Languages of Conservation: A Comparison Between Internet-Based Art and Built Heritage

Claudia Roeck

Abstract As relational, social practices in a changing environment, internet-based art and built heritage require a substantial effort to maintain functionality. This chapter explores the hypothesis that architecture conservation and conservation of internet-based art encounter the same challenges and follow the same principles. The comparison allows one to articulate the materiality of internet-based art, which may not be obvious at first glance. Most important, it suggests that conservation approaches for built heritage may expand the conservation options for internet-based art. To substantiate the hypothesis, I analyse the significant properties of an internet-based artwork, *TraceNoizer* (2001–2004) by LAN, according to the same criteria used in built heritage conservation. After demonstrating that I can describe internet-based art using categories from built heritage, I apply conservation strategies for built heritage to internet-based art to discover new conservation approaches. The pursuit of a common language for the conservation of built heritage and software-based art is another goal of this comparison.

Keywords Conservation strategies · Built heritage · Digital heritage · Conservation · Preservation · Internet-based art · Net art

1 Introduction

The sheer mass of a building suggests its permanence and stability. However, appearances are deceptive. When built in 1889, the Eiffel Tower was intended to last for only 20 years.[1] Since then, every seven years, 60 tons of paint have been applied to prevent the Eiffel Tower from rusting. Apart from the ravages of time, buildings undergo reoccurring changes of use and expansions of space and functions. The website of the Eiffel Tower gives an impression of this kind of changes: improvement of accessibility for visitors of the Eiffel Tower by adding handrails and

[1] https://www.toureiffel.paris/en/the-monument/key-figures. Accessed 29 Jan 2022.

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ramps, renovation of elevators and restaurants, surrounding the Eiffel Tower with a glass wall to improve security, etc.[2] These ongoing changes enable the touristic exploitation of the Tower and the funding of its maintenance. Not only the building, but also its surroundings are protected. The gardens, as well as the view on the Eiffel Tower, are listed heritage. Although the building is massive and has been a landmark for many decades, it is undergoing constant change.

In contrast, internet-based art seems to be immaterial. One just opens a laptop with a browser and an internet connection in order to see the work (nowadays even a smartphone can be good enough). It is not necessary to have the source code of the work on one's own computer. The navigation does not require any physical effort. However, internet-based artworks are not as immaterial as they look at first sight.

To visualise the materiality of internet-based art and to expand its conservation options, I compare the conservation of internet-based art with the conservation of built heritage. After looking for communalities between these very different conservation objects, I will research whether conservation strategies for built heritage can be applied to internet-based art and whether they can contribute to solve the conservation dilemmas between historical accuracy and aesthetical and functional requirements.

Comparison of internet structures with built structures is not new. The internet platform The Digital City,[3] founded in 1994, facilitated access to internet and email and thus the communication among the residents of Amsterdam. The metaphor of the World Wide Web as a city and the homepages as houses was also used for the geocities.org[4] platform, whose users were called homesteaders. Both platforms are not online anymore. Many colloquial terms for the World Wide Web still refer to buildings or built structures such as "web address" for "uniform resource locator (URL),"[5] "under construction" with a corresponding image for a website that is not finished.

In conservation of software-based and internet-based art, the building metaphor has mainly been used to express the obsolescence of the digital technology by using the term "ruin" for abandoned, anachronistic, only partially or non-functional digital objects (Magagnoli 2016, p. 2), (Laforet 2009, p. 22). Magagnoli did not discuss the consequences of this metaphor for the conservation of digital objects in depth, and Laforet focussed on the archaeological conservation approach without referring to architectural conservation. She called it "the museum of internet art as a living archive" (Laforet 2009, p. 186). This living archive hosts digital artworks that consist of fragments and provides contextual information. She bases her theory on media archaeology and the variable media approach. It will be interesting to see, how

[2] https://www.toureiffel.paris/en/news/works. Accessed 29 Jan 2022.

[3] De digitale Stad (DDS), https://nl.wikipedia.org/wiki/De_Digitale_Stad. The digital city was subject of an archaeological excavation in 2017/18 (S. Alberts et al. (2017).

[4] https://en.wikipedia.org/wiki/Yahoo!_GeoCities The geocities platform was archived by the internet activists "Archive Team" (Lurk et al. 2012, p. 247).

[5] https://en.wikipedia.org/wiki/URL. Accessed 29 Jan 2022.

this comparison with conservation strategies for built heritage resonates with Anne Laforet's archaeological conservation approach.

2 Method

To extend the conservation options for internet-based art, I compare conservation of built heritage with conservation of internet-based art in two steps. The hypothesis I explore in a first step is that the conservation objects "built heritage" and "internet-based art" have several similar characteristics relevant for their conservation. Having argued for their similarity, I will examine, the applicability of three conservation strategies for built heritage to internet-based art.

For the comparison of the conservation objects in Sect. 4, I will use *TraceNoizer*, an internet-based artwork, as an example and compare its significant properties to the ones of the Eiffel Tower. The categories applied to describe both objects, *TraceNoizer* and the Eiffel Tower, are based on the method that built heritage specialists Kuipers and Jonge developed to analyse and describe built heritage. Their description is based on building layers (Kuipers and Jonge 2017, p. 87) as well as on an analysis of the construction history of the building (Kuipers and Jonge 2017, p. 73). Their final goal is to find an "adaptive reuse" of the building.

Afterwards I will apply conservation strategies used in built heritage to internet-based artworks in Sect. 5 and draw conclusions about their applicability in Sect. 6. As *TraceNoizer* and the Eiffel Tower cannot cover all the cases, I will also use other artworks and buildings as examples.

3 Characteristics of TraceNoizer (2001–2004) and the Eiffel Tower (1887–1889)

The following paragraphs will analyse the characteristics of *TraceNoizer* (2001–2004) and of the Eiffel Tower (1887–1889) according to the abovementioned building layers-spirit of place, surroundings, site, skin, structure, space plan, interior surfaces, services, and stuff—used by Kuipers and Jonge (2017, p. 87) to analyse built heritage. In addition to the layer analysis, they also map the construction history of the building. I will add a paragraph about the construction history of both examples after the layer description. To facilitate the reading, I begin with a short introduction of the Eiffel Tower and *TraceNoizer*.

The Eiffel Tower was built from 1887 to 1889 as the entrance to the 1889 World's Fair.[6] The tallest building in Paris was designed by the engineers Maurice Koechlin and Émile Nouguier. Originally, it was designed as a temporary structure. But due to

[6] Information from https://en.wikipedia.org/wiki/Eiffel_Tower. Accessed 29 Jan 2022.

