From the Artist's Perspective: On the Longevity of VR/AR Artworks

Myrto Aristidou and Theopisti Stylianou-Lambert

The technological leaps of our time have brought virtuality to the forefront, with technologies such as Virtual and Augmented Reality (VR/AR) becoming easily accessible creative tools for artists. However, technology itself has made VR/AR artworks a challenging category of objects for collecting institutions.

Since 2019, we have been researching the current practices of acquiring, exhibiting and preserving VR/AR artworks in collecting institutions via the *MuseumArtTech* project. Eight professionals working in institutions that engage with VR/AR artworks and five artists who use VR/AR technologies as a main art medium were interviewed, with the aim being to understand the processes, challenges and experiences of museum professionals and identify the artists' standpoint in relation to the institutional management of their artworks. This paper addresses the artists' perspective, by examining how their creative process informs, and potentially increases, the longevity of their VR/AR artworks, as well as how this process may reveal the nature of the reciprocal artist-institution relationship.

Introduction

In our digitally interconnected world, technologies such as Virtual and Augmented Reality (VR/AR) are developing as hubs, building a bridge between the real world and the digital. As the software and hardware supporting these technologies gradually mature, they are also increasingly exploited as a creative tool by artists. The technological instability and obsolescence of these technologies, however, pose a challenge for museums and other collecting institutions that are called upon to manage the artworks produced in this way. There is already an extensive body of literature investigating new media art, the general genre under which VR/AR art can be categorised; however, there has been little research and theorisation that focuses on VR/AR artworks and their relationship with collecting institutions.

In order to understand the various processes, challenges and experiences of museum professionals and artists involved with VR/AR creations, we initiated

the MuseumArtTech project in 2019, under the scope of which we conducted interviews with eight professionals working in institutions that engage with VR/AR artworks, as well as with five artists who use VR/AR technologies as a main art medium. We asked museum professionals some broad questions about the exhibition, acquisition and preservation methodologies of collecting institutions, but we also sought to gather the artists' own views about these processes. This paper focuses on the artists' views.

More specifically, we draw material from interviews focusing on two highly acclaimed VR/AR artists: Char Davies and Tamiko Thiel. Their extensive experience and their contribution to the development of both the technologies and the art genre of VR/AR help us to identify whether the artists' creative processes inform, and potentially contribute, to the longevity of VR/AR artworks, and enable us to explore how these practices reveal, and even cultivate, an artist-institution relationship.

VR/AR Art Collection and Preservation

Artists tend to respond to new media through experimentation, playfulness and critical inquiry, creating artworks that push the boundaries of the available hardware/software and which establish connections across the digital and the analogue (Post, 2017, p. 716). New media art encompasses dissimilar genres such as bio-genetic art, data art, digital animation, game art, glitch art, installations, nanotechnology, net art, telepresence and virtual reality (Grau, Hoth and Wandl-Vogt, 2019, p. 194). Since we are investigating art that is made with the use of VR/AR technologies, we first need to understand what these technologies are.

VR/AR are computer-generated simulations that offer the viewer an experience of immersion in, and/or an interconnection of, physical and virtual environments. These technologies alter or enhance the user's perception of reality and offer new immersive perspectives using computer-generated content. By employing these technologies, an artist usually creates an image space that is joined by a sensorimotor panoramic view, giving the feeling of experiencing a 'living environment' (Grau, 2003, p. 7).

New media art and, in particular, artworks developed with the use of emerging and immersive technologies seem to be flourishing primarily outside the

museum, at festivals, exhibitions, presentations and conferences.[1] However, one can argue that museums and other collecting institutions should make a more dynamic engagement with the new media landscape. The museum's role, after all, is to facilitate and safeguard key cultural products that mark a period and consequently to make them available for future generations. Nevertheless, the scale with which new media art in general is produced is not analogous to the scale with which museums and institutions exhibit, collect and discuss these artworks (Rinehart, 2016, p. 488).

