavy and light

Archives are shaped and defined not merely by their content, but by the nature of their structure and the systems that are used to document and archive records. This applies to archives in any medium whether they are paper, video, or photography, but it is most clearly visible in digital archives, specifically those that are created and evolved on the Web. In 2013 Olga Goriunova reflected upon the role of the online curator as a tension between heavy and light curating:

> Curators and museums working with the new computational materiality are compelled to remain lightly operational, responding to the creation of new aesthetic value, whether by artists or those beyond-artists.
> Confronted lightly and omnipresently with the new aesthetic values ceaselessly churned out by the operations of computational matter, the curator's or art institution's work is heavy. (2013: 28)

In other words, a curator involved in the computational intricacies of the Web sits between the lightness of applications and interfaces and their aesthetic values, and the 'heavy' precision of human–technical creation and systems involved in the production of cultural works. She continues:

> Today, the emergence and further unfolding of aesthetic value is open to intervention and meaning-making in a manner that is unforeseen. Parties of different kinds and orders partake in producing, elbowing each other and dipping into such openness. Here, artists and curators are actors amongst many others, whose aims may be far less generous or conducive to future imaginative openings and the excitement of living. (2013: 28)

This means that curating on the Web is not merely concerned with objects, but that curation functions within a wider ecology of social and technical relations. Applied to online archives this means that archiving on the Web also needs to take into account a complex interrelated network of dependencies and contexts that are often invisible, but which are of crucial importance to the making and archiving of culture. In such a scenario, and especially when taking into account algorithmic processes, archiving is becoming darker as less and less is known about the conditions and outcomes of the computer processes. This process is well exemplified in the project *Dark Archives* (2015) by Erica Scourti.

In general, the term 'dark archive' is used to indicate a repository for information that can be used as a failsafe during disaster recovery – it is a copy of an archive that consists only of meta-data and is not for public use. However, Scourti is interested in another type of dark archive: the information in an archive that cannot be seen. For example, Amazon.com could be seen as a very 'light' archive. Their business model is based on retrievability, which means that everything can be found and is accounted for. Amazon.com has to battle against the forces of darkness, which threaten to make things in the archive un-findable: the photos and videos that somehow evaded classification, the false negatives, the misclassifications, or the media that fell outside Google's definition for that search term. It could also be spam or things with very similar titles, which happens more and more with algorithmically produced content. So, there is need to keep things retrievable otherwise the content of the archive can fall into darkness: the items are available but you cannot find —or sell— them anymore. With *Dark Archives* Scourti wanted to examine how visibility and invisibility relate to online archival platforms such as Google Photo to explore the idea of what eludes classification in an era of increasingly intelligent auto-classification systems and in what ways these systems affect data of individual users.

Her project *Dark Archives* consists of two phases; in the first, Scourti uploaded her entire fifteen-year personal media archive of daily (digitised) photos and images, videos and drawings to Magisto, an online auto-editing and archiving app. Magisto's algorithms analyse videos and photos that are uploaded and breaks them down on three levels: visual analysis, audio analysis and storytelling. Essentially Magisto searches for similarity in the images and sounds. For example, most people take several photos of the same moment or object, because the light was not right, or the smile not genuine enough. The algorithms trace all these instances, which often end up somewhere in the dark corners of hard drives, and based on the results edits everything together in a short video. Scourti's videos showed some of the footage but not all. For the second phase, and inspired by the results of Magisto, Scourti turned to Google Photo. Next to archiving photos, Google Photo uses 'Assistant', a similar algorithm to Magisto that generates short animations or panoramas by stitching similar images together. Of course none of the users really know how these algorithms search for and categorise the images, what the exact parameters are or what the algorithm looks for. This ambiguity, or randomness, of tracing, retrieving and creating new content was of interest to Scourti, and in an attempt to address the 'missing media' she asked five authors –

Jessica Bunch, Christina Chalmers, Sandra Huber, Linette Voller and Joanna Walsh – to search her Google Photo page with keywords of their choice and then speculate on and write captions for what they imagined to be the missing set of media for that search term. By asking the writers to imagine the way an algorithm works, the project tried to get at the core of what a non-human thought process or logic could be. Scourti then matched their captions with the existing media from her archive, and created a final series of videos.

Scourti's *Dark Archives* shows how online content is always ambiguous and unstable—at least when using automated editing systems or even certain platforms. Content moves between 'light' and 'dark' archival systems, surfacing occasionally, while at other times it may present itself in a completely changed context. And even though the content might stay the same, it is not static; it is always added to, and depending on the search terms, the context changes. It could be argued that any collection, or archive, has potentially limitless constellations within it and the meaning of it changes depending on the context in which it is used. However, with semi-automated algorithms an additional, ambiguous, unfinished and semi-fictional quality enters into the equation that is unknown, unpredictable and invisible. *Dark Archives* points to the issues that emerge when image archives can be parsed, and potentially monetised, once in the hands of corporate platforms. It also explores how new technologies inscribe knowledge in different ways and how they record and archive the lives of their users. In other words, how identity and memory are constructed.

> Perhaps every document creates (rather than describes or illustrates) the event; every search creates an archive, and every archive gives rise to a different reality. Search queries both create an archive and are potentially archival material in themselves (as the still ongoing fascination with Google's auto-complete attests to) and, as Derrida says, the archiving itself is productive of events, historical and otherwise. (Scourti, in Dekker 2016)

How to re-assert agency and control when creating online performative or dynamic archives? One possibility I explored in several online projects was to see how such spaces are used as both sources for information and provide possibilities for new enactments, projects or performances.

Circulation

In the project *One Terabyte of Kilobyte Age* (2011–ongoing) Olia Lialina and Dragan Espenschied developed new archival methods that reflect the way archival content was created: the captured universe of Geocities. Geocities was a free Web hosting service founded in July 1995. It soon emerged as one of the most popular and inhabited places on the Web and remained so until the late 1990s. At the peak of the dot.com fever in January 1999 Yahoo! purchased Geocities—for 3 billion dollars. However, Geocities soon became synonymous with old-fashioned aesthetics and bad taste. At the same time people drifted to social network profiles. In April 2009, Yahoo! announced that it would shut down Geocities in six months. During these months the *Archive Team* and about 100 people managed to rescue almost a terabyte of Geocities pages. And on 26 October 2010, marking the first anniversary of Geocities' closing, the Archive Team released a torrent file archive of 641 GB, containing approximately 1.2 million accounts. As mentioned by digital archivist Jason Scott:

> Geocities arrived in roughly 1995, and was, for hundreds of thousands of people, their first experience with the idea of a webpage, of a full-colour, completely controlled presentation on anything they wanted. For some people, their potential audience was greater for them than for anyone in the entire history of their genetic line. It was, to these people, breathtaking.[1]

As a symbol of the 'amateur' Web, Geocities is a trace of how the Web was used at the time. This was one of the main reasons why on 1 November 2010 Lialina and Espenschied bought a 2-TB disk and started downloading the largest bit torrent file of all time.[2] They started unzipping the first files in January 2011, a process that ended in March 2011. After downloading, storing and sorting the 16,000 archived Geocities sites, which took another year, they started to redistribute screen captures of the Geocities homepages through the Web. As Espenschied remarks:

> 'Content' that is isolated, de-contextualized and shuffled around in databases of social networking sites is the main form of communication, to be useful an artefact has to work as a 'post', it has to become impartible and be brought into a format that is accepted everywhere. And that is a screenshot. (Owens 2014)

1 See http://ascii.textfiles.com/archives/2720.
2 For more information about their research and findings, see Lialina (2017).

The circulation was done in different ways: they opened an automated Tumblr blog that every twenty minutes uploads a new screen shot of a Geocities homepage; the screen captures are liked and reposted by the Tumblr followers; and the most reposted or liked are then presented next to related research on their blog *One Terabyte of Kilobyte Age* while at the same time distributed through Twitter.[3]

The Geocities archive became a spiral in which Lialina and Espenschied reflect on the Tumblr archive of the torrent archive of the Geocities archive, people reblog, retweet, like and save the posts, and it just keeps going on.[4] While Geocities was almost a forgotten world on the Web, due to several enthusiasts and thousands of followers and users it became not only visible but also an important marker in the Web's history, and through liking, sharing and redistribution Geocities keeps circulating and popping up in new contexts.[5] Next, the project introduced a whole new folksonomy through tagging—for example, 'alive' and 'under construction'—of how this new archival material could be categorised and analysed (Lialina 2017). Lialina and Espenschied's project provides all kinds of information on how Geocities was used and misused, in terms of frames, banners, navigation elements, GIF's etc.

One Terabyte of Kilobyte Age provides a means of archiving over 500,000 screenshots of homepages, and (re-)viewing the home pages through contemporary interfaces says much about the humour that drives online culture—at least in those days. Instead of purely collecting the material for the purpose of preservation the project became about questioning what 'archive' could mean in the context of making work accessible. The artists specifically choose to represent Geocities' history as a dynamic and still-evolving project, rather than have it exist as static 'back log' of data. As described by Espenschied this form was explicitly chosen as a curatorial and conservation method, because:

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3 See for the Tumblr page http://oneterabyteofkilobyteage.tumblr.com/, the blog http://blog.geocities.institute/, and the Twitter page https://twitter.com/geocities_txt.

4 Interestingly in 2013 Yahoo! which previously shut down Geocities (and also quickly brought down the popular sharing site Delicious after they bought it) bought Tumblr. With such a track record, it's not unlikely that *One Terabyte of Kilobyte Age* will outlive its current host.

5 Often circulation is described as a process of distribution and liking (see, for example, Steyerl 2013). Although this is certainly part of the process, circulation is also inherent in the system through hyperlinking, sharing, and execution processes that move beyond performativity. For more information about this type of computational circulation see, for example, Mackenzie (2005).

> Digital Culture is Mass Culture, it is also more about practices than objects. In order for artefacts to survive culturally, they need to become useful again in contemporary digital culture. (Espenschied in Owens 2014)

Interesting questions arise concerning traditional concepts such as provenance and authenticity. As Espenschied also acknowledges, the screenshots have 'authenticity issues', but he goes on to say, 'this is greatly outweighed by their accessibility and therefore impact' (Owens 2014). The other way to experience the online archive would be to emulate the Netscape browser, but this would be costly and require complex emulator setups. While accepting the losses, applied in a generative and circulatory way, *One Terabyte of Kilobyte Age* keeps creating new forms and interpretations, at times pushed forward by humans, other times by bots (Twitter is supposed to have millions of bot accounts, comprising at least 15% of all their accounts). In this way, the digital archive becomes a carefully designed mass re-enactment. The light interface allows for easy recirculation, bringing to the surface more forgotten moments and new experiences.

The project is driven by a desire to use technology as a tool to make visible and open up content or conduct that is neglected, forgotten, discarded or deliberately concealed. In this way, it makes sense – as also pointed out by Bethany Nowviskie, director of the international Digital Library Federation at CLIR—to 'take the notion of cultural heritage not as content to be received but also as technology to be used'. This means that artefacts and events are no longer merely about the past, but are tools that can be used to imagine alternative pasts and futures (Nowviskie 2016). Similar attempts can also be seen in other areas and disciplines, for example, in the conservation of public art. If, as proposed by conservator Glenn Wharton, it is done in collaboration with local people such 'participatory conservation has the potential for critical dialogue on how material culture is preserved, presented and used (Wharton 2005).[6] Or in the methods used by Shiobhan Davies' dance company for their archival project *RePlay*. Launched in 2009 the elaborate site includes a comprehensive range of audiovisual content, text-based materials and other content that had not been seen before in the public domain, and offers users digital representations of the dance-making process and tools to collect and organise

6 See also the concept of 'proliferative preservation' that is suggested by Rinehart and Ippolito (2014) – a method that allows copies of a work to circulate and mutate to better ensure their survival.

searches for research, teaching and general interest. The archival site started in 2005 as a simple online portal; however, it turned into an extension of the artist's work, reflecting back on her creative methods and also influenced her—as well as other peoples—future projects. Rather than purely collecting the material for the purpose of preservation, *RePlay* queries what 'archive' could mean in the context of making work accessible. Similar to Lialina and Espenschied, they were interested in—whether the circulatory characteristics of a digital archive would change how a work was read and in what ways it would provide new meanings of work that were otherwise lost or at least less accessible. Rather than existing as a static 'back log' of material, *RePlay* became a dynamic and still growing site that changes over time:

> [...] it involves artists in 'dancing the archive' by exploring archives as source material for new performances and novel methods of artists documentation, rather than for faithful re-enactment or reconstruction. (Whatley 2017)

These efforts emphasise the critical context of something that is transient and often seen as ephemeral. Or as the creators of *RePlay* put it: 'the archive reveals not merely explains something: it probes, questions and provokes' (Whatley 2017). Used in a generative way, the archive keeps creating new forms and interpretations of a work.

Networked co-archiving

Based on some of the outcomes of her ongoing research into online curation, curator and PhD researcher Gaia Tedone argues that the new techniques of many online platforms have shifted the meaning of the term 'curating' in which a new 'networked co-curating', and I would argue also a 'networked co-archiving', is taking place that is formed by a strategic alliance between curator or archivist, users, objects and machine (Tedone 2017). As she points out, this change is characterised by a collision of different interests driven by economic, cultural, and socio-political agendas, and can be framed as a new space of performativity, signalling a move from object and project to process and intervention (Tedone 2019). In other words, 'networked co-archiving' shifts attention from what is produced to how it is performed and processed. In this scenario, taking into account the algorithmic processes described earlier, 'networked co-archiving' is becoming darker as less and less is known about the conditions and outcomes of computational processes. In an attempt to counter such darkness artist Harm van de Dorpel developed the project *Delinear.info* (2014–ongoing).

Delinear.info sits in between a sketchbook, a social platform, and an archive. The content that is uploaded by each user simultaneously functions as navigation. Different users take part and connect associatively through images, sounds or texts. Van den Dorpel developed *Delinear.info* because he believed that many existing social media platforms are too chronologically driven and are not enabling enough freedom for expression, as the systems were too rigid and pre-set. Similar to Davies, Van den Dorpel sees *Delinear.info* as a studio, a place to try things out. As he emphasised he is

> [...] particularly interested in how we can connect information in new, meaningful ways. In this context I mean meaningful as aesthetically surprising. I do not believe that knowledge is embedded in documents, just as that beauty is not embedded in objects. Beauty and knowledge arise through a game between the creators, viewers, contexts, historical stories, et cetera. (Dekker 2015)

Van den Dorpel approaches the network as a recursive environment, which is about organisational structures, conceptualisation and making relationships. Emphasising that something is never finished, that results are not fixed and that things can always change, *Delinear.info* shows how a work of art or an image doesn't create meaning or value by itself. It is the different relationships that—in this case—determine the identity of an image.

This way of thinking could be said to be prevalent in the history of art, but in the last decades it is also gaining more attention and relevance in the field of archiving. However, what is slightly different and pushing the current 'boundaries' of archival thinking is Van den Dorpel's insistence in searching for complexity, which he finds in the layers between different systems that are connected to each other. Whereas most methods for organising information are focused on reducing complexity, he doesn't try to simplify or reduce, but to encourage complexity. Most advanced search and database engines are still mainly based on text; hence there is a need to reduce complex matters to a brief summary, ideally one word. This way data can be classified and interpreted mechanically. As Van den Dorpel mentions, the interpretation from something complex to abstract qualification hinders alternative interpretations (Dekker 2015). Based on visuals in *Delinear.info* the 'object' links, it stands on its own and connections—

or relations—arise from the operations that are performed on it. As a user you trace information more intuitively and aesthetically to encounter new information through links, instead of following expected routings. Rather than a smooth fabric or relatively ordered story, images, words, sounds and sentences seem to dance around, move chaotically, form chains, and assemble into a ragged and unbounded multiple.

Going against structured searches in database or archival systems, *Delinear.info* shows the performativity of a database and it articulates the medium-specificity in an aesthetic gesture. Such performance resembles a thickening, a saturation of relations that are intensified, doubled, made similar, made serial, and it is from these operations that something else arises.

Embracing unpredictability and the indeterminate

It could be argued that *Delinear.info* is far removed from conventional archival practices that are concerned with original records, objects or documents. Indeed, online archiving has many of the characteristics proposed by the anarchival. In an environment in which data are constructed, and can only be experienced in relation to other data, code, software and hardware, which may have no obvious relation with the 'object', there is a need to consider alternative ways of thinking about archiving. In order to culturally and socially survive, an online archival practice should reflect the environment in which it's 'records' are created, embedded and constructed. While an anarchival position proposes itself as a counter-example to conventional archiving—stressing the (re)use and production of new work, as a creation event,[7] with the term 'networked co-archiving'—I would like to stress the importance of rethinking the archival, not merely as a counter-strategy, but as a concept to reconsider the influence different systems (human and machinic) exert on archival practices, while introducing alternative ways of thinking about what an archive could mean.

The examples I described emphasise an undermining of what could be considered an archival monopoly to classify, document, display and preserve, and the preoccupation with the archival record. Online archiving is performed in and through human and technical elements, relations and

7 For more information about anarchive in the sense of 'creation event', see the detailed explanation on the Senselab site: http://senselab.ca/wp2/immediations/anarchiving/anarchive-concise-definition.

interactions, which are active in and are simultaneously organised through the platforms and systems that are used. The result can be framed as a 'networked co-archiving', which is not only concerned with objects, but how different elements function within a wider ecology of cultural and socio-technical relations that participate in creating and archiving culture. It is by embracing these relations and moving between light and dark that a new model of thinking, and archiving, emerges that triggers new relations and creative associations. This new model is open to diverse interpretations, and by following paths that were not yet considered, something new could arise. Such a method attributes new values to computational 'objects' and creates new keys by enacting a specific human and machinic aesthetic relationality.

References

Dekker, Annet. 2016. "Archiving Our (Dark) Lives. Interview with Erica Scourti." *Het Nieuwe Instituut*, January. http://archiefinterpretaties.hetnieuweinstituut.nl/en/archiving-our-dark-lives-interview-erica-scourti.

Dekker, Annet. 2015. "Choosing Complexity: Harm van den Dorpel." In *Metropolis M*, n. 6 December/January.

Ernst, Wolfgang. 2015 [2002]. *Stirrings in the Archive. Order from Disorder*. Translated by Adam Siegel. London: Rowman & Littlefield.

Foster, Hal. 2004. "An Archival Impulse." In *OCTOBER*, Vol. 110, Fall 2004, pp. 3–22.

Goriunova, Olga. 2013. "Light Heavy Weight Curating." In *Speculative Scenarios, or What Will Happen to Digital Art in the (Near) Future*, edited by Annet Dekker. Eindhoven: Baltan Laboratories, pp. 25-31.

Laermans, Rudi and Pascal Gielen. 2007. "The archive of the digital an-archive." In *Image [&] Narrative. Online Magazine of the Visual Narrative*. Issue 17, April. www.imageandnarrative.be/inarchive/digital_archive/laermans_gielen.htm.

Lialina, Olia. 2017. "Still There. Ruins and Templates of Geocities." In Annet Dekker (ed.) *Lost and Living (in) Archives. Collectively Shaping New Memories*, Amsterdam: Valiz, pp. 193-210.

Mackenzie, Adrian. 2005. "The Performativity of Code: Software and Cultures of Circulation." In *Theory, Culture & Society*. Vol. 22/1, pp. 71-92.

Nowviskie, Bethany. 2016. "Speculative Collections." 27 Oct 2016. Website http://nowviskie.org/2016/speculative-collections.

Owens, Trevor. 2014. "Digital Culture is Mass Culture": An interview with Digital Conservator Dragan Espenschied." 24 March. Website https://blogs.loc.gov/thesignal/2014/03/digital-culture-is-mass-culture-an-interview-with-digital-conservator-dragan-espenschied.

Rinehart, Richard and Jon Ippolito. 2014. *Re-Collection: Art, New Media, and Social Memory*. Cambridge, MA: MIT Press.

Steyerl, Hito. 2013. "Too Much World: Is the Internet Dead?" *e-flux Journal* #49, 11. http://www.e-flux.com/journal/too-much-world-is-the-internet-dead.

Tedone, Gaia. 2019. "Online Curating – Interview." In Annet Dekker (ed.) *What We Talk About When Talking About Online Curating*, Brescia: Link Editions (forthcoming).

Tedone, Gaia. 2017. "Tracing Networked Images: an Emerging Method for Online Curation." In *Journal of Media Practice*, Vol. 18/1, pp. 51-62.

Wharton, Glenn. 2005. "Indigenous Claims and Heritage Conservation: An Opportunity for Critical Dialog." In *Journal of Public Archaeology* 4, pp. 199-204.

Whatley, Sarah. 2017. "Archiving the Dance: Making *Siobhan Davies Replay*." In Maaike Bleeker (ed.) *Transmission in Motion: The Technologizing of Dance*, London and New York: Routledge, pp. 62-9.

Zielinski, Siegfried. 2014. "AnArchive." In *Eckhard Fürlus*, Claudia Giannetti (eds.) *AnArchive(s) - A Minimal Encyclopaedia on Archaeology of the Arts and Media. Idea by Siegfried Zielinski*, Köln / Oldenburg: Verlag der Buchhandlung Walther König / Edith-Russ-Haus für Medienkunst.

Historicization in the Archive: Digital art and originality

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Abstract

In digital art preservation, the seeming un-archivability of artworks remains to be a central issue. The processual dynamic of digital technologies and the ephemerality of installations as anarchival qualia cannot be preserved with traditional archive and conservation strategies. By reading digital artworks as archival artefacts within the process of historicization and its underlying knowledge cognition, this un-archivability is investigated. The problem of originality in regard to digital art's modular and processual characteristics as well as its function as a concept inherent to the archive as structure of power and knowledge becomes palpable. The aim is to question how innovative archive systems can alter these structures to incorporate digital art in its mediality and collective aesthetic.

Keywords

Digital Archiving, Historicization, Artefacts, Originality, knowledge carriers

Digital art as original

The preservation of digital art and the seeming un-archivability of its digital technologies in comparison to object-oriented art remain to be central topics in digital art discourses and theories.[1] The artwork as original, its originality as artistic intention, was expanded in digital art towards a col-

1 See e.g. Giannachi 2016; Kwastek 2013; Bosma 2011; Grau 2007.

laborative and even collective aesthetic which challenges such traditional art historical terms and categories.

The ephemerality of its installations, performances and experiments still separate digital art from the traditional fine arts and the art market in how it is perceived as—and can be sold and collected as—an original work. Archiving digital art thus centers on the act of artefactualizing in several aspects: to memorize it within our historical consciousness, to conceptualize it as an object of study, and/or to sell it as art object by creating a trade value along with the ability to re-exhibit it.

Scholars, technologists and artists have created several methods for preservation. Digital archive projects often focus on documentation strategies such as databases for visual and textual data, software programs such as screen recordings and a historiographical dissemination.[2] Conservation strategies in museums and other cultural institutions preserve the artwork in a frozen-in status, which is most often decided by the conservator in collaboration with the artist and excludes the artwork from the processualism of digital technologies and the environment of a hyperlinked network.

Although various methods and tools were developed, the main issue remains: In order to be preserved, the artworks have to be altered in their mediality and cannot be persevered in the state-of-being, beholders, conservators and/or archivists have experienced them in, and the artist originally developed them in. Additionally, this processualism of digital technologies, the alterations from one installation to the next (e.g. site-specificity, updates) seem to contradict the idea of an archival document as authorial identity and proof of provenance for one work. Conservation practices in museums and archival strategies in digital databases and platforms have tried to nevertheless preserve digital art within these traditional systems and categories. In this paper, I want to investigate, how we can adopt the (processual) mediality of this art form within archival methods to (1) preserve the knowledge and aesthetic explorations of artworks in their medium qualia and (2) open archival methods towards collective strategies.

This necessitates a re-approach in how to behave towards the concepts of originality and provenance/authenticity inherent to archives as systems of knowledge and power. Originality and authenticity—concepts devel-

2 To name a few scientific-driven examples: digitalartarchive.at; medienkunstnetz.de; lima.nl. The author of this text worked as co-editor at the Archive of Digital Art at the time of writing.

oped in art history, literature studies and philosophy[3]—highlight artistic intention in a radical way. They direct the preservation objective towards a *single* entity and idea, which need to be analysed in order to understand the artwork in its conception and expression.

The archived artefact as a source, which allows us to look into the past as a knowledge carrier, accentuates the emphasis of a digital artwork in an original state-of-being as the moment of creation by a single individual and negates the collaborative effort of artistic, scientific and technological team members as well as the idea of interactivity as a collective effort. Not only the processual technicality of the artworks needs to be included into an archiving method, as Wolfgang Ernst has already argued for with his concept of *dynarchive* (Ernst 2011: 82), but also their collective aesthetic as integral qualia, when the artwork is historicized within an archival or museal framework. Due to the transdisciplinarity of this contemporary art form, the preservation-discourse should not be limited to art history and art historical systems of classification, but media archaeology, history of science and technology among others as well. The artwork as source of historical knowledge needs to be able to transfer these elements inherent to digital art.

The problem of preservation in archive theory

The complex challenge of preserving digital art questions historicization in how this process predefines our perception and understanding of art.

The archive as power structure, which seemingly offers a collection of objectively accumulated, factual knowledge, while innately constructing an exclusive, specific and narrative perspective on historical events and artefacts is built upon the idea of (written) historical knowledge as unalterable sources of past events (Taylor 2003: 23). Within the archive's system of classification and verification, these documents become the dominant witnesses of historical knowledge, although they are "only" ever able to mediate a particular point of view.

The archival mediality and its inherent process of historicization predefines our analysis of artworks in their state as preserved documents, their normative, representative function and the logic of reflection we impose on them. The archive's intricacy of its power structures and the exclusivity of its objects instigate our perception of art historical artefacts

3 See Haug 1993; Nelson Goodman's entry „Authenticity" in the Grove Art Online Database: https://doi.org/10.1093/gao/9781884446054.article.T005210.

with an underlying concept of historical knowledge and epistemological ideas. Once a digital artwork is historicized within this system, it represents its original intentionality, form and experience as well as its classifications (e.g. genre, time period). Regarding the processual digital technologies and ephemeral art installations, these *anarchival* qualia (Foster 2004: 5) contrast with the static and semantic premise of archival documents. In order to preserve media artworks, many qualia are lost in the process of historicization, which produces a problematic predefinition of digital artworks within the archive's system. This predefinition is at least insufficient with the construction and execution of digital artworks. While researchers often focus on questioning, how the originality of an artwork can be preserved (Paul 2014: 295), the process of historicization needs to be investigated and altered, too.

This obstacle was answered with different solutions in archive and conservation projects. Digital archives have opened up the process of archiving towards social software technologies that can incorporate user participation in the documentation and dissemination of historicized media artworks, but their database infrastructure often repeat conventional art historical structures of classification and verification. Conservation practices aim at maintaining qualia of interaction in e.g. net.art works, but these are limited to the level of display and interface. Users can operate the work, but this interaction is lost when restarting it. Like other historical artefacts, it is frozen in its state of conservation. Here, the underlying concept of originality comes into play as it is presupposed by the archival system and its underlying concept of historical knowledge in the fixation on a specific object and a single creator, which as mentioned contradicts digital artwork's qualia and mediality.

Once a digital artwork is archived as a representation—be it a visual or written document or be it as conservation—, the archival logic proclaims a normative power to the material, or, in other words, proclaims an authentic value, which can only ever be exemplary for digital art projects. The processual and modular mediality of digital art and its digital technologies challenge this normative power of an archival document.

Rather than declaring digital art as anarchival, and therefore arguing for any preservation method as a failed attempt, it can be regarded as a challenge to question our archival methods (Lozano-Hemmer 2015). This way, the historicization process does not need to be regarded as unavoidable requisite measures, but an opportunity to analyse and understand media art histories and genealogies in their transdisciplinary and historical developments.

Historicizing digital art

Since the archive is focused on seemingly unalterable documents, digital art is mainly preserved in its written elements (e.g. source code, artist comments, curatorial texts) and visual documentation (e.g. installation photos and videos, screen recordings). As representations, these documents become the dominant source for an artwork, which is as ephemeral, processual and modular as it is semantic and numeric.

As historical artefact and knowledge carrier, the artwork can be examined within an either reflective or explorable method of knowledge cognition for its artistic intention and operability, its genre, or another distinct and categorized field of investigation (Fotiadis 2001: 343): Predefined theories and interpretations can be reflectively authenticated, or new principles can be explored and validated. While we are open in our interpretations, the archive collection and its mediation determine our perspective into the past. In a second analytical step, artefacts suffice for developing explicit, formal laws on the subjects of research. In this representative function, which still relies on the originality of an artwork, we attribute a power of knowledge cognition to these documents.

Historicization theory questions how the perception of historical artefacts changes within the archival system and determines how we perceive documents and artefacts as carriers of knowledge and in the way this knowledge is accessed, organized and distributed. The discourse on the archive as an "idea of what can be said" (Foucault 1981: 186) and the archive as power structure (Derrida 1995: 5) caused a rethinking of the concept of historical facts and the analysis of historical events. Rather than understanding an archival document as a source towards the artwork in its realness—a state-of-being in which the work was meant to be experienced—, the analysis focuses on how these objects are narrated within the archival mediality. In this historicity, they can only ever be re-narrated as representations from a subjective point of view, even though the archive as a power structure assumes an objective perspective. In feminist and queer studies, one consequence of this archival turn was a demand for reorganizing commission and dissemination practices (Squires 2016: 596). Alternative historical analyses are proposed, which focus on marginalized subjects and themes to expand the historical knowledge and create multiple histories and genealogies to be gained from one event, rather than one single narrative. A concept of messiness was introduced into analytical methods by preserving the tension between artefacts and the conditions in which they are preserved (Fotiadis 2001: 339).

Artworks as historical source usually remain within the art historical discourse, although their content can be relevant for other disciplines, too. As part of a history of technology, digital artworks always relate to several disciplines and can be utilized for a production of historical meaning.

The process of re-evaluation of a digital artwork is not only based on the highly perspectival, perhaps even arbitrary documentation process, but in the accumulation of knowledge, which we want to gain from it once it is historicized within the archival framework. In digital art preservation, the main research focus generally centres on the idea of originality, questioning how close conservation and documentation practices can get to the source. This idea correlates with the general historicization process for artefacts. But although the concept of one idea and one origin has become obsolete in digital art, this does not exclude them from being historicized and archived as sources for present and future analyses. However, new methods of documentation with artworks as new type of historical artefacts can create a different process of knowledge cognition.

Originality: Artistic intention as archival source

If artistic conception is still the most important source of investigation in digital archives and conservation strategies, in which way do we have to acknowledge intentionality as original source and to what extent can we differ from this art historical concept? The artefact as abstract object follows the underlying idea of a work unadulterated from when it was created and from how the artist intended it to function technically as well as appear aesthetically. As an archival paradigm, the aim is to gain access to a historical source unhindered and unmanipulated by subsequent influences. This presupposes an origin, which is self-consistent as an entity. We may have accepted that Homer, Shakespeare and other authors of infamous literary works, which have had a great significance for our cultural understanding and identity, were not one person but several. In the analysis and interpretation of their works though, this caused a rethinking of many well-established theories, if not invalidated them. In the archive's system of classification, too, the concept of more than one author and modular entities of a work is problematic. For metadata infrastructures in databases, the artist's name is as important and essential as its title, while technologists and scientists usually become collaborators. This distinction very often does not reflect the collaborative working process of a digital art project. The radical highlighting of the artist as single entity is similar to the idea of originality as it was first conceptualized in German romanticism (Carroll 1990: 138). The artist was transfigured as individual genius for the creation of artworks, whose aim was innovation rather than tradition and canon (Jäger 1990: 75). The masculine concept of a single creator and inventor is still dominant in how art historical collections and archives document their works. However, this does not reflect the diverse methods, practices and aims, which were applied in European art history in general, let alone in digital art. Especially in the twentieth century, many artists and artistic movements, which were also predecessors of digital art, e.g. Marcel Duchamp or the conceptual art group *Art&Language* questioned this concept in their works (Harrison 2013).

The artistic intention as creative process is not problematic as such, but the radicalisation of the concept within archival systems, especially since this logic of arranging and hierarchizing knowledge is contradictory to the definition of digital art. As source of knowledge cognition, the problem lies rather in how originality as a concept of artistic creation and innovation is tied to *idea* as epistemological concept.

In general art theory, *idea* is the artistic intention and the artist's creative process in reflecting and representing reality (Panofsky 1989: 4). The artistic intention became the origin of an artwork, and not idea as an epistemological concept. When a digital artwork is historicized as archival document, its origin, too, relates to the artistic intention, which is not to say that an artwork cannot be epistemological, but this is separated from the epistemological concept of idea.

One could argue that the originality in digital art has shifted from an artistic creation towards a technological one. While artistry, craftsmanship and artistic concept were main criteria in the fine arts, digital art focuses on technological innovations. However, this reduces the outcomes of digital artworks by, once again, neglecting their collaborative and collective qualia. Additionally, technologies do not have an agency— at least not yet, and this ultimately only shifts the problem towards the follow-up question: Who created the technology? In order to acknowledge the multiple agencies in digital art projects, the concept of originality needs to shift towards one of collectivity, which can include the technology, collective aesthetic and collaborative interaction.

As artefacts, digital artworks expand the idea as single entity towards a continued development, an always in process-state and inherent "embodied" or "interactive" knowledge. To archive digital art, we cannot rely on the idea of preservation as saving the origin of an artwork but need to integrate the collectivity into archival methodology.

If we accept that an artist's intention is not an exclusive origin in the collective effort of a digital artwork and in its processual mediality, we are also no longer bound by the archival paradigm of authenticity. As knowledge cognition, the ideal is not to get as close to the idea of origin as possible but understand its processualism as ever-continuing development.

This is a central question in any historical analysis, but especially important in regard to the mediality of digital artworks, since they negate their historicization in their embodied, interactive and technological knowledge, and challenge new methods of storage, access and handling for historical documents.

Alternative methods of storage, access and (re-)usability

As French historian Jacques Le Goff has stated, written documents are what enter our historical consciousness in the present, while oral traditions enter the mythic consciousness and remain elements of the past (Le Goff 1992: 10). The dominance of the archive not only relies on its system of classification and verification but also on the exclusivity of what kind of document is memorable. Since this distinction functions on the idea of inalterability—written documents as seemingly unchangeable containers of factual knowledge—an openness towards other documents questions the archival methodology, too, by necessitating a change of what can be documented and what kind of knowledge is archivable (Taylor 2003: 23-25).

Written documents on digital artworks such as the source code, artwork descriptions, facts on artist name, title, technological data and other information as well as the hardware of an artwork stimulate this dominance, whereas the interactive experience, the software run, or the performance of an experiment are ephemeral and relative qualia, which are subject to change in time, even though these are considered to be intrinsical elements. In order to archive media art as encompassing as possible, other methods of storing and accessing knowledge need to be developed. Instead of the acceptance of an archival document in its state of verification and classification—or in regard to digital art the dissonance of a document—, the method of archiving comes into question in order to open it up for non-written and ephemeral elements. The experimental, modular and collective mediality necessitates a new method of archiving as much as it commences it. Digital art archiving and preserving can expand these concepts by incorporating archival theories from other disciplines, e.g. performance art.

In performance studies, the *repertoire* is a concept and system for the documentation of e.g. embodied knowledge that accepts a dynamic quality of historical knowledge (Taylor 2003: 35). Historicized documents on ritual dances or oral storytelling need to be able to incorporate their dependence on communication, presence and exchange with viewers and participants. By accepting and integrating a performative and ephemeral level of the artwork, the written and visual documents are put into perspective as manipulate-able objects rather than static knowledge carriers. As an alternative system of memorizing several kinds of knowledge, the aim is not to proclaim the archive as an overcome method, but still recognize it as an essential access to memorizing knowledge about historical events, artworks and other sources of cultural artefacts while opening it up to different systems of storage and access.

The processual and modular mediality inherent to digital art has been widely accepted when defining it, but the documentation and preservation still highly relies on common art historical methods: (1) descriptive metadata on artist, title, statements and so forth in digital archives, and (2) the conservation of an artwork in a frozen-in status (e.g. sandbox browser systems, emulation). This re-emphasises the common archival methodology and its inherent power structure, when integrated into (digital) archives.

New methods include enabling users to re-arrange and re-categorise documents by e.g. keyword and image tagging, commentary functions and other interactive tools. Additionally, new archival methods question the quality and mediality of the artefact and its values. Rather than as a static and unchangeable object, the documents should incorporate the processual dynamic of digital artworks by making them accessible as re-usable data. A digital art archive in the future could function more like a distributed version control and source code management than a traditional art collection.

In general, the triadic terminology of archive-preservation-conservation is questioned. Conservation as institutional method and archiving as collective method can be considered as two separate terms.

As a general term in digital art publications, digital platforms and institutional practices, archiving describes any kind of process applied to preserve media art—e.g. emulation, video documentation, artwork description and screen recording. The term is not limited to a specific methodology, but applied to theories, practices and projects that document or conserve media art in a short- or long-time preservation.

In a more restricted definition, digital archiving can be described as a method for both documentation and preservation material such as source code, screen recordings, images, videos and other forms of metadata that are saved within a digital platform and database. This data is not considered as original source, but as re-usable and interoperable documents.

Conservation then refers to institutional methods of preserving an artwork in an isolated, stable status, which was approved by the artist and can be re-exhibited any time as long as it and the technologies, which the artists redeem as essential for the artwork, are maintained or can be updated with alternative technologies. Ultimately though, the lifespan of these conserved artworks seems to be more limited since digital technologies have a shorter lifespan than traditional artistic materials such as e.g. oil colour, canvas.

While digital archives are collective projects based on free participation (e.g. the archive of digital art, or platforms such as GitHub), conservation and its manual labour require institutional back-up. This cannot be limited to museums and other cultural institutions but requires support by technology companies and industries.

Conclusion

Digital artists, too, struggle with the idea of preserving their work for future generations and the necessity of accepting technological changes and integrating the processualism into their preservation strategies. Very often, this requires also a stronger cooperation with technologists.

Since digital artworks are not relying on the presence of audience participation like e.g. performance art, but are at the same time numeric and written, we cannot claim that a digital artwork is un-archivable. However, in order to open up the hierarchical structure of archives, which can integrate the diverse, ephemeral, processual and modular criteria of digital art, a concept of collectivity needs to be applied rather than the static concept of originality and authenticity.

To acknowledge the artistic intention—be it one or more artists and technologists involved, we also cannot negate the quality of an artwork in its original value. In order to allow artists to work freely, they need to be able to sell their works and integrate them into the art market. At the same time, archiving methods need to separate from this idea of originality to incorporate the collective, interactive and ephemeral levels of media artworks as historical artefacts. Therefore, I suggest to separate the methods of archiving digital art as a collective process from the conservation thereof, which is done by the artist(s) and technologist(s) within an institutional framework.

While the problem of historicization with historical documents and artefacts in disciplines like archaeology and history lies in the value we account to them as factual knowledge and how we narrate these seeming facts into statements of historical events, the question of a digital artwork and its preservation needs to reconsider how we document an artwork within an archival system.

Archiving digital art steps away from the idea of written, factual knowledge to an open method of co-creatively recreating the archival material by adding the process of creation, the participants' creative input and reception, as well as the processualism of its digital technologies.

By looking at the archive debate in digital and media art from the process of historicization and knowledge cognition, the idea of dynamic archiving needs to integrate collectivity, too. Not only the media archaeological condition of artworks, but the archival methodology itself can incorporate the interactivity and be open towards associative epistemological processes. By using open licences and sharing material for users to continue working on and alternating archive material, the processual condition of artworks is documented through the use of archival material, rather than the artefactualising thereof.

References

Bench, Harmony. 2016. "Dancing in Digital Archives." In M. Bleeker (ed.) *Transition in Motion: The Technologization of Dance*, London: Routledge, pp.155-167.