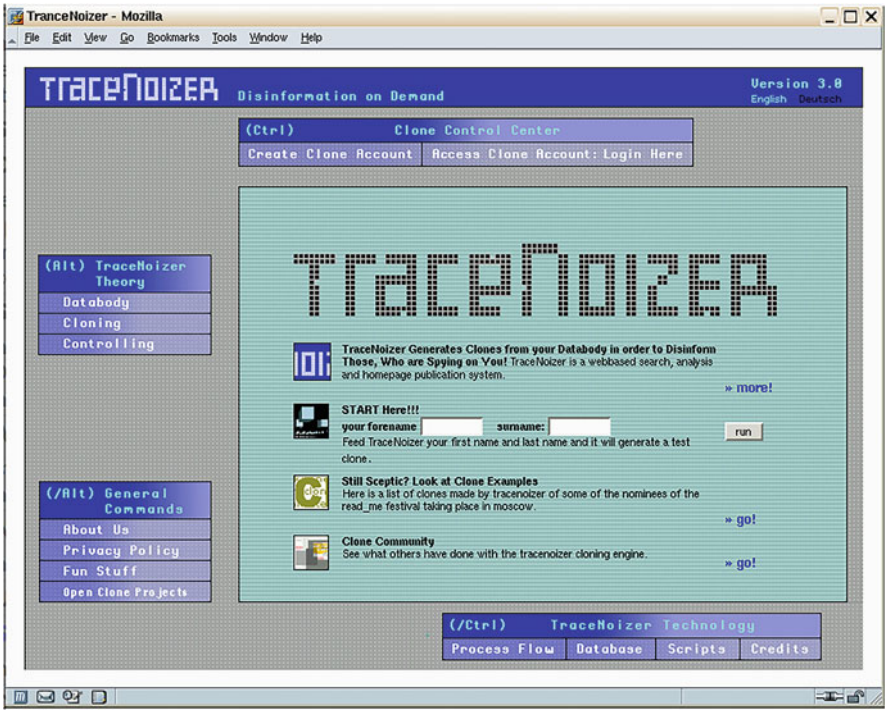

Fig. 1 Screenshot of *TraceNoizer* homepage as conserved on a Linux Live CD by Fabian Thommen

its use for radio transmissions, the city of Paris extended its permit. It also served scientific experiments. The Tower quickly became the landmark of Paris and an important tourist attraction.

TraceNoizer is an internet-based artwork created by the artists group LAN[7] between 2001 and 2004 (Fig. 1). The House of Electronic Arts acquired this website in 2017. TraceNoizer addresses the concern of internet users about the control of their data. Thus, *TraceNoize*r aims to obfuscate the traces a user left behind in the Web. On the *TraceNoizer* website, one could enter one's name and *TraceNoizer* would search the internet for websites containing that name by using Google Search. It would then randomly assemble new websites out of the search results. The more new websites were produced, the less likely it was that the original websites would be found by the search engine. The original traces, in other words, would disappear in the background noise of the newly produced websites. The artists call the part of *TraceNoizer* that produces the fake websites "clone engine."

The following paragraphs characterise the Eiffel Tower and *TraceNoizer* according to the layers used by Kuipers and Jonge (2017, p. 87):

[7] Annina Rüst, Fabian Thommen, Roman Abt, Silvan Zurbruegg and Marc Lee.

Spirit of Place The Tower's location at the banks of the river Seine and its surroundings of the Champ de Mars and Jardins du Trocadero underline its importance as a landmark, as an icon of iron architecture, symbol of development (paired with nostalgia from today's point of view) and of romance. For an internet-based artwork the spirit of place could be translated with aura.[8] The aura of *TraceNoizer* consists of its charisma of an early internet-based artwork made by pioneering artists and of a touch of resistance to consumer internet culture and authority. From today's point of view, it evokes nostalgic feelings.

Surroundings (Wider Environment) The Eiffel Tower is a landmark of Paris. As such, Paris can be seen as its wider environment. Because the city needed radio towers, and later because the Eiffel Tower became an important tourist attraction, the Tower was not taken apart again, as originally intended.[9] The Eiffel Tower still transmits radio and television frequencies and is as such part of a communication infrastructure. As a tourist attraction, it is based on a touristic infrastructure consisting of a transportation and accommodation network. As such, the Eiffel Tower is embedded in a sociotechnical environment. The Web in general is the wider environment of *TraceNoizer*. As *TraceNoizer* processes websites, the web environment is crucial for *TraceNoizer*. Since the creation of *TraceNoizer*, Web 1.0 was succeeded by Web 2.0, while social media became much more important than personal websites, and this negatively affected the functionality and interpretation of *TraceNoizer*. Both, *TraceNoize*r and the Eiffel Tower, are part of a sociotechnical system that undergoes constant changes. They are not isolated objects, but narrowly bonded to their changing surroundings.

Site (Closer Environment) The closer environment of the Eiffel Tower consists of the park surrounding it. It allows high numbers of tourists to enjoy the Tower from up close in a beautiful environment. Furthermore, metro stations in the vicinity facilitate the transport of visitors to the Tower. *TraceNoizer*'s close environment consists of links to external websites.[10] These links lead to two artworks that are the result of the use of the clone engine of *TraceNoizer* by other artists. In the meantime, these links became obsolete.

Skin (Aesthetics of the Building) The Eiffel Tower is a bit untypical in this respect, as its aesthetics are a direct consequence of the technical construction. The arrangement of the girders and the struts produces the aesthetics and the stability of the Tower at the same time. Both the construction and the aesthetics were cutting edge at the time of its construction, as well as an expression of its modernity. The graphical design of a website can be analysed from a technical point of view or from an

[8] The term "aura" of an artwork is coined by Walter Benjamin (Benjamin 1936, p. 5). According to him, unique artworks have an aura which means they are embedded in a certain time and space related context such as traditions or rituals.

[9] https://www.toureiffel.paris/en/the-monument/eiffel-tower-and-science.

[10] Tracenoizer.net → clone community "Illegal immigrants dis.information" (2002) by Darko Firtz and "Eventmodul::anonymous.databody.muttering" (2001) by Knowbotic Research etc.

aesthetic point of view. *TraceNoizer* based its graphics on frames. This was typically a method used in the 2000s to position content within a website. From the aesthetic point of view, *TraceNoizer* was designed without the flashy colours, blinking symbols and moving gifs that were common at the time. However, from its design (colours, font, font size and resolution, use of side bars) it is clearly visible that the website was designed at least 10 years ago.

Structure (Including Construction Materials) The technical construction of the Eiffel Tower is wrought-iron lattice while the website *TraceNoizer* is a server-side dynamic website. This means that the dynamic part, the clone engine and its database, is executed on the webserver and not in the browser (the client). This website construction has consequences for the conservation: crawlers such as the Internet archive uses cannot crawl the software, database or logic that is executed on the webserver. Crawlers can only harvest responses of the webserver to its requests. In order to preserve the logic of such a website, access to the webserver or source code and database is necessary.

While the material of the Eiffel Tower is mainly wrought-iron, the material of *TraceNoizer* are the programming languages HTML, PERL and PHP. PERL and PHP are the languages used to program the clone engine. Like wrought iron that enables the lattice construction, PERL and PHP enable the generation of new clone-websites for *TraceNoizer*. PERL is a language that is particularly apt to manipulate text. As the clone engine searches and parses websites consisting of HTML text, the artist chose PERL to program the clone engine. Engel and Phillips confirm this point of view: "Similar to other areas of art technology, these choices of medium [for instance programming language] can be deliberate (artist-intended), or contingent. In both cases, the source code may be integral to an artwork's identity, even if it is typically hidden from the audience and rarely part of the audiovisual or interactive experience." (Engel and Phillips 2019, p. 181).

Space Plan In the case of Eiffel Tower, a map gives the position of the different floors and restaurants and how they can be reached by lifts and staircases. *TraceNoizer* has several pages that can be visualised with a site map. The site map shows how each page of *TraceNoizer* is linked to the other pages of *TraceNoizer*, a kind of navigational map.

