Net–based and Networked. Challenges for the conservation of digital art[1]

Sabine Himmelsbach
Director, Haus der Elektronischen Künste Basel
sabine.himmelsbach@hek.ch

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

---

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.
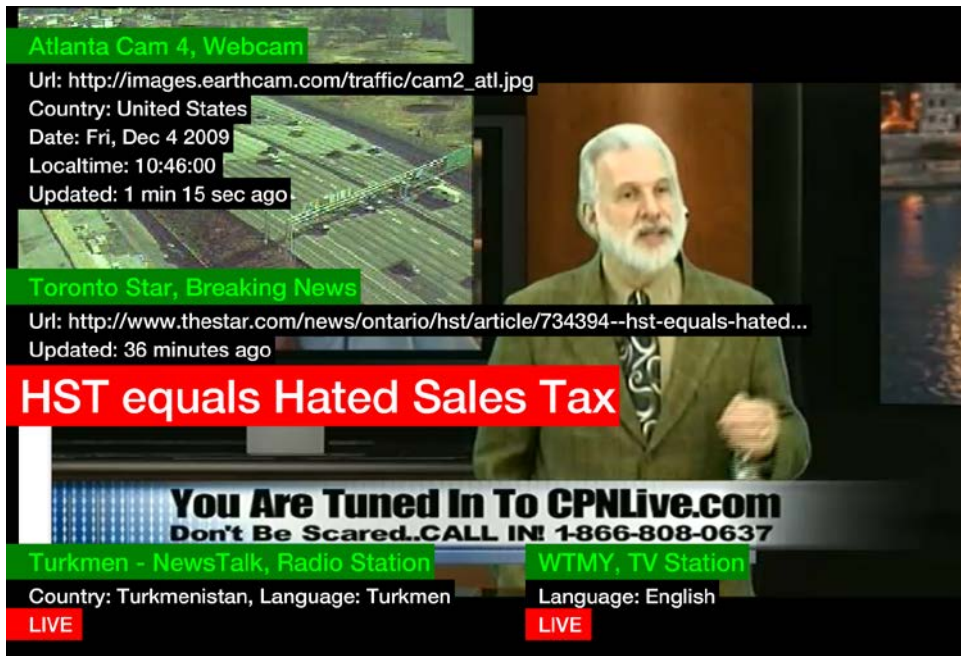
Figures 1-2. Marc Lee, *TV Bot 2.0*, 2010, Screenshot, http://marclee.io/en/tv-bot-world-news-as-soon-as-it-happens. ©Marc Lee

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-

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.

---

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 innova-

tive 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.