Blumenberg, Hans. 1986. *Die Lesbarkeit der Welt*. Suhrkamp: Frankfurt/Main.

Bosma, Josephine. 2011. *Nettitudes: Let's Talk Net Art*. Rotterdam: NAi Publishers.

Carroll, B.A. 1990. “The Politics of “Originality”: Women and the Class System of the Intellect.” In *Journal of Women's History*, 2/2, pp. 136-163.

Chun, Wendy. 2008. “The enduring ephemeral, or the future is a memory.” In *Critical Enquiry*, 35/1, pp.148-171. https://doi.org/10.1086/595632 (retrieved 04.05.2017).

Cox, Laura. 2016. “Reaching for Archive Fever. A Tall Tale about Queer ‘Made in France’.” In *Paragraph*, 39(3), pp. 319–334. DOI: 10.3366/para.2016.020 (retrieved 02.06.2018).

Daniels, Dieter and Günther Reisinger (eds.). 2010. *Net Pioneers 1.0*. Berlin: Sternberg Press.

De Certeau, Michel. 1988. *The Writing of History*. Columbia University Press, New York.

Derrida, Jacques. 1995. *Archive Fever: a Freudian impression*. Chicago, Ill: Univ. of Chicago Press.

Didi-Hubermann, Georges. 2016. *Atlas oder die unruhige Fröhliche Wissenschaft*. Paderborn: Wilhelm Fink.

Ernst, Wolfgang. 2013. ”Underway to the Dual System: Classical Archives and Digital Memory.” In *Digital Memory and the Archive*, Minnesota: Univ. o. Minnesota Press, pp. 81-94.

Fotiadis, Michael. 2001.”Archaeology and historicism.” In Glenn W. Most (ed.) *Historicization/ Historisierung*. Göttingen: Vandenhoeck Ruprecht, pp. 339-364.

Foster, Hal. 2004. “An archival impulse.” In *October*, 10, pp. 3-22.

Foucault, Michel. 1981. *Archäologie des Wissens*. Suhrkamp, Frankfurt/Main.

Giannachi, Gabriella. 2016. *Archive everything*. MIT Press, Cambridge, MA.

Harrison, D. & E. Ch'ng. 2013. “Can Duchampian and Darwinian Virtual Objects Ever Behave Themselves?” In Dew Harrison (ed.), *Digital Media and Technologies for Virtual Artistic Spaces*, Hershey, PA:IGI, pp.91-104.

Haug, W. and B. Wachinger (ed.). 1993. *Innovation und Originalität*. Tübingen: Max Niemayer Verlag.

Lozano- Hemmer, Ralph. 2015. “#Best practices for conservation of media art from an artist's perspective.” GitHub, https://github.com/antimodular/Best-practices-for-conservation-of-media-art (retrieved 10.12.2017).

Jäger, Georg. 1990. "Freundschaft, Liebe und Literatur von der Empfindsamkeit bis zur Romantik: Produktion, Kommunikation und Vergesellschaftung von Individualität durch „kommunikative Muster ästhetisch vermittelter Identifikation".In *Spiel*, 9/1, pp. 69-87.

Jenkins, Keith. 2003. *Re-Figuring History*. London: Routledge.

Kelly, Emma J. 2016. "Listening harder: Queer archive and biography." In *Educational Philosophy and Theory*, DOI: 10.1080/00131857.2016.124834 (retrieved 02.06.2018).

Kwastek, Katja. 2013. *Aesthetics of Interaction in Digital Art*. MIT Press, Cambridge, MA.

Le Goff, Jacques.1992. *History and Memory*. New York: Columbia University Press.

Livingston, Paisley. 2005. *Art and Intention*. Oxford: Clarendon Press.

Most, Glenn W. (ed.). 2001. *Historicization/ Historisierung*. Vandenhoeck Ruprecht, Göttingen.

Paul, Christiane. 2014. "Archiving Context: Preservation Strategies for Digital Art." In G. Beiguelman and A. Gonçalves, *Possible Future—Art, Museums and Digital Archives*, São Paulo: Editora Peirópolis, pp. 292-301.

Rinehart, Richard and Jon Ippolito. 2014. *Re-collection: art, new media, and social memory*. MIT Press, Cambridge, MA.

Saba, Cosetta G. 2013. "Media Art and the Digital Archive." In J. Noordegraaf, Cosetta G. Saba, C.G. and V. Hediger, (eds.). *Preserving and Exhibiting Media Art. Challenges and Perspectives*, Amsterdam University Press, Amsterdam, pp.101-122.

Schiller, Devon. 2017. "Face, A Keyword Story: The Archiving Vocabulary for Facial Expression in the German Imaginary from Printed Text to Digital Image." In D. Maduro (ed.) *Digital Media and Textuality: From Creation to Archiving*, Berlin: Transcript, pp. 1-47.

Schwartz, Joan M. and Terry Cook. 2002. "Archives, Records, and Power: The Making of Modern Memory." In *Archival Science*, 2, pp.1-19.

Shanken, Ed. 2007. "Historicizing Art and Technology: Forging a Method and Firing a Canon." In Oliver Grau (ed.). *Media Art Histories*, MIT Press, Cambridge, MA, pp. 43-70.

Squires, David. 2016. Roger Casement's Queer Archive. In *PMLA*, 132/3, pp. 596-612. DOI:doi.org/10.1632/pmla.2017.132.3.596 (retrieved 02.06.2018).

Taylor, Diana. 2003. *The Archive and the Repertoire. Performing cultural memory in the Americas*. Duke University Press, Durham/London.

Varela, M.E. 2016. “The Archive as Repertoire: Transience and Sustainability in Digital Archives.” In *Digital Humanities Quarterly*, 10/4.http://www.digitalhumanities.org/dhq/vol/10/4/000269/000269.html (retrieved 04.04.2018).

Re-enacting Early Video Art as a Research Tool for Media Art Histories

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Abstract

This paper will discuss re-enactment as a relevant tool for practice-based research to investigate pioneering video performances and video artworks from the 1970s and 1980s from a theoretical, art-historical and curatorial point of view. Since the early 2000s, the re-enactment of artists' performance has been growing as an art practice internationally and has been investigated in several studies and exhibitions. In this paper, I will propose that the re-enactment of early video artworks can open up critical analysis on the original work—its nature, form and content—as well as on collective and personal memory and mediation. Re-enactment becomes a research tool that investigates the nature of video which was at the time a relatively new medium. Re-enactment informs the research into the original piece, its documentation, the relationships between the artist and the body, the work and the viewer. It investigates the effects of analogue video over the viewer and the artist in comparison with the digital video employed in the re-enactment and its documentation. The paper will analyse case studies from the research projects REWIND, REWIND*Italia* and EWVA (European Women's Video Art in the 70s and 80s).

Keywords

Re-enactment, video art, performance

I hear and I forget. I see and I remember. I do and I understand
Chinese Proverb, often repeated by Bruno Munari

A key exhibition that marked the history of Italian video art is *Gennaio 70* [January '70] in Bologna, curated by the art historians and critics Renato Barilli, Tommaso Trini and Maurizio Calvesi. For that occasion, a collection of artists' video-recordings was commissioned. Today though, none of those experimental video pieces have been preserved and only few ephemera and written accounts can document this pioneering endeavour.

In 2012, at the REWIND*Italia*'s *Video Art in Italy 1968-1982* conference at MACRO—Museum of Contemporary Art of Rome—, Barilli suggested that a strategy to investigate the lost *Gennaio 70*'s video recordings could be to invite the same artists—including renowned names as Jannis Kounellis, Luca Maria Patella and Michelangelo Pistoletto—to remake the original video works.

Through the memories of those artists, it could be possible to retrace the work, to learn more about the original video recordings and possibly produce new ones. Although Barilli did not explicitly mention the word 're-enactment', much literature—as we will discuss in this paper—has been published on the definitions and differences among such practices of performing new versions. The argument he raised strongly resonates with an emerging tendency of re-enacting early video artworks today.

Starting from these premises and thoughts, I will discuss in this paper definitions, connections and the status of re-enactment in relation to early video performances and video artworks I researched during the Arts and Humanities Research Council funded research projects REWIND*Italia* and EWVA (DJCAD, University of Dundee), drawing parallels and differences with renowned works and theories of re-enactment of artists' performance and historical facts and examine selected cases of re-enactment to argue that this practice can be particularly relevant in the research of pioneering video artworks as well as to re-mediate them to new audiences and in different contexts.[1]

1 This selection of case studies is motivated by the author's direct involvement in these research projects as well as the familiarity with the REWIND project that allowed to gather data, documentation, opinions and testimonies which are discussed in the paper and support the theories and practices in question.

REWIND (2004- ongoing) and REWIND*Italia* (2011-2014) were led by the artist and academic Professor Stephen Partridge. EWVA European Women's Video Art in the 70s and 80s (2015-2017) was led by the artist and academic Professor Elaine Shemilt. Adam Lockhart was Media Archivist on all the projects.

Research context and literature

In the past two decades, the re-enactment of historical artists' performances and historical events has become an internationally growing practice. Several exhibitions and studies have been dedicated to the topic of re-enactment towards definitions, historical and theoretical contextualization and categorizations of this form. Most relevant exhibitions include *A Little Bit of History Repeated* curated by Jens Hoffmann (Kunst-Werke, Berlin, 2001); *Life, Once More: Forms of Reenactment in Contemporary Art,* curated by Sven Lüttiken (Witte de With, Rotterdam, 2005); *Playback: Simulierte Wirklichkeiten / Playback: Simulated Realities* curated by Sabine Himmelsbach (Edith-Russ-Haus für Medienkunst, Oldenburg, 2006), *RE:akt! Reconstruction, Re-enactment, Re-reporting* curated by Domenico Quaranta, Antonio Caronia and Janez Janša (Ljubljana, 2009).

An element though, that needs to be kept in mind is that the mentioned exhibitions and studies analysed different aspects of re-enactment: re-enactment of artists' performance (Quaranta 2014), artists re-enacting historical events, religious re-enactment and historical re-enactments. Although these practices present significant differences, from my perspective some elements can be fruitfully employed in the context of early video artworks' re-enactment.

A key artwork and exhibition that generated a lot of discussion and debate regarding the question of how an artist's performance as re-enactment can be defined is Marina Abramović's *Seven Easy Pieces* at the Guggenheim Museum, New York (2005). On that occasion Abramović re-enacted for seven hours six famous performance pieces from the 1960s and 1970s, including one of her own body of work plus a new work.

Due to its popularity, *Seven Easy Pieces* instigated debates and research among art historians, curators and critics around fundamental concepts on performativity, liveness, authenticity, authorship, memory, documentation and definitions of the term re-enactment, questioning in fact if *Seven Easy Pieces* really is a re-enactment. Many authors, for example, refer to it as "re-performances" (Santone 2008). Abramović remarked on her project:

> Due to the dire conditions of performance art documentation, these substitute media never did justice to the actual performances. The only real way to document a performance art piece is to re-perform the piece itself. (Abramović 2007: 11)

Commenting on the status of the work, the American feminist art historian and theorist Amelia Jones noted that *Seven Easy Pieces*—as framed today—"is not presented as critique of modernist structures of authorship" and is "viewed as a set of "original acts"' by Abramović herself, leading to a process of 'ratification and commodification' (Jones 2013: 7).

Significantly, re-enactment can be seen as an umbrella term that includes a vast range of practices in our culture and in the art field and is open to different taxonomies but also shows its differences with "simulation, reproduction, and repetition" as remarked by American curator Robert Blackson (2007: 29). Although Abramović's "loose" interpretation of the works clashes with her statements of wanting to reproduce the original performances exactly as they were, it embraces and explores the notion of re-enactment as "a creative act" (Blackson 2007: 40). Agreeing with this approach, we can open up re-enactment to a range of interpretative possibilities.

Regarding the point of faithfully reproducing the originals, Abramović explained her research methodology on more than one occasion: she researched the original performances through archival work and contacting and interviewing the artists to collect oral recollections and testimonies, viewed video documentation and film recordings, when available, in order to re-perform as close as possible to the originals and—using Abramović's own words—as "musical scores" (Abramović 2005: 11). This resonates with the role and importance of the 'script' in re-enactment—whether in the literal sense or not (Cook 2007: 136).

Abramović did not experience or attend the original performance pieces by artists such as Nauman, Acconci, VALIE EXPORT, Pane and Beuys and had to base her re-enactments on available testimonies and limited documentation (Santone 2008: 148). Her approach therefore is mediated by the documentation.

This rising interest for re-enactment of artists' performances can be linked to a renewed attention to performance as an art form in general that came to be in the early 2000s, both in the sense of producing new works and for historicizing early performance pieces (Quaranta 2009: 45; Jones 2012: 16-17).

In the last few years, several projects have been working on the recovery and historicization of early artists' video in Europe. Correspondingly, as happened for the performance, we can observe interesting cases of re-enactment from art projects which can be defined as video-performances or which included significant performative elements.

The importance of memory in these practices has been stressed by several authors (Blackson 2007: 36). For example, Cook identifies two models of re-enactment (in particular regarding the forms of the ritual and the documentary), where “memory is put under the microscope” (Cook 2007: 134). Considering both historical and artists’ performance examples, re-enactment substantially engages with memory at multiple levels: personal, collective and the media memory.

The re-enactment of video performances or early videos that are characterised by a key performative aspect include by definition a mediatisation, e.g. as a form of video recording. Due to this specific characteristic it is interesting to examine how these practices engage with memory, starting by asking what the nature of the relationship between memory and forms of recording as video is.

On this matter, in his contextualisation and framing of re-enactment as a practice, the Dutch curator and art historian Sven Lütticken underlined that the video—as the photo—documentation for a performance can be deceitful and ambiguous and that when photos and videos of a performance are available, “a re-enactment will risk seeming like a sham, a poor substitute for the auratic images of the original event” (Lütticken 2005: 24).[2]

Examining an early video performance or a video that includes a key performative aspect, one might assume that the media memory of how the video was made is somewhat recorded and embedded in it and enquire then if the collective and personal memory—not captured on video—can be a key issue for creating a re-enactment of an early video piece. It is also necessary to enquire how useful, important or fruitful a re-enactment of the examined works can be or, to use Lütticken’s words, whether it will be just a “poor substitute.” We need to remember at this point that if as reminded by Blackson (2007), memory—as history—is a construct, ‘a creative act’, the memory embedded in the video constitutes a creative act as well. An early performative video artwork was a product of careful planning, research, editing (when available), rehearsals and the choice and style employed for the camera movement and shot. All these elements escape the eye or the camera and designate art historians and curators with the task to retrace the process based on oral and written recollections. Re-enactment can play a key role in practice-based research to investigate

2 Lütticken offers the example of the re-enactment of Vito Acconci’s films and videos as soft porn movies in *Fresh Acconci* by Mike Kelley and Paul McCarthy in which a ‘film re-enactment’ act as a ‘remake’.

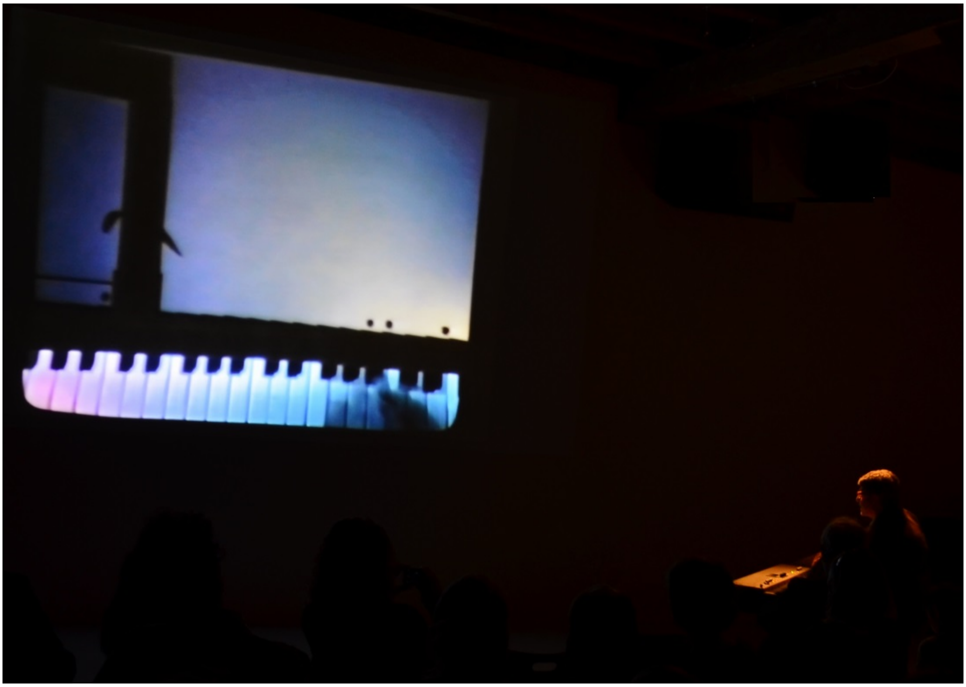


Figure 1. Claudio Ambrosini, *Videosonata* (from *Giorni* [Days]), VIDEOEX Festival, Kunstraum Walcheturm, Zurich, 2014. ©VIDEOEX Festival and REWIND*Italia*.

these works: to structurally decompose and recompose the piece, to include in the research multiple memories which both the original work and re-enactment generated and to re-mediate it in new forms and media. Re-enacting the work becomes a tool to collect, investigate and understand the re-emerged mental and physical memory of the video.

Videosonata: A case study from REWIND*Italia*

As part of REWIND*Italia*, Claudio Ambrosini was invited to re-enact his video performance *Videosonata* (1979) live at the VIDEOEX Festival in Zurich (Fig. 1, May 2014; Marangon 2004: 148) and at the CCA in Glasgow (December 2015). Ambrosini is an internationally renowned Italian musician and composer who experimented with video in the 1970s and early 80s with Cavallino Gallery in Venice. The original *Videosonata* was introduced in the video by the artist himself who explained that, in his performance, he aimed to replicate some of the video processes on the piano. In his mediation of the work, using a monitor and an electric piano, he wanted to re-create the "scanning" of the cathode ray tube, which with an electronic brush passed the lines of the TV monitor. In the live version, Ambrosini enacted a similar strategy of mediation, by introducing the audience to *Videosonata* and commenting on the context and the analogue technology employed in the production of the original video artwork. Following this, he started to perform.

In *Videosonata*, Ambrosini scanned the piano keyboard with his right hand while with his left marked the musical notes which corresponded spatially to specific elements from the photo series *Giorni* (Days) that were visible on the monitor. *Giorni* is a series of photographs, shot by the artist on the roof of his flat in Venice employing the same framing on different days. Although the original video which was inspired by and emulated the cathode tube technology was originally shown on a monitor, the choice to project *Videosonata* on the wall both in Zurich and Glasgow allowed Ambrosini to literally confront and respond live to the original work. It also stimulated a higher engagement with the audience, creating an expanded version of the artwork. The two sounds, that of the past and that from today, dialogued and interlaced. The two temporal streams lived in the same time-frame and space: present and past live in the same temporal frame and created a palimpsest of sound and moving image.

This re-enactment was developed by the artist with the support of the curators of the event, Stephen Partridge and myself, and the Media Archivist Adam Lockhart. It was based on conversations and interviews employing a semi-structured questionnaire developed in REWIND*Italia* with the research team which could collect further documentation, oral recollections and data regarding the original work. The rehearsals became a crucial moment of research, while the artist dissected the work and as a researcher I could explore the re-enactment in its making and collect further oral testimonies.

As part of REWIND*Italia*, research was also conducted on Michele Sambin's re-enactment of his live video performance *Looking for listening* (1977). The work, produced for the first time by the Historical Archives of Contemporary Arts (ASAC), Venice Biennale, and commissioned by the historic video producer and founder of art/tapes/22, Maria Gloria Bicocchi, consisted of three subsequent recordings of Sambin playing and performing with his voice, the cello, the sax and the camera itself. Once the first recording was finished it was displayed on a monitor and used as a "score" to respond to the second recording, and so did the second recording for the third. Video allowed the artist to play an instrument in ensemble formed by other recorded versions of him playing. The final product was a three-channel installation showing the three recordings on three monitors at the same time.

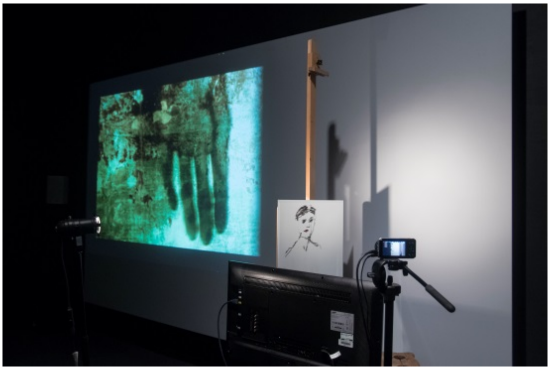
Looking for listening was re-performed live in Marseilles in 2013 and later in other venues including Galleria de' Foscherari in Bologna and *Artissima* in Turin, 2015. The re-enactment reproduced a similar strategy that was enacted in the original work: Sambin performed the third part live, responding to the two recordings from 1977. As in the original work the artist performed while facing two of his pre-recorded performances. In 2013, Sambin re-enacted the work in Marseilles as a live performance: he included the two original pre-recorded videos and re-enacted the third score live (Fig. 2).

A comprehensive documentation of the score, an analysis of the work, its recovery and re-enactment is available on the artist's website and in print (Parolo 2014). After the performance, *Looking for listening* was installed in the exhibition as a video installation with the two original videos and the one made during the live performance. In this way two timelines co-existed: the past and the present, marked by the use of b/w and colour and by the aging of the performer. Sambin also required cathode tube monitors and conformed the new video to the 4/3 aspect ratio.

Figure 2. Michele Sambin, *Looking for Listening*, 1977-2013, video installation, 26es Instants Vidéo numériques et poétiques-Friche La Belle de Mai, Marseille. ©Michele Sambin

Doppelgänger Redux: Re-enacting an early video performance under the eyes of an audience.

Based on the experience gathered with *Videosonata*, I pursued as a researcher and curator further the exploration of re-enactment of early artists' video as practice based research methodology during the EWVA project. In October 2016, I co-curated with Adam Lockhart *Doppelgänger Redux* (Figs. 3-4), a live re-enactment by Elaine Shemilt of her video performance *Doppelgänger* (1979-1981, fig. 5). The video was shot during a three-year residency at South Hill Park Art Centre where she had access to their well-equipped video facilities. After she moved to Scotland in 1983, Shemilt's early video production was discarded and the *Doppelgänger* video performance is one of the two still existing videotapes from her early production, recovered and digitised by the AHRC funded research project Rewind in 2011 after thirty years of oblivion (Leuzzi 2012). As a result of this, Shemilt has been kept at the margins of the video art history canon and until 2011 the available documentation on the work was limited to few archival traces.



Figures 3-4. Elaine Shemilt, *Doppelgänger Redux*, 2016. ©Photos: Elaine Shemilt and Orlando Myxx

Doppelgänger is an introspective video performance that reflects upon structures of representation of the body and construction of the self. The video is composed as a performance-to-camera, in which the artist, facing a mirror and sitting with her back to the camera, puts make up on her face and then with that same make-up, draws a self-portrait/*doppelgänger* on the mirror. Ultimately, this fictitious *doppelgänger* replaces her in the final scene, facing the viewer. The performance is alternated with sequences featuring Shemilt's photographs and prints. In order to reproduce this structure, *Doppelgänger Redux* employed a mix of a live performance, and some slides and soundtracks from the original *Doppelgänger*.

The re-enactment was based on the collection and reassessment of documentation and oral recollections gathered through a number of semi-structured interviews with the artist—drawn from the questionnaire employed as research method in EWVA—and further information that emerged during the rehearsals when the artist's memory was stimulated by re-enacting the performance, the medium and further curatorial conversations.

Figure 5. Elaine Shemilt, *Doppelgänger*, 1979-81, still from video. ©Elaine Shemilt

Therefore, in this case, the re-enactment allowed open critical reflection and assessment both on the form and content of the historical piece, which as mentioned had been marginalised and scarcely researched by both historians and curators, and allowed to investigate the artwork and nature of the medium itself more closely which was relatively new at the time.

In the video, Shemilt seems to draw her self-portrait based on her reflection on the mirror. Instead, the live re-enactment uncovered that the artist took advantage of a fundamental component of early video technology: the video feedback that allowed the artist an enhanced control of the shot. The feedback was one of the "perks" of early video equipment and was considered a key feature in many theoretical analysis of the medium (including, for example, Rosalind Krauss' renowned *Video: The Aesthetics of Narcissism*, 1976).

During the shooting of the original *Doppelgänger*, the feedback was streamed by a monitor placed at a 90-degree angle to the reflecting surface so it was visible in one of its angles: after this technical explanation, it is easier to notice for the viewer that in *Doppelgänger* Shemilt is constantly looking to the left, to draw her self-portrait based on the reflection of the feedback at the corner of the mirror.

In *Doppelgänger Redux*, it was not possible to use the same early video equipment that was used in *Doppelgänger*, which was shot on a then very popular format of analogue recording videocassette, the U-MATIC, and included the use of a cathode tube monitor. In agreement with the artist, it was decided to employ an LCD screen, which streamed live from a video camera: in this way the operating principles of an obsolete system were basically reproduced with contemporary technology (similarly Ihlein 2013).[3]

The feed from the camera was also projected on the wall. This close up on Shemilt's face and gestures allowed the audience an enhanced sense of intimacy and involvement. This confirmed data collected for example in research and surveys about the National Theatre Live where a performance is streamed live in a cinema remotely (Walmsley 2014), and that for the element of the projection/close up is comparable – in my view – to our case. The clash between colour images of the feed and images in b/w from the original video and the projections marked the passage of time.

3 In 2009 the artist was invited to re-stage the video work *Monitor* as part of the symposium Expanded Cinema: Activating The Space Of Reception (17 - 19 April 2009), Starr Auditorium, Tate Modern. A live version was also performed at the National Review of Live Art in 2010 at Tramway and The Arches in Glasgow.

Cook also comments on the key aspect of adapting the re-enactment from "one medium to another" and defines these as forms of "translation" —in the case of *Doppelgänger Redux*, and in *Videosonata*—from a mediatised to a live performance that generates a subsequent transmission of past to the new audience (2007: 136). In this case, this was a precise artistic and curatorial strategy to enable an enhanced audience's engagement and emotional involvement. Furthermore, the inclusion in *Visions in the Nunnery* festival program, curated by video artists Cinzia Cremona and Tessa Garland, aimed to reach different generations and contexts, and stimulate a dialogue and transgenerational cross-fertilisation with performances by artists from younger generations by exploring themes as feminism, gender and the body.

Ultimately, the process of how the video was made was revealed live to the audience, a process that was originally hidden in the video. This revelation enhanced a sense of intimacy and sealed a silent pact between the artist and the viewer. On the role of the audience, Jennifer Allen wrote:

> The presence of witnesses (in re-enactment) guarantees that something complete has taken place, even if the re-enactment strays in its portrayal of the original event. What is reproduced is not only a series of past occurrences but also an experience of duration. (2005: 185)

Employing Allen's terminology, the audience became witness to an action which retains its primary quality of authenticity and lives within a time that in the case of *Doppelgänger Redux* is doubled and characterised by repetition (concept discussed in Cook 2007: 137)—by the way of showing first the original video and then the re-enactment.

Another element that emerged as fundamental in the re-enactment of these video performances is mimicry, a concept outlined by Roger Caillois in *Les jeux et les hommes. Le masque et la vertige* (1958). This term comes from the zoological vocabulary and refers to insects' mimesis. Callois used it to describe phenomena of interpretation of role, empathy and identification particularly in games. In *Doppelgänger Redux* fox example, we had two cases of mimicry: the one of the artist, who was challenged to re-enact, re-perform and re-interpret her own performance; and the one of the audience that is compelled to identify with the performer. Regarding the artist's mimicry, we held some rehearsals to allow Elaine to successfully re-perform the piece: repetition is one of the key elements of re-enactment and, as mentioned, was also a fundamental feature in early video art as—not being able to edit—artists needed to rehearse before shooting. Therefore, *Doppelgänger Redux* addressed and replicated a fundamental strategy employed in the early video practice.

For *Doppelgänger Redux*, the re-enactment created a new performance artwork that is at the same time independent and affiliated to the original video artwork and expands it in time and space. The performance was also documented on video and an edited version of the recording—which mixed the feedback from the camera and a recording shot at the back of the room—was made available online to stimulate future research and assessment of the work.

Both *Videosonata* in Zurich, and the CCA and *Doppelgänger Redux* were also stimulated by re-enactments in which the REWIND research team was previously involved and that constituted an initial inspiration and source of materials.

In April 2009 the British video art pioneer and researcher, Stephen Partridge re-enacted his early video artwork *Monitor* at Tate Modern in London.[4] *Monitor* is a pioneering video artwork recovered during the REWIND research project that was first shown at the seminal exhibition *The Video Show*, Serpentine Gallery in 1975 and is one of Partridge's most iconic works. In 2014/5 Tate Britain acquired *Monitor* and the work is now presented as part of *BP Walk through British Art* in a video installation that include a plinth (of a model similar to the one that Partridge has been using for display of *Monitor* since the 1990s and a monitor similar to the one used in the video).[5] Partridge simulates the video feedback by the way of recording a sequence in which he performs and moves a small cathode tube monitor and then shows it on the same monitor, re-performing the same sequence. He repeats this action several times, creating the effect of a video within a video.

In 2009 Partridge presented the work for the first time as a live performance, and entitled the re-enactment *Monitor Live!* (Fig. 6-7): with a small monitor similar to the one used in the original video Partridge re-enacted the sequence of gestures from the video, creating a new level in the *mise en abyme* (Leuzzi 2016), enhancing this very aspect of the work.

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4 In 2009 the artist was invited to re-stage the video work *Monitor* as part of the symposium *Expanded Cinema: Activating The Space Of Reception* (17 - 19 April 2009), Starr Auditorium, Tate Modern London. A live version was also performed at the National Review of Live Art in 2010 at Tramway and The Arches in Glasgow.

5 Several displays of the work can be viewed at http://www.rewind.ac.uk/partridge/pages2/MON.htm (accessed 29 January 2018).

Figures 6-7. Stephen Partridge, *Monitor Live!*, 2009. ©Stephen Partridge

Like in *Doppelgänger Redux*, the audience was shown the performance in a big projection that allowed exploring the work more closely. The colours of the live performance that clashed with the images on the monitor in black and white and the aged hands of the artist mark the passage of time.

Also, this re-enactment remarkably influenced the interpretation and assessment of the original *Monitor* for the artist himself and art critique. In fact, *Monitor* was described by several authors and critics as a sculptural piece, stressing the importance of its investigation into the specificity of the medium and interpreting the piece as a self-reflection upon video (Calcutt [1998] 2009: 39). On this particular issue, Partridge commented:

> The re-enactment was very interesting for me: for the first time, maybe surprisingly I saw how performative the work was from the very beginning, rather than just a very structural and formally didactic piece. The anachronistic use of colour and video projection added a further dimension, and my presence as an older person added a further layer of poignancy. The work seemed to be opened up to new interpretation and audiences. (Leuzzi 2016: 229)

Furthermore, the re-enactment expanded on a key feature of the original *Monitor*: repetition. In fact, the video itself—as mentioned beforehand—is composed of a number of iterations of the same sequence and—as declared by the artist on several occasions—many rehearsals were necessary to achieve perfect synchronisation between the live action and the recording. The live re-enactment has stimulated other people to re-perform *Monitor*, reaching new audiences on the World Wide Web and exploring contemporary technology.[6]

6 See f. ex. https://www.youtube.com/watch?v=DV6bR-49qt0 (accessed 27 January 2018).

Another element, which emerged during REWIND, is using re-enactment as educational tool. In 2014, *TV21 project* (DJCAD, University of Dundee) led by Adam Lockhart and Sandie Jamieson, involved young people (aged 16-19) creating their own video interventions influenced by the REWIND collection. An exercise part of *TV21* gave the participants the chance—under Lockhart's supervision—to explore an iconic early British video artwork from the REWIND Collection (*Trialogue* by David Critchley, 1977) and understand how the old medium and the new medium worked. In this case, the re-enactment—to use again Cook's concepts—enabled the transmission of how the medium worked and the how contemporary technology can be employed to simulate it.

Conclusion

It is interesting to remark that re-enactments by Shemilt, Partridge, Ambrosini and Sambin all originated from research and a re-organisation of archival material from the original works and therefore became research tools. The re-enactment can be considered a stepping-stone in the research process and was stimulated by a new interest in early video art that has emerged in the past ten years in Europe. In the case of *Videosonata* and *Doppelgänger Redux*, from my own curatorial and research perspective, re-enactment denotes an effective research tool, enabling to investigate the original piece, its documentation and memory. Besides uncovering rare images, ephemera and documents in the artists' archive, it gave the possibility to gather oral recollections and visual documents during the rehearsals, the live performance and the feedback after its enactment and incorporate them into the conservation and mediation of the work. It allowed exploring the physical and conceptual relations between the artist and their body, the medium and the viewer, as well as the effects of the old "original" medium and the medium of the re-enactment (that can be the original medium or a contemporary one) on the work and on the audience. Therefore, from this perspective, I believe re-enacting early video performative artworks opens possibilities in the future to investigate further marginalised and lost works and to subtract them from oblivion.

References

Abramović, Marina. 2007. "Reenactment. Introduction". In Nancy Spector, Erika Fischer-Lichte (eds.) *Marina Abramović. Seven Easy Pieces*, Milan/NY: Edizioni Charta, pp. 9-12.

Blackson, Robert. 2007. "Once More...With Feeling: Reenactment in Contemporary Art and Culture". In *Art Journal*, Vol. 66/1, pp. 28-40.

Caillois, Roger. 2001 [1961]. *Man, Play and Games*. Transl. by Meyer Barash. Urbana and Chicago: University of Illinois Press.

Calcutt, John. 2009. "Monitor (1975, 6 minutes). Stephen Partridge". In *REWIND + PLAY: an anthology of early British video art*, London: LUX, p. 39.

Caronia, Antonio, Janez Janša and Domenico Quaranta (eds). 2009. *RE: Akt! Reconstruction, Re-enactment, Re-reporting*. Brescia: FPE Editions.

Cook, Sarah. 2007. "The Logic of Historical Reenactment: re-speaking and remediating in Contemporary Art". In *Playback: Simulierte Wirklichkeiten / Playback: Simulated Realities*, ed. by Sabine Himmelsbach, Oldenburg: Edith-Russ-Haus fur Medienkunst, pp. 134-139.

Ihlein, Lucas M. 2013. "Medium-specificity and Sociality in Expanded Cinema Re-enactment". In K. Cleland, L. Fisher and R. Harley (ed.) *Proceedings of the 19th International Symposium of Electronic Art*, Sydney: ISEA. isea-archives.siggraph.org/symposium/isea2013-19th-international-symposium-on-electronic-art (retrieved 2017-10-09).

Jones, Amelia. 2011. "'The Artist is Present': Artistic Re-enactments and the Impossibility of Presence." In *The Drama Review*,Vol 55, pp.16-45.

Jones, Amelia. 2013. "The Lure of Re-enactment and the Inauthentic Status of the Event / Le leurre de la reconstitution et l'inauthenticité de l'événement". In *Reconstitution*, Vol. 79 (Autumn), pp. 5-9.

Jones, Amelia. 2012. "The Now and the Has Been: Paradoxes of Live Art in History". In *Perform, Repeat, Record. Live Art in History*, A. Jones, A. Heathfield (eds.), Bristol/Chicago: Intellect, pp.16-17.

Jones, Amelia, and Adrian Heathfield (eds). 2012. *Perform, Repeat, Record. Live Art in History*. Bristol, UK/ Chicago, USA: Intellect.

Krauss, Rosalind. 1976. "Video: The Aesthetics of Narcissism". In *October*, Vol. 1 (Spring), pp. 51-64.

Leuzzi, Laura. 2012. *Notes on Doppelgänger*. Rewind Research Project, www.rewind.ac.uk/documents/Elaine%20Shemilt/ES001.pdf (retrieved 2018-10-09).

Leuzzi, Laura, Elaine Shemilt and Stephen Partridge. 2015. "Body, sign and double: a parallel analysis of Elaine Shemilt's *Doppelgänger*, Federica Marangoni's *The Box of Life* and Sanja Iveković's *Instructions N°1* and *Make up - Make down*." In *Media Art: Towards a new definition of arts*, ed. by Valentino Catricalá, Pistoia: Gli Ori, pp. 97-103.

Leuzzi, Laura. 2016. "Embracing the ephemeral: lost and recovered video artworks by Elaine Shemilt from the 70s and 80s." In *Arabeschi*, Vol. 7. www.arabeschi.it/embracing-the-ephemeral-lost-and-recovered-video-artworks-by-elaine-shemilt-from-70s-80s/ (retrieved 2018-10-09).

Leuzzi, Laura. 2016. "Sulla re-installazione e l'esposizione di film e video d'artista degli anni Settanta e Ottanta: alcuni spunti su un dibattito critico aperto tra pratica e teoria". In *Imago. Studi di cinema e media vii*, Vol 14, pp. 217-232.

Lütticken, Sven. 2005. "An Arena in Which to Reenact." In *Life, Once More: Forms of Reenactment in Contemporary Art*, Rotterdam: Witte de With.

Lütticken, Sven, Peggy Phelan and Jones Allen (eds). 2007. *Life, Once More: Forms Of Reenactment In Contemporary Art*. Rotterdam: Witte de With.

Marangon, Dino (ed.). 2004. *Videotapes del Cavallino*. Venice: Edizioni del Cavallino.

Masters, Tim. "Live screening 'good for theatre'". In *BBC News*, 3 June 2010, www.bbc.co.uk/news/10213684 (retrieved 2018-10-09).

Parolo, Lisa. 2014. "L'Archivio Sambin. Metodologie per la Media Art". In Sandra Lischi and Lisa Parolo (eds.), *Michele Sambin. Performance tra musica, pittura e video*, Padua: Cleup, pp. 218-230.

Quaranta, Domenico. 2014. "RE:akt! Things that Happen Twice." In *RE:akt! Reconstruction, Re-enactment, Re-reporting*, ed. by Antonio Caronia, Janez Janša, Domenico Quaranta. Brescia LINK Editions, pp. 45-52.

Santone, Jessica. "Marina Abramović's Seven Easy Pieces: Critical Documentation Strategies for Preserving Art's History." In *Leonardo*, Vol. 41 (April 2008), pp. 147-152. https://muse.jhu.edu/article/236378 (retrieved 2018-10-09).

Walmsley, Ben. Enhancing audience empathy through technology. 24th October 2014. webarchive.nationalarchives.gov.uk/nobanner/20161103190019oe_///artsdigitalrnd.org.uk/features/enhancing-audience-empathy-through-technology-2/ (retrieved 2018-10-09).

A System Engineer's Perspective for the Re-Creation of Media Art
n-Cha(n)-t by David Rokeby[1]

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Abstract

This article aims to consider the analysis of an artwork as a system -from the system engineer point of view- in order to address its restoration through re-creation. The final result is a general guideline for the full re-creation of the artwork.

Keywords

Conservation, Preservation, New Media Art, System, Migration, Re-creation, David Rokeby

Introduction

New media artworks—and especially digital artworks—cause unique conservation problems due to their mediality. How to address these problems usually depends on each single artwork and may vary from one to another. Nevertheless, some general paradigms, i.e. storage, emulation, migration, and reinterpretation, commonly described in textbooks have been adopted widely.[2]

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1 This article has been developed after the poster presentation of "Artwork as a System" at the Re:Trace conference (Krems, Vienna, Nov 2017) and is a re-worked version of "Caso de Estudio: n – Cha(n) – t (David Rokeby, 2001). Una aproximación sistemática a la conservación/restauración de obras digitales" presented at *19ª Jornadas de Conservación de Arte Contemporáneo* at Museo Nacional Centro de Arte Contemporáneo Reina Sofía" (Feb. 2018, Madrid, Spain) to be published in 2019.