Interior Surfaces This layer is difficult to interpret for internet-based art and for the specific case of the Eiffel Tower. It is therefore not considered here.

Services (Infrastructure) The Eiffel Tower's service layer consists of the electric power system, the communication system and the water supply system within the Tower. The infrastructure of an artwork is usually invisible, although it has a vital function: it runs the background processes that enable the artwork. For *TraceNoizer* such infrastructure consists of internet ports, the internet protocol suite, protocols such as http and https, webserver software, and the markup language html. Naturally, this is based on a wider infrastructure of the whole internet, such as fiber-optic cables, routing equipment, domain name system etc.

Stuff (Mobile Parts) All mobile parts, such as for instance restaurant and ticket office furniture at the Eiffel Tower, are "stuff." For *TraceNoizer*, that is more difficult to define. It could be the *TraceNoize*r screensaver, which one could download, or a *TraceNoizer* T-Shirt, which one could order on the website.

Kuipers and Jonge recommend visualising the construction and conservation history in a map ("Chrono-mapping," 73). For the Eiffel Tower and *TraceNoizer*, this is summarised in the following paragraph.

Construction and Conservation History The Eiffel Tower does not feature single restoration moments, but it is regularly maintained, and its amenities are permanently upgraded and adapted to the needs of visitors. Many changes of the Eiffel Tower have replaced older versions, fragmenting or demolishing certain layers. For instance, the lifts were upgraded and replaced by newer systems many times.[11] From 2008 to 2014, the lift from 1899 was restored, adapted to current requirements. In other words, the Eiffel Tower is a conglomerate of old and new pieces and historical layers are not discernible at first sight.

TraceNoizer was created from 2001 to 2004 during which the artists further developed the artwork and added more features. According to the folder structure in the source code, there is one new version each year until 2004. This can also be retraced in the Internet Archive.[12] The conservation history of *TraceNoizer* started with a conservation measure undertaken by one of the artists. In 2004, Fabian Thommen created a Linux live CD. It contained the webserver including operating system and internet browser. *TraceNoizer* went offline in 2011 but had not been fully functional several years before that. While the graphical surface is still intact, the clone engine is no longer able to produce fake websites. The subsequent conservation measures were undertaken by the House of Electronic Art in 2018 in order to make the work accessible online again.

It can be concluded from the above comparison that Internet-based artworks and buildings can both be described based on layers. These layers described above are receptacles and can be layered themselves. Internet-based art and buildings have environments (term used for software) and surroundings (term rather used for buildings) and often their boundaries (between what is part of the work and what not) are difficult to define. As long as the building and the Internet-based artwork are in use, they are both changing continuously, as they need to be adapted to current needs of their users as well as to external infrastructures. All these characteristics are relevant for conservation and some of them a challenge. In this respect, it will be interesting to compare the conservation ethics and strategies of both fields.

Another conclusion from the comparison is that Kuipers and Jonge's concept of building layers and mapping of construction history does not provide sufficient information to analyse the building: despite its goal to find adaptive uses there is no category that describes the use history of the building. Use is only represented in

[11] https://www.toureiffel.paris/en/the-monument/lifts. Accessed 29 Jan 2022.

[12] https://web.archive.org/web/2019*/www.tracenoizer.net. Accessed 29 Jan 2022.

Riegl's value matrix (Kuipers and Jonge 2017, p. 87) as use value, but not as a separate topic for investigation. Furthermore, researching the reasons for changes and their connection to sociotechnical developments could help to evaluate the significance of certain technologies and materials and explain or expose external dependencies. I recommend adding some of Laurenson's "areas of focus" for significant properties of software-based art,"[13] such as "external dependencies," "processes" and "context." On the other hand, Laurenson's areas of focus could profit from a layered approach regarding the "structural elements," while "context" could be expanded with sociotechnical context and conservation history. If the suggestion to include socio-technical context in the artwork documentation is not new (Lurk et al. 2012, p. 250), it is not yet practised in museums. As Annet Dekker states in her dissertation about the conservation of internet-based art, "conservation tends to discard the importance of the social space" (Dekker 2014, p. 18).

It is now clear that internet-based art and built heritage can be described in the same terms that are relevant for conservation decisions. The following section will discuss, how conservation strategies for built heritage can be applied to internet-based art.

4 Conservation Strategies for Built Heritage Applied to Internet-Based Art

In 2004, the Variable Media Network defined four conservation strategies for the conservation of variable contemporary art: storage, migration, emulation and re-interpretation.[14] Almost the same terms are used in digital preservation, although their definitions[15] differ from those of the Variable Media Network. In contrast, built heritage conservation does not use such a categorization. The conservation strategies for built heritage I investigate originate from different sources. I chose the strategies "adaptive reuse," "re-interpretation based on the combination of old and new materials" and "reconstruction" as they are different from the contemporary art strategies mentioned above. Sections 4.1 to 4.3 describe these conservation strategies for built heritage conservation and assess whether they can be applied to conservation of internet-based artworks.

[13] Areas of focus for significant properties of software-based art according to Laurenson (2014): content, appearance, context, other versions, formal and structural elements, behaviour, durations of processes, spatial or environmental parameters, external dependencies, function, processes, artist's documentation, rules of engagement, visitor experience and legal frameworks.

[14] https://www.variablemedia.net/e/index.html → terms → strategies. "To emulate a work is to devise a way of imitating the original look of the piece by completely different means". "To migrate a work involves upgrading equipment and source material."

[15] Thibodeau (2002, pp. 18–19): "Emulation strives to maintain the ability to execute the software needed to process data stored in its "original" encodings, whereas migration changes the encodings over time so that we can access the preserved objects using state-of-the-art software in the future."

4.1 Adaptive Reuse—"Function Follows Form"[16]

The trigger for restorations of built heritage is often not the building quality or the aging of its material. Most buildings undergo major changes because their original function cannot be sustained, and a new use must be found for the building. Such changes of use are a consequence of the evolution of the sociotechnical environment (layers "surrounding" and "site" in Sect. 4). Industrial technologies change, production is farmed out abroad, the living standard changes, transportation and communication infrastructures are renewed, and energy and safety requirements evolve.

However, as argued by the architect Jan Duiker (1890–1935), one of the spokesmen of the Modern Movement, "whenever a building's purpose had to change, the form would lose its raison d'être. In such cases, the building should either be adapted or demolished altogether" (Kuipers and Jonge 2017, p. 99). This point of view does not include a third possibility: the adaptation of the use to the building in order to preserve it: "Function follows form"[17] instead of "form follows function," as Kuipers and Jonge put it. Kuipers and Jonge, both working in and researching the field of built heritage in the Netherlands describe the procedure for a building's adaptive reuse.[18] Besides a technical and historical analysis of the building layers, they recommend a value-based analysis based on Riegl[19] by mapping building parts and layers with different values. Based on this analysis, they determine the most important building elements and characteristics before they negotiate an adapted use and the necessary building changes with the building owners. Depending on these negotiations, the required changes of the building can range from minimal to substantial.

The ruin Santa Catalina de Badaya in Spain (Fig. 2) can be seen as an example of minimal intervention. The adaptive reuse of Santa Catalina de Badaya as a botanic garden does not require too many changes of the original buildings. Nor does it afford large scale reconstructions. The conservation focussed on the material remains of the buildings and brought them to the foreground. On the flipside, its original functions as a residence or monastery cannot be reinstated. While the restoration of Santa Catalina de Badaya is obvious to the visitor due to the contrasting materials used, other measures such as the stabilisation of the castle walls are not visible.