As a matter of fact, museums seem reluctant to acquire artworks that make use of emerging technologies which are in danger of not functioning properly within just a few years. The complexity of digital objects often presents problems in the previously linear process of storing and exhibiting artworks in a museum collection. Maintaining and reinstalling such works may very well suggest the merging of the expertise of conservator and curator (Rinehart and Ippolito, 2014, p. 10). There is a growing number of initiatives originating from museums and other art organisations, academic institutions and platforms that examine the collection, preservation methodologies and management of new media art.[2] However, very few focus specifically on VR/AR art.

Grau, Coones and Rühse (2017, p. 21) suggest that an interdisciplinary approach seems to be better suited for exhibiting and preserving Media Art, combining ideas from Art History, Museum Studies, Conservation Theory and Media and Cultural Studies. Could we perhaps identify more stakeholders for this interdisciplinary approach? Following the argument presented by these authors, we investigate the role of artists in this discourse, focusing specifically on the cases of Char Davies and Tamiko Thiel. How can artists contribute to the institutional workings of safeguarding VR/AR Art through their own creative processes, decisions and artist-museum relationship?

1 For example, Ars Electronica, Intersociety of Electronic Arts (ISEA), Transmediale, Dutch Electronic Art Festival, European Media Art Festival, Mutek Festival in Montreal, Elektra International Digital Art Biennial, FILE, Microwave Festival, Korean Media Art Festival, the Sundance Film Festival, Siggraph and many more.

2 Among the museums and organisations dealing with these issues are Tate Modern, ZKM Center for Art and Media, Ars Electronica, Solomon R. Guggenheim, San Francisco Museum of Modern Art, New Museum, Walker Art Center, New York's Museum of Modern Art and MoMA PS1, Whitney Museum of American Art, Electronic Arts Intermix, Berkeley Art Museum and Pacific Film Archive, Akron Art Museum, the Kramlich Collection, the Zabludowicz Collection, the Majudia Collection or the Julia Stoschek Collection. Collaborative initiatives and platforms have also contributed to these efforts, such as: The Variable Media Network, Matters in Media Art, Tate's Time-Based Media Lab, DOCAM Research Alliance, CRUMB Curatorial Resource for Upstart Media Bliss, Turbulence, ArtHost, Tracks Project or the Pericles Project for Digital Preservation, to mention just a few.

Methodology

Current exhibition, acquisition and preservation methodologies and challenges relating to VR/AR artworks and the ways in which these are tackled by both collecting institutions and artists were investigated through twelve[3] in-depth, semi-structured interviews conducted within the framework of a qualitative research methodology. A number of themes and questions were identified. In this paper, we explore two key research questions: (1) Do artists working with VR/AR technologies consider the variable exhibition possibilities and the collectability of their artworks while working on them? (2) Are VR/AR artworks currently redefining the artist-museum relationship?

The museum professionals and artists were identified through the use of a strategic sampling technique (Mason, 2002, p. 124), whilst we expanded our inquiries through the snowballing technique (Wildemuth, 2009, p. 121), acquiring referrals and recommendations made by the individuals who responded to our invitation or by academic and professional acquaintances. The main challenge we faced in this process was that of identifying institutions that not only exhibited, but also acquired, VR/AR artworks.

The interviews were conducted in 2020 and 2021, with each one lasting between 25 and 90 minutes. All of them took place via Zoom or Skype, except for one interview, which was conducted through an exchange of emails. Whilst the interview protocol basically consisted of 10 semi-structured questions, these questions were sometimes revised in accordance with the interviewee's professional role, background and practice.