2 See R. Rinehart y J. Ippolito, *Re-Collection: Art, New Media and Social Memory*, Cambridge, Massachusetts, The MIT Press, 2014.

This article tries to validate a new paradigm—*re-creation* [3]—for a future debate on preservation practices in media art.

This technical paradigm is based on several System Engineering concepts such as the idea of the system itself, the idea of "black box" and flow diagrams. It is proposed not only for conservation and restoration but also for production of new media artworks to gather valuable information for future conservation. The goal is to provide a norm, which functions as a continuing evolvement for the artwork, or, in the words of Prof. Dr. Lino García Morales, "to change so nothing changes." (2010: n/p). The main idea behind re-creation is to obtain the main characteristic of the artwork at different levels to ensure that future implementations of this characteristic do not alter the symbolic value of the artwork, preserving its aesthetic experience opposite to some other paradigms—such as migration, emulation or reinterpretation—and technical performance.

This paper aims at showing two different results: first, the extraction of those characteristics and, second, the collection of useful documentation for future actions. A collection can also be further utilized for the production of new digital artworks. Since the approach is strongly technical, some of the decisions made could be understood as incorrect from a more traditional conservation point of view. An additional goal for this paper would be to create a debate around the adequacy of this approach. Nevertheless, this proposed paradigm—as any of those presented in the introduction (Wijers 2005)—is not to be considered as a definitive solution for conservation, but a tool or additional approach that could help to conserve some digital artworks.

For a proper use of this paradigm, a full description of the elements of the artwork and the process followed to develop it would be needed, which is not always possible. Using this paradigm together with other, for example emulation and migration would be interesting in order to achieve the best possible conservation of the artwork. But since each of them imply their own problems; having a hybrid approach will most probably increase the level of complexity regarding the problems of each one.

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3 The term was firstly introduced in L. García, *Conservación y Restauración de Arte Digital*, Tesis Doctoral, Programa de Doctorado en Prácticas Artísticas y Teoría del Arte en la Contemporaneidad, Madrid, Facultad de Artes y Comunicación de la Universidad Europea de Madrid, Pilar Montero (dir.), Madrid, 2010.

Figure 1. David Rokeby, “n-Cha(n)-t", artist webpage, 2001. ©David Rokeby

This case study was developed without the help of any public or private institution, collection or program, as part of the personal research of the author in the technical conservation of digital artworks. The artist David Rokeby, who kindly helped during the whole process, approved the procedure and validated the results at the end of it.

Description of the artwork

The work *n–Cha(n)–t* by Canadian artist David Rokeby was presented for the first time in the year 2001. Based on The Giver of Names[4], a previous work from the same artist presented ten years before, *n–Cha(n)–t* won Ars Electronica’s Golden Nica Award in the year 2002[5] and it has been a common reference in books regarding new media for the last 15 years (Fig. 1).[6]

Extensive documentation of the artwork is available at the artist web page.[7] Briefly, it can be described as a set of seven elements or *individuals*, as Rokeby phrased them. Each of these individuals generates its oral

4 Rokeby, David. 2010. *The Giver of Names*. www.davidrokeby.com/gon.html [Last check: Sept. 2018].

5 Ars Electronica Archive Prix. archive.aec.at/prix/showmode/38545/ [Last check: Sept. 2018].

6 See Paul, Christiane. 2015. *Digital Art*. Thames & Hudson: NY; Shanken, Edward. 2009. *Art and Electronic Media*. Phaidon: NY; Broeckmann, Andreas. 2016. *Machine Art in the 20th Century*. MIT Press: Cambridge, MA.

7 Rokeby, David. *n-Cha(n)-t*, www.davidrokeby.com/nchant.html [Last check: Sept. 2018].

speech, each with a different computer-generated voice. In a stationary state, all individuals "say" the same speech—so to say agreed to it—, similar to a chant. If a spectator speaks to one of the individuals, it will attempt to recognize what the spectator says and extract some keywords for her or his speech. With those keywords and using some syntactic rules, the individual will generate a new speech, disagreeing with the rest of the set. The individual in disagreement will start to transmit keywords of its new speech to the rest of the set, causing them to generate new, different speeches too. After several iterations of speech generation and keyword transmission, all elements will reach a stationary state, chanting again.

Each individual is composed of different sub-elements or components. These components are arranged in a display to showcase their state: a microphone for voice recognition, a pair of speakers for speech emission and a computer that performs the speech recognition, voice generation and communicates all the elements among themselves.

The descriptive methods of preservation (re)present this artwork in two very different ways: The first method is to describe the artwork based on how it is perceived, which focuses on the symbolic value. This is the usual description done by the artist and curator that can be found in e.g. text books, catalogues. The second one describes the artwork in its parts, structure and the relation among these elements. This second description of the elements can be considered the description of the artwork's medium or support for its symbolic value, which connects the methodology to Brandi's theory of conservation (2008 [1963]).

The paragraph describing the parts of the artwork presents not only physical parts –hardware- but also logical parts—software—, which also (co)constitute the medium of the artwork. Similar to the description of the hardware, the software can be expressed in terms of its parts and the relations among them. The medium of media artworks is not limited to physical but also logical elements. The performance of these logical elements contributes to the symbolic value of the artwork.

If a representation of all the elements which signify the artwork's medium could be described *abstractly*, by considering what characterizes them, what their intrinsic value and functionality are, then an abstract representation of the artwork can be obtained, which renders its restoration possible. Additionally, if the idea of the artist can be represented with this method, the production of the artwork and its preservation challenges are addressed systematically. This paper shows an example of how to make a system description, from the system engineer point of view of the artwork. This description will work as an abstract representation of the artwork, independent from the current implementation in both hardware and software means. This abstraction represents the artwork as a process that is executed in order to synthetize the artwork.

Methodology

Taking into account its state of preservation, Rokeby's artwork could not be exhibited anymore. The coding for the software was developed on a computing platform which is no longer available[8] and the compiled version of that code–the actual software running on the computer—cannot be executed in current machines due to backward incompatibility. Storing spares of the hardware used at the time of the artwork's development represents just a short-term solution: there will be no more devices at some point, and the working conditions of those available may be inadequate–not to talk about the storage problem itself.

Emulation[9] may be a valid solution, but it will include an additional layer of complexity to the artwork and will also require new hardware. Besides, emulation presents its own problems regarding obsolescence. Because of these issues regarding preservation and alteration of an artwork and/or parts thereof, a re-creation of the artwork is proposed. It allows for future updates and less expensive production.

At the beginning of the re-creation process, the source code of *n-Chan(n)-t* could not be used since it was developed using an IDE (Integrated Developer Environment) not available for modern operative systems. The working material available to us was the IDE manual and the extensive documentation of the artwork, together with the source code of "The Giver of Name", the artwork used as starting point for *n-Cha(n)-t*. Additionally, the artist had updated *The Giver of Name* recently and wanted to integrate some of its improvements into *n-Cha(n)-t*. Thus, although working with the code of *The Giver of Name* was the only source code available, it became very convenient considering the artist's intention.

The high complexity of the code developed by the artist should be considered. Several tens of thousands of lines of code, which are a result—as

8 Mac OS 10.1.

9 Rechert, Falçao, Ensom: "Introduction to an emulation-based preservation strategy for software-based artworks" https://www.tate.org.uk/download/file/fid/105887 [Last check: Sept. 2018]

Rokeby himself pointed out[10]—of more than 10 years of changes and additions, written in such a way that it could be compiled (i.e., transform the code into machine-language which a computer could run) on different, modern systems. This compilation process, though not easy, demonstrates the artist's will to conserve his artwork for the future.

Using this theoretical approach and the materials at hand, the re-creation of the main element of the artwork—the individual—was addressed as description. To do so, both the artwork and the element were to be described as "system" and "sub-system", this being, as stated before, "the set of elements and the relations among themselves that fulfill a given task" (Wasson 2015). Those elements and relations represent the support or medium of the artwork. By executing descriptions which focus on the task to be fulfilled, the artwork's symbolic value can also be preserved.

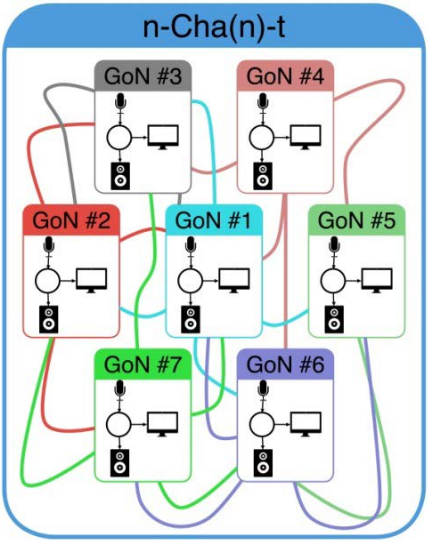

Figure 2. Abstract representation of the artwork as a system.

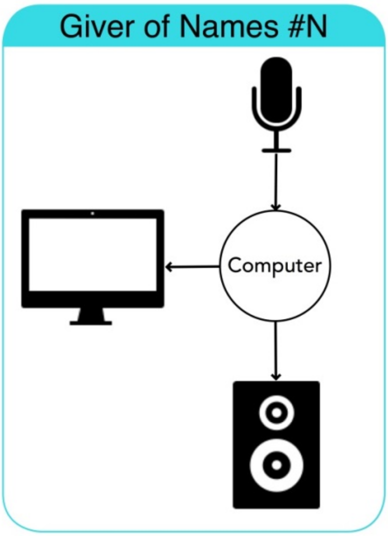

Figure 3. Representation of one individual.

System Description

To perform this analysis, several levels of depth should be defined, from highest (more general) to lowest (more detailed). The highest level ($L0$) describes the whole behavior of the artwork and its individuals as a set.

10 Several Skype and e-mail conversations with the artist took place during the development of this project.

An abstraction of the artwork can be seen in figure 2: seven interconnected elements which generate its speech in or out of agreement.

Individuals can be described in the following level (*L1*). Since all individuals are identical, the description of one works for the other six. Subelements of the individual will be the computer, display, microphone, and speakers as shown in figure 3. *S L0, L1* describes how each element is intended to behave, the characteristics of each of its components and how these are connected (Fig. 4).

This description—characteristics, behavior, inputs, and outputs—lead to a new concept: the *black box*. According to System Engineering, a black box is an abstraction of an element in a system whose behavior is defined and could be substituted by another element behaving the same. It is therefore a key document for the proper analysis of the artwork as a system to explain that behavior correctly. This behavior description should be done by the artist during the production of the artwork. Considering the ever changing nature of this kind of artworks, artists should also document the "life" of the piece, keeping records of all its evolution and changes. If not done by the artists, an expert technician could manage the task. But having this job done by someone not familiar with the artwork could lead to misinterpretations and wrong assumptions about the artwork.

If not, in-depth research on her practice should be considered to respect her original intention. In this particular case, these details were discussed with Rokeby through several conversations and e-mail corre-

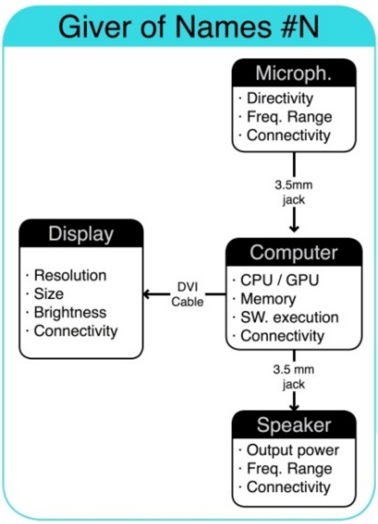

Figure 4. Element description.

spondence. When working on the development of new artworks these definitions should be delivered as part of the documentation of the artwork—e.g. in its manual—in order to state the artist's intention for future conservation.

After L1, another step can be taken in L2. On this level, the sub-sub-elements are documented in how they compose the elements described as black boxes in L1 as well as how those sub-sub-elements communicate. For the sake of simplicity and to focus on the most valuable details for our preservation purposes, this article will cover only the computer. The rest of the elements do not have any specification out of the common nor have been modified or "hacked" to achieve a particular behavior.

The case of the computer is particularly interesting. A computer, whether used in an artwork or on an office desk, is always a multi-purpose device, waiting to be programmed to fulfill a task. Thus, the computer itself acts like a vehicle or media for the software, or, in other words, exemplifies the means for the software to be executed or performed. Again, there are two levels: (1) the physical hardware of the computer and (2) the logical software running on it. Unless the hardware of that computer works at a symbolic level, it is just a device for the software that has been programmed to happen. The physical hardware can be considered transparent if the logical software performs as intended. Therefore, it can be substituted as long as the proper behavior of the software can be achieved.

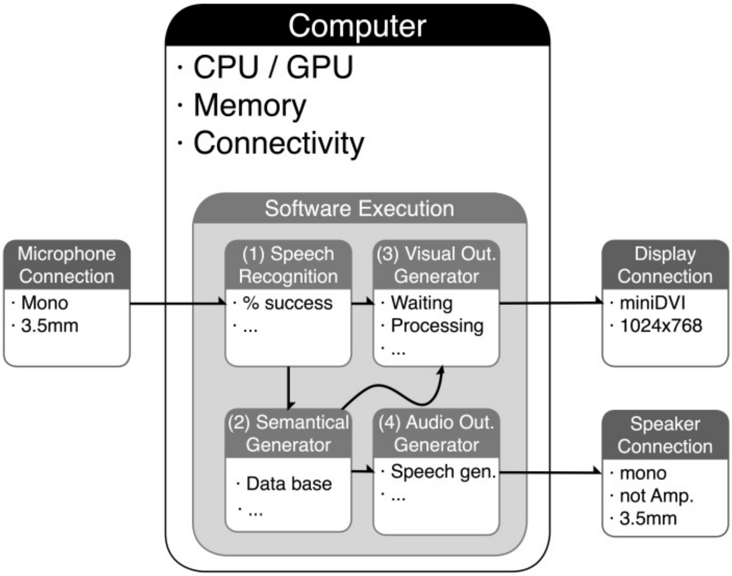

Figure 5. Systematic Analysis of the Computer as Sub-Element.

A modern computer can easily overcome computers from just five or seven years ago at much lower prices and is sufficient as a preservation tool. In this particular case, the computer had no intended impact on the aesthetics of the artwork and therefore its specifications could be just defined as *those that allow for the software to run properly*.

After examining the computer as physical hardware, the software must be analyzed using the same systematic approach. In this case, four modules could be observed: 1) voice recognition, 2) semantic generator, 3) visual generator and 4) audio generator. Each one communicates to the other elements at a software level and generates an output delivered to the rest of the elements at L1 through the computer hardware outputs, as shown in figure 5.

An additional step can be taken for all the modules described in L2. This new level (L3) can explain the behavior of the four modules stated in the previous paragraph. In figure 6, the behavior of the voice recognition module using a *flow diagram* is described. This representation, also taken from System Engineering, describes how the module should behave abstractly and independently from its implementation way. It can be understood as pseudo-code: this diagram represents the steps that the program will go through without considering its final implementation. Any programmer with enough knowledge could read it and implement it in a chosen language.

If an additional step is taken, it will lead to the implementation of that logical process. Once the expected behavior is defined, the implementation can change as long as it fulfills its definition. Here, the black box paradigm becomes highly useful. In the case of the implementation of the code, it is not necessary to analyze and understand every line on the source code if its functionality can be reproduced. For example, getting the code to compile and perform on a different system will respect all of its functionality. In that case, the contribution of the element to the symbolic value of the artwork would be kept, which allows the re-creation of the artwork without symbolic loss. The rest of the modules can be described similarly and integrated into the general system (Fig. 7).

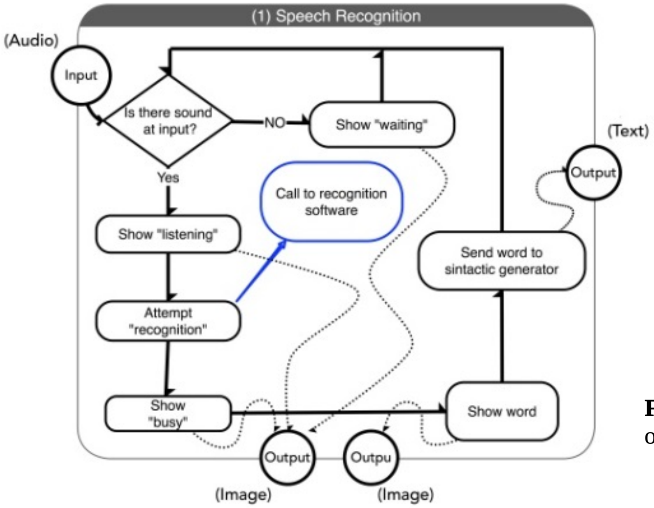

Figure 6. Flow Diagram of Speech Recognition.

Focusing on computer description at L2, the following characteristics could be observed at the logical level:

VOICE RECOGNITION
No aesthetic impact on the artwork.
On the original artwork, a commercial solution was used.
There are new commercial alternatives that perform at a similar level.

AUDIO GENERATION
It has some impact on the aesthetics of the artwork (audio representation of the artwork)–the tone of the voice- but can be modified as long as different voices can be provided.
On the original artwork, a commercial solution was used.
There are new commercial alternatives that perform at least at a similar level.

VISUAL GENERATOR
It has a high aesthetic impact (visual representation of the artwork)
Original images are available and can be used.

SEMANTIC GENERATOR
It has a high aesthetic impact (this is the tool that creates the speech)
Original source code is available and can be re-compiled.

RE-CREATION PROCESS
Once the system is properly described, next step would be to implement that description on a new support, both physical and logical.

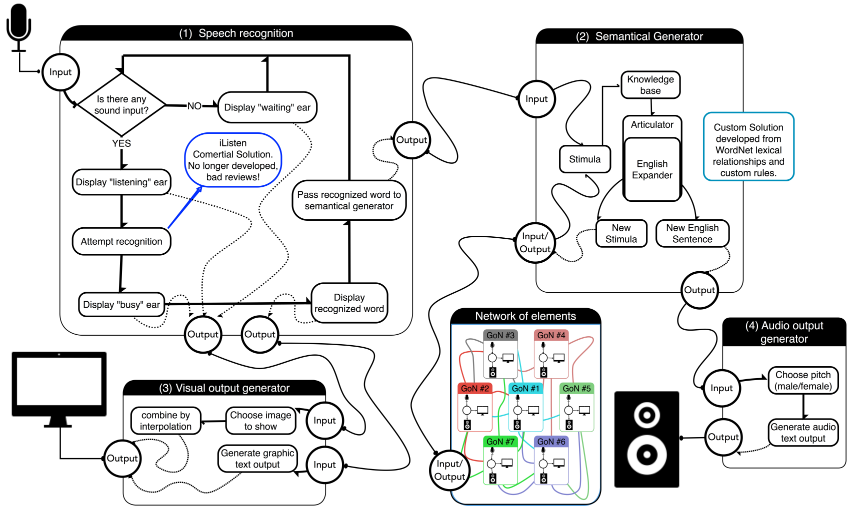

Figure 7. Flow Diagram of the artwork.

Regarding the physical level, following elements were used:

- Speaker: Self-amplified. 6W speaker, USB powered, miniJack connection
- Microphone: passive, directive microphone, USB connection
- Display: 800x400 pixels, 7-inch screen, SDI connection
- Computer: ARM based computer (Rapsberry Pi 3B[11])
- Regarding the logical level, following implementation was chosen:
- Voice Recognition: Google API
- Audio Generator: Google API
- Visual Generator: From original images, developed and compiled for ARM processor
- Semantic Generator: From original source code, compile for ARM processor

Each software module works as an independent unit, with its own inputs and outputs. An additional piece of code was developed to “glue” all those modules together and allow them to communicate. All programming was done under C++ language.

11 Wikipedia, Raspberry Pi 3 B, https://en.wikipedia.org/wiki/Raspberry_Pi#Model_B [Last check: Sept. 2018].

Compiling the semantic generator on a new platform allows the use of the very same original code that the artist used for the artwork but on a different OS without losing any of the symbolic value. Since the code has not been altered—only small changes applied by the compiler to identify under which platform the program will be executed with no impact on the performance of the generator—the process cannot be considered as migration or re-interpretation, but as a re-creation.

Results

The overall result of the re-creation of the artwork was satisfactory for the artist. It was functional at all levels, and the integration of the hardware and software elements composition the individual worked as defined. The behavior of the whole artwork, especially when it came to the convergence of the agreement did not work as expected and required a finer tune. It was considered that for future adjustments and tuning, a set of "test patterns" or "reference values" for the artwork would be of great help.

According to Rokeby's opinion, a significant amount of the artistic process when developing the artwork originally is lost or hidden while re-creating the artwork this way. The artistic research process cannot be described in the same terms used for describing the parts and elements of the artwork; hence the preservation material is fundamentally different from the sketches and work-in-progress documents used to create an artwork. In this case, the re-creation aimed at obtaining a working version of an existing artwork, which was already defined. This justifies and even necessitates working over specifications in order to preserve the artwork as close to the original in its appearance and functionality as possible.

The only criteria we considered to evaluate the re-creation of the artwork was the satisfaction of the artist as the creator. But, what happens when the artist is not available? From the technical point of view, there is no chance to accomplish a correct re-creation of the artwork in the absence of specifications. Ideally, the necessary information should be gathered during the production of the artwork. Technical and aesthetical (support and symbolic) documentation on the choices would provide the needed information to construct the re-creation. This paper would like to suggest the system approach shown to be used not only for the re-creation but also for the production of the artwork. As an additional tool for documenting the art process, it would help to obtain valuable information for future conservation and restoration of the artworks. It is evident that artists may not always have access to the resources but collections and institutions could provide good engineers and technicians that may help to obtain this information when acquiring artworks or working on exhibitions. If the artists do not provide that information or she/he is not reachable anymore, then it should be a qualified conservator who provides that information in direct exchange with engineers or technicians. Both roles could hardly be undertaken by the same person, which lead to the necessity of interdisciplinary teams for conservation.

References

Rinehart, R. and J. Ippolito. 2014. *Re-Collection: Art, New Media and Social Memory*. Cambridge: MIT Press.

García, L. 2010. *Conservación y Restauración de Arte Digital.* Tesis Doctoral, Programa de Doctorado en Prácticas Artísticas y Teoría del Arte en la Contemporaneidad, Madrid: Facultad de Artes y Comunicación, de la Universidad Europea de Madrid, Pilar Montero (dir.).

Wijers, G. 2005. *Preservation and/or Documentation: The Conservation of Media Art*. Países Bajos: Instituut voor Mediakunst. http://www.nimk.nl/preservation-andor-documentation-the-conservation-of-media-art [Last checked: Sept-2018].

Rokeby, D. 1990-. *The Giver of Names*. www.davidrokeby.com/gon.html [Last checked: Sept-2018].

Broeckmann, A. 2016. *Machine Art in the 20th Century*. Cambridge, Massachusetts, MIT Press.

Rokeby, D. 2001. n-*Cha(n)-t*. www.davidrokeby.com/nchant.html [Last checked: Sept-2018].

Brandi, C. 2008. *Teoría de la Restauración*. Madrid: Alianza Editorial.

Wasson, C.S. 2015. *System Engineering Analysis, Design and Development*. New Jersey: Wiley.

Image references

Resisting a Total Loss of Digital Heritage: Web 2.0-archiving & bridging thesaurus for media art histories

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Abstract

While digital art has evolved into a critical field at the intersection of art, science and technology, a significant loss threatens this art form due to the rapid technological obsolescence and static documentation strategies. Addressing these challenges, the Interactive Archive and Meta-Thesaurus for Media Art Research project (AT.MAR) was developed to advance the Archive of Digital Art (ADA, digitalartarchive.at). Through an innovative strategy of *collaborative archiving*, social Web 2.0, 3.0 features foster the engagement of the international digital art community, and a *bridging thesaurus* linking the extended documentation of ADA with other databases of 'traditional' art history facilitates interdisciplinary and transhistorical comparative analyses.

Keywords

Art Database, Thesaurus, Archiving Digital Art, Media Art Histories

As a valuable solution to challenges in the documentation, indexing and research of digital art, the Interactive Archive and Meta-Thesaurus for Media Art Research (AT.MAR) has been developed as an innovative strategy for *collaborative archiving*.[1] Supported by the Austrian Science Fund (FWF), and conducted at the Department of Image Science, AT.MAR is an advanced conception of the Archive of Digital Art (ADA)[2]. Formerly called

1 The Interactive Archive and Meta-Thesaurus for Media Art Research was conducted by Prof. Oliver Grau (Danube University) and Team: Sebastian Haller, Valerie Kummer, Michaela Seiser, Viola Rühse, Janina Hoth, Wendy Coones, Devon Schiller.
2 digitalartarchive.at.

the Database of Virtual Art, this pioneering archive for works at the intersection of art, science and technology celebrated its fifteenth anniversary in 2015 (Grau 2000: 320). ADA was established as a collective project in cooperation with renowned international media and digital artists, researchers and institutions for the integration of a sustainable exchange between artists, experts and users. Comprehensive and open access, ADA is a cost free database.

Hard humanities: Media art histories & image science

Over the last five decades, digital art has evolved into a significant contemporary field. It encompasses art forms produced, modified or transmitted by means of the very digital technologies that are fundamentally revolutionizing our world—as well as how we perceive and interact with images—through globalization, the Internet, social networks, Web 2.0 and 3.0, and on. Unlike with painting or sculpture, graphic printing or even photography, digital artists make use of emerging technologies that originate from a scientific, military or industrial context not only as their media, or image carrier, but have this technology as their explicit image-subject as well (Paul 2003). Thus, digital art can take highly disparate forms and include such art genres as bio/genetic, database, digital animation, game, glitch, installations, nanotechnology, net art, telepresence and virtual reality.

Image Science (*Bildwissenschaft* in the German tradition), and its sister discipline, Visual Studies, encourages a "reading" of artistic images that is interdisciplinary, as is essential with digital art. This approach presupposes that scientific work with images must include their definition, archiving and a familiarity with a large quantity of images. Though there have been a number of historic forerunners to the image science method, most frequently cited as the discipline's "father" is Aby Warburg. Famously intending to develop art history into a "Laboratory of the cultural studies of image history" that would widen the field to „images [...] in the broadest sense", by including many forms of images in his iconic *Mnemosyne image atlas* of 1929, Warburg redefined art history as medial bridge building (Warburg 1922: 216).Yet, definitions of the image such as those by Gottfried Böhm (1999), James Elkins (1999) and W.J.T Mitchell (1995) have become problematic in the context of the interactive, immersive, telematics and generative digital image. These challenges have fueled interdisciplinary debate as to the status of the image with protagonists such as Andreas Broeckmann (2009), Oliver Grau (2007), Erkki Huhtamo (2004), Martin Kemp (2009) and Barbara Stafford (2007).

Through the study of MediaArtHistories in the discourses of digital art the most immediate socio-cultural questions of our time are investigated: from body futures and media (r)evolution to environmental interference, finance virtualization and surveillance culture. While the critical lexicons of classical art history are relatively fixed, the classifying language of digital art is defined with dynamic terminologies that are continually in flux, or so-called 'floating signifiers.' Thus, the forums and catalysts for digital art rhetoracy take place in a vibrant knowledge ecosystem reported in: collaborative projects for database documentation supported by institutional and social agencies; international festivals with peer reviewed awards and globally publicized interviews; and new literature published by leading scientific and university presses. Yet, despite such worldwide recognition, programmes for documenting the 'art of our times' continue to be met with serious challenges within the memory institutions of our societies. As Media Artworks frequently have functionalities across variable media substrates, and these constituted by the latest technologies as well as characterised by a rapid obsolescence, the work of Media Artists complicate both object-oriented preservation methods as well as static indexing strategies. Consequently, artworks originating even just ten years ago can often no longer be exhibited. As debated since the 1990s, museums rarely include Media Art in their collections, and those that do struggle to sustain finance, expertise, and technology for the preservation of artworks through strategies such as migration, emulation, and reinterpretation (Ippolito/Rinehart 2014; Buschmann/Caianello 2013). Further, that Media Artists engage the most contemporary digital technologies leads to the production of artworks that are necessarily processual, ephemeral, interactive, multimedia-based, and fundamentally context-dependent.

Since the turn of the Third Millennium, there has certainly been evident promotion of conferences, lexicons, and platforms in the endeavour to document Media Art. It is specifically the subject of the MediaArtHistories conference series, which with its premier in 2005 represented and addressed the many disciplines involved in the then emerging field.[3]

3 http://mediaarthistories.org.

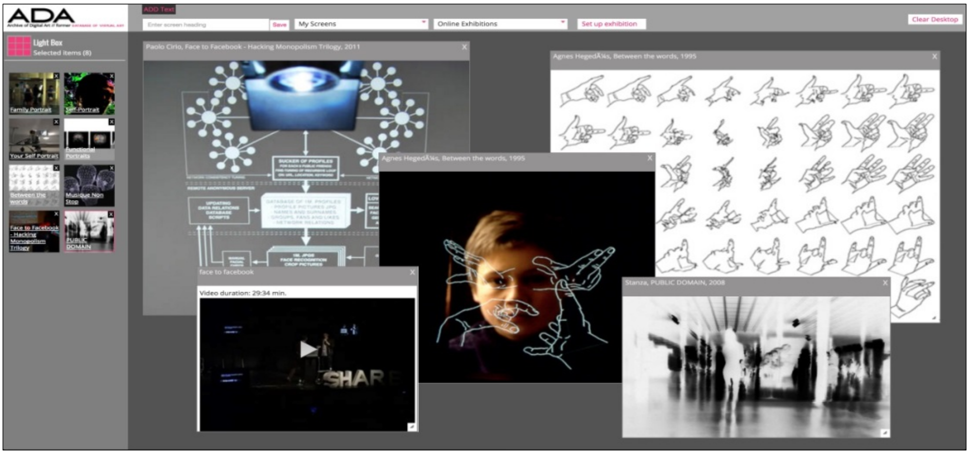

Figure 1. Archive of Digital Art (ADA), screenshot (detail Light-Box), www.digitalartarchive.at. ©ADA

A number of preservation projects have also been established. While many continue to exist online, each either lost key researchers, had funding expired, or was eventually terminated.[4] And as recently expressed in an international declaration[5], signed as of 2016 by more than 450 scholars and leading artists from 40 countries, there is an urgent need to create a stable international platform of interoperable archives. Yet, even with such progress in the study of Media Art, programmes for documenting this 'art of our times' continue to be met with serious challenges within the memory institutions of our societies. Indeed, it is no exaggeration to state that we continue to be threatened with a significant loss of this critical art form, both in the archives of art history and for future scholarship.

Media (r)evolution and the archive of digital art

Since the year 2000, ADA is one of the most complex research-oriented resources available online as a platform for both scientific information and social communication. Hundreds of leading Media Artists are represented by several thousand documents, with more than 3,500 articles and a survey of 750 institutions of media art also listed. Besides the artists,

4 For example, the Langlois Foundation in Montreal (2000–2008), Netzspannung at the Fraunhofer Institut (2001–2005), MedienKunstNetz at ZKM (2004–2006), The Boltzmann Institute for Media Art Research in Linz (2005–2009). The Variable Media Network, http://www.variablemedia.net. And the Capturing Unstable Media project by V2, http://v2.nl/archive/works/capturing-unstable-media.
5 http://www.mediaarthistory.org/declaration.

there are also more than 250 theorists and media art historians involved in making ADA a collective archiving project (Fig. 1).

Because of the singular structure of the art form, a defining strategy for the Archive of Digital Art is that of an "expanded concept of documentation" (Grau 2003). The documents on ADA that represent the artists there archived include: biographical and bibliographic information about the artist, their inventions, awards, and statements; exhibitions, and publications; graphic images of the installation of the artwork; digital images of individual artworks (exhibited, in process, and in all its varying iterations); information on the software and hardware configuration; technical instructions; type of interface and display; video documents (interviews, presentations, symposia); references and literature about the artists; information about the technical staff; institutions; and copyright.

A system of online community membership for ADA allows artists and scholars to upload their own information, with a gate-keeping policy that the ADA advisory board reviews applicant qualifications and makes member selections. The system[6] offers a tool for artists and specialists to individually upload information about works, people, literature, exhibits, technologies, and inventions. Over the last fifteen years some 5,000 artists were evaluated, of which 500 fulfilled the criteria to become a member of the ADA. From the beginning, the long-term goal of the project was not simply the documentation of festivals, awards or similar events, but a scientific overview with the respective standards of quality. Members have to qualify with at least five exhibitions or articles about their work, or, alternatively, can be suggested by the board.

Documenting digital art: Implementing 2.0, 3.0 features

For the Archive of Digital Art, the first online collective archive that is both scholarly and social in art history or media studies, documentation and access are not understood as static concepts, but as a process that integrates a continuous exchange between users, scholars and artists. With an open access policy that provides users with an active role and that supports accessibility, ADA is more likely to continue to be an up-to-date as well as a lasting resource. An essential aspect of the Interactive Archive and Meta-Thesaurus for Media Art Research project (AT.MAR) was thus to transfer ADA into a Web 2.0 environment and open it up on the "retrieval-side" by making the data available and easier to share for users,

6 The PostGreSQL Database is open Source and the operation system is Linux based.

and on the "archivist-side" by allowing contributions of diverse individuals in order to facilitate a collaborative and more balanced preservation practice.

Newly innovated ADA features support the group engagement and foster motivation. A messaging system and News section allow archive community members to interact with peers and announce upcoming events. Contribution monitoring and a function to follow colleagues provide updates on the research and activities of other archive members. And collaborative processes of peer-reviewing and content curation, integrate the member community's decision-making and agenda setting into ADA itself. Contributions can be seen in the "Works" section of every scholar and artist on ADA, where the Archive features enable members to collect "Descriptions and Essays" about their artworks, as well as information on "Technology," "Literature," and "Exhibition and Events." A process of peer-review performed by the ADA member community guarantees the quality of these contributions, with all the atest ADA updates visible to members on the homepage after login. Individual contributions, once peer-reviewed, are automatically referenced and made accessible to all users, whether ADA community member or online visitor to the archive. Contribution visibility is measured not only in web links, page hits, and citation statistics, but also exemplified by the above described peer assessments internal to ADA, in a disciplinary as well as interdisciplinary networking that builds the standing of archive members within their international professional community.

Members also engage in selecting featured artists or scholars, a profile about who is published on the ADA homepage, social media, and through newsletters. This *Featured Artist/Scholar* introduces ADA visitors to community members distinguished by their peers; allows archive members to commemorate achievement within the discipline or recognition within the community; and supports active participation in content direction. ADA's *Light Box* (Fig. 1) feature is both scholarly and social. Promoting the comparative analysis of Media Artworks on the archive, this tool permits community members to assemble individual arrangements from the extended documentation of images, texts, and videos on ADA. These selected items can then 'enlarge' and 'overlap' so that relevant image details can be compared and analyzed. Textual notes can be added and exhibitions saved on a visual pin board ("My Screens") for further research. These Light Box-based exhibitions of ADA content by community members are then publishable as an online exhibition, visible to all users, and accessible for a wide variety of applications from scientific or art-based research, to science, education and public outreach. ADA promises many potential affordances as an online collaborative archive, including expanding data beyond that which any single institution or even cross-institutional research team could compile; increasing the high quality of data that originates directly with artists and scholars in the field of media art; cultivating the various viewpoints of the global community that contributes to the archive; and developing this scholarship through a system of checks and balances by archive community members. Features such as Featured Artist/Scholar, and Light Box peer review all enhance the interpersonal relationships of ADA community members and foster exchange.

Indexing digital art: The bridging thesaurus

Keywording is bridge building! And for the *bridging thesaurus* of the AT.MAR project, the intent to establish a linguistic framework that allows for the classification of the aesthetics, subjects and technologies of artworks, directs the process of individual concept and term selection. To achieve a comprehensive overview of the knowledge domain of digital art, but also a manageable one, this vocabulary is kept limited to around 250 terms. This constraint increases the usability of vocabulary terms and insures an accuracy for indexing practice, which is particularly crucial with ADA since the community members themselves carry out a significant part of the indexing. Central to the construction of ADA controlled vocabulary is the logical concept of terminology structure based on a classification strategy that will allow users to index various levels of meaning relevant to the digital art knowledge domain. In relation to other vocabularies, ADA keywords have a unique hierarchical schema based on a categorical triad of ‘aesthetics’, ‘subject’, and ‘technology’. This top-down distinction of categories allows for the contextual specification of vocabulary as well as for the conceptual analysis of these levels by users:

Aesthetics: In accordance with the dominant understanding of Media Art in the scholarly literature, and “relatives” of this field such as digital or electronic art, the ‘aesthetics’ category encompasses a broad scope of terms ranging from phenomenological observations such as ‘immaterial’ to ontological qualities such as ‘site-specific’ and ‘object-oriented’. *Subject*: The ‘subject’ category encompasses iconographic terms established in art history and Media Art Histories, as well as concepts that enable both descriptive and interpretative approaches to the subject of works. In regards to term quantity, this category is the most comprehensive.[7] The 'subject' category includes 10 subcategories like: 'Body and Human', 'Media and Communication', 'Nature and Environment', 'Technology and Innovation', 'Power and Politics', 'Religion and Mythology', 'Science and Knowledge'. *Technology*: The 'Technology' category was adopted from the original thesaurus developed for the Database of Virtual Art (DVA), which later became the Archive of Digital Art, and enhanced by subcategorizations 'interface' and 'display,' as well as terms encompassing 'traditional' image-carriers such as 'painting', 'print' or 'book'. The resources for terms and concepts used in the development of AT.MAR, which define the very foundation of this controlled vocabulary, include (1) 'traditional' art history vocabularies, (2) Media Art databases, (3) festivals and (4) literatures:

(1) The 'traditional' art historical vocabularies cited were those most widely accepted scientific tools used for the description, linkage, and retrieval of images in art history. These included Iconclass, an alphanumeric classification scheme designed for the iconography of art; the Art and Architecture Thesaurus (AAT) and the Warburg-Index, an index of iconographical terms.

(2) Databases selected for AT.MAR include the *Dictionnaire des Arts Médiatiques*, GAMA keywords, the vocabulary of the Daniel Langlois Foundation, and Netzspannung. Each of these vocabularies reflects the explicit practical affordances and implicit ideological assumptions of the institution that advanced it.

(3) Further, as festivals are central to the media art scene as forums and catalysts for the contemporary discourses and innovative technologies of media art, the project team took account of an international range of festival materials such as official publications and professional interviews. Festivals reviewed included, among others, Ars Electronica; Dutch Electronic Art Festival; European Media Art Festival; Festival Internacional de Linguagem Electrônica; Inter-Society for the Electronic Arts; Microwave Festival, Transmediale..

(4) Research literature was evaluated on the basis of its indexes that 'map' the most valuated topics in the field. Important innovations such as, 'interface' or, 'genetic art' were considered along with keywords that play a role in traditional arts—such as 'body' or 'landscape'— with a bridge-building function.

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7 In accordance with the guidelines of the ,Categories for the Description of Works of Art' (CDWA), the AT.MAR vocabulary considers 'subject' as "the narrative, iconic, or non-objective meaning conveyed by an abstract or a figurative composition. It is what is depicted in and by a work of art.