[16] Term used by Kuipers and Jonge (2017, p. 114).

[17] Dito.

[18] In Dutch "adaptive reuse" is "herbestemming". Wikipedia (accessed 29 Jan 2022) describes "herbestemming" slightly different than "adaptive reuse". The Dutch Wikipedia definition describes "herbestemming" as assigning a new use to a building in order to preserve cultural, historical, architectural and other values. In the English Wikipedia definition, "adaptive reuse refers to the process of reusing an existing building for a purpose other than which it was originally built or designed for. It is also known as recycling and conversion. Adaptive reuse is an effective strategy for optimizing the operational and commercial performance of built assets."

[19] Riegl (1903).

Fig. 2 Santa Catalina de Badaya (SP) restored by isuuru architects (Source: http://isuuru.com/pat_consolidacion.html. Accessed 29 Jan 2022): Restored ruin with clearly contrasted wooden additions and less visible consolidations (Photo: © isuuruarquitectos)

The mechanism of why internet-based art becomes dysfunctional after only a few years is similar to the context of built heritage: its sociotechnical environment changes: protocols, programming languages and webservices evolve, browser plugins become obsolete, the way how people use the internet changes. Internet-based artworks often end up as ruins before they are acquired by a collector or museum for the reasons mentioned above. The custodians have to decide between the preservation of the original material and the restoration of the original functions and aesthetics.

In contrast to built heritage, adaptive reuse applied to art is not about repurposing the artwork. The artwork's purpose should not change, as conservation should not change the meaning of the artwork. In the short- and mid-term, it is not the purpose, but the functionality of the artwork that is impeded through obsolescence. In addition, the user knowledge how to interact with internet-based art evolves and the interaction with an old artwork might not come natural to a young user. In that sense adaptive reuse can mean that a user needs to be shown how to interact with the artwork instead of updating the interface of the artwork to current technology. Hence, adaptive reuse for internet-based artworks can mean compromises on the level of functionality in favour of less invasive changes and on the level of usability (use no longer self-explanatory) by having to explain more about the artwork.

TraceNoizer (2001–2004) can figure as an example of an internet-based artwork that was restored with minimal interventions and whose functionality was not fully restored. For the restoration of full functionality, an external library not maintained since 2002 would have needed to be substantially adapted without a guarantee that

these changes would improve the result much.[20] Furthermore, there was reason to assume,[21] that the work did not function perfectly before, either. For this reason, the work was restored so that the users can create the clones, but it was accepted that the clones are faulty, and that the users cannot save and access them later. To give the user the opportunity to see what a clone looked like in 2002, the *TraceNoizer* clone project archive was restored.

For both the conservation of the former monastery Santa Catalina de Badaya and the website *TraceNoizer* "migration"[22] was employed by applying many small interventions that changed the building and artwork substance. However, in combination with adaptive reuse, other strategies such as adding a building layer or encapsulation can be applied. Kuipers and Jonge mention the example of the Van Nelle factory where a second skin was added on the inside of the building envelope to improve the building climate for reuse as office spaces (2017, pp. 118–119). The former commanders house of the Holocaust memorial in Westerbork, the Netherlands, was encapsulated with a glasshouse for protection from the weather. Such layer-based strategies also exist for internet-based art. An emulator[23] encapsulates software. For instance, a client computer is emulated to enable the use of obsolete internet browsers. This adds the emulator as a layer to the client computer. A digital interface-layer functions as a translator between old technology and new technology. An example for this would be a library-layer that translates an old protocol to a new one. To summarise, adaptive reuse only aims to reduce the impact on the building or artwork substance, but it does not prescribe how to achieve that goal.

Returning to the two cases, the former monastery Santa Catalina de Badaya and the *TraceNoizer* website, both lost either their former use and/or their former functionality. I would even go so far to claim that if a building changes its use there will always be building parts that lose their function even if these parts are preserved. For *TraceNoizer*, this is similar. Although the code is still there, certain parts of the code do not function any longer. However, as the artwork is not assigned

[20] The work was based on the fact, that users had their own homepages hosted by free hosting services such as geocities, whereas today users have social media instead of homepages. The "rainbow" library parses the text of the websites provided by the search engine. However, as most websites found today are not websites with manually written HTML code, as was the case in 2001, but rather are composed by content management systems (used in social media and blog posts), the parsing code needs adaptations.

[21] According to the Jury of the *READ_ME Festival 1.2* http://readme.runme.org/1.2/adden.htm (accessed Jan 2021): "*(...), TraceNoizer is not literally effective at introducing noise into our data identities; after several weeks we still couldn't find our data clones in search engines at all. TraceNoizer's interest to the jury, however, was its use of algorithmic processes as critique.*"

[22] Migration is a term used in digital preservation. It is used here in a more general way as the sum of many small changes applied directly to an artwork or building, slowly changing it if repeated for many times. Changes can encompass stabilisation measures, retouching or completing, or adaptations to new use.

[23] Emulation is a term used in digital preservation. Computer hardware is represented as software (the emulator). It is a common strategy for the preservation of video games. The old video games can be played within the emulator.

a new purpose, the reduced functionality makes it more difficult to understand the artwork. For both, the former monastery Santa Catalina de Badaya and the *TraceNoizer* website additional explanations and documentation are needed to compensate for this loss of functionality and change of use. Today, due to the minimal interventions and the publicly available explanations, the buildings and the website are solutions in between a ruin and a fully functional monument or object.

4.1.1 Visibility of Conservation Interventions

The visibility of changes is a returning topic in conservation ethics.[24] In contrast to Santa Catalina de Badaya, the user will not notice changes made in *TraceNoizer* immediately, because the changes only influenced the functionality of the website and not its design. These changes were made on the source code level and can be visualised in a version control system. Version control systems are used in software development but are also very useful in preservation of software-based art (Engel and Phillips 2019, p. 191). The programmer can bundle and describe changes in so called commits (Fig. 3). Each commit comprises source code changes of multiple files. These changes can be viewed line by line (see Fig. 4) as archaeological software layers. Depending on the copyright of the source code, the code in a cloud-based versioning control system can be made publicly accessible.

Interestingly, built heritage conservators are also starting to consider version control systems to manage and visualise building changes. For instance, Chaturvedi et al. (2017) describe a concept for the use of version control for planning alternatives.

Fig. 3 *TraceNoizer* (2001–2004). Changes of source code bundled in commits on the versioning control platform "github." A commit can be related to many different files. By clicking on such a commit, each single change of code line can be seen as in the following figure:

[24] For instance, Art. 12 of the Venice Charter (1964). Or the Athens Charter (1931).