The research participants were: Agathe Jarczyk, Media Conservator at the Solomon Guggenheim Museum; David Neary, Project Manager, and Savannah Campbell, Media Preservation Specialist for Video and Digital Media, from the Whitney Museum of American Art's Media Preservation Initiative; Seema Rao, Deputy Director & Chief Experience Officer, and Regina Lynch, Curator of Community Engagement, at the Akron Museum; Elizabeth Neilson, Director of the Zabludowicz Collection; Anaïs Castro, Managing Director & Special Projects Curator at Arsenal Contemporary Art; and Manuela Naveau, a curator and producer at Ars Electronica. The five artists interviewed were

3 David Neary and Savannah Campbell were interviewed simultaneously. So, there were 13 interviewees and 12 interviews.

Racheal Maclean, Rachel Rossin, Rindon Johnson, Tamiko Thiel and Daniel Chudak, the Project Manager for Immersence at Char Davies's studio.[4]

The interviews were transcribed and analysed using qualitative data methodologies based on grounded theory (Flick, 2009). The strategic sampling technique was expanded into a thematic cross-sectional analysis, performed with an inductive approach (Mason, 2002, p. 141). The interviews with the artists revealed details about their creative processes, as well as about the challenges and the decisions that each artist takes while working on a VR/AR work.

For the purpose of this paper, we focus on the views and practices of two artists: Char Davies and Tamiko Thiel. These artists were selected because they have been witnessing and contributing to the development of VR/AR art from the very beginning. They have quite distinct experiences with exhibiting and collecting institutions and shared with us some interesting practical cases. Their experiences with the VR/AR artmaking process and its correlation with the future of their artworks - both inside and outside the museum space - are investigated here.

VR/AR artmaking and the institutional lives and futures of the artworks

Char Davies and Tamiko Thiel are both closely linked to the origins of Virtual Reality, working with the technology and pushing it forward as early as the mid-1990s. In that period, Davies created two highly acclaimed VR artworks, *Osmose* (1995) and *Ephémère* (1998). Thiel has been continuously creating equally highly acclaimed Virtual Reality, Augmented Reality, Mixed Reality and other immersive experience artworks since 1994. Together with Zara Houshmand, Thiel also authored *Beyond Manzanar* (2000), which was one of the earliest VR artworks to be collected (by the San Jose Museum of Art in California, in 2002). Davies and Thiel have used different technologies and methods for their immersive experiences, and these approaches have obviously played a role in the "life cycles" of their works, as well as in their specific institutional paths.

4 A consent form was signed by all participants, and their position in their respective organisations is important for this research.

Char Davies works with a team of technical collaborators in her research company *Immersense*. This multidisciplinary cooperation is particularly important, as it helps 'to digitally implement her artistic visions' (McRobert, 2007, p. 12). For the *Osmose*[5] interactive VR environment installation (Fig. 1), she and her team worked with Softimage software that ran on Silicon Graphics Onyx2 Infinite Reality, which, at the time, was a new visualisation supercomputer (Immersence Inc., n.d). Representing Char Davies's studio, Daniel Chudak, the Project Manager of Immersense, mentions that for the artist, 'the technology development was part of the work' as she was working with the best possible means to reach her vision (Chudak, 2020). The sophisticated software and high-cost components that Davies used to create her works enabled her to produce two of the most emblematic works of new media art: *Osmose* and *Ephémère.*

Both works might pose challenges in terms of exhibiting and collecting. However, Chudak explains that while it may have been challenging to exhibit them in the past, this is not the case anymore, as the artworks have been migrated to more recent components that are easier to manage. He characteristically mentions that it was 'a big operation to migrate these huge boxes [the Silicon Graphics supercomputer that contained *Osmose* and *Ephémère*] to a pretty normal PC and making it work with Vive or Oculus (HMD sets)' (Chudak, 2020). He also stresses that the artworks were not 'just a piece of software', they were a 'work of art, written in a certain way', something that made the migration process and the provision for expanding the artworks' life cycle even more demanding. The project manager adds that, luckily, many of the original collaborators who worked on these artworks were involved in this major migration and 'the main challenge was keeping the spirit [of the artworks, while making sure] that things will work better' (Chudak, 2020). After this process, which lasted for several years, the team continues to keep both artworks always updated, considering that 'when a maintenance plan is followed, these interventions prove minor throughout the years' (Chudak, 2020).