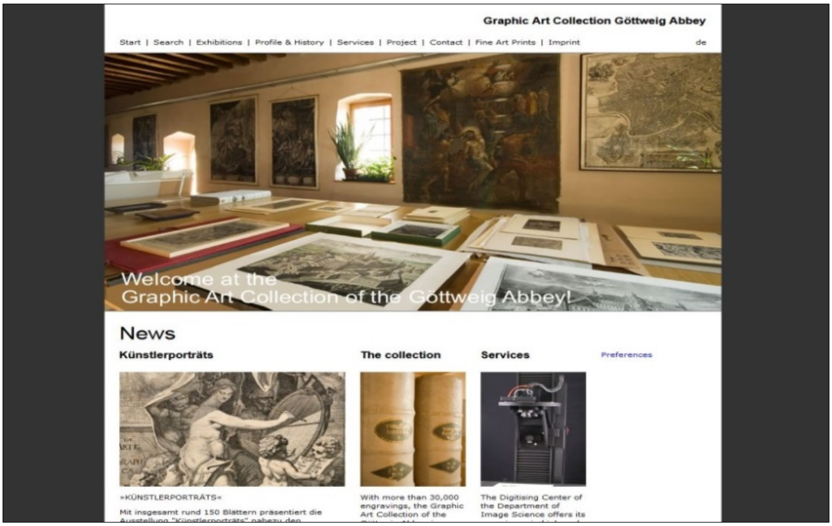

Figure 2. Göttweig Abbey Graphic Art Collection Online, www.gssg.at [Last access 4 March 2018]. © Department for Image Science.

Future digital art research: The Göttweig collection

To support the cross-cultural, interdisciplinary, and transhistorical comparative analyses of the Media Artworks on ADA, the keywords of its bridging thesaurus are further applied to artworks from other social contexts and historical periods. Through AT.MAR, ADA is now linked with the Göttweig Abbey Graphic Collection (Fig. 2). Göttweig Abbey, founded in 1083, holds 30,000 prints as well as a library of 150,000 volumes in one of the most comprehensive private collections of mostly Renaissance and Baroque engravings. With acquisitions first recorded in 1621, the collection was systematically expanded during the Abbotship (1714–1719) of Gottfried Bessel. In cooperation with Göttweig, the Department of Image Science conducted the digitization of the collection.[8]

The graphic and textual works of the online Göttweig collection, document subjects from the 'representation of knowledge' and 'history of science,' to 'architecture' and 'fashion,' 'optics' and 'panorama.' Thesaurus keywords are navigable as "Hierarchical," "Alphabetical," and "As Cloud" , support and stimulate users to bridge the 'traditional' artworks and the digital art of ADA, providing complex image resources for a richer analysis (Fig. 3).

8 www.gssg.at.

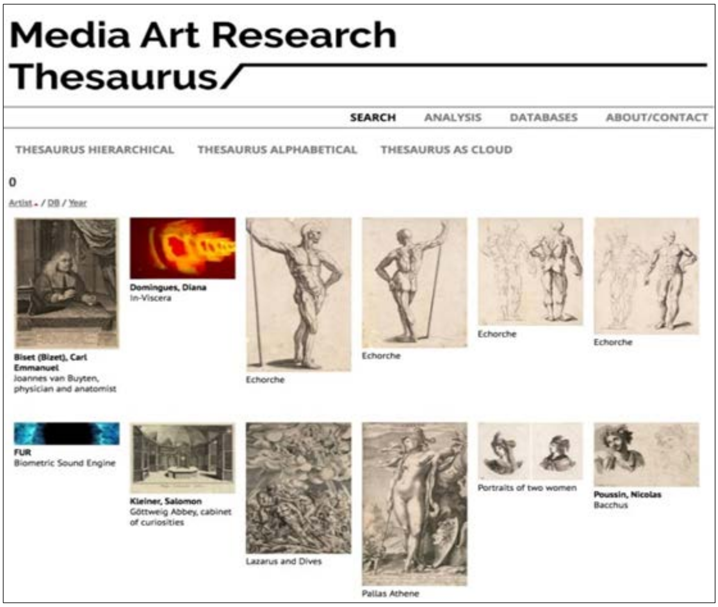

Figure 3. Media Art Research Thesaurus, comparative analysis: Keyword “Anatomy“, accessed 4 March 2018. ©Department for Image Science

Conclusion

The innovative methodology developed through the AT.MAR project will foster the documentation, indexing and research of digital art on the Archive of Digital Art in a context of multiple histories of art, science and technology. Thesaurus categories in aesthetics, subject and technology bridging ‘traditional’ art forms with digital art support the tracing of hybrid qualities in these artworks, as well as historical correspondences and conflictions. Through collaborative visual tools that include a Light Box and semantic links, a global community of artists and scholars may conduct research and perform clustering analysis or comparative study. That the thesaurus connects digital art with art history, and neither isolates these fields from one another nor includes only contemporary terminology, increases the usability of the Thesaurus for the humanities. For the future of ADA, further goals are to document works within a context of complex information and, at the same time, allow users to find specific information readily. Beyond using analysis using the Briding Thesaurus, which shows, for example, virtual and immersive art’s reminiscences to its predecessors in the panorama and *laterna magica*, Media Art documentation should also include questions of gender, track the movement of technical staff from lab to lab, technical inventions pertaining to art, as well as public and private funds allocated to research. By advancing from a one-way deposit of key data to a proactive process of knowledge transfer, the archiving of digital art becomes a resource that facilitates research for academics, experts, and students.

References

Boehm, Gottfried. 1994. *Was ist ein Bild?*. Munich: Wilhelm Fink.

Broeckmann, Andreas and Gunalan Nadarajan (Eds.). 2009. *Place Studies in Art, Media, Science and Technology: Historical Investigations on the Sites and the Migration of Knowledge*. Weimar:VDG.

Buschmann, Renate and Tiziana Caianiello (Eds.). 2013. Media Art Installations Preservation and Presentation: Materializing the Ephemeral. Berlin: Dietrich Reimer Verlag.

Dixon, Steve. 2007. *Digital Performance: A History of New Media in Theatre, Dance, Performance Art, and Installation*. Cambridge: MIT Press.

Elkins, James. 1999. *The Domain of Images*. Ithaca, NY: Cornell UP.

Fauconnier, Sandra. 2003. "Capturing Unstable Media: Summary of Research." V2-Lab for Unstable Media. http://v2.nl/files/2003/publishing/articles/capturing_summary.pdf [Last Checked: April 2019]

Grau, Oliver. 2003. "For an Expanded Concept of Documentation: The Database of Virtual Art." In *ICHIM Proceedings*, École du Louvre, Paris, pp. 2–15.

— 2003. *Virtual Art: From Illusion to Immersion*. Cambridge, MA: MIT Press.

— (Ed.). 2007. *MediaArtHistories*. Cambridge: MIT Press.

— with Wendy Coones and Viola Rühse (eds.). 2017. *Museum and Archive on the Move: Changing Cultural Institutions in the Digital Era*. Berlin: De Gruyter.

Huhtamo, Erkki. 2004. "Elements of Screenology." In *Iconics. The Japan Society of Image Arts and Sciences*, Vol. 7, pp. 31–82.

Ippolito, Jon and Richard Rinehart. 2014. *Re-collection: Art, New Media, and Social Memory*. Cambridge, MA: MIT Press.

Kemp, Martin. 2011. *Christ to Coke: How Image Becomes Icon*. Oxford: Oxford University Press.

Mitchell, W.J.T. 1995. *Picture Theory: Essays on Verbal and Visual Representation*. Chicago: University of Chicago Press.

Paul, Christiane. 2003. *Digital Art*. New York: Thames and Hudson.

— 2009. “Context and Archive: Presenting and Preserving Net-Based Art.” In Dieter Daniels and Gunther Reisinger, Net pioneers 1.0 : contextualizing early net-based art, Berlin/ New York: Sternberg Press, pp. 101-122.

Sachs-Hombach, Klaus (Ed.). 2005. *Bildwissenschaft*. Frankfurt/Main: Suhrkamp.

Shanken, Edward. 2009. *Art and Electronic Media*. London: Phaidon.

Sommerer, C. and L. Mignonneau. 2003. “Modeling Complexity for Interactive Art Works on the Internet.” In John Casti/Anders Karlqvist (Eds.), *Art and Complexity: At the Interface,* Amsterdam: Elsevier, pp. 85–107.

Stafford, Barbara. 2007. *Echo Objects: The Cognitive Work of Images*. Chicago: University of Chicago Press.

Warburg, Aby. 1922. “Heidnisch-antike Weissagung in Wort und Bild zu Luthers Zeiten.” In *Zeitschrift für Kirchengeschichte* 40, p. 261–262.

Wilson, Stephen. 2010. *Art and Science Now: How scientific research and technological innovation are becoming key to 21st—century aesthetics*. London: Thames and Hudson.

Redesigning Rare Japanese Books in the Digital Age: Design of the Narrative Book Collection

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Abstract

This paper introduces Narrative Book Collection—a unique model of digital exhibition for pre-modern Japanese books that explores computational and visualization approaches to create a new book reading experience in the digital age. Narrative Book Collection uses both verbal and nonverbal aspects of books to enable distant and close reading, and reveals cultural features in a narrative format. This paper describes the process of design and implementation of a digital exhibition inspired in approx. 200 titles selected from an extensive collection of pre-modern Japanese books from the 8th to the 19th century, kept by Keio University's Library and the Institute of Oriental Classics. The implementation of Narrative Book Collection provides practical and comprehensive insights of Japanese culture through pre-modern Japanese book collections, and opens a new door for digital exhibition of books.

Keywords

Rare Japanese Books, Pre-Modern, Narrative, Digitization, Visualization, Digital Collection, Interface Design

Introduction

The transformation of books

Books are physical artefacts, a medium of communication that relates to our senses by written words or illustrations stimulating our minds. Despite the rise and development of digital technology, books retain its value through preserving words and images. However, the impact of digitization enables a much greater number of people to engage with books from many different perspectives. By adopting digital technology, books are now transformed into digital formats making resources accessible and usable in many different ways. The mass digitization of books has the potential to make them, their large variety of perspectives, accessible remotely and to further transform the reading experience.

In the digital age, books are becoming more accessible, shared, and explored online. These transformations have been applied to several collections and especially to the books that are distinguished by their early production or printing date, namely rare or special book collections (IFLA 2014).[1] While there is no single definition for rare or special, and every institution defines the term for itself, these collections find value in their physical characteristics which includes "date, imprint, textual state, binding, aesthetic qualities, and condition, among other things" (Bennett 1969: 7) rather than its intellectual content. With maturing technologies, from digitization, and via web-based visualization, now a broader public obtain access to these rare books.

Introducing the Narrative Book Collection

By adopting bibliographical knowledge into digitized rare book collection, this paper proposes an online interactive interface named *Narrative Book Collection* to provide new reading experience in rare Japanese books. The Narrative Book Collection is designed alongside a massive open online course (*MOOC*) entitled *Japanese Culture Through Rare Books*[2], and the core element is based on a collection of 148 books retrieved from the course—such as ancient scrolls, original manuscripts, and other unique manifestations of pre-modern Japanese literature. Given the value added by the digitization and visualization, the Narrative Book Collection aims at encouraging open-ended explorations in diverse types of pre-modern Japanese books in the digital environment.

Research outline

In this research, we work with a vast book collection from *Keio University's library* and *the Institute of Oriental Classics*, which keeps an exten-

1 Guidelines for Planning the Digitization of Rare Book and Manuscript Collections, T*he IFLA Rare Book and Special Collections Section*. September 2014. http://www.ifla.org/files/assets/rare-books-and-manuscripts/rbms-guidelines/guidelines-for-planning-digitization.pdf.
2 FutureLearn, Online Course: Japanese Culture Through Rare Books, 2016. https://www.futurelearn.com/courses/japanese-rare-books-culture.

sive collection specializing in pre-modern Japanese books from the 8th to the 19th century. And in collaboration with experts of pre-modern Japanese book studies and bibliography, the design of the Narrative Book Collection proposes an experimental approach to not only initiate exploration and facilitate understanding in rare Japanese books, but also to make book exploration a pleasurable experience where the MOOC learners can further broaden and deepen their learning experience. Moreover, this research shares insights from the collaborative design process between the Narrative Book Collection and the MOOC, and the feedback from the learners as well as usage data gathered during the deployment of the resulting case study will demonstrate the potential of new procedural techniques and design in developing online book collections.

Foundations

Books as cultural artifacts

Composed of texts or pictures as the main element, traditionally, physical books have mainly functioned as reading material. However, books as physical objects have several other qualities that appeal to all of our senses which examples in a range of formats. As cultural artifacts, books are historical evidence, which contain an abundance of knowledge and information from the past. Most importantly, every book functions as a form of media and sends a "message" (Marshall 1967: 34-37) from the past to the present. Pearson (2008: 7) states that books are "emblems of our culture" and we should become more conscious about their physical format and cultural values, beyond the text. In *The Study of Book History*, Howsam (2015: 4) claims that a "book is a *material object*. From the literary and historical perspectives, the materiality of books is often overlooked, so powerful are their texts and the impacts of those texts upon their times. But bibliographical scholarship demonstrates that the book-as-object holds the evidence of its own making; it carries not only the obvious text on its pages but a further 'text' in its format, materials, design and impression." McGann (1991: 43) argues that every literary work contains physical characteristics as "bibliographic codes," and it should be considered significant along with its linguistic codes. Further, McKenzie (1999: 13) describes bibliography as a study of the "sociology of texts" and the principle is to transmit both material form and textual meaning into sociocultural context.

Although the discipline of bibliography has several different branches—such as, *Enumerative bibliography*, *Descriptive bibliography*, or *Analytical bibliography*—extensively, all bibliography focuses on the material conditions or textual features, and examines the role of the book in a particular culture or society (Gaskell 1995). Indeed, as one academic discipline, practitioners in bibliography need specific knowledge, however, with the development of humanities research as well as new forms of digital research dissemination enables bibliographical scholars to make their research available to wider audiences. According to Howsam (2015: 4), “bibliographical scholarship in practice is highly specialized, like the knowledge of physicists. But (like the knowledge of physicists) its findings can be interpreted for a lay audience.” Although digital transmission does not reproduce the materiality of books, it is clear that the development of digital technologies has changed the way people appreciate the physical structure of books and has also re-contextualized bibliographic studies to be shared with the wide public.

Digitization of rare japanese books

The importance and need for digitization in the field of rare Japanese books have been advocated in the last few decades. To name a few examples, the *Art Research Center (ARC)* at Ritsumeikan University[3] published the collection in their database: *The Early Japanese Books Portal Database*[4], unifying the digitization and publication phases. Waseda University Library is known for their noble digital collection called Waseda University Library’s *Kotenseki Sogo Database*, which provides approximately 300,000 digitized Japanese and Chinese classics and allowing free download of high-resolution digital images.[5] More recently, the *National Institute of Japanese Literature (NIJL)* has started a 10-year project named *Project to Build an International Collaborative Research Network for Pre-modern Japanese Texts (NIJL-NW project)*. This project aims to develop a new large-scale database by collecting 300,000 pre-modern Japanese books from universities and institutions across Japan[6]. Furthermore, NIJL collaborates with the *Center for Open Data in the Humanities*

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3 Ritsumeikan University,. Art Research Center. http://www.arc.ritsumei.ac.jp.
4 Art Research Center,. The Early Japanese Books Portal Database, 2005. www.dh-jac.net/db1/books/search_portal.php.
5 Waseda University Library,. Kotenseki Sogo Database. www.wul.waseda.ac.jp/kotenseki/index_en.html.
6 National Institute of Japanese Literature Project to Build an International Collaborative Research Network for Pre-modern Japanese Texts (NIJL-NW project). www.nijl.ac.jp/pages/cijproject/index_e.html.

(CODH)—a center that promotes data-driven research for humanities—and provides their collection as datasets to promote the use of pre-modern Japanese book collections on a global scale.[7]

However, most research remains focused on developing digitization techniques, creating a database or an online archive mainly for academic usage only. Although many researchers in Digital Humanities welcome public outreach, the above examples align the book titles or images in a simple aligned format, which makes it difficult for "a user who is unfamiliar with the collection's scope, contents, or structure" (Hinton and Whitelaw 2010: 52) to wander around the collection. For non-academic people, the digital collection and its interface are often the first interaction they have with pre-modern Japanese books, yet for most existing collections "keyword search is the central—often the only—way to access the collection" (Whitelaw 2015). However, Murray (2011: 159) claims that "for digital collections, designers can maximize collocation because the same object can appear in multiple places, unlike a single copy of a physical book." Indeed, a large design space remains in the field of transforming digital collection. While a number of academic laboratory researches remain in catering too much to and for academics, under the broad notion of Digital Humanities, the integration of humanities and technology has a large potential to advance research and experimental study to attract a broader public, with interest for both academic and non-academic audiences.

The concept of close reading and distant reading

Instead of anchoring in traditional approaches—functioning as a repository or an archive of books—the visual exploration is the key factor of the Narrative Book Collection. In this research, the bibliographical perspectives of books are revealed through the process of generation and manipulation of data, and transformed into visual formats. The analytical insight into bibliography is based on the concept of *Close Reading* and *Distant Reading* which enable learners, to capture the wide variety of characteristics that appear in rare Japanese books, beyond the written texts.

Close Reading—a way to read books closely—has been adopted in the humanities field for many years. Boyles (2012: 36) defines it as one way of "reading to uncover layers of meaning that lead to deep comprehension." Close Reading, in other words, is an approach of intensive reading, which

7 Center for Open Data in the Humanities, Research Organization of Information and Systems. Datasets. http://codh.rois.ac.jp/dataset/index.html.en.

requires readers to read its individual words or illustrations, then capture and understand the contexts of books. On the contrary, Distant Reading—a term introduced by a literary scholar, Moretti (2000)—is an approach that proposes new ways to study world literature, and enables us to capture books from multiple sources across institutions and archives. While Close Reading focuses on isolated features, and Distant Reading illuminates common features throughout, both the conception of Close Reading and Distant Reading reveal not just what is written in books, but how the materialization of each book—its similarities or differences—can be enacted, and give new insights to the readers. Therefore, in this research, we embrace both Close Reading and Distant Reading as a form of context necessary for interpreting data,and that multi-scale and multi-resolution will continue to develop approaches and paradigms in creating the Narrative Book Collection.

Story, storytelling and narrative

The classical definition of ‘narrative’ is considered “as the representation of a real or fictitious event or series of events by language, and more specifically by written language” (Genette and Levanos 1976: 1). However, in the digital age, narrative is not limited to text and the essence of narrative is applied within the virtual space in different formats. Narrative is now used as an act, event, or an element of storytelling, which connects real/virtual space, presented in a sequence of written/spoken words or still/moving images across mediums (Abbot 2009). Indeed, there are a considerable number of studies that demonstrate the use of narrative alongside story and storytelling. Every story, storytelling, and narrative takes a variety of forms (Bal 1997), however, given its instinctual nature, the core of this paper is to generate meaning and understanding in every content that learner explores. Hence, following is a set of definitions of Story, Storytelling, and Narrative composed of three primary levels. In this way, the Narrative Book Collection enables online users to explore pre-modern Japanese books through adopting bibliographical knowledge. The narrative can be explored not only in the dissemination of its content but also in the ways in which they are crafted.

- Story (Stories): consists of viewpoints with distant and close scale. Enable learners to focus their attention on specific parts of course materials.
- Storytelling: series of stories formulated by the learner that forms different pathways and sequences.

– Narrative: sum of every single aspect of story and storytelling. Learners can perform an open-ended exploration through the narratives.

Setting the stage to FutureLearn

FutureLearn[8], a UK-based MOOC platform, is one of the major MOOC platforms that has a user base of more than 7.8 million people as online registered learners. FutureLearn offer a diverse range of courses from universities and institutions from around the world and states their pedagogical principle in "visible teaching" and "visible learning" (Hattie 2008) where both teaching and learning process are visible with sharing a simple and linear structure accompanied by videos, articles (images and texts), quiz, and discussion.[9] Moreover, FutureLearn is unique with its social learning approach, which emphasizes learning through social interaction (enabling comments, 'Likes,' and the ability to 'Follow' individual learners) throughout the duration of the course.

Keio University has been delivering courses on FutureLearn's platform since 2016. The first course, in which the Narrative Book Collection will be implemented, was coordinated by the professors at the Institute of Oriental Classics to "explore Japan's history of book production from its beginnings in the 8th century, drawing on Keio University's extensive collection of rare Japanese books" (Keio University 2015: 2).

Design of the Narrative Book Collection

Overview

The research presented in this paper proposes a new reading experience through designing an interactive interface of rare Japanese books. With the Narrative Book Collection, we intend to create an open-ended browsing experience that promotes public access and engagement through the collection where engagement does not only mean making the collection accessible or reaching out to people, it also aims at enhancing understanding of rare Japanese books through establishing effective, easy and useful interface.

In this section, we begin with a pilot research in the FutureLearn

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8 FutureLearn. www.futurelearn.com.
9 FutureLearn, Using FutureLearn. www.futurelearn.com/using-futurelearn.

course: Japanese Culture Through Rare Books to investigate enrolled learners' activities. The pilot research studies were conducted in summer 2016 and early 2017 where the Narrative Book Collection was not yet implemented, though the courses were published as a first and second run on FutureLearn. During the pilot studies, we conducted informal discussion with scholars in bibliography and examined how FutureLearn learners behave on the course. Then next, based on the insights gained from the studies, we formalized the design process, tested an early prototype of the Narrative Book Collection with several course learners in order to investigate learners perception. Lastly, we presented the refined design and formulated design principles for the Narrative Book Collection. (Table 3.1)

1st Run	Pilot Research	18 July - 21 August 2016
2nd Run		9 January - 26 February 2017
3rd Run	Initial Design (Prototype)	22 May - 30 July 2017
4th Run	Refined Design Proof of Concept	25 September - 12 November 2017

Table 3.1. Outline of the Research Schedule

Pilot research on FutureLearn

The course Japanese Culture Through Rare Books has run multiple times with four to five-month intervals in between since July 2016. And for this pilot research, we examined the courses, classified as runs, that were offered in 1) July through August 2016: 1st course run and 2) January through February 2017: 2nd course run. To observe how bibliographical scholars teach and show their collection in the course, and to examine the requirements of the learners—the potential users of the Narrative Book Collection—this pilot research examined every phase of course design, such as developing, conducting, and analyzing phase.

Learner attributes

The following table 3.2 and figure 3.1 indicate the number of learners and registered learners per location. The size of the circle correlates with the number.

	Registered Learners	*Learners* (who joined at least one course step)	*Active Learners* (who completed at least one course step)
1st Run Course	8,666	3,951	2,990
2nd Run Course	5,617	2,584	1,826

Table 3.2. Learner Attributes (1st and 2nd course run)

Figure 3.1. Demographics of registered learners (1st and 2nd course run).

Developing the course

The course was led and taught by the faculty members of the Institute of Oriental Classics at Keio University and covered various topics in bibliographical studies. The course introduced the role of books in Japan's culture and history from the 8th to the 19th century with focusing on the 159 masterpiece collection from both Keio University's library and the Institute of Oriental Classics. To attract worldwide interest in rare Japanese books, the course was designed as an introductory course and open to anyone with an interest in the history of Japanese books. It was organized to be three-weeks long and required three hours of weekly workload. Within each week, the course had a main study topic, such as: The relationship between visual appearance and content in Japanese books (Week 1), Manuscripts and illustrated versions of the Japanese classics (Week 2), and Scholarship and publishing in the Edo period (Week 3). As explained in the previous section, FutureLearn presents the contents in various formats, and in this course, contents were categorized into 4 format types: Article (n=15), Video (n=30), Quiz (n=4), and Discussion (n=6).

Conducting the course

During both course runs, we observed learners' behavior and occasionally posted comments to assist learners by being a *host*, "a facilitator [...] act as a guide to learners."[10] Through observing and interacting with the comments, we found out that the demographics of the learners are diverse not only in geographical environment or age difference, but also in the 'learner archetypes' (Valentine et al. 2017). We observed learners from 1) Work and Study (e.g., librarians, university scholars), 2) Personal Life (e.g., retired, teacher), and 3) Leisure (e.g., artists, university students) in good balance. Many of them were not confident in Japanese language, yet the language barrier seemed not to be a hurdle in this course.

The total numbers of comments were 7,618 (from 895 unique authors) for the first course run and 5,844 (from 579 unique authors) for the s course run. While drop-out or non-completion rates are substantially high in every MOOCs, known as the "funnel of participation" (Doug 2013), we did not see much reduction in the comments itself. Instead, we noticed many conversational comments happening in every week.

Analyzing the course

Quantitative approach

During the 1st course run, 897 learners out of 3,951 learners (22.7%) posted at least one comment and 579 learners out of 2,584 learners (22.4%) at the 2nd course run. In order to understand the learners' preference in scale, we first investigated the posted comments through text mining. After manually cleaning the dataset through tidying inconsistencies of terms and spelling (e.g., unify the term 'book' and 'books' to 'books'), removing stop-words which are "words that are not useful for an analysis, typically extremely common words such as "the", "of", "to", and so forth in Eng-

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10 FutureLearn Partners, Managing your course team, 2016. https://partners.futurelearn.com/course-creation/building-a-course/managing-your-course-team/.

lish" (Silge and Robinson 2016), all comment data were organized and analyzed using R[11] through text mining. In this study, we used two sources: 7,618 comments from the first course run and 5,844 comments from the second course run.

In figure 3.2, by plotting the top 50 term frequency—with having texts, nodes and edges (directionality of the pairs are added with an arrow and the shades reflect the frequency)—it shows a connected, yet widespread comments rooting on 'books' along with other various terms. It is also interesting to see that alongside 'en.wikipedia.org' there is a path to YouTube 'www.youtube.com,' which indicates that a large amount of people were interested in looking into further explanations and visual information.

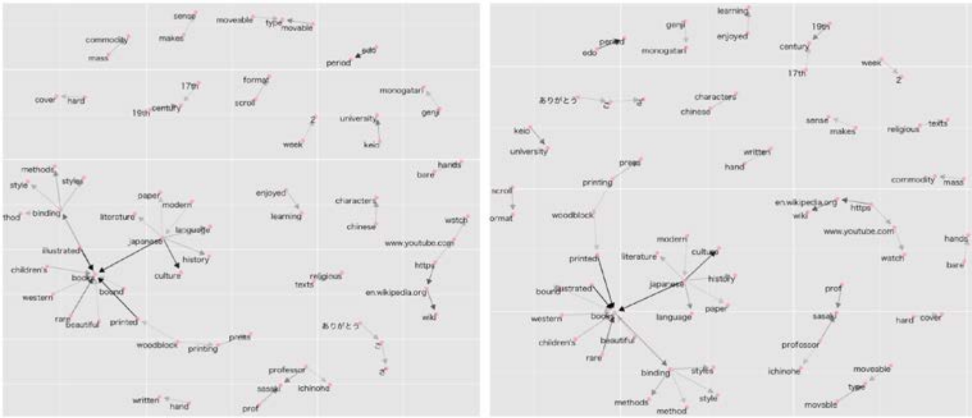

Figure 3.2. Visualization of Top 50 Term Frequency: 1st course run (left)/2nd course run (right).

Qualitative approach

Next, to interpret with text data more closely, and to gain behavioral insights about learners, l looked into the descriptions. In both comments posted by the learners and the post-survey result, most comments were positive with the course contents and the way it was organized, however, as shown in the following comments extracted from the discussion boards as well as post-survey results, there were a considerable amount of opinions and requests for further visual representations.

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11 The R Foundation,. R: The R Project for Statistical Computing. https://www.r-project.org

> I also find it a bit confusing. There could be some more pictures illustrating the differences, or diagrams. (Comment from the 1st course run)

> I feel that charts comparing each bookbinding time, and each type of paper, would have made it easier to discern each type from each other [...] for most people re-reviewing materials in a different format helps retain the material better [...]. (Post-Survey Result from the 1st course run)

> I'd like to examine more illustrated works and have comments on the objects/people/processes in the images. (Post-Survey Result from the 2nd course run)

Results and findings

Compared with the average FutureLearn course data (around 100,000 responses from the FutureLearn course run from 2015 to February 2017[12]), the satisfaction rate of overall experience was much higher. According to the optional post-survey result, 76.2% (n=319 from 1st course run) and 70.7% (n=157 from 2nd course run) of the respondents rated Excellent for their course experience while the average is 56.3%. Thus, in overall, both course runs received high reputations from enrolled learners.

However, the insights while conducting the course, and the results from the qualitative and quantitative analysis suggest further development of the course. On one hand, as shown in figure 3.2, we saw connections in every course topic—for instance, there were terms mentioning about the books physical appearance, binding style, scripts and production year, etc.—and broad patterns of learners' interests on a massive scale. On the other hand, the comments as well as the survey results reveal that not all topics—which were represented as course steps—were delivered to the learners in an appropriate context. Some contents were considered too self-explanatory, lacking interaction with the learners, and not well organized in a narrative context. To summarize, the following three issues were drawn from this pilot research:

– Lack of interaction with the course materials and the content: The sequential flow of the course as well as restricted course materials

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12 FutureLearn Partners, Survey comparison, 2017. https://partners.futurelearn.com/data/surveys/survey-comparison/.

limited learners to engage with the course and collection. Linearity is restricting the interactions in the course materials and leads to its lack.
- Expectations for a wider range of features to explore the course narrative: What many learners explored were not only constructed on top of pure materials or the linguistic representations, and led them exploring in external sites.
- Limitations in organizing course materials: Although learning goals were predefined by the scholars, learning pathways structured on the FutureLearn environment—linear and sequential structure—have its limitations in providing diverse narratives.

Design goals

The results and findings from the pilot research provided reliable evidence and became a strong basis for the design concept. The design of the Narrative Book Collection correlates with the content of the course, yet has further potential in providing a unique experience in exploring diverse elements of rare Japanese books. The central point of this research is to design and implement a digital collection of rare Japanese books for general audiences regardless of their baseline ethnic, regional, or educational differences, and to evaluate the effectiveness of the model through the process and implementation. Thus, in accordance with the discovered issues from the pilot research, we formulate three design goals as follows:
- Stimulate exploration and facilitate the understanding of the course through browser-based interactions
- Enable a wider range of interpretation of bibliographical information
- Provide both distant and close reading experiences to enable multiple pathways in different narrative contexts.

Design process of the Narrative Book Collection

The Narrative Book Collection will be built upon learners' perspective and the design process consists of four components: (a) story formation: establish stories (viewpoints) based on the course narrative, (b) data generation: generate and store digital data from the main content, (c) story-driven data analysis: analyze and interpret data to facilitate knowledge transfer, and (d) narrative visualization: offer multiple viewpoints and interactions with the collection.

Initial design

As an initial experiment, we developed a prototype of the Narrative Book Collection and tested with the enrolled learners of the 3rd course run. This prototype functioned as a browser-based interface in order to examine the effectiveness of the user experience and to receive feedback from the real FutureLearn learners. In the Narrative Book Collection, the visualization takes form as an interactive interface associated with viewpoints. And instead of merely connecting audiences to one concrete story or pathway, this prototype was designed uniquely to foster exploration in the collection through intuitive interactions—namely through clicking and dragging (Raskin 2016). In practice, the prototype was implemented as an external website, designed to first enter the top index page—an introduction page. Then, by clicking the top menu bar, learners were allowed to freely explore the collection in cover, timeline, color or size viewpoints. Furthermore, by clicking a book image or a text link 'Take a Closer Link,' learners were led to separate page with high-resolution zoomable images.

Results and findings

The analytics—implemented in the prototype—indicated that there were 105 users (learners) formed by 54% of new users, and 46% returning users (who accessed more than once). There were 193 sessions—a set of user interactions per visit—with 1,336 page views in total, and the duration of visits (per session) was 6 minutes and 43 seconds on average. The bounce rate was 38.14%. Besides, figure 3.3 shows the user flow of the learners. This figure shows the relative volume of page view along with the gray lines, which shows the flow (pathway) of learners, and the red lines, which represents the leaving (drop off) learners.

These results suggest that there were a number of leaners finding their own path and exploring several viewpoints. However, simultaneously, there were a considerable amount of learners—almost half of the learners who first visited the top index page—who drop off immediately after entering the site.

Furthermore, to receive direct feedback from the learners, we asked the learners to fill out an optional online survey. The following are part of the answers:

> [...] I think if more consideration was given to the whole look of the site it would be more in keeping with the beauty of the images of the books and the lovely idea and uniqueness of the site overall. (Optional Survey Result)

> [...] When first loaded, covers overlap, so cannot see “closer look”; when returned to this page, covers separate so better [...] TIME-LINE: good. But not clear how to move along timeline. (Optional Survey Result)
>
> Better index/listing; Colours on the timeline option—grey on grey with white should be changed as it is very difficult to read. (Optional Survey Result)

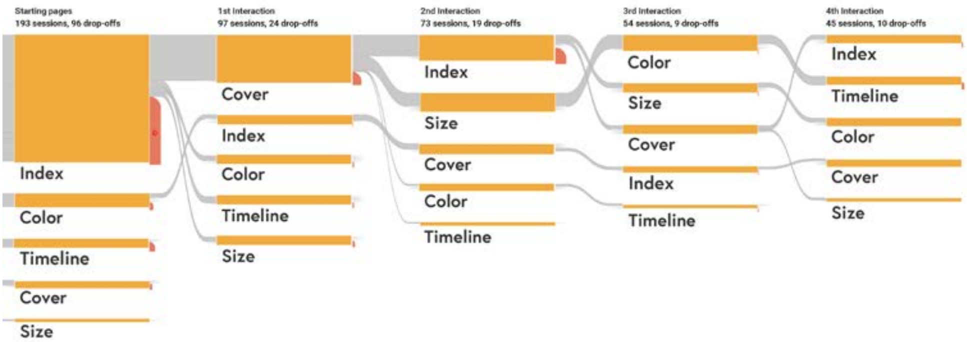

Figure 3.3. Prototype User Flow.

Summary

Rare Japanese books have qualities that appeal to all of our senses. The form of the object and its intended function are taught throughout the course. In this initial experiment, we intend to argue how these books can be delivered through designing and implementing the interface alongside the course. Through observing the prototype in use, we learned a number of practical lessons that will be fed into the following refined design. The results support the overall concept of the Narrative Book Collection, yet the main improvements suggested by the learners relate to the interface design. According to their feedback, the problem stems from representing a cluttered visual appearance which led to disengagement.

Accordingly, effective design and experience must be accessible to a plurality of people with different language, culture, and ability to originate aesthetic information visualization that composes the collection. Moreover, it is important to consider the balance of stories (viewpoints), the way to visualize rare Japanese books in a coherent and functional context with aiming in-depth detailed understanding of interrelationships alongside the course.

Refined design

Emphasizing the tight focus on user experience, the refinements require a deeper engagement with the subject matter as well as course content. Hence, the refined design put more emphasis on its artisanal and aesthetic value as a supporting material of the course in order to provide a synergistic learning experience among all enrolled learners.

Design Process

(a) Story formation

The refined design creates additional context across multiple scales. To focus more on the historical or artifactual value independent of its content, and enable learners to find and select their own pathways throughout the viewpoints, the refined design sets the cover image as main component (not a viewpoint) then features six viewpoints in both distant and close scale, such as Time (timeline), Genre, Typology (binding style), Appearance (color and size), and Content (writing style).

(b) Data generation

Since the 1st course run, 105 titles—264 digitized images—were accessible in high-resolution images and 95 titles were available on the prototype. However, many of the digitized books did not contain enough bibliographic records and not all books were available as high-resolution images. Therefore, based on the viewpoints we summarized at (a) Story Formation, we created/added bibliographic records and 53 newly digitized titles (401 images)—every image with 10 million pixels or more, with 16-bit color depth and sRGB color space.

(c) Story-driven data analysis

Based on (a) Story Formation and (b) Data Generation, we conduct both manual and computational analysis of the generated data. The data contained both bibliographical records and visual images of rare books, and due to the lack of heterogeneousness in data (e.g., uncertainties of production age, changes in colour, etc.), the analysis has been coordinated with scholars and experts in the bibliography.

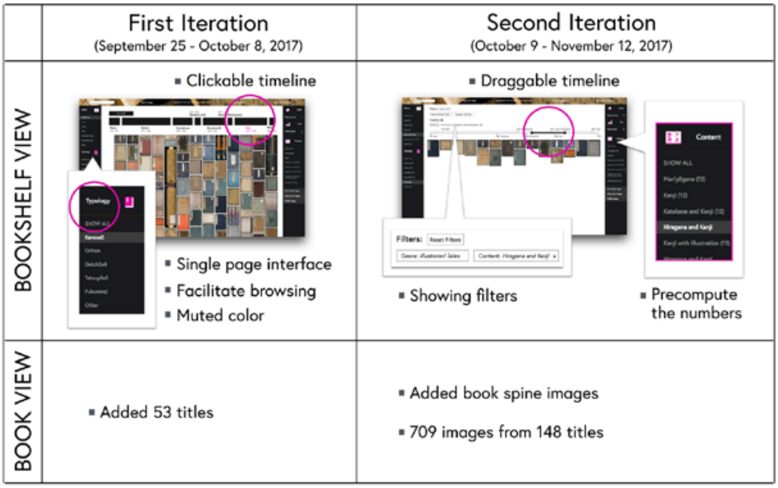

Figure 3.4. Main features in the first and second iteration.

(d) Narrative visualization

In the Narrative Book Collection, the narratives are created by offering viewpoints and allowing learners to find their own pathways. To provide a synergistic learning experience between this Collection and the Future-Learn course, we used a Bookshelf View—an overview of the collection through tiled cover images—linking to a Book View—high-resolution zoomable images with bibliographical records—, which bridges to the FutureLearn course. The interface allows learners to explore and deepen engagement with materials promoted by learning objectives specified in the course. However, it is important to note that the design and development of the interface were paralleled to the execution of the 4th course run (for the first two weeks), and the visualization evolved during the course run and was based on learners and experts feedback. Figure 3.4 shows the main features newly adopted in both iterations.

Bookshelf View

Bookshelf View offers an overview with multiple viewpoints—formed with icons—to easily instruct learners. Following one's own interest, Bookshelf View allows learners to slide/click on viewpoints. Although links between the course and the viewpoints can make use in many different ways, in this research, Bookshelf View is associated with Time (timeline), Genre, Typology (binding style), Appearance (color and size), and Content (writing style). Learners are able to select, combine and filter any viewpoints.

Book View

Book View was developed from the previous high-resolution zoomable image page. Accompanying bibliographical records, learners can deepen their knowledge in particular books. Book View also functions as a bridge to the FutureLearn course—by having a link to related course step(s)—as well as link icons which are pre-classified to the related viewpoints. To summarize, in the Book View, learners can see a) a list of digitized images of the book (all selectable), b) an image with Japanese title and imprints, c) detailed description of the book, d) zoom link that allows learners to view higher resolution image, and e) clickable link icons that lead learners to the unique Bookshelf View (Fig. 3.5).

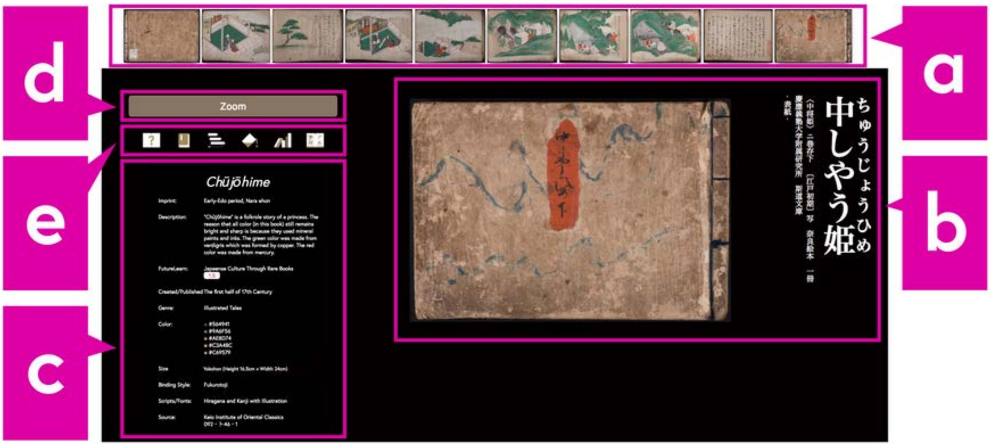

Figure 3.5. Details of Book View.