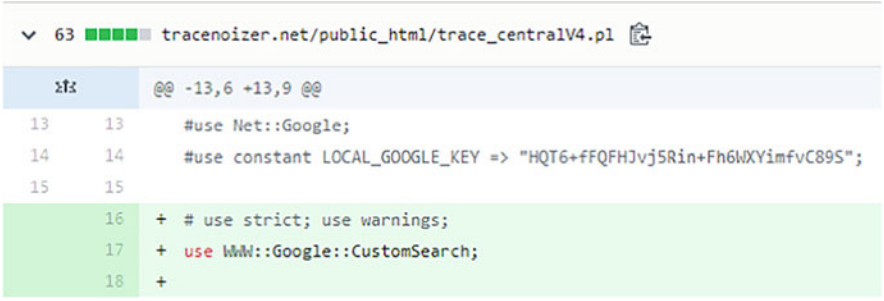

Fig. 4 *TraceNoizer* (2001–2004) Additions on code level, line by line: Replacement of non-functional Google API with a current one. The changes are visualised with github (https://github.com/fabtho/tracenoizer. Accessed 29 Jan 2022) versioning control

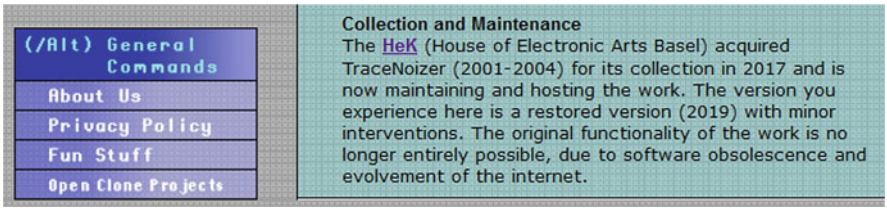

Fig. 5 Imprint of TraceNoizer.net, menu "About us." Text added by the House of Electronic Arts Basel

Another option of making the user aware of the changes of *TraceNoizer* is to mention the restoration in the imprint or credits of the website. On the *TraceNoizer* website (menu "about us", Fig. 5), the House of Electronic Arts added a paragraph on "Collection and Maintenance" to give the user some minimal information about the restoration and maintenance of the work. The user can contact the House of Electronic Arts if desired.

4.2 Re-Arch Approach or Reinterpretation Based on the Combination of Old and New Materials

Architects often have a view on the conservation of built heritage that differs from the one of built heritage specialists. Their creative handling of building conversions and reconstructions can have a huge impact on the original building and on its use. *Re-Arch* (Stimuleringsfonds voor Architectuur 1995), a book written by architects, discusses the architectural design for built heritage from the architect's perspective. The authors claim that there are two main approaches to design for built heritage. The first approach is to design a new building or an extension as a continuation of the existing building without contrasting it. The new building (part) is supposed to intensify and visualise the important traits of the old building. In the second

approach, the new building actually contrasts with the old building and highlights the differences. Furthermore, as Provoost, one of the authors of *Re-Arch* states: "It is precisely layering and juxtaposition that can be linked to the idea of the historical experience. By coldly juxtaposing objects or by wrapping them with translucent materials, unpredictable frictions and paradoxes can arise. They do not need to be dissolved or synthesized, but offer, as they are, a new form of harmony and proximity. The aim of Re-Arch is to create something that transcends the old and the new" (Provoost 1995, p. 35).[25] Their approach to preserve, convert and expand a building is not only conservation-based but also design-based.

This double purpose can be recognised in the restoration of the Neues Museum in Berlin. The representatives of the Prussian Cultural Heritage Foundation and the architect tried to preserve as much original material as possible (Fig. 7) and to outline the previous staircase (Fig. 8). However, they did not reconstruct the former room decorations as seen in Fig. 6. Chipperfield formulated this double purpose as follows: "Desiring neither to imitate nor invalidate the remaining complex of ruined fabric, a Piranesian structure of bricks and architectural fragments, our concern has been motivated by the desire to protect and to repair the remains, to create a comprehensible setting, and to reconnect the parts back into an architectural whole" (Chipperfield 2009, p. 56). The result (Fig. 8) is a reinterpretation of the old museum depicted in Fig. 6.

This design-based approach is rather rare in art conservation. The reinterpretation strategy of the Variable Media Approach[26] might be closest to this approach. Because of the uneasiness of conservators to use reinterpretation, LIMA, a research and conservation institution for media art in Amsterdam, advocates reinterpretation of media artworks in order to "ensure that media art remains understandable" (Wijers and UNFOLD network 2017, p. 1), but also to foster discussion between artists, audience, curators and conservators about the interpretation of the artwork.

The reinterpretation of the internet-based artwork *TraceNoizer* came up in an artist's interview[27] about the conservation of *TraceNoizer*. Its creators mentioned the idea of a contemporary reinterpretation. Instead of cloning "fake" websites, the cloning and remixing of Facebook accounts would have been a possible answer to current internet practices. After a discussion they concluded that this reinterpretation of *TraceNoizer* would result in a new work. As they did not intend to create a new work, but to preserve the existing one, they did not pursue this idea.

This hypothetical example of *TraceNoizer*'s reinterpretation is based on a new platform with new technology. Neither design nor substance (source code) would remain. This differs from the Re-Arch approach, which combines old elements with the design of new elements in order to form a new whole and trigger a historical experience, as for instance in Neues Museum in Fig. 8. The difference between

[25] "Historical experience" is a term coined by the Dutch history theorist Frank Ankersmit (1993, p. 14 ff). It describes the personal experience when seeing traces from the past (as an example he uses a painting from the 18th century depicting a scene from that period).

[26] http://www.variablemedia.net/e/welcome.html. Accessed 29 Jan 2022.

[27] Artist's interview on 22 June 2017 with the artists of *TraceNoizer*: Fabian Thommen, Marc Lee and Annina Ruest. Interviewed by Claudia Roeck.

Fig. 6 Water colour of the main museum staircase by Hedwig Schultz-Voelcker (ca. 1910) (© bpk/Kupferstichkabinett, SMB/Jörg P. Anders)

reinterpretation and conversion/migration is blurred in this case, as conversions with prominent new design elements are at the same time reinterpretations.

The reinterpretations of the internet-based artwork *TV Bot* (2004) by Marc Lee come closest to the Re-Arch approach. The artist himself updated and reinterpreted the work twice, once in 2010 and once in 2016. He keeps only the most recent version online, while the older versions are still accessible as screencasts (TV Bot 1.0, see Fig. 9).

TV Bot took pride in being the most current news channel in the world with news not older than one hour. In an interview,[28] Marc Lee mentioned that he wanted to

[28] Serexhe (2013), p. 427.

Fig. 7 Museum Island, Ruin of the Neues Museum Berlin 1985 (© bpk/Zentralarchiv, SMB/Schreiber)

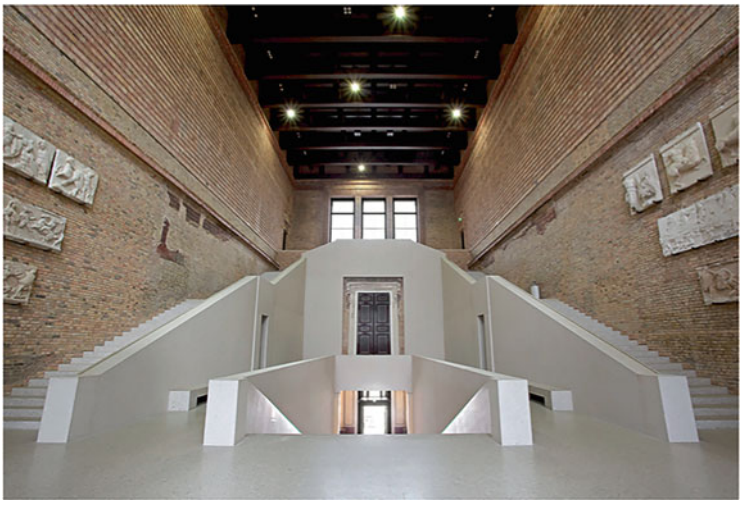

Fig. 8 Neues Museum Berlin, built by Friedrich August Stüler 1843, restored by David Chipperfield, staircase with historical plaster casts, 2009 (© bpk/Achim Kleuker)