Referring to the latest artwork that Davies has been working on – once again a large artistic project that she has been developing for some years now – Chudak (2020) points out that, while developing it, they are 'taking

5 *Osmose*, created in 1995, is 'an immersive interactive virtual-reality environment installation with 3D computer graphics and interactive 3D sound, a head-mounted display and real-time motion tracking based on breathing and balance' (ADA, 1999-2020). The artwork immerses the viewer, who wears a motion-tracking vest, in a 360° virtual environment through a head-mounted display (HMD), incorporating 'the intuitive processes of breathing and balance as the primary means of navigating within the virtual world', as described on the Immersense website.

into account already what [technological parameters] it needs to be alive'. Particular attention is being paid to the maintenance of the work's legacy by keeping all the process files in a workable condition, something that was not taken into account almost 20 years ago. Significantly, the migration of *Osmose* and *Ephémère* has also made the artworks "museum ready". Davies's studio created a complete "information package" for each artwork, allowing them to be efficiently exhibited, and eventually acquired. As Chudak (2020) indicates, a close and trusted collaborator of Davies's studio acts as the intermediary between the artist and the museum, assisting in communicating all aspects of the work – technological, conceptual and practical – and discussing all relevant details for exhibiting the artworks.

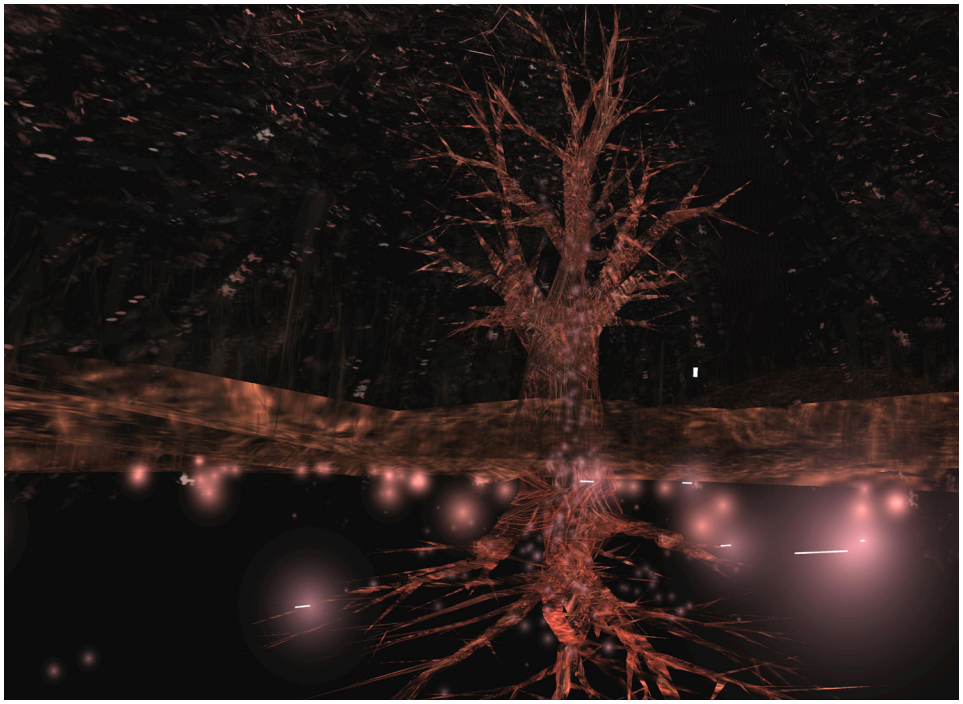

Fig. 1 → Char Davies, *Tree Pond, Osmose,* 1995. Digital still captured in real time through HMD (Head-Mounted Display) during live performance of the *Osmose* immersive virtual environment. © Charlotte Davies.

Tamiko Thiel and Zara Houshmand's large interactive projection installation *Beyond Manzanar*[6] (Fig. 2) was developed on a PC and written in an open-source language, namely the Virtual Reality Modelling Language (VRML).