Implementing the Narrative Book Collection

Expected pathways

There are several pathways that can be followed during the learner's journey, with mainly two touch points. The first one is the Bookshelf View itself, where the user can visualize the whole content in a glance. The journey can start from the timeline that gives immediate response filtering the contents according to the period of publication. After clicking one of the books, the learner jumps to the Book View, where other pathways can be followed (Fig. 3.6):

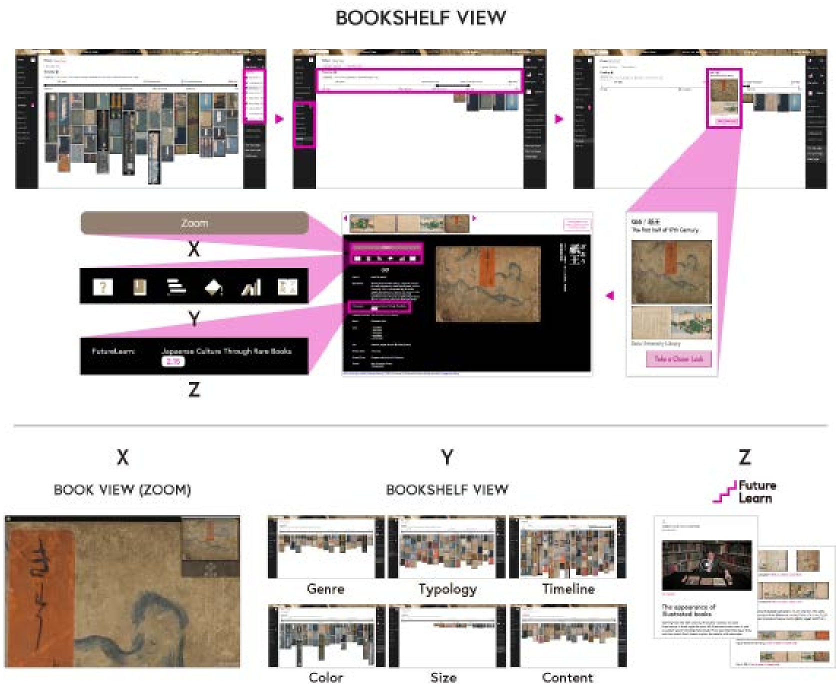

Figure 3.6. Expected pathways from the Bookshelf View.

- (X) Zooming in the pictures: reveals details such as texture and binding techniques
- (Y) Different filtering features: genre, typology, timeline, colour, size, content
- (Z) Jumping to the FutureLearn website

The other touch point is the course description in the FutureLearn website. From the link published in the course steps, the learner can jump into the Book View, and then have access to the pathways described previously (Fig. 3.7):

Figure 3.7. Expected pathways from the course steps.

Proof of concept

In this section, we first implement the Narrative Book Collection into the 4^{th} course run. Second, we examine the usability and effectiveness of the Narrative Book Collection through both quantitative and qualitative approach. Third, we examine the flow (learning behaviour) made by individual learners that represent three context areas in FutureLearn.

Research setting

The Narrative Book Collection was published on the World Wide Web[13] to welcome all potential users who are interested in Japanese culture and books, however, it was designed to work best alongside taking the course in greater depth. During the course, the Book View was directly accessible from 148 titles with 709 high-resolution book images which were shown in 46 out of 55 course steps. Besides, the Bookshelf View along with Book View was first introduced in course step 1.5 as one part of the introduction of the course, then it was introduced in official announcements (e.g., through e-mail announcements to the registered users) as a new feature.

Learner attributes

Running from 25th September until 12th November 2017—when 7 weeks of the course was finished—1,797 learners registered for the fourth course run. Learners enrolled from over 95 countries, and the country that provided the largest percentage was the UK with 21%, followed by Japan 13%, US 9%, Vietnam 6% and Mexico 6%. The age range started from 26-35 (26%), followed by 18-25 (18%), >65 (16%), 56-65 (12%), 36-45 (11%), 46-55 (9%), and <18 (3%) years old (Table 4.1).

	Registered Learners	Learners	Active Learners
Fourth Course Run	1,797	1,045	563

Table 4.1: Learner Attributes (4th course run)

13 Keio University Graduate School of Media Design, Narrative Book Collection, 2017. https://narrative-book-collection.com.

Evaluation—Quantitative approach

The numbers shown in figure 4.1 indicates the total number and flow of learners' sessions—who have explored the course, Book View, and Bookshelf View—and the deployment was logged over the seven weeks. As the number indicates, large numbers of learners are exploring the paths throughout the course, Book View, and Bookshelf View.

Access to Bookshelf View

There were 1,132 sessions in total for Bookshelf View. The duration of visits (per session) was 4 minutes and 23 seconds on average. The bounce rate was 34.4%. In more details, the Bookshelf View was accessed from 525 users from over 60 countries, and the largest of users reached the site from Japan (37%), followed by US (14%), UK (12%), Australia (5%) and Spain (3%).

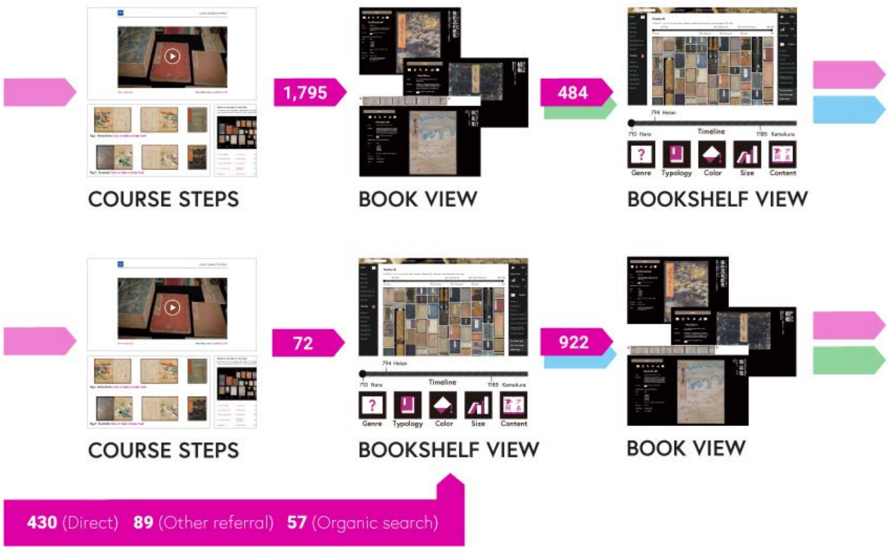

Figure 4.1. Sessions throughout Narrative Book Collection.

Access to Book View

Based on the access log, in seven weeks there were 2,678 sessions in total for Book View. In details, there was access to 11,857 books and 18,063 images. And the average access number for each book title and image (inside Book View) per day were 4.4 books and 6.7 images. (Fig. 4.2 LEFT)

The access to Book View was coming from FutureLearn as well as Bookshelf View. For example, access to Book View per day was 165 books from FutureLearn and 77 books from Bookshelf View. (Fig. 4.2 RIGHT)

Encouraged to re-join the course

The Narrative Book Collection also contributed to increase the relative number of returnees of the course. Returnees are defined as those leaners who registered for at least one past run of the same course, and comparing with the second course run (7%) and the third course run (10%), the fourth course run showed 21% of returnees from the previous runs.

Evaluation—Qualitative approach

During the course, 136 learners out of 1,045 learners (13.0%) posted at least one comment, totaling up to 1,454 comments. To further examine how the learners have received the Narrative Book Collection, we extracted 71 comments, which mentioned Narrative Book Collection, and also examined the post-survey and optional survey results. Moreover, to further investigate how each learner goes about their tasks, an interview (optional) was paired with surveys. Most comments were positive with the design and the way it was implemented in the course—referring to its easy usability, as follows.

> This is one of the coolest things I've ever seen anyone do with technology. Oh, thank you so much! I am loving this. (Comment from Week 1)
>
> I found NBC extremely detailed and allows me to search by Genre, Typology, Timeline, Color, Size, and Content, etc. It provides high-quality digital images and you can easily flick through the items that were scanned. The description of the item is very useful and helps to understand a bit of the history [...]. (Comment from Week 1)
>
> What an amazing resource! This has convinced me to upgrade to the paid version of the course because I want to take more time to look at all these beautiful books [...]. (Comment from Week 1)
>
> Incredible software—really impressed with the ease of access to material. (Comment from Week one)
>
> Zooming in on the books—almost as good as actually seeing them in real life. Brought the course to life and made all the lectures much more meaningful. (Post-Survey Result)

Figure 4.2. LEFT: Average number of access to Titles and Images (Book View) per day/RIGHT: Access to Book View (from FutureLearn and Bookshelf View) per day.

Results and findings

Both observations and feedback from the learners indicate that our design goals have largely been met and encourage further explorations through the Narrative Book Collection along with the FutureLearn course. Its synergic design allowed learners to look into the diverse elements of books with open-ended explorations. With the advances in interactivity and improved usability, the Narrative Book Collection has been successfully implemented in the course. The results suggest multiple filtering and zooming of a collection and visual resources—arranged along a contextualized timeline—enhanced learners' experience and further gave rise to new perspectives in exploring rare Japanese books in the Internet.

Concept proof

While FutureLearn learners are from diverse demographics, backgrounds, motivations or expectations, referring to the learner archetypes, individual learners can be categorized under three context area, such as 1) Work and Study, 2) Personal Life, and 3) Leisure. And by taking a closer look at the learners' behavior patterns in the FutureLearn course steps linking the Narrative Book Collection (both Bookshelf and Book View), we could identify and categorize the user flow in three different broad pathways as follows:

(A) Bookshelf View → Book View → FutureLearn course steps
(B) FutureLearn course steps → Book View → FutureLearn course steps
(C) FutureLearn course steps → Book View → Bookshelf View → Book View → FutureLearn course steps

For the pathway A (e.g., learners categorized in Work and Study), most learners seemed to have their own initial interest and curiosity in rare Japanese books. Learners start with a large number of images and viewpoints by accessing the Bookshelf View which provides the possibility to choose their own path. Some start with exploring the Bookshelf View and some learners seems to be interested in seeing particular books, moving to Book View → FutureLearn, which are both inspirational experience and improves engagement with the books. For the pathway B (e.g., Personal Life), learners tend to follow the course structure. When they see an interesting book that interests them in the course, they select that image and take a closer look, then go back to the course and continue their study. They keep the clear sequential flow while taking the course. And for the pathway C (e.g., Leisure), learners are normally in an exploratory mode and looking for more information, going back and forth between the course, Book View and Bookshelf View. Through looking at the books in both close and distant scale alongside the course, they create more in-depth pathways and deepen their understanding in the contents.

Summary

While there are promising practices in the field of rare Japanese book studies, this research, along with the Narrative Book Collection revealed the structures and patterns from various narrative viewpoints and created visually appealing contents to augment learners' experience in the course. The results indicate that the Narrative Book Collection allows learners to enter into a dialogue—which is collaboratively created by both the designers and the learners (users) in an open-ended environment—alongside the course topics. In the above three contexts, the implementation of the Narrative Book Collection enhanced and transformed learners' experience in exploring rare Japanese books, and proved that the concepts could make the learning experience more exploratory and deepen learner's knowledge of Japanese culture.

Conclusions

Discussion

In this research, interface design is something more than mere illustration, style or fashion. Although all the data can be transformed into many ways of representation, from the results and findings, some clear satisfaction emerged and ensured that the experience and interaction with the

Narrative Book Collection were pleasant for the learners. The majority of respondents held positive opinions with the content within the interface, finding the content easy to understand, comprehensive, accurate and over all helpful to explore rare Japanese books. Hence, it is clear that these methods turned up important patterns that people couldn't see before. The visual resources, multiple pathways, and interaction within the Narrative Book Collection—which were implemented in the FutureLearn course—have sufficed its design goals.

Contribution

This research challenged us to rethink traditional ideas about text-based interpretation of books through adopting bibliographical knowledge. The integration of scholarly knowledge, as well as the application of interactive interface, has created great opportunities for the collection to be developed coherently and effectively in exploring rare Japanese books. Alongside the FutureLearn course Japanese Culture Through Rare Books, the Narrative Book Collection enabled online learners to create their own narrative and experience in rare Japanese books from a variety of bibliographical perspectives through both distant and close scale. In this way, the Narrative Book Collection brings new possibilities to the interaction of human beings with books to a new dimension.

References

Abbott, H. Porter. 2008. *The Cambridge introduction to narrative* (2nd ed.). Cambridge: Cambridge University Press.

Akama, Ryo. 2015. "The digitization of Art Research Center, Ritsumeikan University on the old Japanese books: About the ARC International Model." *In The Journal of Information Science and Technology Association* Vol. 65/4, pp. 181-186.

Bal, Mieke. 1997. *Narratology: Introduction to the Theory of Narrative* (2nd ed.). Toronto: University of Toronto Press.

Bennett, Josiah Q. 1969. *The cataloguing requirements of the book division of a rare book library*. Kent, OH: Kent State University Libraries.

Boyles, Nancy. 2013. "Closing in on Close Reading." In *Educational Leadership* Vol.70/4, pp. 36-41.

Clow, Doug. 2013. "MOOCs and the funnel of participation." In *Proceedings of the Third Conference on Learning Analytics and Knowledge* (LAK 2013), pp. 185-189.

Gaskell, Philip. 1995. *A New Introduction to Bibliography*. Oxford: OUP, 1972; New Castle, DE: Oak Knoll Press.

Genette, Gerard. 1976. "Boundaries of Narrative." trans. by Ann Levonas. *New Literary History* Vol.8/1 (Autumn), pp. 1-13.

Hattie, John. 2008. *Visible Learning: A Synthesis of Over 800 Meta-Analyses Relating to Achievement*. London: Routledge.

Hinton, Sam and Mitchell Whitelaw. 2010. "Exploring the digital commons: an approach to the visualisation of large heritage datasets." In *Proceedings of the 2010 international conference on Electronic Visualisation and the Arts* (EVA'10), pp. 51-58.

Howsam, Leslie. 2014. "The Study of Book History." In Leslie Howsam (ed.) *The Cambridge Companion to the History of the Book*, Cambridge: Cambridge University Press, pp. 1-16.

Keio University. August 7, 2015. *Keio University—The First in Japan to Join FutureLearn, the UK-led Massive Open Online Course* Platform.

McGann, Jerome. 1991. *The Textual Condition*. Princeton, NJ: PUP.

McKenzie, D. F. 1999. *Bibliography and the Sociology of Texts*. Cambridge: Cambridge University Press.

McLuhan, Marshall, Quentin Fiore and Jerom Agel. 1967. *The medium is the massage*. New York: Bantam Books.

Moretti, Franco. 2000. "Conjectures on World Literature." In *New Left Review* Vol. 1 (Jan.-Feb.), pp. 54-68.

Murray, Janet H. 2012. *Inventing the Medium: Principles of Interaction Design as a Cultural Practice*. Cambridge, MA: MIT Press.

Pearson, David. 2008. *Books as History: The Importance of Books Beyond their Texts*. New Castle: Oak Knoll Press.

Raskin, Jef. 2000. *The Humane Interface: New Directions for Designing Interactive Systems*. NY: ACM Press/Addison-Wesley Publishing Co.

Silge, Julia, and Robinson David. 2016. "tidytext: Text Mining and Analysis Using Tidy Data Principles." In *JOSS*, 1/3. doi:10.21105/joss.00037

Valentine, Liz, Tracey Walker, Ben Fields and Lucy Blackwell. 2017. Webinar: *Introducing Learner Archetypes*. September 12, 2017.

Whitelaw, Mitchell. 2015. "Generous Interfaces for Digital Cultural Collections." In *Digital Humanities Quarterly* Volume 9/1. www.digitalhumanities.org/dhq/vol/9/1/000205/000205.html.

Curatorial Practices. Commissioning policies & conservation strategies for digital art

Net-based and Networked. Challenges for the conservation of digital art[1]

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Abstract

Digital art, in its countless manifestations, has become an integral part of contemporary art production. Its cultural relevance is unquestioned, but its conservation does present new challenges to museums and collections alike. After all, we are not talking about static objects that can be "stabilized" in the classical sense; rather, digital art is akin to performance because new conditions can arise in each process or each performance. In an era of rapid technological change and short-lived technologies, the question of how best to conserve our digital heritage is becoming increasingly urgent.

With examples of works from the programming and the collection of HeK (House of Electronic Arts Basel) as a unique institution with a pioneering role in Switzerland, the text gives insight into software-based artistic practice and the complex tasks of preservation of digital art. The text will focus on some of the challenges and opportunities in the conservation and contextualization of these media art practices for museums, emphasizing the collaborative approach and cooperation beyond institutional borders.

Keywords

Digital heritage, net-based, networked, obsolescence, software, emulation

1 The text is based on a presentation by the author during the 13th International Conference on Digital Preservation, iPRES 2016, in Bern on October 4th, 2016.

Introduction

HeK, House of Electronic Arts Basel, is an institution with a thematic focus that is unique in Switzerland. Founded in 2011, HeK soon began to assume the role of a national competence center for media art, covering the presentation, production, mediation and collection of works in this genre. In programming and collecting, the focus is on works that use digital technologies as a tool for production and that take advantage of the digital medium's inherent characteristics. Artworks are showcased that reflect the input of media technologies on our society and that describe our current condition in an age, when digital processes are shaping our actions and inform our understanding of the world. Media art can take on numerous forms—from interactive installations to software, from virtual reality to locative media. It can be experienced in various forms of distribution–from displays within a museum, to displays on smartphones and tablets or online.

In this text I will give insight into my work at HeK and will present examples from my curatorial background since I joined the institution as director in 2012. I will focus on born-digital art and specifically on artworks which are net-based and networked. This means we no longer deal with a static object that can be "stabilized" in the classical sense, but rather with a boundless practice that is embedded in networked systems. These works—which use the Internet not as a tool but as an artistic medium—are challenging the traditional notion of preservation. Traditionally, preservation means the fixation of a work, based on authenticity and integrity. But net-based and networked artworks are fluid by nature: They are as unstable as the networks in which they are embedded. They are beholden to industries, to a fast-changing technological environment and are limited by other parameters beyond the museum's reach. Conservation practices must acknowledge these performative and processual qualities.

Media art in the museum

More and more software-based artworks are entering museum collections, but as curator Christiane Paul points out, "for decades, the relationship between digital art and the mainstream art world and institutions has been notoriously uneasy" (2017: 184.) Joanna Philips, conservator at the Guggenheim Museum in New York, stated during the third Tech Focus conference at the museum last year that the Guggenheim collection includes only 22 software-based artworks, which is the equivalent to 0.3% of the total collection (2015). Nevertheless the institution is doing groundbreaking work with regard to digital preservation strategies.

"Software-based art is perceived as a risky area," says Pip Laurenson, Head of Collection Care Research at Tate. She supposes that the reason for the limited collecting activities in this area in museums is mainly due to the "lack of established documented practice for the conservation" of these works (2016: 73). I think it is exactly this quality and expertise that give institutions like HeK their *raison d'etre*, with their expertise in handling software-based art and their experience in meeting artists' demands regarding technical infrastructure, equipment or maintenance.

Building up a collection of media arts and research addressing the digitality of our society is part of HeK's agenda. The collection's main focus is on born-digital art and specifically net-based artworks. HeK's collection is still in its infancy, but it is growing steadily and has reached more than 60 works of software-based art by the end of 2017. Of course, for such a small institution—no more than six people work fulltime at HeK—preservation is a tremendous task but nevertheless an important one. We involve many different experts in the management and monitoring process, in order to handle those complex and fluid artworks—from our technicians and those responsible for the information infrastructure of the institution, to the external expertise for inventory-taking. When the institution moved into a new building, it was not only the physical infrastructure that was newly built. We also redesigned our virtual information infrastructure so we could host and care for net-based artworks. These works are the focus of our collection at a time when few museums are collecting such works—one exception is the 'Art Base' of the digital arts organization Rhizome, which is associated with the New Museum in New York.

Preserving those net-based artworks means preserving behaviors, not only artifacts (Lurk/Enge/Espenschied 2012). An enormous threat is technical obsolescence. In our world of rapidly changing technological formats there is no way of knowing how long hard- and software devices will remain functional; how long software-based tools will be supported or are downward compatible. We are dependent on an industry that is based on and nourished by continuous change, promoting a new version and products in ever-shorter periods of time. For researcher Jon Ippolito born-digital equals "born almost already obsolete" (2015.)

The last 15 years have seen many collaborative research groups and projects dealing with the issues of preserving media art. They have helped museums adapt to the idea that an artwork can no longer be presented with the original material or equipment.

The *Variable Media Network* at the Guggenheim Museum has done groundbreaking work with their focus on the idea of “endurance by variability.”[2] They set the standards for the four main approaches to preserving media art: storage or hardware preservation, emulation, migration and re-interpretation. One of their valuable outputs is the *Variable Media Questionnaire*, which today is used and promoted by the Forging the Future alliance.[3] Another project is *Matters in Media Art. Collaborating towards the care of time-based media*—a joint project by Tate, the San Francisco Museum of Modern Art, MoMA in New York and the New Art Trust.[4] They provide helpful guidelines for the logistics of acquiring and lending media artworks. Many more could be named, and I am mentioning only one more example from Switzerland, *Aktive Archive* (active archives), a project initiated by the Bern University of the Arts that dates back to 2004 and focused on documentation, preservation and restoration as well as on storage of diverse forms of media art.[5]

But the handling and preservation of net-based artworks is still a rather new field. HeK has been part of the tri-national research project *Digital Art Conservation*, led by the ZKM | Center for Art and Media in Karlsruhe, with the only net-based project among the ten case studies that have been explored.[6]

Case Study: Marc Lee, *TV Bot 2.0*

The work *TV Bot 2.0* by Swiss artist Marc Lee was the case study that HeK investigated for the research project *Digital Art Conservation*. It is also one of the first works acquired for the HeK collection. The preservation strategies involved were migration and re-interpretation. In this case, I suggest speaking of *versioning*, which is central to Marc Lee’s artistic practice, as will be explained later.

The *TV Bot* by Marc Lee is an online news channel that automatically searches the most recent news items from the web and compiles and remixes these gleanings, whether from radio, television, newspaper, webcam or website news, into a continuous live stream. Searches include

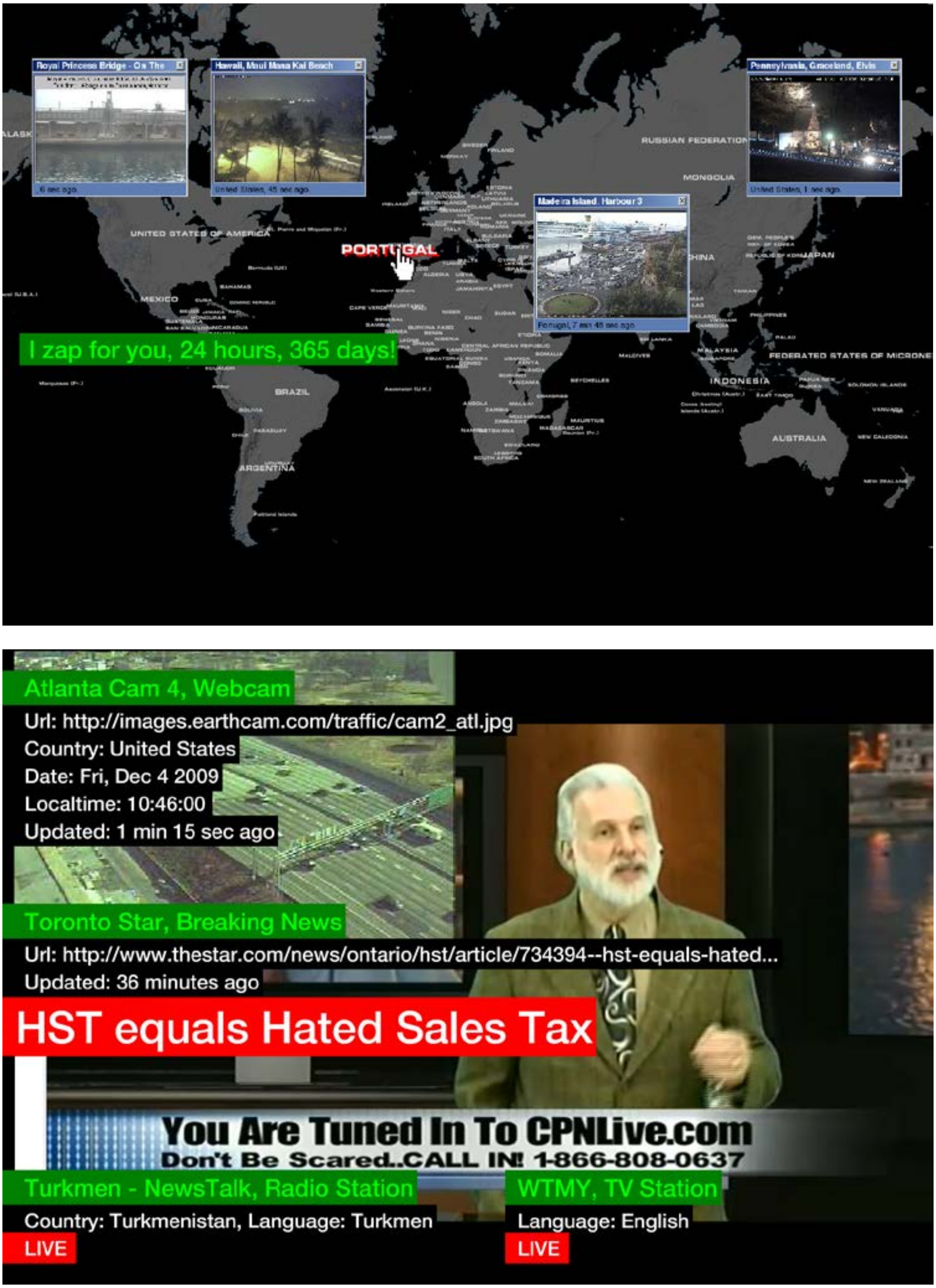
2 http://www.variablemedia.net/e/welcome.html.
3 http://variablemediaquestionnaire.net.
4 http://mattersinmediaart.org.
5 http://www.aktivearchive.ch.
6 http://www.digitalartconservation.org.

all languages, cultures or continents. The only relevant criteria are that the news must be not older than an hour. In its graphical design, the “TV Bot” mimics international news broadcasters like CNN or NTV. The “TV Bot” is born-digital art. It runs on the Internet and scrapes its material, which means it is very much dependent on this rapidly changing technological infrastructure.

The *TV Bot* software is programmed with PHP and C++ script for Linux and scans the flow of information on the Web. The TV Bot software then indexes, analyzes and verifies the information. The sources are made visible to the users as URLs, time of discovery and the time code of when it has been updated.

The work originated in 2004 as *TV Bot 1.0* and has been realized as a contribution to the online exhibition project *56k-bastard Channel TV* by Reinhard Storz. Only six years later, the work was not functioning properly anymore. The standard of the World Wide Web to display audiovisual content had changed by then from the RealPlayer to the Adobe Flash Player. In connection with another online exhibition project with the title *beam me up*, Marc Lee migrated the work to the new web standard, but also renamed and versioned it as *TV Bot 2.0* in 2010. *TV Bot 1.0* only existed then as a historical Webcast-documentary from 2005. When migrating the work, Lee also made some esthetic changes and therefore also reinterpreted his own work. The presentation had been adapted to the new visual standards of news broadcasts. Also new was that the “TV Bot” was now accessing feeds from the community platform Twitter, which did not exist in 2004. The look and feel of *TV Bot 2.0* is oriented to the older version, but–according to Lee–it was ‘modernized’ and updated to a more contemporary design (Fig. 1-2). This included faster cuts in the changes from TV, radio or Webcam images, which are better adjusted to the contemporary flood of information. The whole presentation was arranged more clearly. Radio and TV broadcasts were labeled “live” and a new logo—a spinning globe—was added.

When asked about the changes in the work, Lee would say: “For me it is still the same work. It had received a classical software update and a new branding” (Blanc 2013: 401.) It is a good example of how artists often do not see their projects as static, but rather as constantly developing, based on the need to adapt to new systems. It also shows that, for Lee, the code is not considered a key artistic medium but simply a means to enable certain functions.



Figures 1-2. Marc Lee, *TV Bot 2.0*, 2010, Screenshot, <u>http://marclee.io/en/tv-bot-world-news-as-soon-as-it-happens</u>. ©Marc Lee

When HeK acquired the work for its collection, the functionality of the software was guaranteed by the artist for another five years, but it was clear that sooner or later another upgrade, as Lee calls it, would be necessary. Therefore, part of the acquisition has been a Webcast-documentary from 2011. In 2016, the *TV Bot 2.0* went into *defunct mode* as the Adobe Flash Player is no longer supported and the web standard changed to HTML5. Meanwhile Lee has released a new version—*TV Bot 3.0*.

I think Marc Lee's own strategy is a quite interesting case. This kind of versioning or re-interpretation is central to his artistic practice. For the collecting institution it does not make sense to migrate the work, as the artist is doing this himself by interpreting and versioning it, but also by claiming it as a new version of the work. In my opinion, Lee uses this strategy out of necessity, as no one was ready to support him in preserving his work. In fact, there is a continuous double bind situation for artists, partly due to media art not being market-driven and to the fact that collectors and institutions worry about how works can be preserved and therefore are not collecting them.

Mexican-Canadian artist Rafael Lozano-Hemmer pointed out the need for media artists to take action in preserving their own work so it does not "disappear from history"—even while recognizing that it is unfair that the artist himself has to deal with it. In his essay—or one could even call it a manifesto—on "Best practices for conservation of media art from an artist's perspective" he stresses the importance of being interested in both creating the work and "overseeing its death or zombiefication."[7] With collecting these works, institutions also start a dialogue with the artists that document these decision making processes and changes that evolve over time.

But it is not only technological obsolescence that threatens such works. The versioning that Lee is applying to keep his work alive, also documents cultural changes. His work depends on newsfeeds that are freely accessible online. We are already experiencing today how more and more news portals use paywalls to regulate access to their data. In a couple of years the way in which we perceive news online might have changed. Many of Lee's works deal with the idea of the broadcast, a feature and inspiration from the era of TV that he incorporated into the new medium Internet. For today's millennials, television is no longer the influential medium that it was 15 years ago and in years to come a new audience needs to be familiarized with this specific TV esthetics that he is using in his work to un-

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7 See Lozano-Hemmer's article in this collection, pp. 105-116.

derstand the original cultural context. Cultural obsolescence is therefore another threat for such a 'living' and continuously changing work.

Case Study: Exhibition *My Boyfriend Came Back From The War. online since 1996*

The question of cultural context is also addressed in my next case study. It is an example of how emulation strategies can be used to present an exhibition about Net Art, with works ranging from 1996 until today, in an emulated scenario, allowing audiences to perceive net-based works from the 1990s within their original technical constraints.

In 2016, from January 21st to March 13th, HeK staged the show *My Boyfriend Came Back From The War. online since 1996*, that was centered on the seminal work of the same name by the Russian net artist Olia Lialina and included remixes and responses to the work over the last 20 years (Fig. 3.)[8]

My Boyfriend Came Back From The War is a classic from the pioneer phase of so-called *Net Art*. Back when there was no general standard of access to the World Wide Web, artists already were using the global network as a new medium. Olia Lialina is among the first artists to explore the Internet's artistic possibilities. Her work broke new ground—both as Net Art and as an interactive narrative. It focuses on the story of two people who are trying to talk with each other about a war that has just ended. The work's historical significance lies in the formal aspects of the use of hypertext in a new form of narration, where the online user clicks through the story and plays an active role. But another central aspect of the work's effective power is in the universality of its story. And that is what has inspired artists for more than 20 years. Olia Lialina has collected 27 versions so far in what she calls the "Last Real Net Art Museum," an online archive that has become a work in itself. The selection of 13 works, which were shown at the HeK, reflects the development of the World Wide Web as medium and technology—from wondrous rarity then to omnipresence today. The various stages of the Internet's development are traced in the projects' structure and technical constitution: from HTML to Flash, Dotcom to e-commerce, from the website to the app. In order to do justice to the original 'look and feel' as experienced by the first users and also to illustrate the developments leading to today's ubiquitous Network—

8 http://www.hek.ch/en/program/events-en/event/my-boyfriend-came-back-from-the-war-online-since-1996.html.

accessible everywhere through mobile devices—the works in the exhibition were presented on historical equipment.

Regarding the hardware, we were grateful to the Department of Conservation and Restoration at the Bern University of the Arts,[9] which helped provide historical equipment. To create the sense of authenticity, we also needed to reproduce the historical conditions of the Internet. In the early days, it took a long time to load an image; a click did not bring you to a new frame within fractions of a second. Therefore, all the historical works in the exhibition have been emulated. For the emulation software that mimicked the Internet of the 1990s we owe our thanks to Dragan Espenschied, conservator for digital art at Rhizome in New York,[10] as well as to the bwFLA, which stands for Functional Long-Term Archiving, a research team under Professor Klaus Rechert at the University of Freiburg, who did the groundwork for obtaining net-based art.[11]

It was the software emulation that allowed exhibition visitors to appreciate the poetry of the historical works and intrinsic quality of the media as they have been perceived in their time. The tension and silences between the two protagonists in Lialina's story can only be experienced in the slowness of the connectivity of that time; the protagonists' waiting, their love and loss become apparent within the formal qualities of the work and part of its beauty is lost if experienced via our fast Internet connection of today.

The advantages of emulation are clear—it reaches across platforms and decades and gives artworks a context by simulating an original environment that would be otherwise lost.

To date, only a few museums have experimented with emulation. The *Seeing Double* exhibition at the Guggenheim Museum in New York in 2004 is one important example, the exhibition *Digital Art Works. The Challenges of Conservation* at the ZKM in Karlsruhe from 2011 showed examples and also the video games exhibition at MoMA in 2012 worked with emulation. The exhibition at HeK has been another interesting showcase to proof that a whole exhibition setting could be created using an emulation framework specifically conceived for the demands of digital preservation. These projects help to show how preservation decisions and alterations change the esthetic of a work and how it is perceived by the public.

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9 https://www.hkb.bfh.ch/en/hkb/about-us/divisions/conservation-restoration.
10 http://rhizome.org/editorial/2014/jan/27/dragan-espenschied-lead-rhizomes-digital-conservat.
11 http://eaas.uni-freiburg.de.

Figure 3. Olia Lialina, My Boyfriend came back from the war. online since 1996, 2016, installation view. ©Olia Lialina, Image: Franz Wamhof

Case Study: Beat Brogle, *onewordmovie*

My last case study focuses on a combined approach of migration and emulation to keep a work functioning online and to also preserve its historical authenticity. The Internet project *onewordmovie* by Beat Brogle and Philippe Zimmermann from 2003, an important example of net-based artistic practice in Switzerland from the early years of the 21st century, entered the HeK collection in 2016.

Onewordmovie is an online platform that organizes the flood of images on the Internet into an animated film based on user-supplied terms. A search for a particular word creates image results that are turned into a movie. Using a specially programmed search engine, users can call up images from the Internet that match their search term. The project's search engine is built on top of the most popular image search facilities available on the Internet—in this case Google. Supplied with a search term, the engine produces a *hit list*. This list can be several thousand images long, depending on the term. The images on this hit list provide the "raw material" for the movie. Following the ranking of the hit list, the images are animated into a film in real-time, following a fixed and predetermined score, which consists of a series of interwoven loops. Each film has an individual trailer displaying the search term as the title and each film lasts until the raw material is used up.

Beat Brogle and his collaborator, Philippe Zimmermann, had to make minor changes and upgrades every once in a while to keep *onewordmovie* functioning online, but it became more and more difficult for the artists to keep the project running on their own, especially when Google restricted the use of its API (Application Programming Interface) connections. In 2015, the artist contacted me at HeK and we started our dialogue regarding acquisition and preservation of the work.

The challenge for preservation is *distributed obsolescence* due to the boundless or uncontained structure of the work, which uses technological infrastructure and data services of other big online companies that the artist does not control. The process of preservation is not fully completed yet. The strategy includes migration or reprogramming of the work and its parameters. The goal is to find a solution that would keep the work accessible online, keep the functionality intact, and simultaneously keep the historical esthetic of the piece intact.

The PHP script that runs on the server can easily be preserved since PHP is a well-documented, open-source programming language under active development, but it depends on the availability and accessibility of the Google Image Search API, which creates the list of images based on the search terms. Already during recent years search requests have been placed through geographically diverse servers so that Google is not registering abusive use of the API and shutting down access. Meanwhile, it runs from the HeK server and we use the Google 'Custom Search Engine' (CSE) with a limitation of 100 search requests in 24 hours with a maximum of ten hits per request. This demonstrates that the preservation strategy also needs to deal with the fact that the Google search API might not be usable anymore within a couple of years.

So far, the use of *onewordmovie* has been documented but no image archive has been created. The conservation strategy envisaged an innovative approach.[12] After migrating the work to HTML5, *onewordmovie* was functioning online again and from now on, the metadata of every search will be stored in a database. This enables the work to slowly transfer from a functional online work towards a work that is accessible online, but whose material when used for search requests comes from a database built upon earlier searches. This principle can be compared with the Rhizome project Webrecorder, a software used for web-archives that seems to be quite helpful for many net-based artworks.

Another part of the preservation strategy plans envisages that the front end of *onewordmovie* will be emulated so that the original Shockwave programming remains intact. This is still ongoing. In the end there will be two versions of *onewordmovie*, the migrated version and the emulated version.

Of course, ideally there would be solutions found in collaboration with Google and other web companies to support artistic practice and allow artists to use their web infrastructure—institutions like Rhizome in New York have made first steps in that direction.

Conclusion: From closed to open institutions

My three case studies exemplified that conservation of digital artworks needs to be done on an individual basis for any artwork. Although there is an understandable need for a bigger toolkit on well-established solutions to become more efficient in the future, these case studies help to provide new insights into specific problems and challenges. Needless to say, documentation plays a fundamental role in conveying the significant properties of a work and helping capture its stages and versions so that preservation decisions can be based on a firm understanding of the work, its functionality and its context.

Given the fluid characteristics of net-based and networked art, researcher Annet Dekker argues for a more speculative and process-driven preservation and speaks of “authentic alliances” (2018). She says, “By emphasizing ‘alliances’ I want to uncover the core of net art, which is not always immediately visible, and address its implications. [...] What determines net art as authentic is found in relation to alliances. [...] Net art is a process, where different properties of the work, authorship, and time are in alliance with each other. This doesn’t mean that questions about

12 Dragan Espenschied from Rhizome supported us in defining the preservation strategy of the work together with the artist, Beat Brogle and his programmer Stefan Goergens.

material, author, and time are irrelevant, but there is a shift of focus to questions relating to ownership, authorship and copyright." (2016). I agree with her argument, that for a conservator—and also for other museum staff involved in preservation of works—this means "becoming part of a *network of care* in which a collaborative approach is important to comprehend the complexities of networked art." Conservation thus "is less about conserving materials and more about the preservation of social information and relations" (ibid.).

Collaboration is essential for preserving net-based and networked art and must foster a dialogue between "those responsible for digital storage and the information infrastructure within the museum and those responsible for digital collections," as Pip Laurenson claims (2016: 90). It also must involve a group of experts from different fields – within and outside the museum. Museums must find new ways to engage with communities that are already experienced in the field of preservation and that can offer support networks. Several articles and essays have already pointed out that the preservation of software-based art can be advanced through interaction with gaming communities, which consist of amateurs who have preserved their own digital heritage by developing emulators so they can play their favorite old computer games. Jon Ippolito supports "trusting amateurs with our future," (2016: 537) as he titles one of his essays, and to shift the focus of preservation to practices outside the institution.