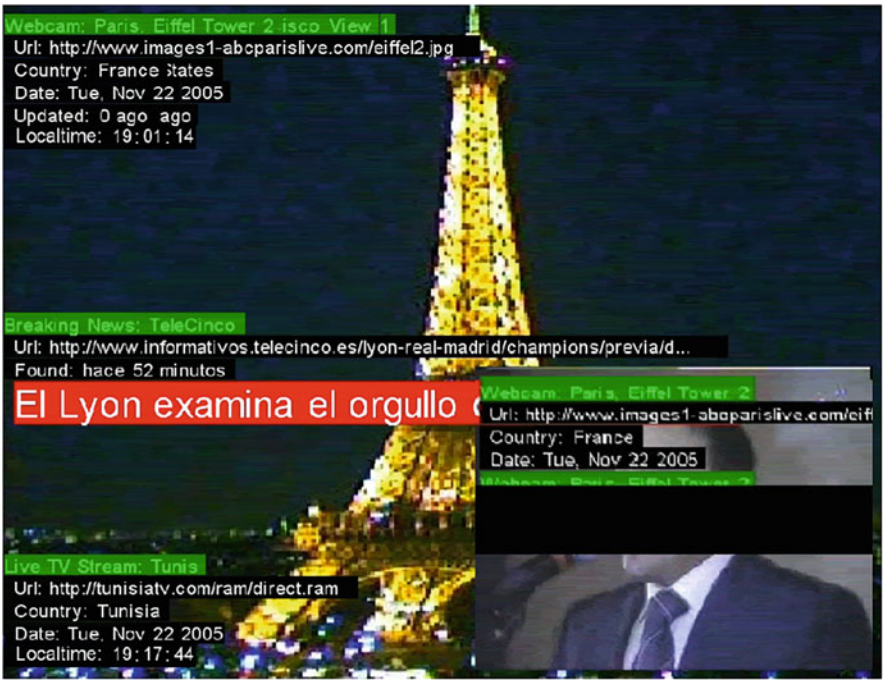

Fig. 9 Screenshot of *TV Bot 1.0* (2004). Red/black/green colour scheme for headlines

show, how simple it is to imitate a news channel by replacing the news editors with software. A good description of the first and second *TV Bot* version can be found in (Serexhe 2013).

When Marc Lee created *TV Bot*, social media did not exist yet. *TV Bot 1.0* used a list of more than 1000 web sources such as webcams, news platforms and radio streams. A RealPlayer browser plugin was necessary to view the website.

In 2010, the artist had to adapt the website to Flash technology, as the news platforms started to stream their news in Flash. He also introduced the social media platform Twitter as a news channel. The look and feel of the website did not change much (TV Bot 2.0, see Fig. 10).

The artist reused code of *TV Bot 1.0* and adapted it. In this sense, the code changes could be compared to the changes of the Neues Museum mentioned above. In contrast to the Neues Museum, however, the visitor or user is not aware of these changes and cannot perceive the layering and juxtaposition of old and new material mentioned by Provoost above.

In 2016 the artist had to revise the work for a third time as the streaming technology Flash became obsolete. *TV Bot 3*.0 does not look like a "serious" news channel, but rather like a candy-coloured blog of a social media influencer (TV Bot 3.0, see Fig. 11).

Fig. 10 Screenshot of *TV Bot 2.0*. Twitter was added (blue headline). Red/black/green/blue colour scheme for headlines

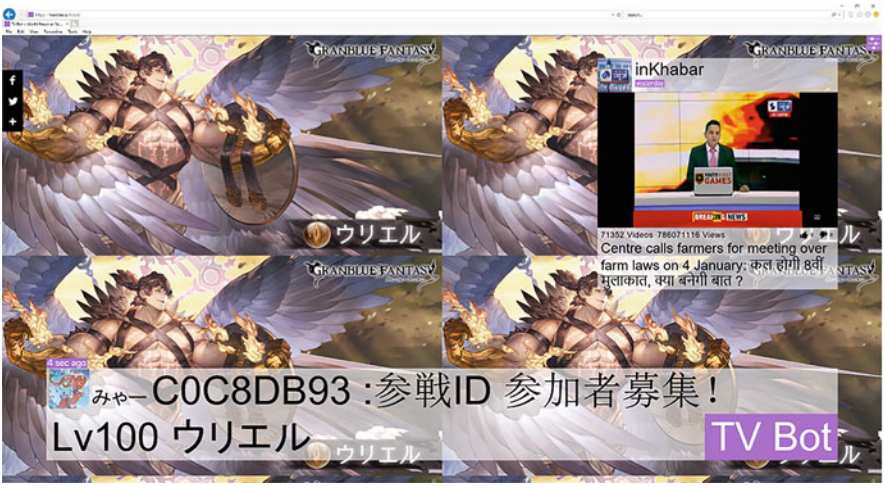

Fig. 11 *TV Bot 3.0*. Pink colour scheme. About 1000 news- and webcam channels replaced by 5 to 6 social media platforms

According to an interview with the artist in January 2021, the artist adapted the work to the postfactual period. Due to the emergence of social media the artist replaced the more than one thousand webcam, radio, and news sources with five to six social media platforms. Although the artist could not reuse the code, *TV Bot 3.0* is still a website programmed in almost the same programming languages (HTML, JavaScript, CSS and PHP) as the previous versions of TV Bot.

The reinterpretation history of *TV Bot* brings out three characteristics of web-based art that do not feature in the case of built heritage:

- Skin layer: the major changes on the webserver (backend) are not visible on the website (frontend), as is in the case of built heritage where a different material can indicate the filling of lacunae.
- Structure/material layer: it is not possible to understand what is happening on the webserver (backend) without having access to it. For this reason, the user does not know the information sources accessed by the work and the logic/algorithms it applies.
- Site (close environment): Following from the first two points it is not possible to understand the changes made between the versions of the work. The sociotechnical environment's level of change and its impact on the artwork is therefore difficult to grasp.

As a response to the first point, the artist placed the links to the three artwork versions on his website[29] next to each other. With respect to the two other points, more background information about the sociotechnical context and the restoration of the work would contribute to a better understanding of the work. The idea of *TV Bot* was revolutionary in 2004. It was probably the first bot that showed such current news while social media did not exist yet. Nowadays, the topicality of the news stream does not cause the same surprise as back in 2004. It could even be argued that the idea of the work changed slightly with *TV Bot 3.0* by highlighting the postfactual period more than previous TV Bot versions. Knowing the work's history of changes and its environment helps to value and position the idea and originality of the work. Together with the parallel display of two or more versions, this enables the historical experience of "layering and juxtaposition" mentioned by Provoost.

4.3 Reconstruction

Reconstructions of built heritage are common if sometimes contested. A prominent example is the Berlin Palace, a baroque palace whose façade was reconstructed in 2020. Due to heavy damages during WWII, the East German government demolished the Berlin Palace in 1950 and replaced it by a modernist building, hosting the parliament of the GDR, called Palace of the Republic. After the German

[29] https://marclee.io/en/tv-bot-world-news-as-soon-as-it-happens/. Accessed 29 Jan 2022.

reunification, the Palace of the Republic became obsolete. After twenty years of public debate[30] about the fate of the modernist Palace of the Republic, it was decided to demolish it and replace it with a reconstruction of the former baroque Berlin Palace. The reconstruction is a modern building of the same external dimensions as the former baroque Berlin Palace, comprising three reconstructed façades and a courtyard of the former structure. The use of the new building as a museum and cultural centre for the public is very different from its former use as an administrative building, which is why the interior building layout and structural design differ completely. One argument for the reconstruction of the façades was closing the aesthetical gap of the historical cityscape of the Museum Island (Fig. 12).

Such a reconstruction strategy can also be applied to internet-based art. Fig. 13 sets an example for a digital reconstruction of an internet-based artwork. The artwork, a YouTube video, played with the expectations of the YouTube users. The artist tagged the video with frequently used "spam" keywords that did not match the video content. Due to the "abuse" of these keywords YouTube took down the artist's video. Rhizome still had the video, but without the YouTube platform, it would not be understandable. Rhizome reconstructed the look of the YouTube

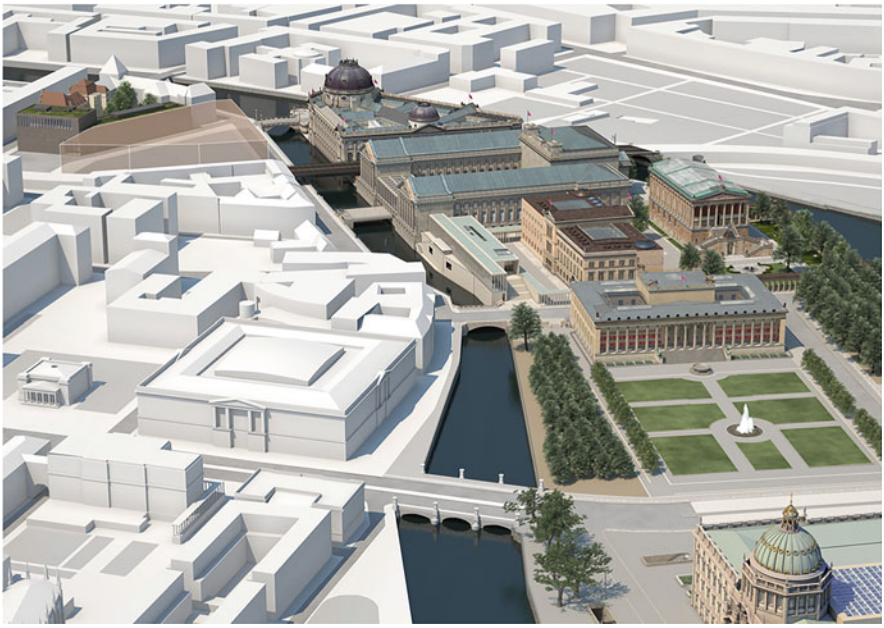

Fig. 12 3D-model of the future Museum Island Berlin, view from the south (in the lower right hand corner the Humboldtforum) (© bpk/Stiftung Preußischer Kulturbesitz, ART+COM)

[30] Summary of the debate: https://en.wikipedia.org/wiki/Berlin_Palace. Accessed 29 Jan 2022.

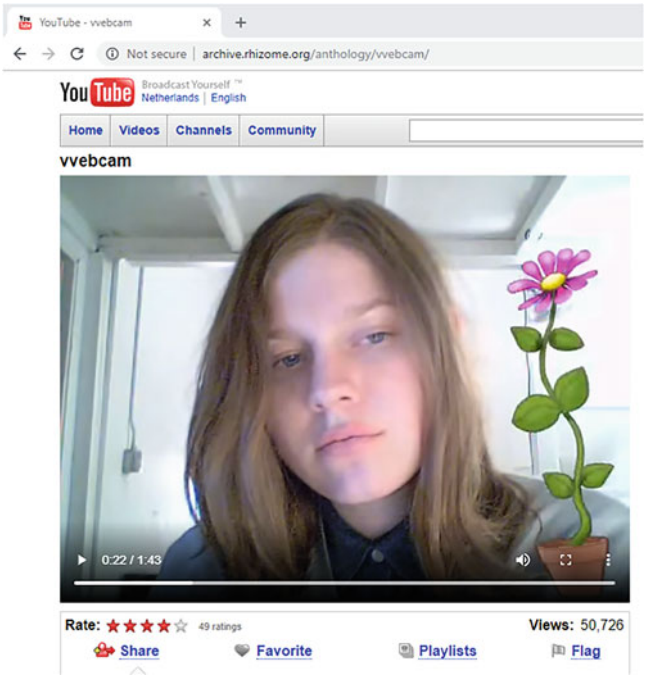

Fig. 13 *VVebcam* (2007) by Petra Cortright. Reconstruction of a YouTube channel by Rhizome: http://archive.rhizome.org/anthology/vvebcam/The reconstruction is recognizable in the URL of the website (it is not a YouTube domain)

platform so the user can understand the context of the video, but the YouTube platform as such does not function. The "fake" is immediately visible in the URL: http://archive.rhizome.org/anthology/vvebcam/ is not a YouTube domain. Rhizome chose this URL very carefully to make clear who hosts the website and that it must have been altered in some way. This reconstruction of YouTube can be compared to the reconstruction in Fig. 12, where just the façades (skin) of the Berlin Palace were reconstructed, while the building's interior was completely changed. The reconstruction of the skin allows one to have a more complete idea of the work.

Disappearing web-services and linked websites are a major problem for many internet-based artworks. For certain artworks, it can be a solution to reconstruct these services partly to simulate their output and freeze the environment.[31] The artwork *VVebcam* by Petra Cortright is now, after the reconstruction or simulation of the YouTube-service, independent from the YouTube platform and therefore more stable in the long term. In the example of the Berlin Palace, the reconstruction of

[31] Miksa et al. (2015, p. 78) refer to this reconstruction or simulation of a web service as "web service mock up."

the façades only had an aesthetical function (on the level of the cityscape and of the building), while it did not reduce the dependencies and the maintenance.

Prior to the reconstruction of the Berlin Palace there was a broad discussion in Germany about the justification of reconstruction and what requirements it has to meet to be authentic.[32] Often, reconstructions are reconstructions of the skin layer (façade), while all the other layers inside are adapted to current uses or tastes, a practice often criticized as Disneyfication.[33] In the case of the Berlin City Palace, the outer dimensions and shape of the buildings had to be preserved, in addition to the skin. "Structure," "services," "space plan" and "stuff" were not reconstructed. For the internet-based artwork VVebcam also the skin was reconstructed. Neither "space plan" (other videos) nor "services" (communication with YouTube users) nor "structure" (inner working/architecture of YouTube) were reconstructed. The criticism of "Disneyfication" did not present itself in this case, as the (partial) reconstruction was necessary to understand the artwork.

5 Conclusions

By starting from a comparison of built heritage with internet-based art, similar characteristics were found in both. They are both relational, social practices in permanently changing environments with visible and invisible layers. Often the need for conservation is caused by a change of the sociotechnical environment, rather than by material breakdown. This motivated me to explore the viability of conservation strategies used for built heritage and apply them to internet-based art.