But even with these diverse collaborations we cannot avoid to engage intensively with the technology itself. Inspired by the conference *Tech-Focus III - Caring for Software-based Art*, an event hosted in 2015 at the Guggenheim Museum in New York that included practical software exercise using basic technical aspects, HeK launched a series of events titled *Conservation Piece(s)* that aim to start a dialogue with specialists and experts from various fields to collaboratively deal with the pressing issues of preserving media art. The first *Conservation Piece* was a conference under that name this past June, organized in partnership with Agathe Jarczyk, conservator of Modern Materials and Media at the Bern University of the Arts and Dragan Espenschied, media artist, digital culture researcher and conservator. In organizing the first event of the ongoing series, we also emphasized a hands-on approach to reach another level of engagement—to achieve a deeper understanding for the technical aspects of media artworks and the computer languages and platforms they are rooted in. Meanwhile three events have been staged.[13] We hope we can

13 www.hek.ch/en/collection/conservation-pieces.html.

foster a dialogue and help build regional and national knowledge communities here in Switzerland and also with international partners; to develop a "network of caretakers" or a "community of concern," to cite again *Conservation Piece* symposium keynote speaker Annet Dekker (2018).[14]

We must change from closed institutions towards open ones that share information and interact with external communities in order to sustain a broad range of artworks. Establishing a dialog between all the players involved in presenting and preserving artworks will be a key factor and I hope for many further exchanges from all involved parties. This is not an easy task, but a necessary one!

References

Fabienne Blanc. 2013. "TV Bot. An Interview with Marc Lee." In Bernhard Serexhe (Ed.), *Digital Art Conservation. Preservation of Digital Art: Theory and Practice*, Wien: Ambra V, pp. 400-404.

Dekker, Annet. 2018. *Collecting and Conserving Net Art: Moving beyond Conventional Methods*. London: Routledge.

Ippolito, Jon. 2015. "In wilderness is the preservation of the world." *Cultural Heritage in the Digital Age Conference.* iMAL Center for Digital Cultures and Technology Brussels, 30-31 Oct 2015. https://www.youtube.com/watch?v=mbxpL98YK4M.

Ippolito, Jon. 2016. Trusting Amateurs with Our Future. In Christiane Paul (ed.). *A Companion to Digital Art.* Malden, MA: John Wiley & Sons, pp. 537-552.

Laurenson, Pip. 2016. "Old Media, New Media? Significant Difference and the Conservation of Soft-ware-Based Art." In Beryl Graham (Ed.). *New Collecting: Exhibiting and Audiences after New Media Art*, London: Routledge, pp. 73-97.

Lurk, Tabea / Espenschied, Dragan & Enge, Juergen. 2012. "Emulation in the context of digital art and cultural heritage preservation." In *PIK – Praxis der Informationsverarbeitung und Kommunikation*, Berlin: De Gryter, pp. 245-254.

Paul, Christiane. 2017. "From Archives to Collections. Digital Art In/Out of Institutions". In Viola Rühse, Wendy Coones and Oliver Grau (ed.) *Museum and Archive on the Move: Changing Cultural Institutions in the Digital Era*, Berlin: Walter de Gruyter.

Phillips, Joanna. 2015. "Approaching the Challenge: Caring for Software-based Art in Museum Collections." In *Tech Focus III – Caring for Software-Based Art*, Guggenheim Museum New York, 25-26 Sep. https://vimeo.com/145979586.

14 https://www.hek.ch/en/collection/conservation-pieces.html, author's transcript.

The Future of Museums
How will they evolve due to digital changes and in relation to time-based media

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Abstract

In upcoming years, museums will evolve due to societal digital changes and the influence from the more adventurous media art within their collections. This evolution will be prompted by changes in museum operations and in the museum's relation with the public that comes from merely displaying this complex media art within gallery settings. And it will also be prompted by museums needing to find ways to preserve and reinstall these works. This piece revisits predictions of relevant museum changes made by this author in three installments over the past 30 years, paying particular attention to those predictions related to topics raised at the Re:Trace conference. Given the technological, cultural and organizational changes in the intervening years, it then seeks to re-assess those predictions with many years of hindsight.

Keywords

Museums, future, evolution, technology, predictions, authority, time-based media

Predictions from 30 years ago

Approximately 30 years ago the American Society for Information Science held a conference with the theme *Information: The transformation of* *society* (Chen 1987). As part of the conference proceedings, Howard Besser wrote a piece entitled “The Changing Museum” (1987, 14-19). The article predicted that computers would be able to analyse works of art, and also apply that analysis to both teaching and cataloguing.

> Eventually, new areas of research (such as pattern-recognition) will be applied to these systems, allowing the computer to do some preliminary syntactical analysis of works of art. The computer will be able to give statistics as to quantities of various colors used and their distribution around the canvas. Later, it should also be able to analyze angles and line-of-sight flows within paintings. Finally, the computer should be able to view the composition of a work of art as a system (similar to a language), and break it down into its interrelating components to see how they work together (much as computerized language analysis does). (1987: 15)

Parts of this prediction have already come true, though not in the integrated way that the author predicted. Since the mid-1990s the corporate sector has been using machine-vision to analyse and categorise still and moving images. These systems are now commonplace in environments with huge collections of visual materials (like television archives), but are not nearly as mature as predicted. The kind of semiological analysis predicted here is more recently found in Mehul Bhatt’s work on Wes Anderson presented at the Media Art Histories Conference *Re:Trace* in 2017 (Suchan/Bhatt 2016). And the mention here of breaking down a work of art into its inter-relating components has since become an essential part of what museum conservators do with their new media works since that process was promoted fifteen years ago as part of the *Variable Media Initiative* (Depocas et. al. 2003).

And six years before the first web browser, this article predicted that museums would create systems so that viewers

> will be able to navigate through a network of images of original paintings and Japanese poetry, English translations and commentary, index terms, descriptive text, bibliographic information, and explanatory information. Each small piece of information will have pointers leading to many other pieces of related information, which in turn will have pointers to still others. The viewer can choose to display any number of the totality of pieces of information on the screen at any given time ... and in any given juxtaposition to one another. It is likely that viewers will explore many different ways of

> combining information which were completely unanticipated by the designers of the system. (Besser 1987)

Though this article did predict many functions later available on the WorldWideWeb, the prediction was naïve in its assumption that the museum would play the dominant role in this web of information related to museum objects. And though much of the kind of system envisioned here is already in place, it will not likely reach a maturity until more progress is made in the coming years on Linked Systems and the Semantic Web.

Besser takes some of Walter Benjamin's analysis of the impact of mechanical reproduction and invokes this for digital reproduction by predicting democratisation, in the form of giving individuals some power previously reserved exclusively by curators.

> In exhibitions, this technology allows museum users to view images of works not actually on display, to juxtapose images in new ways (*essentially taking on some functions that are usually exclusively reserved for curators*), and to view bibliographic references and explanatory information alongside the images. (Besser 1987)

And he predicts that the process of democratization will remove some of the museum's exclusivity and authority.

> As a result of this democratization, the museum loses its authority as the only place to view such objects, and will become less of a sanctified place. ... The museum will shift from being a passive repository, and begin to take on a more active role. There is great potential for the museum to take on a much larger instructional role. This democratization will also have significant effects in changing the role of art in society. Today the study of art and the examination of original images or high-resolution facsimiles are confined to museum-type settings and classrooms. By bringing the study of art out of these settings and into new arenas such as computer labs, study halls, and even the home, the study of art can become less of something that is done only in specialized environments, and more a part of daily life. The erosion of this "specialness" cannot help but change how one views the study of art. (Besser 1987)

It is still unclear whether user access from home will erode museum exclusivity and authority. While it is certainly true that digital technology has greatly increased access to art works from outside the museum walls, museum attendance has not diminished. Museums have responded in a variety of ways to encourage viewers to attend. From social (museum "date nights") to fashion (blockbuster exhibits) to engagement (interactive exhibits), museums have developed more sophisticated practices to bring people inside their doors. And particularly with technology-based art, museums are regularly exhibiting works that will be difficult to experience on home systems for several years (e.g. the sort of virtual reality artworks that have been shown in museums in recent years are just now becoming accessible to home audiences). Museums will certainly continue to have a window of several years of exclusivity of access to works employing technology that is not ubiquitous.

Perhaps a bigger threat to museum authority is artists exhibiting their works outside the museum context. As Sarah Kenderdine showed during her Re:Trace keynote, airports are new sites of adventurous art installations, and the intensive work bringing the Mogao caves in Dunhuang to light and creating new exhibitions are not being managed by museums (Kenderdine 2013: 201). Digital art distributed digitally has the potential to reach vast audiences, many more people than would attend a single museum. We have already seen artists exhibiting their works: directly from the artist to the public, through commissions from non-museums, as well as through non-profits (such as Rhizome[1]). Some of these distribution models offer compensation to the artist (including a sort of crowd-sourced funding), but some do not. A question looming for museums is the future value of the museum imprimatur. That value is likely to decline as the museum loses its exclusivity. The question is: will it decline enough that more and more artists will choose alternative routes for exhibition? If this does happen, it is also likely to have a serious effect on issues of conservation and preservation.

Predictions from 20 years ago

Approximately 20 years ago the American Association of Museums[2] published *The Wired Museum: Emerging Technology and Changing Paradigms* (Jones-Garmil 1997). Despite its unfortunate title (which failed to imagine the rise of a multitude of wireless services), the book was the first attempt by a large organized US museum association to try to grapple with the wide variety of impacts that computing might have on museums.

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1 classic.rhizome.org/commissions.
2 www.aam-us.org.

In a chapter entitled “The transformation of the museum and the way it’s perceived”, Howard Besser both updated his “Changing Museum” piece from a decade earlier, and looked at a variety of other issues. The article particularly examined standards that would allow others (artists, researchers, developers, visitors) to build upon museum collections with new art, visualizations, newer curations, etc.
This chapter revisited the issue of the digital age eroding the authority of the museum.

> When a large number of museum visitors find it possible to visit and exhibit without physically entering the museum premises, how does that change the public's perception of the museum? Does the museum's authority increase (because more people actually see its exhibits)? Or does it decrease (because it is being delivered through a channel adjacent to "Home Shopping”)? (Besser 1997)

This idea of online exhibits competing with other ways of spending leisure time is already plaguing “brick-and-mortar” museums. And it is likely to continue to be of concern to museums well into the future.
The chapter was also accurate in predicting that scholarly analysis would move away from cultural repositories onto individual workstations.

> In the past, scholarly examination of books, photographs, and other material took place only in specialized environments such as museums, archives, and libraries. As tools are developed to analyze works from personal computers, and as more of the works are available digitally through networks and CDs, scholarly research will shift from these specialized environments to homes and offices. This is likely to change both the way scholars work and the view of research institutions as specialized environments. (Besser 1997)

This also will likely continue into the future.
This chapter accurately predicted that the storage impediments to museums scanning their objects would evaporate, “because file-size constraints will continue to rapidly diminish, these will no longer serve as impediments to a repository's use of digital images. In the near future we are likely to see significant increases in the use of digital images and multimedia by cultural repositories.” (Besser 1997)
It also accurately predicted that network speeds would increase, allowing museums to deliver services online to the public (and even putting public pressure on museums for more online services).

> As network speeds continue to increase, more and more individuals will access information and entertainment from their workstations at home or work. Still images, moving images, and multimedia will become available as networked services. And as individuals access more and more of these resources online, cultural repositories will be under increasing pressure to distribute in this arena. (Besser 1997)

These technological trends are likely to continue, and the hesitancy of museums towards storing large collections of time-based media will likely diminish over time. The chapter also commented on changing modes of scholarship.

> If user behavior on the WWW is any example, when a huge body of multimedia information is readily available it is possible that scholarship may shift its focus from discovering new knowledge within objects to discovering connections and themes between them. (Besser 1997)

In the past, because access to challenging media art works was so limited, much of the scholarship focused on intensive study of single or small groups of works. In all likelihood, as access to these works improves, we will see more and more scholarship ranging across numbers of works. Besser also raised the issue of intellectual property rights, and of commercial entities repurposing works and metadata sourced from museums.

> As museums create more and more of these building blocks of images and descriptive text online, will disputes develop over the rights to use these building blocks in different ways? Will commercial enterprises develop their own exhibits that incorporate links to hundreds (or thousands) of these building blocks in museums? (1997)

We have already seen attempts by third parties to declare ownership over metadata created by cultural heritage institutions, with OCLC's assertion of ownership rights over bibliographic information created by libraries (Lowry 2008). More frequently we see other services employ museums' visual material and metadata as part of their own services. Services like Google Arts & Culture and Google's Knowledge Graph rely on museums' visual material and/or descriptive metadata. While the former usually involves an agreement between Google and the museum, the latter does not. But as Linked Systems and the Semantic Web develop in the coming years, we will see a significant increase in informational sources employing museum metadata without attribution, as museum metadata is deemed highly authoritative.

Predictions from 15 years ago

Approximately fifteen years ago (2003) the Canadian Heritage Information Network[3] commissioned five people to jointly author a report on the future of museums. This report was released in 2004 under the title *The Virtual Museum: The Next Generation* (Dietz/Besser/Borda Geber/Lévy 2004). The report emphasized that the museum of the future might occupy either a physical or a virtual space (or a hybrid of the two). Most important was that the next generation of museums would build new relationships and engagements with its audience.

> Some of the primary trends that this paper explores, such as the hybridization of the concept of the museum, the increasing interpenetration of physical and virtual spaces, the advantages of a modular, pan-institutional structure, audience participation in the creation of content, and the deployment of wireless, locative media devices... (Dietz et. al. 2004)

Certainly a number of museums have made their physical and online spaces complementary to one another. And many have explored deploying Apps on personal wireless devices that use location data to enhance the user experience. Audience participation is dealt with in more detail below. But few cross-institutional modular features have as yet been deployed, and doing so would require major efforts towards standards agreement among multiple museums and their vendors.

Extending Besser's earlier predictions that museums will diminish their previously exclusive role in juxtaposing and interpreting works, the authors predicted that all phases of museum experience creation would be opened up to those outside the museum. They claimed that this will actually help the museum be successful.

> While authoritativeness will remain a critical differentiating factor for the Virtual Museum of Canada, the key to sustainability in every area investigated, from audiences to interfaces to content to infrastructure, is creating the tools and platforms that will allow others—

3 https://www.canada.ca/en/heritage-information-network.html.

> both individuals and institutions—to create the compelling experiences that will ultimately make the VMC successful at the scale of its ambitions. (Dietz et. al. 2004)

Thus far we have seen minor evidence of museums taking a more open approach to content, platforms, and tools. And the relatively sparse third party activities have mostly involved teachers and individuals creating their own online exhibitions involving open museum content. But a few groups have employed museum APIs to build experiences ranging from cross-museum catalogues to new user interfaces. But as more museums both adopt open strategies and encourage others to employ them, we are likely to see more groups and individuals building new experiences on these.

The paper also advocated that users be allowed to add their own content in the form of works, descriptions, interpretations, and other forms of contextualization, saying "the VMC should focus on systems that allow users to create and manage content" (Dietz et. al. 2004).

There has been little museum effort to implement this in a robust way, probably because few museums see their role as encompassing this type of effort. But a number of museums have allowed users to reorder pieces into a personalized quasi exhibition. The report addressed personalization directly.

> One of the main directions for the next generation of virtual museums should be personalization. Visitors to the next generation of virtual museums should be able to collect content from a virtual museum, a number of or all virtual museums, museum sites or any other information source, into their personal museum spaces and this should be the focus of interoperability research. (Dietz et. al. 2004)

But though individual museums have supported users personalizing a museum experience within a single museum (like walking through a museum and using a personal device to note all the pieces they like, and having the museum deliver an online exhibit containing only those noted pieces), very little work has been done to allow for the combination of user-noted objects across multiple museums. It will take much more work for museums and their vendors to agree on the type of interoperability standards that will make something like this possible.

The report predicted that museums would both facilitate individuals creating their own experiences with museum information and would create online spaces for patrons to discuss the works.

> The VMC should focus on developing a lively communications platform that provides access, communication and social spaces to meet audience needs to collect, relate, create and donate activities; a platform that encourages individual points of view but provides access to usable authoritative information as the audience desires. (Dietz et. al. 2004)

Though the report was written before Facebook existed, most museums now have Facebook pages that invite a kind of low-level form of discussion among patrons and art enthusiasts. And as museums become more comfortable with balancing their own authoritative information with observations from members of the public who have no background in art history, we are likely to see museums providing more robust environments for users to both communicate alternative points of view and to create their own applications and paths using museum information and infrastructure.

"The VMC should model open system projects that have a high degree of audience participation without undermining the value of the museum's subject matter expertise." (Dietz et. al. 2004). The report advocated that museums engage in interactive projects that push the boundaries of what museums have done in the past and that museums could do this while still emphasizing their authority over knowledge, context, and interpretation.

> The VMC should model experimental projects, such as ones that have a high degree of audience interactivity yet attempt to retain the value of the museum's subject matter expertise. (Dietz et. al. 2004)

We have seen very little of this over the past 15 years, but we may see more of it in the future.

Predictions from Today

We can expect museums to continue to evolve due to changes and opportunities from the digital world in general, and from time-based and complex media works in particular. Here are some trends identified earlier that we can expect to continue:

Museums will lose their relatively exclusive role in showcasing art

We will continue to see museum-like displays outside the walls of museums. The type of projects outlined by Sarah Kenderdine in her Re:Trace keynote address (airport installations, Mogao caves) will continue to increase. Artists will go directly to a large audience with web works and online exhibits. The museum's semi-monopoly on the display of art will slowly erode.

Curators will lose some of their power

We will continue to see some erosion of the curator's relatively exclusive power to juxtapose pieces with one another. The curator's contextualization or "story" (in the form of the exhibition and the exhibition catalogue) will no longer be the only narrative. We will see museums opening up nearly their entire collections and (unlike in most exhibitions) users will be able to do their own juxtapositions and find their own paths through the collection. We are also likely to see curators' roles shifting from a focus on creating somewhat linear exhibitions to providing visitor-based multiple experience or paths through a set of art objects. We may very well see curators providing a set of paths and accompanying tools for visitors to navigate through a set of art objects.

The notion of museum ownership of works will continue to change

Because it is possible to make an exact copy of a digital work, a museum's traditional idea of exclusive ownership over a tangible "original" needs to evolve. In recent years museums have explored different models of what they "own" when they acquire a media art work, from commissioning works (where they can claim ownership of a portion of the work's creation) to numbered editioning of a work (where they own one copy among many). Museums have increasingly explored joint ownership of media art works through entities like the New Art Trust with joint ownership by the Tate, the NYC Museum of Modern Art and the San Francisco Museum of Modern Art.[4] In the future, we will likely see more commissioning, editioning, joint ownership, and other new forms of custodianship.

4 www.artforum.com/news/new-art-trust-receives-works-from-kramlich-collection-12361.

ARTISTS WILL KEEP THEIR OWN WORKS ALIVE, NOT RELYING EXCLUSIVELY ON MUSEUMS

Whether it is a "do it yourself" attitude or a distrust in the way that museums may have treated their works in the past, artists are increasingly taking actions to keep their own media works alive and viewable. Since 2014 volunteer archivists/conservators from the XFR Collective[5] have worked with scores of artists to revive their older works and make them accessible (XFR Collective). For the past two years ARTHYVE[6] has worked collaboratively with Colorado (US) artists to keep their own media works alive. We are likely to see further such initiatives in the future that challenge the museum's previously exclusive role in maintaining art works over time.

BIG DATA & VISUALIZATION TREND

As part of the more general societal trend towards "big data", museum works and documentation will be used for many purposes, including for purposes that the museum never anticipated. Individuals will use museum works and museum metadata as their own data (to look at trends, do analysis, explore new ideas, etc.). The kind of work with Seattle Library information that George Legrady discussed in his Re:Trace talk will increasingly be used with museum information ("making visible the invisible", 2005).

EXHIBITIONS WILL INCREASINGLY BE HYBRID (BOTH GALLERY AND ONLINE)

For example, museums will realize that personal-driven interactive pieces (such as Char Davies' *Osmose* (1995), Grahame Weinbren and Roberta Friedman's *Erl King* (1983-86) and Cory Arcangel's *I Shot Andy Warhol* (2002)) may work better in individualized and even home setting (and avoid very long lines in the gallery), while more and more interactive exhibits will focus on group interaction in a gallery setting (such as Sep Kamvar's and Jonathan Harris' *I Want You To Want Me* from 2007).

5 xfrcollective.wordpress.com.
6 arthyve.org/more-about-arthyve.

MORE TRAINING & SPECIALIZATION SPECIFICALLY IN TIME-BASED MEDIA CONSERVATION

> Because of the specific challenges posed by time-based media, the need for training in conservation of these works will continue to increase. Conservation of these works requires knowledge of media arts history and technology, familiarity with media arts description and cataloguing, and a paradigm shift from conservation treatments to restore an "original" work to the employment of newer technologies to re-install a work (Besser 2001). In recent years museum conservation departments have begun to adopt "artist interviews" to help identify the types of technological variability that would be acceptable to the artist (Beerkens et. al. 2012). And just in the past handful of years more than a dozen graduates of New York University's (NYU) Moving Image Archiving & Preservation master's degree program have been hired by art museums to focus on time-based media conservation. NYU's Institute of Fine Arts is launching a specific degree focus in Time-Based Media Conservation in the fall of 2018 (Sharpe 2017). Museums will need to continue to hire time-based media conservation specialists, or to train their existing conservators in the newer methods developed over the past two decades.

How libraries have responded to social and technological changes provide a good example of how museums may choose to adapt to future changes. As another type of institution that collects cultural works for a public audience, museums will be facing some similar challenges. For more than a century, libraries were places where people went alone to look at books and other resources and study them. With the growth of the Internet and the wave of resources available remotely, people stopped coming to libraries, did previous library-dependent work at home, and libraries became more of an access point (or portal) than a place to physically go. But eventually in response, academic libraries latched on to the new mode of group study, provided isolated rooms designed for collaboration, encouraged quiet talking and group discussions, and began to allow people to drink coffee while they worked with others. As a result, in the past decade academic libraries have become even more crowded than they were in the years before online access to information.

Like libraries, museums can develop concrete changes in traditional practices that will respond to the new modes of learning and interacting with culture. But first they need to understand the larger trends that are affecting what they do.

References

Artforum News. 12 Jan 2007. "New Art Trust Receives Works from Kramlich Collection." https://www.artforum.com/news/new-art-trust-receives-works-from-kramlich-collection-12361 (last access 19.06.18)

Beerkens, Lydia/ 't Hoen, Paulien/ Hummelen, IJsbrand/ Van Saaze, Vivian/ Scholte Tatja & Sanneke Stigter. 2012. *The artist interview: for conservation and presentation of contemporary art: guidelines and practice*. Heijningen: Jap Sam Books.

Besser, Howard. 1987. "The Changing Museum. Information: The Transformation of Society." In Chen, Ching-chih (ed.). *ASIS'87 Proceedings*, pp 14-19.

Besser, Howard. 1997. "The transformation of the museum and the way it's perceived." In Jones-Garmil, Katherine (ed.). *The wired museum*, pp 153-170.

Besser, Howard. 2001. "Longevity of Electronic Art." In *International Cultural Heritage Informatics Conference Proceedings*, Milan, 3-7 Sep, pp. 263-275. https://dblp.org/db/conf/ichim/ichim2001-1.html#Besser01 (last access 18.06.18)

Chen, Ching-Chih. 1987. *ASIS'87 Proceedings of the 50th Annual Meeting of the American Society for Information Science*. Boston, MA, October 4-8, Medford, NJ: Information Today Inc.

Depocas, Alain/ Ippolito, Jon & Caitlin Jones. 2003. *Permanence through change: The variable media approach*. New York/Montreal: Guggenheim Museum Publications.

Dietz, Steve/ Besser, Howard/ Borda, Anne/ Geber, Katie, & Pierre Lévy. 2004. "Virtual Museum (of Canada): The Next Generation." *Canadian Heritage Information Network*. http://besser.tsoa.nyu.edu/howard/Papers/vm_tng.doc. *(last access 18.06.18)*

Legrady, George. 2005. "Making Visible The Invisible." Seattle library data flow visualisation. In *ICHIM Conference Proceedings*, Paris, 21-23 Sep 2005, pp 3-23. 156.74.250.135/Documents/branch/CEN/georgelegrady_art.pdf (last access 19.06.18)

Jones-Garmil, Katherine (ed.). 1997. *The Wired Museum: Emerging Technology and Changing Paradigms*. Lanham/New York: AAM Press.

Kenderdine, Sarah. 2013. ""Pure Land": Inhabiting the Mogao Caves at Dunhuang." In *Curator. The Museum Journal*. Vol. 56/2, pp 199-218.

Lowry, Charles B. 2008. Ownership of Bibliographic Data and Its Importance to Consortia, Journal of Library Administration, 8/3-4, pp 69-84. DOI: 10.1300/J111V08N03_08 (last access 19.6.18).

Sharpe, Emily. 2017. It's about time: NYU launches US first time-based media conservation graduate course. The Art Newspaper, 17 February, https://www.theartnewspaper.com/news/its-about-time-nyu-launches-us-first-time-based-media-conservation-graduate-course.

Suchan, Jakob/ Bhatt, Mehul. 2016. Semantic Question-Answering with Video and Eye-Tracking Data – AI Foundations for Human Visual Perception Driven Cognitive Film Studies. In *IJCAI 2016: 25th International Joint Conference on Artificial Intelligence Conference Proceedings*, New York City, USA, 15-19 Jun, pp 2633-2639. http://www.ijcai.org/Proceedings/16/Papers/374.pdf (last access 18.06.18).

Algorithmic Signs, Venice 2017: Tracing the history of computer art

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Abstract

This paper examines *Algorithmic Signs*, an exhibition exploring the history of pioneering computational art conceived, researched and curated by the author in collaboration with the Fondazione Bevilacqua La Masa (Venice, Italy, October 2017). The author presents the historical context and main concepts that led to the creation of this exhibition. In addition to this, the author demonstrates how *Algorithmic Signs* provided new interpretations of the history of computer art.

Keywords

Computer art pioneers, exhibitions, algorithmic art, generative art, interactive art

Introduction

Algorithmic Signs was an exhibition held at the Fondazione Bevilacqua La Masa's historical gallery in St. Mark's Square, Venice, from 19 October until 3 December 2017. This exhibition explored the history of pioneering generative art and its contribution to the broader field of contemporary art from the 1960s to the present. The history was exemplified in the creative work of five international pioneers in the world of digital arts: Ernest Edmonds, Manfred Mohr, Vera Molnár, Frieder Nake, and Roman Verostko.

Historical context

Given what we know about the influence of Venetian art on the arts, particularly from the Byzantine period to the Renaissance and up to the eighteenth century, Venice and algorithmic art are not the most obvious association in the art world.

Looking for computational art in Venice therefore represents a new, fascinating and exciting adventure. It is an even more challenging task, owing to its hybrid, fluid nature and by the fact that this art uses the computer as a tool or medium; and although around from the mid-1950s, has not been fully accepted by the traditional art institutions and has been overlooked for many years. Despite the fact that major exhibitions on art and technology have been shown internationally from the late 1960s to early 1970s, the sense of excitement instilled by these exhibitions did not last long and in the past 50 years, museum exhibitions on computer art have been a rarity.

Contemporary art in Venice has had a relatively long history that dates back to the first Venice Biennale in 1895. But, as English art historian Lawrence Alloway proved in 1968, the first Biennales, particularly between 1895 and 1914, were devoted to the celebration of the official academic style, or *Salon art*. Far from being innovative and open to the new European tendencies, the first Biennales demonstrated a conservative and reassuring attitude towards art. The breaking of the original Venice Biennale's curatorial model happened owing to political circumstances in 1968, the year of European radical revolts for social and economic change. From a curatorial point of view, the 1968 Biennale represented an "anomaly" compared to its previous renditions. Not only the political instances brought forward by the student revolt, but also the introduction of new technologies in art from the mid-1960s contributed and allowed the Biennale to distance itself from its original nineteenth century Salon art model. Owing to innovative and cross-disciplinary projects such as those presented by Argentinean artist David Lamelas and French cybernetic artist Nicolas Schöffer at the 1968 Biennale, the institution started, slowly, to open up towards new media and to accept them as a new form of art.

The 1970 Biennale represented a fundamental step for the art institution in the long journey toward the acceptance of computer art (Franco 2013). The Biennale's major show *Ricerca e Progettazione. Proposte per una Esposizione Sperimentale* was curated by Umbro Apollonio and Dietrich Mahlow. It was an exhibition entirely devoted to "experimental" art and featured a large selection of early computer art which included, amongst others, Frieder Nake's *Matrix Multiplication* (Fig. 1). Except for the rare case represented by the 1970 Biennale's experimental show, computer art at the Biennale has since been exhibited only peripherally.

Algorithmic Signs

Algorithmic Signs represents the first attempt after the 1970 Biennale to bring early computational art and some of its most prominent pioneers back to Venice.

Coming to the computer from completely different backgrounds and experiences—monastic life, jazz music, traditional painting, philosophy, mathematics, and logic studies—the artists featured in the exhibition began to experiment the creative use of the algorithm and computer code to construct their works and make art.

50 years after the first experiments in computational art, international interest in the history of this subject remains strong and at the same time almost uncovered. Focusing on the relationship between computer programming, art and creativity, the presentation of each artist explores the role of programming in their work, looking at how their practice has kept pace with the rapid advance of technology in recent decades.

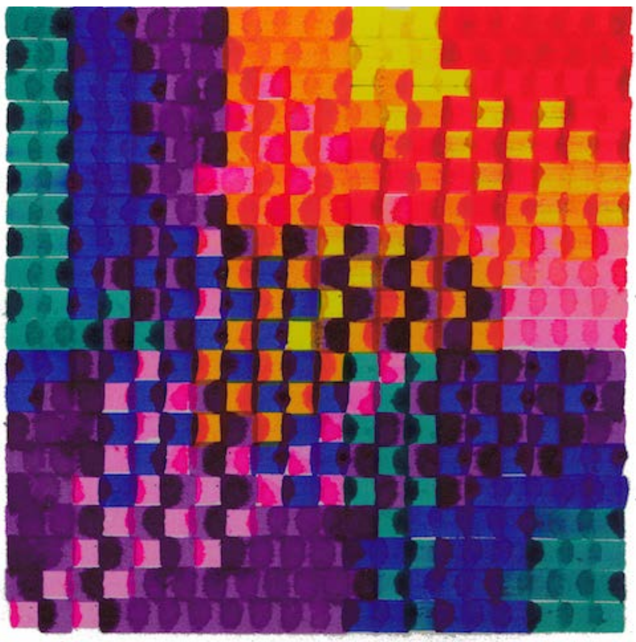

Figure 1. Frieder Nake, *Matrix Multiplication series 29*, 1968. Coloured ink on paper. © Frieder Nake

Figure 2. Manfred Mohr, *P-499-AI*, 1993. Painted steel, 15 parts, 250x1200 cm. ©Manfred Mohr, Photo Giorgio Bombieri

Figure 3. Vera Molnar, site-specific installation based on Molnar's *13 Variations Mt St. Victoire*, 280x100 cm. ©Vera Molnar, Photo Giorgio Bombieri

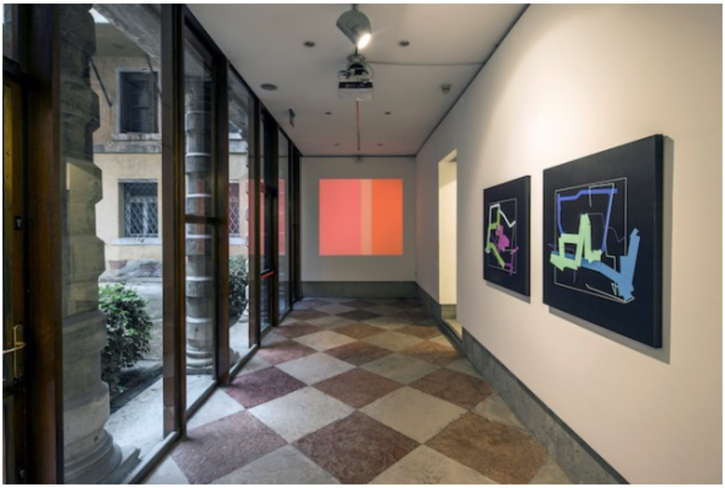

Figure 4. Ernest Edmonds, *Growth and Form*, 2017. Generative interactive installation, 250x250 cm. ©Ernest Edmonds, Photo Giorgio Bombieri

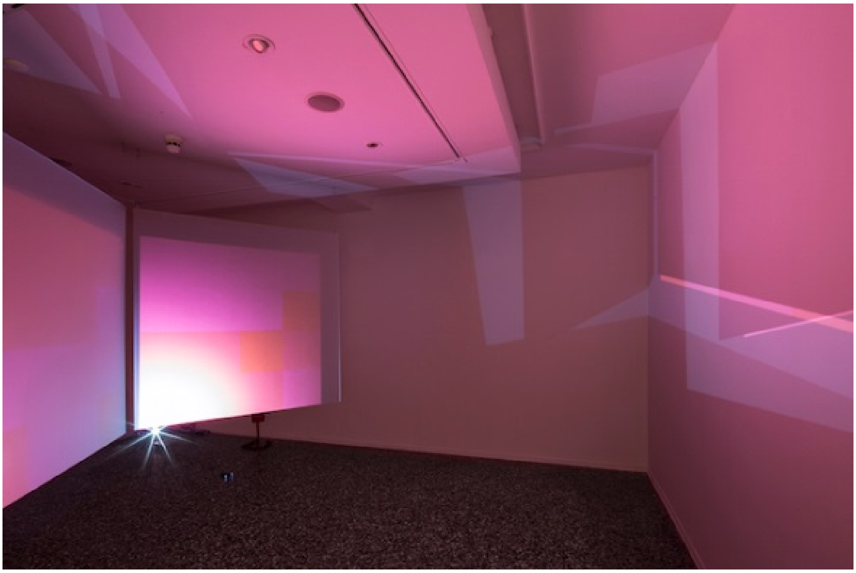

Figure 5. Ernest Edmonds, Shaping Space, generative interactive installation, 2012. ©Ernest Edmonds, Photo Giorgio Bombieri

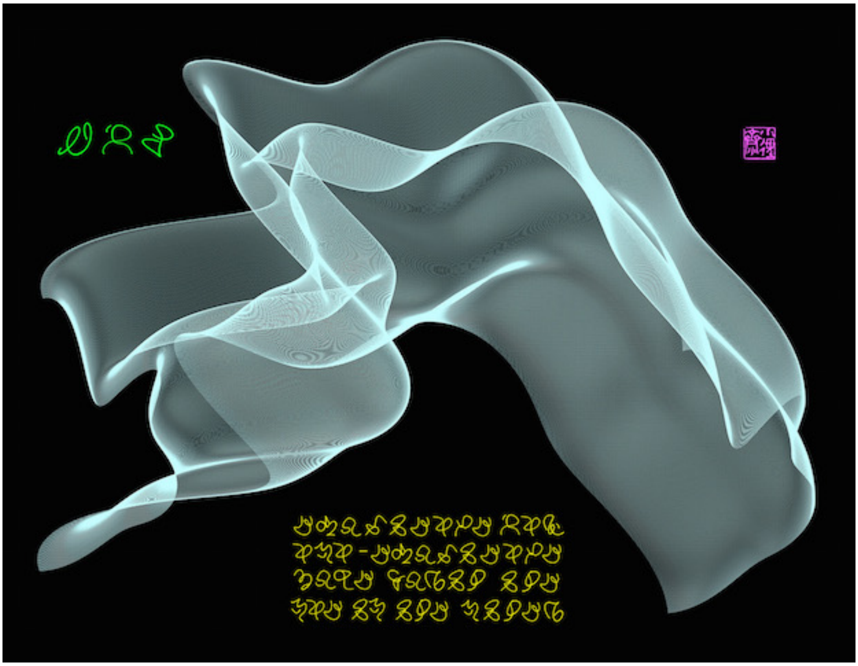

Figure 6. Roman Verostko, *San Marco Apocalypse: Lifting the veil*, 2017. Digital print, 55x30 cm. ©Roman Verostko

Algorithmic Signs featured over 60 artworks, including early plotter drawings, four site-specific installations, two newly commissioned works, and an eight-hour video documentation showing how an algorithmic drawing is made (Figs. 2-6).

Featured Artists

Ernest Edmonds' art explores colour, time, and interaction in the context of colour field painting and systems art. His work extends the Constructivist tradition into the digital age in a powerful and enduring investigation of mathematical and computational systems (Franco 2018). Some of the major artworks that define Edmonds' singular achievement were exhibited in this show. They included early generative computer-based art systems such as *Nagoya* (1996), and most recent works in which the artist has explored the potential of an interactive audience in public spaces, extending interactivity to a more comprehensive new form of collective behaviour, and has extended the notion of interactive art to include long-term influence. *Shaping Form* consists of a series of works on individual stand-alone screens framed so that the image is square. Movement in front of each work is detected by a small camera. This leads to continual changes in the program that generates the images. A viewer can readily detect the immediate responses of the work to movement but the changes over time are only apparent when there is more prolonged, although not necessarily continuous, contact with it. A first viewing followed by one several months later will reveal noticeable developments in the colours and patterns.

Manfred Mohr is a pioneer of computer-generated algorithmic art. After discovering Max Bense's "Information Aesthetics"[1] in the early 1960's, Mohr's art transformed from abstract expressionism to computer generated geometric art. In 1969, the introduction of the computer together with a mechanical drawing device, the plotter, in Mohr's art extended Mohr's creativity and helped him creating signs generated by the rational structure of programming and algorithmic processes. As he stated in 1985,

1 See Bense, Max. *Aesthetica. Einführung in die neue Ästhetik*. [1954-60] Agis: Baden-Baden, 1965; Bense, Max.. "The projects of generative aesthetics". In Jasia Reichardt (ed.) *Cybernetics, Art, and Ideas*, Vol. 57–60. London: Studio Vista, 1971, pp. 57-60.

> I call my work 'generative' because all my work is generated from algorithms (logical processes) worked out by myself beforehand. This is my fundamental contribution to aesthetic research. I create signs, graphic existences, out of rational context. These signs refer only to themselves and their content is evidence of their creation. A logical and straightforward development of my work was the introduction of a computer and of a plotter in 1969. Dialogue with the machine thus became an important part of my work - an irreversible extension and/or amplification of my artistic thought. (Mohr/Teufel 1985: n/p)

For the first time in his art, algorithms were used to calculate images. The resulting drawings were made by a plotter. So for example, in works such as *P-021* (1969) with a choice of different line characteristics, such as horizontal elements, vertical lines, and zigzags that move mostly from left to right, an abstract text was created. It is basically an alphabet of arbitrary generated elements. From 1972, Manfred began employing the structure of the cube as a system and alphabet, and, as the works exhibited in *Algorithmic Signs* demonstrate, over the years he has always maintained the structural elements and constraints of the cube in his vocabulary.