In contrast to the definitions of the variable media network or digital preservation, the conservation strategies for built heritage are not divided into fixed categories or concepts. Rather, a procedure to achieve a sustainable conservation project or an individual concept is applied.

The adaptive reuse approach of Kuipers and Jonge is a process-based strategy used in built heritage conservation. As its application to internet-based art established, any conservation goal in between a "ruin" and a fully functional work can be a valid option. The use or function of the object is adapted so that the necessary changes in the artwork material can be minimised. The artwork is stabilised, well maintained and documented but certain functions are not restored if this requires big interventions. This resonates with Ann Laforet's "museum of internet art as a living archive" (Laforet 2009, p. 186), an archaeological museum that hosts digital fragments of net art. The documentation of the artwork context, such as pertaining to restoration goals, original functionality, the work's idea and change of the socio-technical environment, is crucial for this approach.

[32] Bundesinstitut für Bau-, Stadt- und Raumforschung, Bonn (2010) contains an extensive overview of discussions about reconstruction in Germany.

[33] Bundesinstitut für Bau-, Stadt- und Raumforschung, Bonn (2010), p. 74, p. 134.

The adaptive reuse approach does not prescribe how the minimal interventions are implemented. Layers are not only a category for description, but they can be a point of departure for preservation measures. Layers can be added to adapt and protect the building or artwork. They are placed between or on top of already existing layers. As such they can create a transition to the old substance without having to change it. Encapsulation, which corresponds to emulation in digital preservation, has a similar protective effect. In contrast, migration is a strategy independent from the concept of layers that changes the substance of the object by introducing many small changes.[34] It is applied not only in digital preservation, but also, quite frequently, in the restoration of built heritage.

The design-based Re-Arch-approach creates a historical experience by combining old building parts with newly designed parts. The work is fully functional, but the functions are adapted to the new reinterpretation, even if this asks for big interventions. The architects handle the "conservation design" creatively. With this approach, the most important difference between internet-based art and built heritage becomes apparent: the user cannot differentiate old from new web page parts. The historical experience is not possible, and the juxtaposition of different layers is not visible. The materiality of the pixels stays the same, no matter what software they are made of. The changes can only be seen on the web server layer, where the user does not have access. Therefore, it is important to document the work logic (algorithms), the web sources (services), the tools (programming languages and libraries) and changes in a way that it is accessible to the public. Furthermore, the visualisation of changes in internet-based artworks calls for creative solutions. There is a potential for more solutions than the ones given in this article.

The third strategy tested on internet-based art involved reconstruction. It is used to rebuild and imitate historical buildings that do not exist any longer. In internet-based art, this strategy can be employed to replace external dependencies, such as web services that changed or do not exist any longer. The Internet Archive can be interpreted as a partial reconstruction of the historical internet. Web archives can be used to recreate the surroundings of a website (using the building layer terminology), providing context to the artwork. Although such reconstructions possibly do not restore the whole functionality of the artwork, they make the artwork better readable and more independent from external infrastructure such as web services.

Sociotechnical developments are a frequent cause of changes of built heritage and of internet-based art, but they are not documented routinely. Their documentation would help to recognise external dependencies and the value of the material of the conservation object, as well as serve as an important input for selecting preservation strategies.

[34] This definition of migration in the field of digital preservation as the sum of many small changes differs from the definition of the "variable media network" (migration = updating to a new medium/technology); still, it is adopted here, as it better fits internet-based artworks and can be separated more easily from the reinterpretation strategy.

In museums only conservators and curators usually have access to the full documentation of artworks. With a publicly accessible documentation anybody could broaden their knowledge about a work and shape their opinion about a reinterpretation. The documentation can become part of the work, as Aga Wielocha concludes in her dissertation. She promotes to conceive of an artwork as an "anarchive" (Wielocha 2020, p. 232), an anarchive that grows with each artwork version. This is particularly relevant for Internet-based art where the layers and conservation interventions are not visible.

Despite the obvious differences between built heritage and Internet-based art, there are surprisingly many communalities that make it possible to analyse them in similar terms and derive conservation strategies from built heritage conservation, which can enrich the conservation of internet-based art. This comparison could be even extended to software-based art or contemporary art in general, increasing the cross-sections between the various languages of conservation.

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References

Alberts G, Went M, Jansma R (2017) Archaeology of the Amsterdam digital city: why digital data are dynamic and should be treated accordingly. Inter Hist 1–14

Ankersmit FR (1993) De historische ervaring. Historische Uitgeverij, Groningen

Bundesinstitut für Bau-, Stadt- und Raumforschung, Bonn (2010) Positionen zum Wiederaufbau verlorener Bauten und Räume. Forschungen 143

Chaturvedi K, Smyth CS, Gesquière G, Kutzner T, Kolbe TH (2017) Managing versions and history within semantic 3D city models for the next generation of CityGML. In: Rahman AA, Abdul-Rahman A (eds) Advances in 3D Geoinformation // Advances in 3D geoinformation. Springer, Switzerland, pp 1–16

Chipperfield D (2009) The Neues Museum architectural concept. In: Hamm OG (ed) Das Neue Museum Berlin: Konservieren, Restaurieren, Weiterbauen im Welterbe. Seemann, Leipzig

Dekker A (2014) 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. Doctoral Thesis, Goldsmiths, University of London

Engel D, Phillips J (2019) Applying conservation ethics to the examination and treatment of software- and computer-based art. Journal of the American Institute for Conservation 58

Kuipers M, Jonge WD (2017) Designing from heritage.: Strategies for conservation and conversion. TU Delft, Delft, Netherlands

Laforet A (2009) La conservation du net art au musée: les stratégies á l'oeuvre. PhD, l'Université d'Avignon

Laurenson P (2014) Old media, new media? Significant difference and the conservation of software-based art. In: Graham B (ed) New collecting: Exhibiting and audiences after new media art. Ashgate Publishing Limited, Surrey (UK) /Burlington (USA), p 73–96

Lurk T, Espenschied D, Enge J (2012) Emulation in the context of digital art and cultural heritage preservation. PIK - Praxis der Informationsverarbeitung und Kommunikation 35. https://doi.org/10.1515/pik-2012-0048

Magagnoli P (2016) The internet as ruin: Nostalgia for the early World Wide Web in contemporary art. transformations. J Media Cult

Miksa T, Mayer R, Rauber A (2015) Ensuring sustainability of web services dependent processes. IJCSE 10:70. https://doi.org/10.1504/IJCSE.2015.067058

Provoost M (1995) Re-Arch: Nieuwe Ontwerpen Voor Oude Gebouwen. In: Stimuleeringsfonds VA (ed) Re-Arch: Nieuwe Ontwerpen Voor Oude Gebouwen. Rotterdam: Uitgeverij 010, pp 9–37

Riegl A (1903) Der moderne Denkmalkultus, sein Wesen und seine Entstehung. W. Braumüller, Vienna and Leipzig

Serexhe B (ed) (2013) Digital art conservation: Preservation of digital art. Theory and practice, 1st edn. Ambra V, Wien, Karlsruhe

Thibodeau K (2002) Overview of technological approaches to digital preservation and challenges in coming years, Kenneth Thibodeau. In: The state of digital preservation: An international perspective. Conference proceedings. Council on Library and Information Resources, Washington DC, pp 4–31

Wielocha A (2020) Collecting archives of objects and stories: On the lives and futures of contemporary art at the museum. PhD thesis University of Amsterdam

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