Vera Molnár is one of the pioneers of computer and algorithmic arts. Born in Hungary in 1924, Molnár initially trained as a traditional artist, studying fine arts and obtaining a diploma in art history and aesthetics from the Budapest College of Fine Arts. Inspired by abstract, geometrically and systematically determined painting, she created her first abstract works in 1946. In 1968, she began working with computers and started to create algorithmic paintings based on simple geometric shapes and themes. One of her most moving works, *Lettres à ma mere*, was exhibited for the first time in Venice. It is a series of works Molnár created with the aid of a computer and a plotter to recreate the handwriting of her mother, between 1981 and 1990. Molnár describes the creative process behind them as follows:

> The visual aspect in these pieces, executed with computer and plotter, changes evenly at every line, proceeding from left to right. Using an increasingly random process, the lines – built up with regular sequences going up and down with a tilt of 110-120 degrees – become more and more chaotic as they advance to the right. This phenomenon occurs within each line, within each letter. The letters become

more and more disturbed. The relative order seen in the first letters, on the left side, disappears progressively. (Molnar 1995: 169)

Frieder Nake belongs to the founding fathers of computer art. He studied mathematics and in 1963, “by accident” as he likes to say, became a pioneer of algorithmic art. He had his first exhibition in Stuttgart in November 1965. He has participated in all major international exhibitions on computational art, including *Tendencies 4* (Zagreb 1968), *Cybernetic Serendipity* (London 1968) and the first computer art show at the Venice Biennale in 1970, amongst others. Over the last thirty years, he has exhibited and lectured around the world, and published his work in various academic publications. *Matrix Multiplication* (Fig. 1), back in Venice since it was exhibited at the 1970 Biennale, represents one of the most iconic computer-generated artworks, and one of the earliest examples of full-colour continuous drawings generated by a computer. Consisting of a grid of little squares where colours have been assigned by mathematical process, the work presents a series of variations that, as Frank Dietrich described in 1986, “reflect the translation of a mathematical process into an aesthetic process.” (Dietrich 1986: 161)

Roman Verostko is best known for his richly coloured algorithmic pen and brush drawings. Born in 1929 in the USA, he was schooled as an artist at the Art Institute of Pittsburgh. A year later he entered monastic life at St Vincent Arch abbey in Latrobe, PA, where he became deeply involved with art and spirituality. Following studies in philosophy and theology, he was sent to New York and Paris to pursue further studies in both studio practice and art history. In Paris, he maintained a studio where he experimented with automatism and expressionist brushwork. Returning to the monastery he began experimenting with electronically synchronized audio-visuals. Roman departed monastic life in 1968 and joined the humanities faculty of the Minneapolis College of Art & Design in Minnesota. Roman's work with electronic synchronizers led him to an interest in computer circuits and programming. He followed a night course in FORTRAN at the Control Data Institute in 1970, gained more experience with circuits and continued painting and programming electronic audio-visuals. In 1982, he coded a series of visual sequences, “The Magic Hand of Chance”. This program, written in BASIC, grew into his master drawing program, HODOS, generating his art-form ideas with both ink pens and brushes mounted on drawing machines. The front and end pieces for his 1990 limited edition of George Boole’s “Derivation of the Laws...” exhibited in *Algorithmic Signs* demonstrate the emerging power of generative art. *Algorithmic Signs* featured some of Verostko's most celebrated algorithmic poetry drawings. Amongst them, *Green Cloud* belongs to a recent series that was exhibited as a form of "visual poetry".

Conclusions

One of the challenges of this exhibition was to open up new perspectives and uncover a new level of understanding of the intricacies in media art to reveal aspects of creativity that have helped shaping its complex history. The works on display demonstrated how human thought could be amplified by machines and could raise our consciousness to a higher level of comprehension, both intellectually and visually.

Algorithmic Signs also revealed an often-overlooked link that connects the work of the five exhibiting artists to past artistic traditions. In particular, the carefully structured and organised works in "Algorithmic Signs" demonstrate unequivocal affinities with the tradition of Constructivism, the modern art movement that began in Russia in the early twentieth century. Based on the supremacy of the functionality of the art object over its exterior appearance and composition, Constructivism inspired artists to explore the potential of modern materials and their role in expressing a new dynamism in modern life. Similarly to the way Vladimir Tatlin, one of the founding figures of Constructivism, explored the potential of new materials in his creations, Edmonds, Mohr, Molnar, Nake and Verostko have investigated the materiality of the art object and its organising structures in the context of computing technologies. They represent the missing fragment of the mosaic that connects this multifaceted and sophisticated line of research and that links the past and future of media art.

References

Alloway, Lawrence. 1968. *The Venice Biennale, 1895-1968; from Salon to Goldfish Bowl*. Greenwich Conn.: New York Graphic Society.

Franco, Francesca. 2013. "The First Computer Art Show at the 1970 Venice Biennale. An Experiment or Product of the Bourgeois Culture?" In Sean Cubitt and Paul Thomas (Eds.) *Relive Media Art Histories*, Cambridge, Mass.: The MIT Press, pp. 119-134.

Franco, Francesca. 2018. *Generative Systems Art – The work of Ernest Edmonds*. London: Routledge.

Franco, Francesca. 2020. *The Algorithmic Dimension: Five Artists in Conversation*. Berlin: Springer (publication date 12 Mar 2020).

Mohr, Manfred/ Hans Teufel (eds.). 1985. *Manfred Mohr Divisibility II. Generative Arbeiten 1981-1984*. Exhibition Catalogue Cologne: Galerie Teufel.

Molnar, Vera. 1995. "My Mother's Letters: Simulation by Computer." In *Leonardo*, Vol. 28, No. 3, pp. 167-170.

Dietrich, Frank. 1986. "Visual Intelligence: The First Decade of Computer Art (1965-1975)." In *Leonardo*, Vol. 19/ 2, pp. 159-169.

Preservation of Software-based Art at Tate

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Abstract

Software-based art has been part of the Tate Collection since 2003. In the intervening period, practices in different institutions have changed and become aligned and shared within the community of practitioners. It is fair to say that the current body of knowledge has reached a degree of consensus around the specificities of this medium and the processes involved for sustainability and preservation, or the lack thereof. This paper describes our current understanding of the role of the conservator, the lifecycle of the artwork in the institution from a conservation perspective and some of the recent developments in the field. We discuss *intervention*, defined as any action that changes the materials of an artwork, both hardware and software, in terms of its possible intentions and the most usual types. We identify intervention not only at a treatment moment but also possibly as a preventive measure, that increases a system's sustainability.

Conservation of software-based art is still in its infancy, but strategies are being actively tested and developed in different contexts and practices, and Tate as an institution is happy to contribute to those developments through practice but also by disseminating information.

Keywords

Tate, time-based media, museum collection, conservation

Introduction

Conservators are professionals trained in materials and production techniques of objects as well as in the vulnerabilities of those objects. We are further trained on the importance of documenting an object's function and condition. As a profession, we have spent the last 60 years developing, testing, defining and refuting strategies to reduce decay rates, maintain authenticity and significance and in some cases to restore an object to its original condition.

Conservation has also, over the years, evolved to encompass new materials and objects of conservation, which nowadays range from whole buildings, to pre-historic seeds, from ethnographic objects to software-based art. Why and how these objects are preserved is dependent on both their materials and the context in which the conservation processes happen.

Conceptual art and the apparent disengagement between material and concept brought further changes to conservator's understanding of the object of conservation, where the constituent materials are no longer unique and therefore new forms of preservation are possible (Van Saaze 2018). This is even more so when the focus turns to time-based media art, where a different approach is essential to address the dependencies on technology and the in-built obsolescence of these technological systems.

This evolution has required that conservation in contemporary art museums expands its frames of reference and processes. The latest moment in the evolution is software-based art, which is still a fairly niche field within the discipline of conservation. Nevertheless, as more software-based artworks come to the collections and the care of conservators, a body of knowledge and practices is finally coalescing.

This paper describes our current understanding of software-based art preservation in the context of contemporary art in museums as well as the main strategies being tested and developed in the field.

We will look at the lifecycle of an artwork in a collecting institution and the key moments for preservation; this will provide an insight into the role of conservation in caring for software-based artworks.

The described methods show the depth and relevance of the work of conservators in preserving this fragile heritage, and hopefully instigate closer collaboration between all the different actors in caring for this type of works.

Conservators as Practitioners

Conservators specialise in particular areas such as paintings, objects or photography due to the level of expertise required to safely treat valuable objects. These specialisations also address the context in which conservators work, for instance in the care of ethnographic objects or time-based media art, where we are trying to preserve not only unique physical objects but also immaterial aspects of the conservation object, as discussed by Muñoz Viñas (2005).

This paper focuses on this last group of professionals, and our role in or in connection to collecting institutions. This is based on my experience of 10 years working as part of a team of time-based media conservators at Tate, the first institution to employ a time-based media conservator, Pip Laurenson, in 2003.

Formal training in media conservation was first created in 1999 at the University of the Arts in Bern, Switzerland. Since then, other courses around the conservation and archiving of electronic media have emerged, but the number of specialised conservators is still very low. Specific training in software-based art conservation is still not available, but some degrees now offer options to choose related subjects and are encouraging students to research in the area. Current experts either have training in other subjects of conservation and then extended their expertise as required or have a background in computer science or engineering and have then trained in conservation or learned about conservation as part of a job.

As any other conservators we are interested in materials and production techniques and ways to preserve and document them. Working in the context of software-based art means understanding hardware, software and the overall technical environments needed to run it, as well as aspects of display, either in the gallery or in a browser on a computer screen.

Context, Tate and the collection

In the context of time-based media conservation we use the term software-based artwork to mean any artwork in which the software is one of the primary media of the work (Falcao et al. 2016). Tate collected its first software-based artwork—Michael Craig Martin's *Becoming*—in 2003. Subsequent acquisitions of software-based artworks by Tate were at a somewhat leisurely rate of one per year until a step change occurred in 2016, when Tate Modern's Director Frances Morris, in her first interview in post, signalled a shift in Tate's curatorial goals: "I am sure that for the collection, the next big challenge is going to be digital. In the 19th century we didn't buy photography. It took us over 100 years to catch up. Let's not be in that position again." (Higgins 2016)[1]

This focus is now clearly reflected in the number, diversity and com-

1 Higgins, Charlotte, Interview with Frances Morris, Director of Tate Modern in The Guardian, 16/04/2016. www.theguardian.com/artanddesign/2016/apr/16/tate-modern-director-frances-morris-interview.

plexity of the works acquired or in the process of being acquired and we have already seen an increase in the rate of acquisition of software-based artworks, or artworks with software elements.

Collecting software-based art raises some new questions about what aspects of a work we can preserve and how we should go-about this. Tate's mission statement, as set out in the Museums and Galleries Act 1992, is essential in defining what we want to achieve, and consequently the actions we must take:

> Our mission is to increase the public's enjoyment and understanding of British art from the sixteenth century to the present day and of international modern and contemporary art. Its statutory aims and objectives set out in its governing document are:
>
> – to care for, preserve and add to the works of art and the documents in its collections;
> – to ensure that the works of art are exhibited to the public;
> – to ensure that the works of art and the documents are available to persons seeking to inspect them in connection with study or research; and
> – generally to promote the public's enjoyment and understanding of British art, and of twentieth-century and contemporary art, both by means of the Board's collections and by such other means as they consider appropriate.[2]

It is important to highlight the relevance given to care and preservation in the first point of the list, as this is then reflected in the institutional view of Conservation - and Collection Care in general -as equal contributors and collaborators and in the resources made available for these actions.

The other important points for software-based art preservation are that works of art must be exhibitable, which in the case of software-based art equates with them being functional. The fact that they must be available for study and research points to the need to maintain or at least thoroughly document historical systems. By systems we mean the combination of hardware, software, data and display specifications. So far the systems supplied by artists at acquisition have all been only a few years old when they come to the Tate Collection, which means we have less experience in dealing with completely obsolete computer systems.

At Tate, time-based media conservation is responsible for the long-term preservation and display of any artwork in the collection that makes

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2 Tate, Governance page: www.tate.org.uk/about-us/governance.

use of media such as film, slides, video, sound, performance and software.

The number of time-based media artworks in the collection is increasing steadily, with an average of 35 works being acquired per year over the last five years to a total of c. 650 artworks. The number of works on display at any given moment is also increasing and the extra exhibition space in the new building at Tate Modern is a key aspect, but the overall interest from the different Tate sites has also had an impact. These two aspects, and the importance given to the care and display of these works, means that the time-based media team has grown from being one person in the sculpture conservation team to currently being a team of 12 people specialised in the different media and activities of time-based media conservation. The team includes one conservation manager, four conservators, one assistant conservator, four senior conservation technicians, one conservation technician, and a long-standing group of freelancers as well as eventual interns and trainees.

The now fairly long history of the team means we did not have to start from scratch in considering how to document and preserve these works and can build on an experience of over 20 years in caring for electronic media and time-based media art, and in adapting our systems and processes to accommodate the specificities of the different media, artists and artworks.

For software-based art, the first acquisition in 2003 was a trigger to start researching the subject. Basic preservation procedures, such as testing equipment, creating copies of hard-drives and digital assets and thoroughly documenting systems were tested and put in place for the first time. Since then we have been able to build on those procedures, grow our experience and test new methods for preservation. We have also put our effort into learning from related disciplines, developing new relationships with experts, and maintain and expand our networks of knowledge about specific technologies.

It has always been clear that any procedure must be adapted to the individual artwork and the basic steps must be revised over time, to follow the evolution of the technologies used by artists and of the tools for preservation. The experience and knowledge on how to stabilise, treat and document this type of artworks is also constantly being expanded by sharing of museum practice and collaboration with researchers in software preservation and digital preservation in general.

The increase in numbers and complexity of artworks being acquired does highlight the urgency of new scalable strategies for preservation, also to mitigate risks for preservation and display of both obsolete and brand-new technologies. And this brings us to a basic question about what are we trying to preserve.

The artworks

Between 2003 and 2016 Tate acquired the following artworks:

Year Acquired	Year Produced	Artwork	Artist
2003	2003	Becoming	Michael Craig-Martin
2007	2005	Subtitled Public	Rafael Lozano-Hemmer
2008	2007	Things Change	Michael Craig-Martin
2010	2007	Brutalismo	Jose-Carlos Martinat
2012	2005	Colours	Cory Arcangel
2012	2006	Astrophotography	Cerith Wyn Evans
2013	2002	Adji	Meshac Gaba
2015	2009	Sow Farm (near Libbey, Oklahoma)	John Gerrard

There are currently another six works in the process of acquisition. These include three software-based art installations, two works classified as netart and one webpage that is part of a larger physical installation.

The majority of the artworks such as José Carlos Martinat's *Brutalism: Stereo Reality Environment* from 2007 (T13251) or Rafael Lozano-Hemmer's *Subtitled Public* from 2005 (T12565) are meant to be installed in a gallery.[3]

Most works so far were delivered as computers, with all the required software installed[4] and ready to be used in a gallery display. We often also receive other hardware needed to display the work, such as video cameras or printers. For all our artworks these are only one instantiation of the work, and the artists have stated that they are happy to see the hardware

3 For a description of these artworks, see Falcao 2010.

4 Installed is used with two meanings in this paper, one referring to the computer science concept and the other to the actions needed to set-up an artwork in the gallery. Where doubt may exist it will be made explicit.

and software changed as needed to keep the work running. This then opens up the question of what do we mean by preservation and what are we trying to preserve? To answer this it is helpful to start by introducing the lifecycle of an artwork in the museum from a preservation perspective.

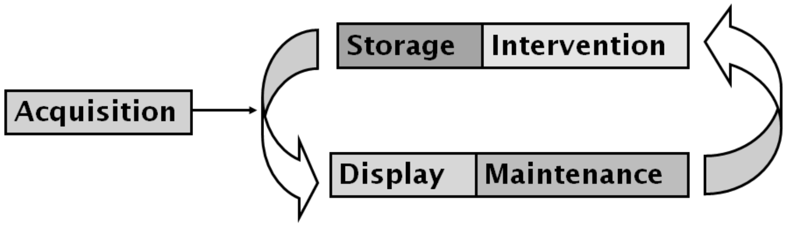

Figure 1. Lifecycle in the Museum.

The artwork's lifecycle in the museum

There are four key moments that can be singled out; Acquisition, Display (and the related maintenance processes), Storage and Intervention (Fig. 1).

At Tate, the acquisition process includes all the initial decisions to collect a work from a curatorial perspective, which then trigger the steps related to conservation. From a conservation perspective, this is the moment in which conservators are involved to identify and secure the components and information needed for preservation and display. At this point, a baseline of information is created about a work, both from the artist and/or galleries but also through technical analysis of an artwork's components by conservators and technical experts. This analysis informs the creation of a preservation plan highlighting any risks related for instance with obsolescence or specific dependencies. This may lead to an initial intervention, with the agreement of the artist, to improve the sustainability of an artwork.

The information gathered will feed any decision for display, and whenever possible artists have further input to the discussion. Display allows us to test the information we have, correct any errors or clarify inconsistencies. It also helps to gain an understanding of how an artist's views may have evolved since a work was acquired. It also often triggers the need for changes in technology.

Having a record of how an artwork has been displayed also ensures that later displays will take into account any changes and decisions made at this stage. Joanna Philips proposes a documentation model to create a record of the changes of an artwork over time, based on its multiple iterations. She also highlights the benefit of it “serving as a tool for institutional self-reflection, making current choices transparent to future interpreters, and thereby helping to prevent uninformed and compromising realizations of an artwork.” (Philips 2015: 168)

As part of a display, and to ensure that a work is shown in accordance with an artist’s instructions there are a number of maintenance processes that need to be followed. These will be dependent on the artwork’s needs and may include things like dusting the inside of a computer or ensuring a projector is focused and has new lamps.

For any digital artwork there is an expectation of permanence of its components, and storage for both digital and physical components is essential. I will go into more detail looking at storage as a preservation strategy, but at this point it is relevant that storage must happen for as long as an artwork is in the collection, so even historical components are stored permanently.

A very important moment that can happen throughout the whole lifecycle is intervention, which includes any process by which an artwork is changed to ensure its continued displayability. Again, this is discussed in more detail as part of the preservation strategies, and the point to be made is that these change processes are often triggered either at acquisition, as described before, at the point of display, or by imminent risk in terms of obsolescence. As I mentioned, all the moments in the life cycle are closely linked to the preservation of an artwork, so it is useful to define what we understand as preservation and its aims.

Preservation and preservation strategies

When preserving software-based artworks we have two main objectives, preserving the experience of an artwork and at the same time its technical history. One important aspect of preservation is to maintain, as much as possible, the experience of an artwork. This requires that we understand what an artwork does and how it is meant to be displayed. For that it is helpful to understand if the work can be defined by a set of functions that is performing, and whether the means by which these functions are performed can be replaced. An example is for instance the projection of words in Rafael Lozano-Hemmer’s installation. It is fair to assume that we will continue to project images over the foreseeable future, and therefore that function can be replaced.

The importance of preserving the production and technical history of an artwork can be illustrated by the frequent articles in academia and the media, for instance on how the X-ray of a painting brought to light an artist's work process. With electronic technology and its inherent need for change, this history can be easily lost, particularly if the information is not captured in a timely fashion, and this is a key aspect for conservators at Tate.

Sometimes much of the information is captured and transmitted by the artists themselves, for instance, the documentation created by Rafael Lozano-Hemmer and his team for *Subtitled Public* is exemplary.[5] Rafael's engagement with Lizzie Muller and Caitlin Jones in their documentation case study of *Subtitled Public* at the Daniel Langlois foundation in 2007 has probably influenced this, as has his collaboration with conservators in collecting institutions.[6]

More frequently it is the role of the conservators at Tate to gather the information needed to preserve and display the works. At Tate that involves curators in conversation with conservators and registrars, among others.

Defining significant properties and risks

An important step in this analysis and risk assessment of an artwork is defining its significant properties, a term used in the context of Digital Preservation to mean: "The characteristics of digital objects that must be preserved over time in order to ensure the continued accessibility, usability, and meaning of the objects." (Wilson 2007: 8)

In our context, the object is an artwork and more often than not for time-based media works, it only exists when installed correctly in space. The importance of defining these properties is for instance to understand the value put on specific elements or functions by an artist. An example is the choice of hardware and the options to replace a piece of equipment. For the work *Brutalism: Stereo Reality Environment 3*, 2007 by José Carlos Martinat Mendoza. At Tate the work was described as:

> "This sculpture is a scale model of the Peruvian military headquarters, an example of 'brutalist' architecture it was nicknamed the 'Pentagonito' (or 'little Pentagon'). During the Fujimori presidency, the building became notorious for the torture, murders and disappearances conducted by the secret service. The sculpture incorpo-

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5 Lozano-Hemmer and Anti-modular Research: http://www.lozano-hemmer.com/subtitled_public.php and http://www.lozano-hemmer.com/texts/manuals/subPublic_manual.pdf.

6 www.fondation-langlois.org/html/e/page.php?NumPage=2111.

> rates a computer which has been programmed to search the internet for references to 'Brutalismo / Brutalism', picking up extracts about Latin American and global dictatorships but also on architecture, forging associations between different kinds of 'brutalism' which it spews out onto the gallery floor."[7]

For the gallery display a computer must be placed on the floor near the main sculptural element, as an indication of the connection to the internet. The computer supplied by the artist was a generic looking black desktop, as used in many offices around 2007. In discussion with the artist, while preparing for a display at Tate Modern in 2011, it became clear that the look of the computer was important, and therefore that when it fails it should be replaced by a similar looking computer. The other option in this case is to keep the case of the original computer and hide a smaller computer inside it. Because the computer is generic, and its function easily replaceable we can say that we will be able to retain its significant properties, that include its look and the ability to run the software, even once the original electronics fail. Consequently, the risk of loss of function is minimal and we can address it by caring for the original computer as if it were a sculptural object but without having to ensure that it remains functional.

For the same work, one of the main risks is its dependency on the Google API to make web searches. As an external dependency beyond the control of the museum, any change by Google to the API requires a change to the software. To pre-empt issues related to loss of the internet connection the artist's programmer has designed the software system to include a database, where the results of the searches are stored and then retrieved for printing. This not only means that the work will run even if an internet connection is not available, but also that the history of the search results is stored as part of the work. The artist did state a clear preference for the software to run with live searches, and therefore we already know that the next time the work is displayed we will have to update the API. Due to the modularity of the software system it is unlikely that any of the other modules would need to be changed.

To summarise, when identifying risks and significant properties we try to define the following aspects:

- What are the display parameters? How is the work meant to look like in a gallery?

7 https://www.tate.org.uk/art/artworks/martinat-mendoza-brutalism-stereo-reality-environment-3-t13251.

- What can or cannot be changed and within which parameters?
- What are the obsolescent, or at risk elements and how can we recover them if needed?
- How would the artist like to see the artwork preserved?

Analysis

An essential part of the acquisition process is the description, analysis and documentation of the systems supplied by the artist. These are more often than not a computer with all the software installed and ready for gallery display.

Before the analysis itself we have in the last few years started to add an initial step of creating disk images of the hard drives in the computers. To prevent the accidental deletion of data we do any copying via a device named write-blocker. This is now basic best practice in digital preservation (John 2012). By creating an exact copy of the original disk we can start to investigate the software components without putting the original computer/s at risk, and we can also test the hardware while being assured that we can recover the system if it fails.

A clear list of the hardware—from the computers to any peripherals—and software—from Operating Systems to specific libraries—makes possible risks clearer, and helps to plan for the purchase of any replacements, if necessary.

The result of this analysis allows us to then plan for the future preservation of the work and to evaluate the applicability of the different preservation strategies (Fig. 2).

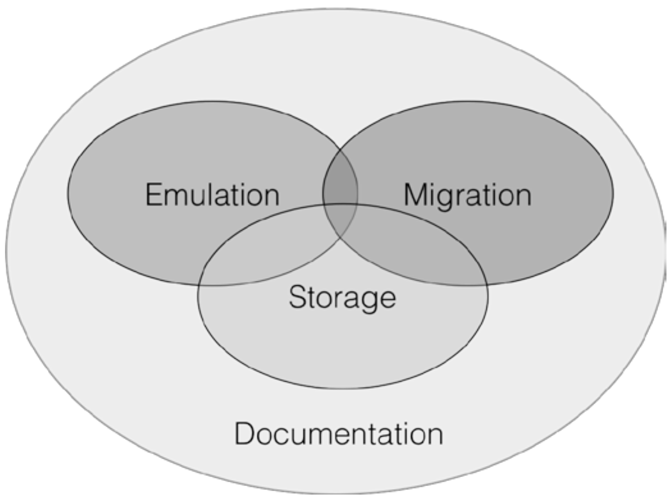

Figure 2. Preservation Strategies.

Storage

Museums are very good at storing physical objects, and in most institutions, even with limited budgets, resources are invested in keeping objects in clean areas, with controlled environmental conditions, avoiding variations of humidity and temperature, and managing and controlling any issues with pests. For software-based art, as for any other type of artwork, any hardware and objects supplied as part of an artwork are kept and stored under the appropriate environmental conditions, and adequate packing is designed to keep those elements.

What is generally less well developed is archival digital storage, even if the requirements have been defined. The digital preservation community has developed guidelines[8] and standards[9] that can be applied for any type of digital information, including software and software-based art. The implementation of those standards at an institutional level and for larger amounts of data requires a commitment from the institution in the long-term, just as physical storage, and this often requires good advocacy skills from stakeholders and interdepartmental collaboration. For smaller collections, such as an artist's archive, it is possible to create a fairly robust archiving system with a modest investment.

The aim of having archival digital storage is to ensure that any digital file exists as multiple copies in at least 2 different locations, and that their condition is monitored, so that if a file is corrupted this can be corrected. These files must also be easily found and retrieved. There are open source and free tools to achieve many of these objectives, for instance the Bagger tool from the Library of Congress[10] or the software Exactly and Fixity by AVPreserve[11].

Intervention—Migration, emulation and anything else that helps

As explained before, in this context intervention is an action that changes the materials, both hardware and/or software, of an artwork.

There are a few different approaches that often must be applied in con-

8 For instance the NDSA levels of Digital Preservation https://ndsa.org/documents/NDSA_Levels_Archiving_2013.pdf.

9 Such as the ISO Standard 16363, Audit and certification of trustworthy digital repositories http://www.iso16363.org.

10 github.com/LibraryOfCongress/bagger.

11 www.weareavp.com/products.

junction. Interventions can range from migrating a system to new hardware, migrating a piece of software to a more recent version, completely rewriting a piece of software. or running the original software on emulators. Which techniques are used, and possibly in which combination can only be decided when facing a specific artwork and understanding the effects of the intervention.

Two intentions can lead to a decision to intervene, a preventive intention, to make an artwork more sustainable over time, or a treatment intention, to allow an artwork to run and be displayed. Preservation risks for an artwork are often identified early on in its lifecycle in the collection, hence it is often possible to take steps to increase the sustainability and robustness of specific systems. An example is the work done with Arturo Diaz, José Carlos Martinat's programmer, to change the software for *Brutalism* so that it works with USB printers, rather than requiring replacement printers to have parallel ports, given that printers with the latter connections are now obsolete.

Another recent example, on a currently ongoing acquisition we were going to receive an application for MacOS created using the platform Unity. In conversation with the artist it became clear that it would be simple to provide a second version that would be compatible with a Windows OS, and this would not only increase flexibility in terms of showing the work, but could also facilitate emulation in the future, given the legal limitations of running MacOS in non-Apple hardware systems. By taking these steps at an early stage we can pre-empt problems later, when the artists or their programmers may be no longer available to make and advise on these changes.

The aim is always to increase the sustainability of a system by making use of current standards, avoiding issues around proprietary systems and reducing the impact of obsolescence in a system.

The interventions with a treatment intent can happen at any time in the artwork's lifecycle, but very often they will be prompted by display needs. For instance, when planning a display at Tate Modern conservators may have to create back-ups of hardware to allow any hardware to be replaced if a fault occurs. A display often means a computer running 24/7 over up to one year, and this prompts the need to create a new back-up of that computer. At this stage obsolescence may have an impact and trigger the need for a treatment.

Most of these interventions are perfectly reversible, provided they are performed in copies of the data, but nonetheless some questions must be considered:

- How will this intervention affect the artwork?
- Will it maintain all the significant properties of the artwork?
- Will there be any loss in those properties, and if yes, how will that affect the experience of the work?
- How will it interfere with the original system of hardware and software, and how will those changes be documented?
- How sustainable will that intervention be? Is the treatment only meant to allow the next display, or is it meant to ensure displayability for a longer period of time?

There is still limited experience of software-based art being conserved or treated, and even less experience of the sustainability of these results in light of changes in context and technology, but the number of institutions and conservators learning about this types of works is growing and some consensus is being found, for similar technologies. Documentation is essential to build and share this body of knowledge.

Documentation

The main aim of the documentation we create in time-based media conservation is to have a record of the materials that compose an artwork, the artwork's production processes, information about past and present displays and of course any interventions that may have changed them. This diagram summarises the average documentation created for a software-based artwork at Tate. Time-based media conservation is still defining the best form for this information to be captured and used. This can range from a fairly classical conservation report, to an artist's interview, a wiki entry or a metadata export. Most recently the interest in linked data, and the possibility of sharing and re-using technical information seems to be gathering traction, with interesting projects on the subject at the Yale Center for British Art[12] and the work on Wikibase at Rhizome[13]:

12 britishart.yale.edu/collections/using-collections/technology/linked-open-data.
13 wikimediafoundation.org/2018/09/06/rhizome-wikibase.

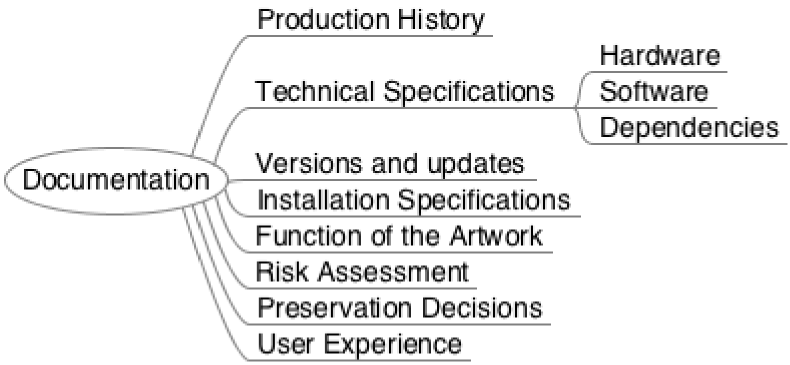

Figure 3. Documentation strands.

Documentation is one of the areas where a level of standardisation can be very helpful, if shared throughout a community, in defining best practices and avoiding each institution making the same mistakes. So let's look into best practices.

Developing best practices

Software-based art conservation is built on the experience and best practices developed for time-based media. Over the years a growing number of museums, not only contemporary art museums, are collaborating to share practice and advice. Some results can be seen for instance in the excellent Media Conservation Initiative[14] at the Museum of Modern Art in NY, which complements the work done by the collaborative project "Matters in Media Art2[15]. We are further seeing relevant research happening in Universities both at MA and Phd level, with Tate for instance supporting a doctoral student, Dr. Tom Ensom, in his research into the documentation of software-based art. Recent relevant Master Thesis include work done at the Moving Image Archiving program at NYU, where students have done timely research in the preservation of technologies such as Virtual Reality and Flash, or at the School of the Arts in Bern, where students were looking at the use of arduinos and Max/MSP in art.
To continue to develop and disseminate these practices it is important that this need is understood, and that research time is considered part of the job. Participation on communities of practice is another way in which

14 www.mediaconservation.io/resources#asdf.
15 mattersinmediaart.org.

knowledge can be created and shared, and Tate is actively engaged with other contemporary art museums, but also with other collecting institutions, in training programs and the broader field of digital preservation. This collaboration will be essential in our next steps, summarised as:

- Improve and refine our workflows
- Work with developers to improve tools available and adapt them to our needs
- Strengthen the collaboration between departments at Tate
- Extend our network outside Tate to include the expertise required
- Work with other practitioners to define and disseminate best practices

These can be seen as ongoing next steps, and without ever being complete, as new technologies, questions and challenges are a given. By creating these networks of collaboration, not just within conservation but also including other careers and stakeholders we are more likely to achieve our aims, of maintaining as much of these works alive for as long as possible.

References

Campbell, S. 2017. *A Rift in our Practices, Toward Preserving Virtual Reality*. Master Thesis at Moving Image Archiving and Preservation program at New York University. https://www.nyu.edu/tisch/preservation/program/student_work/2017spring/17s_thesis_Campbell.pdf.

Falcao, P., A. Dekker and P. Laurenson. 2016. "An exploration of Significance, Dependency and Virtualisation in the Conservation of Software-based Artworks." In B. Feston-Brunet (ed.) *The Electronic Media Review*, Volume Four: 2015-2016.

Falcao,P. 2010. *Developing a Risk Assessment Tool for the conservation of software- based artworks*, Master Thesis at the University of the Arts, Bern.

Higgins, C. 2016. "Interview with Frances Morris, Director of Tate Modern." In *The Guardian*, 16/04/2016. https://www.theguardian.com/artanddesign/2016/apr/16/tate-modern-director-frances-morris-interview .

Laurenson, P. 2014." 'Old Media, New Media? Significant Differences and the Conservation of Software-Based Art'." In Beryl Graham (ed), New Collecting: Exhibiting and Audiences after New Media Art. London: Routledge, pp. 73-96.

Muller, L. et al.. 2007. Rafael Lozano-Hemmer, Subtitled Public (2005).Documentary Collection. Daniel Langlois Foundation. www.fondation-langlois.org/html/e/page.php?NumPage=2111

Muñoz Viñas, S. 2005. *Contemporary Theory of Conservation*. Butter Worth Heinemann: Oxford.

Philips, J. 2015. "Reporting Iterations, a Documentation Model for Time-based Media Art." In *Revista de Historia de Arte - Performing Documentation in the Conservation of Contemporary Art*, N.4, pp. 168-179.

Van Saaze, V. et al. 2018. "Adaptive Institutional Change: Managing Digital Works at the Museum of Modern Art." In *Museum & Society*, 16/2, pp. 220-239. https://journals.le.ac.uk/ojs1/index.php/mas/article/view/2774.

Wilson, A. 2007. inSpect: Significant Properties Report. Arts and Humanities Data Service. https://web.archive.org/web/20130825111321/http://www.significantproperties.org.uk/wp22_significant_properties.pdf. (retrieved 02.04.2019)

Zaborowski, Jacob. 2017. *Save Homestar Runner!: Preserving Flash on the Web*. Master Thesis at Moving Image Archiving and Preservation program at New York University. https://osf.io/m8bcs.

The Development of Digital Narratives. Case study: Fred Adam and the pioneering multimedia interactive creations in the MIDE of Cuenca during the 1990s

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Abstract

In the 1990s, the International Museum of Electrography of Cuenca (MIDE), thanks to a newly-created artist-in-residency program, welcomed artists from all over the world who experimented with new media during this historical era of pioneering Media Art. One of the first artists to visit the MIDE was Fred Adam, a French artist, still a student at the École des Beaux-Arts in Nantes, who carried out countless researches in this creative field during his stay. One example that had a greater repercussion was the creation of digital narratives in interactive multimedia.
This work seeks to put some of the pioneering media artworks into value, building their story, and working to recover and preserve them and update their languages so that they become accessible again. Only through this institutional and personal commitment to history can we recover, divulge and give access to the immense artistic heritage that generated and continues to generate the art that uses or has as a reference on new media.

Keywords

Media Art Histories, Media Archaeology, Interactive multimedia, Contemporary Art

Histories of media art in Spain. The production of digital art in the workshops of MIDE at the beginning of the 1990s

What you cannot see, what does not have a storytelling, does not exist.

This popular saying could be applied to the history of the activities of what can now be considered Media Art at the International Museum of Electrography - Centre for Innovation in Art and New Technologies (MIDECIANT) in Cuenca, Spain. This museum-research centre belongs to the University of Castilla-La Mancha (UCLM). It was inaugurated in May 1990 and commissioned by the Rector of the UCLM to Professor José R. Alcalá, a pioneer artist of Media Art in Spain. He had been contracted only a year before as Guest Teacher in the School of Fine Arts in Cuenca. Alcalá began organizing some workshops of artistic electrography thanks to a collaboration agreement signed with Canon Spain. These could be used by artists and researchers from all over the world thanks to the MIDECIANT scholarship program. At the same time, the permanent collection of electrographic artworks (which was based on several biennials and private collections) was expanded owing to the artworks donated by artists themselves and with the works that the museum-centre produced in its own workshops. Shortly after commencing, the workshop expanded its production to the field of Digital Art through the incorporation of computers and electronic technologies as they were then being marketed.

At the early date of 1993, MIDECIANT produced artworks made with interactive multimedia infographic programs, which were recorded for distribution on CD-ROMs. Its distribution and marketing by offline media reached very few places of sale, such as bookstores of the most advanced contemporary art centres (or those contemplating the creation of art using new technological means). This was also happening at the same time in a few other places, such as United States, Canada, Japan or Europe, in centres such as ZKM in Karlsruhe or Ars Electronica Centre in Linz.

Today, unfortunately, these artistic creations belonging to the so-called Media Art are no longer accessible. This is because the media on which these digital creations were recorded (CD-ROMs) can no longer be read by current computers. Neither can they be put into operation by the operating systems of today's computers. And the software and programming languages with which they were created have been replaced by others that are, unlike those older systems, accessible from online networks.

Figure 1. MIDECIANT, Electrography permanent workshops, Cuenca (Spain), 1990.

Figure 2. MIDECIANT, Installation at its Medialab. Cuenca (Spain), 2001.

This is the reason why MIDECIANT as an art institution which is dependent on an educational and research organization (UCLM), has assumed the museum's responsibility to recover these creations of early digital art based on interactive multimedia which were produced in its workshops and laboratories. The goals were to make them accessible again, for which it is necessary to translate their languages and operating systems, to migrate them, to emulate them or to reinterpret them to new ones—if the artist allows it—, to consent to be disseminated online using open and free standard protocols (creative commons, copy left, open codes, etc.).

By building a specific storytelling for each piece and each author, putting them in value and contextualizing them within the general story of a new History of Media Art, we promote and disseminate these artworks within the international arena.

The communication that we present in this article tries to report on the first results of this process, which is still in the middle of development.

With this, we intend to provide some concrete data, some unique stories about the construction and dissemination of the History of Media Art in Spain, which demonstrates a broad, pioneering, and productive view on global Media Art. We have decided to frame this complex task within the Media Art Histories' research field (object of the Conference RE: TRACE 2017), using the methodological approach of Media Archaeology. At the same time, we are coordinating the creation of the *Spanish Archive of Media Art* (AEMA) from MIDECIANT which will become a part of the Iberoamerican Network of Digital and Electronic Art and is currently in the process of being incorporated. The results and documentation can be implemented in international platforms, such as the Archive of Digital Art (ADA), which is promoted by the University of Krems and led by Professor Oliver Grau.

Sotos v.1.0: A pioneering experience in interactive multimedia narrative in Spain

Autumn of 1993. Fred Adam, a young French student at the Ècole des Beaux-Arts in Nantes, first appears in Cuenca's MIDE workshops; attracted to this place after reading a curious article in a famous French publication on Spain in which this university museum-centre was mentioned (Bouffet et.al. 1992).

"Following the *Routard Guide*, you will arrive in Cuenca and visit the International Museum of Electrography", then located in the historic Carmelites' Convent. He was so fascinated with this artist-run-space project focused on New Media Art that he made an important personal decision that would change his life: staying in Cuenca. His fascination with this small town located in the middle of the mountains of the centre of the Iberian Peninsula, and the creative potential of MIDE, do not make him doubt that this place was where it should be. Nothing would ever be the same in MIDE, or in Cuenca, or in the School of Fine Arts after his visit. This is his little known history and a part of his contributions to the development of Digital Art.

At the beginning (in the early 1990s), the *International Museum of Electrography*, located in the Spanish city of Cuenca (160 km east of the capital), offered the analogue and digital-laser photocopiers and other xerographic machines that the Canon company had given as part of its collaboration agreement with the centre-museum only to its users (artists and resident researchers and guests). Gradually, these first machines were set up in the same space with computers, digital cameras and all kinds of electronic devices for the processing of images and sounds. In addition, each new visitor or resident contributed new and valuable information, new ideas and new media, previously unknown in Cuenca. Thus, during the same initial years, coinciding with the appearance of Fred Adam, MIDE was beginning to develop interactive multimedia projects, thanks to the basic knowledge already possessed in that early period by young fellows of the centre (among them, Ricardo Echevarría, Luz Gil, Jorge Santamaría and Kepa Landa), as well as the director himself (Alcalá)).

Adam joined this young team of multimedia art production, while he was trying to finish the works corresponding to his Master's project in the Nantes school. Once finished, he returned to present it, but, incomprehensibly, it was not admitted by the academic leaders of the French school, who had left little by little inclining towards positions much more conservative. This is another of the many reasons that drove him back to Cuenca and live permanently in a small town called Sotos up in the mountains.

Adam is fascinated with the rural life of Sotos. For him, as a French citizen, this town cannot be more picturesque and he feels how its small community lives immersed in its own ancestral memory which surfaced continuously in the conversations with its inhabitants, now his neighbours. He wants to record that. To do this, he decides to make a documentary about Sotos, but from the implementation of new narrative strategies that makes possible the use of a revolutionary computer program of the time to create interactive multimedia called Director. A software program still incipient and quite limited, as it is still in version 3.0. Despite its many techno-expressive limitations, the innovations in its functional possibilities allow him to adapt the technology "like a glove" to the peculiar narrative and aesthetic conception. In MIDE, everyone is attracted by this strange aesthetic: digital but very surreal; filled with backgrounds as black as the infinity of the computer screen-window; characters, objects and elements covered with photographic textures, but with digital "skin", elaborated by the chromatic effects of solarisation obtained by Adam through the manipulations that he submits to the images through his deep knowledge of software programs like Photoshop (the current version at that time was not yet multilayer); representational naturalism, but from the emerging "de-constructive" creative philosophy of the "copy & paste" characteristic of Macintosh technology, which was faithfully followed in MIDE.

The result was *Camera Obscura. Sotos v.1.0*, an interactive multimedia production, recorded on a physical CD-ROM for distribution.[1] Nevertheless, this first "digital narrative product" is nothing more than a "photographic collection" of relevant "Sotos characters", taken manually by Fred, and then digitized to create an infographic production of visual files mounted on the space-time line of Cast of the Director program, accompanied by the voices of its protagonists (also recorded in a stealthy way) digitized. As the author explains:

> The interesting point of the photographs made with a shoe box was the exposure time and the camera object itself. Taking pictures with a shoebox and revealing them in the bathroom was an act of magic, a true ritual to create a first surprising relationship with the inhabitants of Sotos. The exposure time was also very important. I will never forget those 30 seconds of immobility needed to get the exposure of the portraits I performed in the streets. Those 30 seconds of silence and immobility were great moments of deep and precious communication. They helped me weave a special relationship with certain people of the village. [...] The subsequent processing in the computer of all this material generated in an analogical way was the moment of the analysis of the experiences, a work of exploration of the personal and collective unconscious. It was no longer a matter of creating simple audio-visual signs to be contemplated; it was an inner journey into the depths of our civilization. *Sotos v.1* [Camera Obscura] was to put the cards on the table and establish new exploration routes that had drawn the light on the photographic paper. (Adam 2017, s/n)

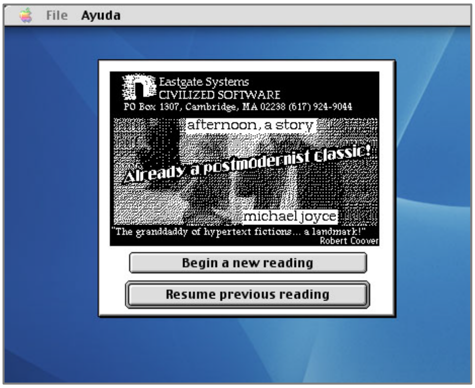
Camera Obscura. Sotos v.1.0 was, for the first time in art history, an audio-visual narrative shown on the screen of a computer, which was capable of interacting with its user, and created from a rather static but highly novel graphic development to offer unprecedented solutions around a very basic script, while no longer following the rigid linear form of traditional paper book technology.

1 https://vimeo.com/221246290.

Figure 3. Fred Adam. 1993. *Camera Obscure. Sotos v.1.0*, CD-ROM based Interactive Multimedia, Interface of its interactive navigation, Screenshot. (10/06/2017).

Fred wanted all the interactive elements of this rudimentary graphical interface to be as intuitive as possible, avoiding signs whose meaning had to be known previously by its user (Fig. 3). To hear the voice of the characters appearing on the screen, Fred had inserted the image of an ear to click on. To advance between screens, he had placed advance signs (which, in other versions, were photographs of legs in a forward and backward position). With each new character appeared on the screen naturalistic photographs of objects belonging to them. A magical micro world of images and sounds through which the viewer (now a user) could go through at his whim, entering the hidden world of small town Cuenca guided by its own residents. The pinhole (stenopeic) images of their characters in black and white refer us to a distant and ancient fantasy world; their voices and the precarious sound of their daily actions—like the "ax of Isidoro", the town's gardener, cutting barks of trees from the nearby forest—allow us to approach them, feel very close to them; also be able to share some personal objects, reproduced in a naturalistic form on the screen since it was scanned directly. All this created a very intimate atmosphere, full of complicity with the user.

Although it is necessary to recognize that in this initial version of *Sotos* a script constructed in accordance with the new concept of arborescence (as it will happen in following versions, also realized in MIDE three years later) does not yet exist. But a "back and forth" linear navigation model at the discretion of the user can be seen which anticipates the creation of the future nonlinear and interactive scripts based on the elaboration of an "open" index according to the capricious desires of its users. Just two years before, in 1992, George P. Landov had published his essay *Hypertext; The convergence of contemporary critical theory and technology* which was translated into Spanish and published in 1995 by Paidós Ed.



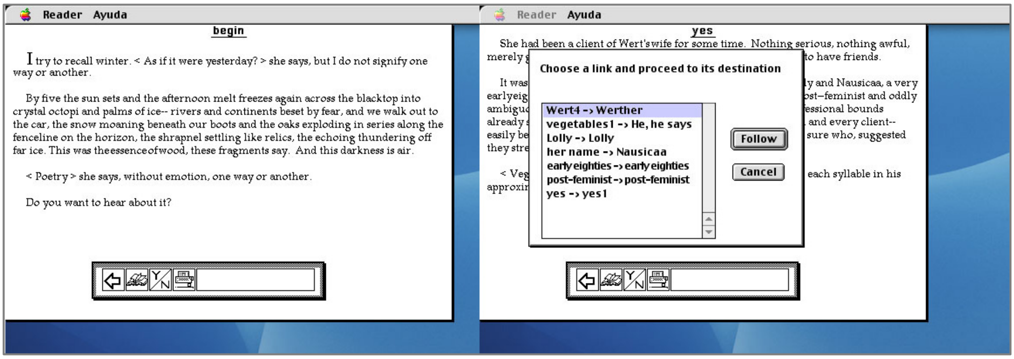


Figure 4&5. Michael Joyce, *Afternoon, a story*, Hypertext writing Environment, 1987.

And just a couple of years later his *Theory of hypertext* was also published. These two texts became the theoretical basis of the multiple techno-artistic speculations that were developed in pioneering times in the centre of Cuenca in the form of artistic creations, research projects or articles and theoretical-critical essays.

The birth and initial development of interactive multimedia creations which would coincide with the incipient development of the Internet—although they would still have for several years a "locality" that did not yet participate in the incipient globalism that favours the Internet to the point that Fred Adam himself defines these productions as "locative media"—, were marked by a deep analysis and a varied experimentation around the potential of digital narrativity. These investigations were heirs to the pioneering hypertextual novels, which were physically distributed and copied on 3 1/2 computer diskettes, as is the case for *Afternoon, a story*, the "first bestseller" of this new type of literature. Its author was the American writer Michael Joyce, and was published in 1987. In its publicity, this one was presented like the first "Hypertext Writing Environment".

The emergence of computer technology incorporated the screen interface to the literary narrative. Its software—capable of generating interactive settings, a multitude of varied multimedia resources and RAM and ROM memories to save what was read—would allow, for the first time, a reading experience proposed by the writing of Julio Cortázar for his experimental novel *Rayuela*, and other predecessors such as *The Garden of the Paths that fork off* by José Luis Borges, as well as the ideas of *Opera Aperta* by Umberto Eco, as something personalized, memorized and offered as an option to remember. The reading system itself allowed the reader to save settings and her book status at any time. In other words, the reading of this new digital novel opened up the script to multiple possible readings and enabled an upsetting of the classic Aristotelian plot. This was finally converted into a real hypertextual reading exercise, *rhizomatic* (Gilles Deleuze and Felix Guattari), not a mere experimental proposal only of potential and propositional character. The hypertextual narrative was now utilized by the most experimental artists willing to become "digital narrators" as an authentic gift that finally enabled their derivation in extraordinary hypermedia narratives, incorporating e.g. images, sounds into the hypertext. Its extension to the hypermedia range also affected the classic and invariable narrative structure—from its invention, one hundred years ago—of cinema.

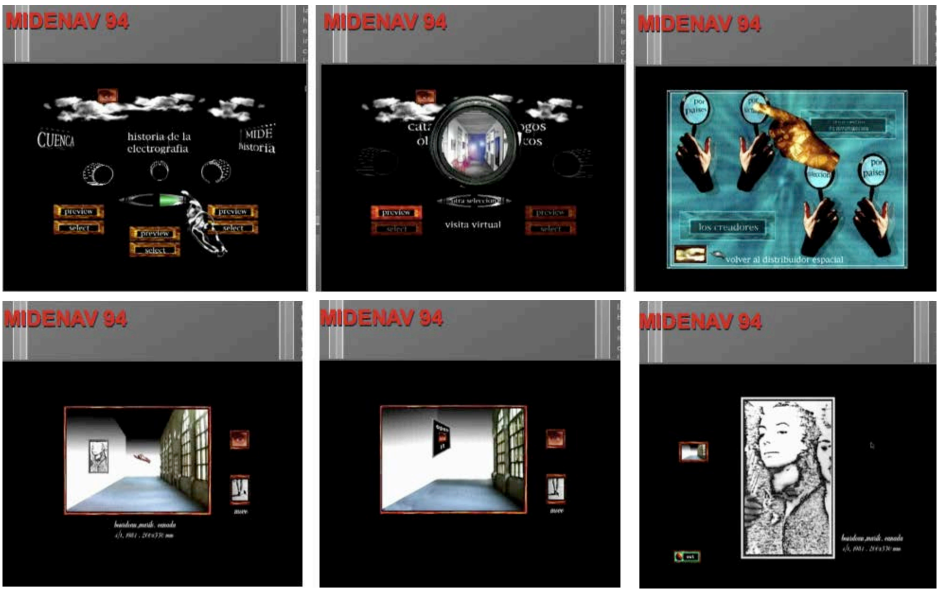


Figure 6. Fred Adam, Ricardo Echevarría, Luz Gil & José Ramón Alcalá. *MIDE Navigation 94*, Interactive Multimedia, Screenshots from a guided travelling around its screens, 1994.

Evolution of digital narratives. *Sotos v.2.0 and v.3.0*, MIDE's contributions to emerging digital art

Between the first and second version of *Sotos* multimedia were three years. As Fred Adam continued to research through new small personal digital creations (such as *Pavlov for Human*[2]), the team that had been trained at MIDE for those productions (and joined the young Frenchman) began to develop innovative proposals. According to Adam himself:

> While I was personally immersed in a local narrative, the debate at MIDE was more focused on the potential and limits of an interactive narrative. How the digital contents were navigated and, later, what kind of metaphors we could apply to the narrative structure. [...] were, logically, failed attempts, because the way we did the narratives did not allow dynamically generating the content to be able to respond to the exponential growth of narrative ramifications. (Adam, in Alcala 2017, s/n)

All the developed multimedia productions at that time were contaminated with a "pop" aesthetic and with that magical realism constructed by Adam through delirious digital iconographies that proposed the construction of a highly aesthetic electronic space and arranged to be navigated—virtually walked through—following the model of the naturalistic-dreamlike simulation of the surrounding reality.

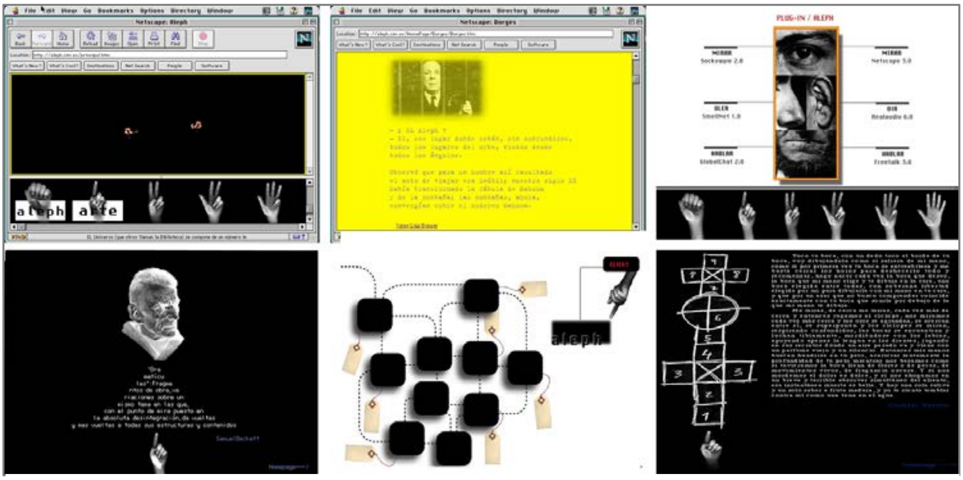


Figure 7. Ricardo Echevarría & José L. Fernández, *Aleph-arts.org*, Screen selection of its first interactive interface, Snapshots, 1996. © Echevarría/Fernández

2 previa.uclm.es/profesorado/gnoltra/MEDIATECA_MIDE_LACAIXA/mediateca.html.

As we know, this simulation model of virtual space failed. With the passage of years a standard of digital-virtual representation based on the formal minimalism of the semantic hyperlink was consolidated. The electronic space was going to become a place crossed by infinity of hyperlinked routes, which are shown through its simple and textual statements. The information contained in this will be pure information, written on the computer screen, which is now understood as a two-dimensional metaphorical space without any graphics to decorate it. Information that is always susceptible of being clicked—activated—by the user to be transported to a new one, constituting an infinite network of nodes, links, routes and virtual paths that, little by little, would saturate the electronic space and its online networks. Of course, this was not how Fred had imagined the architectural construction of electronic space. The young French creator wanted to transpose the real world into this new virtual-digital-electronic world full of dimensional potentiality through a highly aesthetic simulation representation.

The influence of the young Fred Adam in the MIDE had been decisive. Ricardo Echevarría, who just conceived the net art website *aleph-arts.org*, designed his first interface following Fred's ideas, creating a formal symbolization that paid homage to the Argentine writer Jorge Luis Borges. Helped technically by the Spanish programmer Jose Luis Fernandez, Echevarría filled the screens of the first web of *aleph-arts.org* with colourful digital images from the symbolism of Borges. But all this highly simulative-allegorical virtual world of the net art website would disappear in its following versions because of the incorporation of the philosopher, critic and curator Jose Luis Brea—also teacher of the School of Fine Arts of Cuenca at that time.

The influence of Brea's ideas on how the electronic information and communication space (EICS) should be managed and represented led to the complete transformation of the formal structure of *aleph-arts.org*, making it the formal minimalist hypertext appearance that made it famous. Then, MIDE fractured into two streams of creative thinking: minimalists and simulation-symbolists. A duality of thought faced around fundamental concepts on which the evolution and development of the construction, management and habitability of the EEIC depended. This confrontation was in line with the two important cultural and digital art pioneers in the international sphere: Don Foresta and Roy Ascott. It was publicly discussed for the first time at the international meeting *Art / Cognition; Diferentiel (s)*, held at the École des Beaux-Arts in Aix-en-

Figure 8. Fred Adam, *Sotos v.2*, the beginning travelling, Screenshot of the navigation video, 1995.

Provence (France) between 5 and 17 July 1992, organized by the French school itself in collaboration with the cultural association Cyprus, the bio-informatics group of the École Normale Superieure de Paris and the Université de Hawaï to Manoa, and attended by members of the MIDECIANT team. Foresta advocated artists' use of high-tech media and high-tech technological systems for incipient tele-transmissions (and their consequent tele-creations); that is, using real-time broadcast systems (whose main model was television and whose cost was prohibitive for individual use) which he publicly defended as the future of emerging telematic art. Ascott, on the contrary, defended the use and development of low-tech systems of low quality and poor definition—but very affordable and versatile and open protocol—and whose main model was the incipient Internet network. Today we all know who would win that debate in the future and why: speed, multiplicity, efficiency, accessibility, at the cost of assuming rudeness, coarseness and a very limited artistic expression, sacrificing formal beauty, mannerist aesthetic and polyvalent sensoriality. Unfortunately (or not?), Adam's creative line—and that of MIDE environment—was positioned on the losing side.

Fred Adam made a second interactive multimedia version of his account of life in the small town where he lived with a greater ambition on narrative and aesthetics. This new version of *Sotos* is an attempt to describe the trauma of the Spanish civil war which Fred was detecting from his first contacts with the inhabitants of the town. This is a transitional version, much more ambitious in terms of narrativity and navigation systems than the first. In this second version (Fig. 8), the piece incorporates an interesting beginning which, however, will disappear in the next version, the third and final one. This is a brief QuickTime of traveling in Fred's Volkswagen while approaching Sotos—similar to a road movie—until arriving, crossing its main street, to the town square.[3] Meanwhile, a voiceover tells us that in the Spanish Civil War there were no losers or winners, only victims.

But Fred will abandon this idea as the guiding thread of the script of the piece because it was too loaded with political ideology. In this way, this second version was unfinished. In October of 1996, Fred Adam begins the production of the third version of *Sotos* (the last one). Thus, he himself explains how he approached this new narrative strategy of the final version:

> During one of my last walks through the town of Sotos, in 1996, I found on the floor a sheet of newspaper where you could read in large letters 'A world that no longer exists'. It was perhaps my final farewell to the history of the people, the moment to move on to address other issues, such as the environmental problem from the internet and globalization. But, above all, I was referring to this temporal force that causes all places to change, where nothing is eternal, everything changes. Many of the older Sotos people on the CD-ROM are already dead and the children have grown up. Even the village streets have changed. No longer is that nice big house of the early twentieth century that overlooked the town square. (Adam, in Alcala 2017, s/n)

Therefore, the subtitle of this latest version #3 of *Sotos* will be: "A world that no longer exists." The new script, much more ambitious and complex, was made up of a series of cross-stories that revolved narratively around these same main characters that appeared in the first version, enlarged in number and in stages. These functioned as autonomous micro-narratives, but could be related to each other at random, depending on the choices made by the reader-user.

3 https://vimeo.com/221252107.

Figure 9. Fred Adam, *Sotos; Un mundo que ya no existe. v.3*, Initial sequence, Screenshot [13/06/2017; vimeo.com/221244978] , 1995.

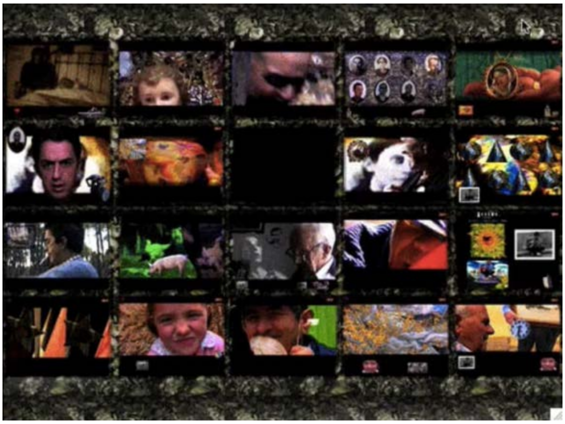


Figure 10. Fred Adam. *Sotos; A world that no longer exists. v.3.*, Index displayed by sequences & characters. Screenshot, 1996.

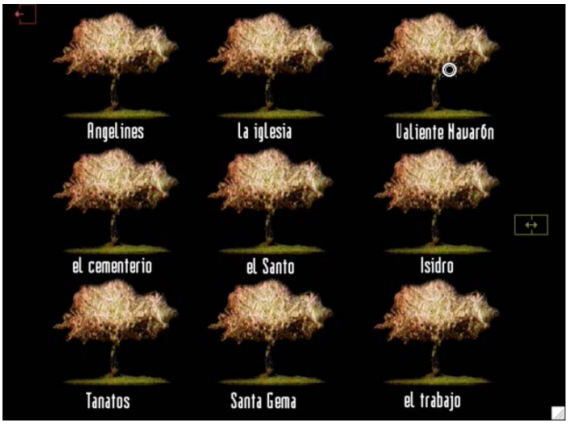


Figure 11. Fred Adam, *Sotos; A world that no longer exists. v.3*, Arborescent index with sequences & characters. Screenshot, 1996.

For this new version Fred created an opulent aesthetic with a digital graphics reminiscent of Pop Art style, full of colours and filters of Photoshop but limited to the 256 colours of his basic palette, as allowed by Lingo language version 4.0 of the Director program. In this way, he composed small pre-recorded audio-visual scenes, interweaving them into a narrative plot dominated by an open script that followed an index of tree-structure graphically shown as a new navigation menu, and using the metaphorical representation of the tree, one for each character and situation, each with several branches-clips navigable through multiple paths chosen arbitrarily by the viewer/user. Each branch of this metaphoric tree alluded to the different sequences/acts/chapters of *Sotos*' story, written by Fred himself.

The metaphor of the tree is based on the idea that the forest which borders the town of Sotos is common property of all its inhabitants. In this new version of *Sotos; A world that no longer exists* (Fig. 10-11), each character-event is symbolized by a tree, whose ensemble composes a navigable digital forest within the hypertext system of the work through eligible paths, metaphorically incarnated by its multiple branches intertwined with each other and interconnected with those of the other trees.[4] The narrative structure was supported by the "journey" strategy. Thus, Fred's initial idea—which was only partially implemented in the second version—was that the application had to be opened with the sequence-traveling of an approach to the people, a metaphor for the "foreigner’s", "the French’s" trip, from his native country to Sotos, filmed from his Volkswagen van, which is approaching the town, making its entrance through its streets to park in its only public square. Although this travelling was finally eliminated as an initial sequence, version 3 allows us to either start from one of its two indices that graphically display its tree-script: that of tree-icons or that of sequence-icons; or from the initial screen-sequence that places us in the bench of the town square where different characters and icons begin to appear. We can continue—actuating—our journey through the micro-stories about the daily life of Sotos and their main characters.

4 https://vimeo.com/221244978.

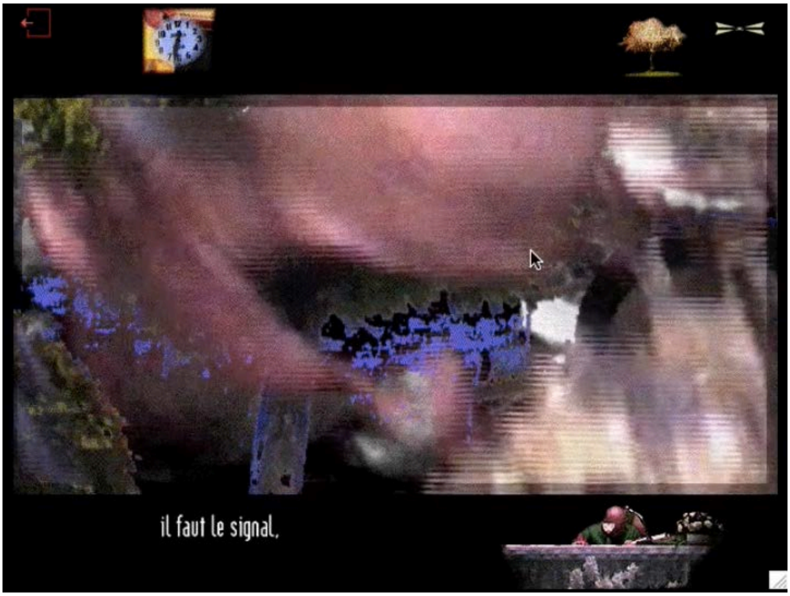


Figure 12. Fred Adam, *Sotos; Un mundo que ya no existe. v.3.*, Sequence of the village's priest, Screenshot from video navigation [13/06/2017, https://vimeo.com/221244978), 1996.

During the evolution of each micro-story other characters or distinctive elements appear referring us to other micro-stories, which, if activated by the user, will be transferred to a typical scenario of each of them, starting a new story, which follows the current narrative strategy of virtual walking through as "surfing" (Fig. 12).

After his navigation through the various micro-stories, Adam's artistic aim to tell the people's lives to the reader-user of *Sotos v.3* concluded by following a narrative structure corresponding to a development process as "natural" as the real experience of the traveller that reaches this remote and picturesque place and begins to experience its history progressively and its characters as a sum of microhistories. All this was attempted in a temporarily distended and random happening, casual relationships—intended or fortuitous—as Adam himself did in his real life in his process of knowledge and integration in the tiny and lost town of Sotos, in the middle of the mountains of Cuenca.

The result of the piece, which is inevitably characterized by the techno-expressive primitivism of all the pioneering media works of art of the 1990s, implies the creation of one of the first hypertext narratives of the history of art and digital culture in the period from the 20th to the 21st century. The story of the town of Sotos which Fred Adam tells us -from within, as authentic and privileged protagonist -, following a revolutionary discursive form that had to be invented ad hoc, using for that the high digital technology of the period, has lost nothing of its original freshness, seduction and interest twenty years later. On the contrary, we dare to affirm that it is gaining and expanding day by day.

Conclusion

From the perspective of looking back—almost three decades later—and the abundant first-hand information accumulated and already fully available and discernible, it becomes necessary to rescue these first digital productions that were abandoned due to the dominant tendencies in digital technologies. Doing so, we can understand the beginnings of this new culture in its complex totality, and what structure and appearance the bricks of their pillars had. If we really want to immerse ourselves in the atmosphere of debate, reflection, creative excitement, and aesthetic and ideological discourse that dominated the artistic scene in the beginnings of digital art, which today is hegemonic and normative, we must necessarily gain access to the study and in-depth analysis of these primitive pioneer creations, now abandoned and forgotten. It is also very probable that its rescue, valuing and diffusion, especially among the creative layers, will generate an effect like “contagious empathy.” This could allow for new expectations and modelling new trends by taking old models as reference, which were discarded by the course inertial imposed by the canonical version of History, as we have seen so many times in the Western History of Art.

The first version of this multimedia art project was distributed in 1994 by MIDECIANT, included in *Multimedia Narrations*, the first compilation of interactive art projects developed in the workshops and laboratories of the centre, and recorded in CD-ROM format. The latest version (v.3.0) was distributed by MIDECIANT as part of the catalogue—also on a CD-ROM platform—edited by the centre of Cuenca from a selection of interactive multimedia pieces produced in its own workshops for the contemporary art festival *Situaciones*, held at the Faculty of Fine Arts of Cuenca in 2001. However, unfortunately, neither had these pioneering creations much impact nor did the rest of these digital publications created by artists around the globe. The limitations of the electronic device used for its recording and distribution greatly limited its distribution (only through few specialized bookshops of contemporary art centres). In addition, these CD-ROMs needed to be run on expensive and perfectly equipped computers to be visualized and enjoyed by a few users interested in this type of digital art. They had to access these multimedia pieces by buying them "blindly," because their content would not be revealed until the CD-ROM was unpacked and placed on a computer with a compatible operating system. With these limitations and difficulties, and before it was possible to create a consumer culture of interactive multimedia art pieces, came the development of a new Internet much more capable and powerful, which, through new Flash technology, managed to assume and disseminate online—and also offline—artistic interactive multimedia productions.

Unfortunately, one of the great tragedies of early digital artworks is that they were realized using software like Director. These were not—or have never been—compatible with the present open languages of programming, which is the reason why we have not been able to make translations and updates in order to make them accessible on the Web. Thus, today, stories narrated through multimedia and user-created interaction using programs like Director and programmed through its Lingo language can no longer be visualized or navigated through. The preservation of the multisensorial experience of Fred Adam's *Sotos*, has only been possible through the recovery of the original files, and its subsequent reprogramming—thanks to the magic and the talent of several expert programmers-taking access to a strong economic investment. It was worth it, no doubt.

Thus, the question of the preservation and subsequent restoration of such pieces of Media Art from the 1990s is not a trivial matter. Therefore, it requires commitment and responsibility on the part of the institutions to ensure that they are not irremissibly lost—or, which is basically the same, that it is no longer possible to access their contents.

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References

Alcalá, José R. 2017. *Personal interview with Fred Adam*. Cuenca. Unpublished.

Alcalá, José R., Escribano, Beatriz. 2016. "International Museum of Electrography Cuenca - Center for Innovation in Art and New Technologies." In Alcalá, José Ramón y Jarque, Vicente (Eds.), *CAAC Cuenca; Contemporary Art Centre, Archives and Collections*. Cuenca: University of Castilla-La Mancha Ed. Col. Caleidoscopio, #12. Vol. 2, p. 1-192.

Alcalá, José R.; Jarque, Vicente. 2013. "Utopías del arte tecnológico. Un análisis de la situación, cincuenta años después." In Alsina, Pau (Ed.), *Historia(s) del arte de los medios*. *Artnodes*. #13, Pp. 4-15. UOC. DOI: http://dx.doi.org/10.7238/a.v0i13.1924.

Bouffet F, Ph. Gloaguen, Y. Couprie, P. Josse, B. Lucchini, O. Page, S. Vivier & V. deChardon. 1992/93. *Le Guide au Routard*. Paris: Hachette.

Escribano, Beatriz. 2016. *Processes: The Artist and the Machine; Reflections on the historical Media Art*. Cuenca: University of Castilla-La Mancha Ed. Col. Caleidoscopio. #10.

Landov, George P. 1992. *Hypertext: The Convergence of Contemporary Critical Theory and Technology*. Baltimore: Johns Hopkins University Press.

Image References

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HOWARD BESSER is Professor of Cinema Studies and Associate Director of New York University's Moving Image Archiving & Preservation Program (MIAP), as well as Senior Scientist for Digital Library Initiatives for NYU's Library. In addition to teaching MIAP courses, he teaches regular Cinema Studies courses on New Media, Installation Art, and the Future of Cinema and Free Culture & Open Access. His research projects at NYU have involved preserving digital public television, preserving and providing digital access to dance performance, preserving difficult electronic works, issues around copyright and fair use, Do-It-Yourself media, and the changing nature of media with the advent of digital delivery systems. His four main interest areas have been Image and Multimedia Databases (particularly in cultural institutions), the social and cultural effects of information technology, digital library issues (particularly around standards, longevity, and intellectual property), and the development of new ways to teach with technology (including web-based instruction and distance learning). He is particularly interested in design issues and the use of critical theory perspectives.

ANNET DEKKER is an independent researcher and curator. She is currently Researcher Digital Preservation at TATE, London, Post-doc Research Fellow at London South Bank University / The Photographers Gallery, and core tutor at Piet Zwart Institute, Rotterdam (Master Media Design and Communication, Networked Media and Lens-Based Media). Previously she worked as Web curator for SKOR (Foundation for Art and Public Domain, 2010–12), was programme manager at Virtueel Platform (2008–10), and head of exhibitions, education and artists-in-residence at the Netherlands Media Art Institute (1999–2008). From 2008-14 she wrote her Ph.D. *Enabling the Future, or How to Survive FOREVER. A study of networks, processes and ambiguity in net art and the need for an expanded practice of conservation*, at the Centre for Cultural Studies, Goldsmiths University, London.

ANNE-MARIE DUGUET is Emeritus Professor at the University Paris 1 Panthéon-Sorbonne and art critic. Among her publications are Vidéo, la mémoire au poing (Hachette, 1981), Jean-Christophe Averty (Dis-voir, 1991), Déjouer l'image. Créations électroniques et numériques (Éditions Jacqueline Chambon, 2002). Curator of the exhibitions "Jean- Christophe Averty. Collages, découpages" (Espace Electra, Paris 1991), "Thierry Kuntzel" (Jeu de Paume, Paris, 1993), "Smile Machines" (Akademie der Kunst, Berlin, 2006), "peter campus video ergo sum" (Jeu de Paume, Paris, 2017). Co-curator of the Biennale Artifices (Saint-Denis, 1994 and 1996). Since 1995, she has been the director and editor of the "anarchive" series, digital archives and multimedia projects on contemporary art, with Antoni Muntadas, Michael Snow, Thierry Kuntzel, Jean Otth, Fujiko Nakaya, Masaki Fujihata, Peter Campus.

PATRICIA FALCÃO is a Time-based Media Conservator at Tate. Her role includes the conservation of new time-based media artworks coming to the Tate Collection. She is part of a team at Tate developing the processes necessary for preservation of digital artworks. From 2013-14 she researched the use of virtualisation for the preservation of software-based artworks. Her M.A. thesis at the University of the Arts in Bern focused on risk assessment for software-based artworks. She continues to develop research in this field within the ambit of *Pericles*, a pan-European project that aims to address the challenge of ensuring that digital content remains accessible in an environment that is subject to continual change.

FRANCESCA FRANCO is a Venetian-born art historian based in the UK whose research focuses on the history of art and technology. The central theme of Francesca's research is the history of art and technology and the pioneers of computer art. Increasingly it concerns issues of generative and interactive art and the connections between Constructivism and Systems art in early computational art.She is Senior Research Fellow at De Montfort University Leicester where she is researching the archive of computational art held at the Victoria and Albert Museum London. She is also Executive Editor and Vice Chair of Media-N, Journal of the New Media Caucus. Her first solo authored book, Generative Systems Art - The Work of Ernest Edmonds has been published by Routledge in 2017. Her second monograph, The Algorithmic Dimension - Five Artists in Conversation, will be published by Springer in 2018.

OLIVER GRAU was appointed first Chair Professor for Image Science in the German speaking countries at the Center of Image Science at Danube University in 2005. As researcher and lecturer in the transdisciplinary fields of the history of media art, immersive images, emotion and immersion, the history of telepresence and artificial life and digital humanities, he has developed several research projects, including the database "The Archive of Digital Art". His book "Virtual Art. From Illusion to Immersion" (MIT Press, 2003) is one of the most quoted art history monographies of the last decade (H-Index) and received more than 90 reviews. He co-developed the international M.A. programme Media Arts Cultures (Erasmus+ Mobility).

SABINE HIMMELSBACH is artistic director of the House of Electronic Arts Basel. She studied art history at the Ludwig Maximilians University in Munich. From 1993–1996 she worked for galleries in Munich and Vienna and later became project manager for exhibitions and conferences for the Steirischer Herbst Festvial in Graz, Austria. In 1999 she became exhibition director at the ZKM | Center for Art and Media in Karlsruhe. From 2005–2011 she was the artistic director of the Edith-Russ-Site for Media Art in Oldenburg, Germany. Her exhibition projects include "Fast Forward" (2003); "Coolhunters" (2004); "Playback_Simulated Realities" (2006); "Ecomedia. Ecological Strategies in Today's Art" (2007); "Landscape 2.0" (2009); "MyWar. Participation in an Age of Conflict" (2010) and "Culture(s) of Copy" (2011). 2011 she curated "gateways. Art and Networked Culture" for the Kumu Art Museum in Tallinn as part of the European Capital of Culture Tallinn 2011 programme. As a writer and lecturer she is dedicated to topics related to media art and contemporary culture. www.hek.ch

JANINA HOTH (M.A. in Theatre, Film and Media Studies – 2015, University of Vienna; additional B.A. in Art History) is currently researcher and lecturer at the Department for Image Danube University Krems, working on Archive of Digital Art (ADA, digitalartarchive.at) and developing projects in the field of Digital Art Archiving, Online Exhibitions and Digital Humanities. As a freelancer, she works as translator and author, and is developing her PhD thesis on “Collective Aesthetics. Mechanic and intersubjective aspects of artistic creation.”

LAURA LEUZZI is a contemporary art historian, curator and author. Her research is particularly focused on the relationship between words and image in visual arts and new media. Since March 2015, she is PDRA on the AHRC funded research project ‘EWVA European Women’s Video Art in the 70s and 80s’ (PDRA, 24 months, 1.0 FTE), based at DJCAD, University of Dundee. She is co-editor with S. Partridge of REWIND Early Video Art in Italy/I primi anni della videoarte in Italia (John Libbey Publishing, New Barnet, 2015). She has curated screenings on early European video art including: REWINDItalia at VideoEX (Zurich 2014), Autoritratti at The Showroom (December 2015), EWVA screening at Rome Media Art Festival (MAXXI, MAXXI National Museum of the 21st Century Arts, Rome 13-17 April 2016).

GEORGE LEGRADY is an internationally exhibited artist whose projects have explored the intersections of photography, computation and camera systems, interactive installations, and data visualization. He is distinguished professor and former chair in the Media Arts & Technology graduate program at the University of California, Santa Barbara where he directs the Experimental Visualization Lab. He was born in Budapest, raised in Montreal, and received the Masters of Fine Arts in Photography at the San Francisco Art Institute. He is a Guggenheim Fellow recipient in Fine Arts, 2016. Legrady is an internationally exhibited and published artist and scholar whose works address the intersections of photography, computer media, and digital data-based interactive installations. He is an early adopter of computer technologies since the mid-1980s. His research and projects investigate how technologies transform visual content and result in new kind of representations.

RAFAEL LOZANO-HEMMER (born 1967 in Mexico City) is a Mexican-Canadian electronic artist who works with ideas from architecture, technological theater and performance. He holds a Bachelor of Science in physical chemistry from Concordia University in Montreal. Currently, Lozano-Hemmer lives and works in Montreal and Madrid.(from Wikipedia: https://en.wikipedia.org/wiki/Rafael_Lozano-Hemmer)

GOKI MIYAKITA (KMD Research Institute, Keio University) is a researcher at Keio University. He received his Master’s degree and Ph.D. in Media Design from Keio University. His research interests lie in the intersection of user-experience design and digital humanities, ranging from theory, design methods and implementation. He has collaborated with researchers in several other disciplines, such as performing arts, computer science, and bibliography of Japanese literature. Since 2016, he has been a research member of the FutureLearn online course design team at Keio.

FRIEDER NAKE is a mathematician and computer scientist who early in his career entered the area of computer graphics when he algorithmically generated images of aesthetic relevance (first exhibition in 1965). There are people who consider him an artist. By forcing the calculating automaton to draw, he learned that the computer was to become a medium of unimagined power. Today, his thinking, writing, and teaching is mainly in digital media, semiotics, and art. But borders between disciplines don't interest him anymore. His academic stations were Stuttgart, Toronto, Vancouver, and Bremen besides many stays worldwide of short duration. He has supervised hundreds of theses and published widely. He still hopes to bring to an end "Computers and Signs. Prolegomena to a Semiotic Foundation of Computing" (with Peter Bøgh Andersen).

KEIKO OKAWA (Keio University Graduate School of Media Design, Keio University) is a Professor of Keio University Graduate School of Media Design. She received her Master's degree in Engineering and Ph.D. in Media and Governance, both from Keio University. Twelve years of computer industry experience. Research on "the internet and higher education" at United Nations University, Institute of Advanced Studies in 1996 and Keio University Shonan Fujisawa Campus from 1997. She leads the SOI Asia Project, and since joining KMD in 2008, also leads the Global Education Project in collaboration with UNESCO and partner schools and universities throughout Asia. Teaches the class "Global Society". Project theme is "Global Education for Global Issues".

EVELINE WANDL-VOGT is research manager at the Austrian Academy of Sciences (coordinator Lexicography Laboratory) and DARIAH European research manager. She is expert in several national and international committees, mainly focussing on standardization, interoperability and Open Science. She enjoys to support trainees and internships, contributes to children's universities framework (or similar), and is member of the Young Science Network. Eveline is working interdisciplinary in a global virtual network. She has academic background in German philology, geography, informatics, dramatics, teaching, and social innovation; as well as international courses on lexicography, archiving and data curation, design thinking, open innovation, and management. Recently, she mainly focuses on supporting transformation processes from the humanities towards interdisciplinary and applied humanities in the framework of open science and citizen science.