6 *Beyond Manzanar* is an interactive VR installation, created by Tamiko Thiel and Zara Houshmand. It revisits the Manzanar Internment Camp, the first of over ten internment camps that were set up during the Second World War in order to incarcerate Japanese American families, based solely on their ancestry. 3D space is projected, life size, onto a wall-sized screen creating the feeling of immersion, whilst a mounted joystick allows the viewer to change viewpoints within the virtual space. A stereo sound system provides the audio and, while only one person can have control of the navigation, others can also experience the walkthrough in the same room, as described on the project's website (Thiel and Houshmand, 1998-2001).

Thiel explains how she worked with 'the best graphic card [available] at that time and literally typed it [the software code] all in the text editor' (Thiel, 2021). The artists really wanted *Beyond Manzanar* to be accessible and to have a large audience, so they made a conscious decision to use 'cheaper technology to build this world that runs on a normal computer' (Thiel, 2021).

The artwork was purchased by the San Jose Museum of Art in California in 2002 and has been part of their permanent collection ever since. When the San Jose Museum acquired the piece, they archived the artwork's software on a memory stick and the navigation joystick with all its instructions, as well as the tripod and the computer that ran the programme at the time (Thiel, 2021). The artists not only provided the museum with all the written research documents that they had gathered for the making of the artwork, but also created a walkthrough video of the experience and a scene list with detailed descriptions that they considered helpful for understanding whether 'it was working or not'. Interestingly, apart from the bill of sale of the artwork, and until the interview conducted for the purposes of this study, no further agreement was made between the museum and the artists regarding the maintenance of the work. Nevertheless, Thiel (2021) points out that she has been actively migrating and updating the software, changing it with each iteration, from the upgrades to a different operating system, with the help of a group of friends that run the company Bit Management Software.

Fig. 2 → Tamiko Thiel and Zara Houshmand, *Beyond Manzanar,* 1998-2001. Interactive virtual reality large screen projection. Installation view at San Jose Museum of Art, 2019. © 1998-2001 Tamiko Thiel and Zara Houshmand. Courtesy of Tamiko Thiel.

Thiel compares the *Beyond Manzanar* acquisition process with the experience that she is currently having with the Whitney Museum of American Art, which has acquired her *Unexpected Growth*[7] AR installation piece (Fig. 3), stressing the huge difference between the two acquisition processes (Thiel, 2021). While the acquisition of *Beyond Manzanar* was fairly straightforward, with the technology-related information and the experience of the artwork being defined by the artists themselves, the Whitney Museum, on the other hand, has an elaborate acquisition process. The ten-page 'Digital Art Questionnaire' template, which David Neary, from the Whitney's Media Preservation Initiative, shared with us during his interview, is designed to collect necessary information from the artists about the artwork that is to be acquired and it is an integral part of the museum's preservation procedures. The production history, together with the preservation and fabrication details of the artwork, as well as a section containing display and experiential details, are just some of the information that the artist is required to share.

Thiel is currently working on this documentation in order to finalise the artwork's eventual acquisition and describes it as a lengthy process. She explains that they delayed completing the questionnaire as they had to migrate the artwork's platform. Specifically, Thiel and her husband, Peter Graf, have developed the artwork's software further by using an open-source platform, ARpoise (ARpoise, 2018), which they have made available to the public. According to the artist, this was 'a big technical step' that they now also have to document (Thiel, 2021). ARpoise 'is an open-source Augmented Reality service environment that allows AR content designers to create and distribute AR experiences, and users to view location-based, image trigger or SLAM AR content that is created in Unity' (GitHub, 2021).

The ARpoise hosting platform is made available through a GitHub repository[8] in the hope of attracting a community that would be interested in contributing and helping to maintain it, as well as using it to create their own artworks (GitHubARpoise, 2021, n.d.). There is also an ARpoise app (Thiel and Graf, 2018-2021) for mobile devices, where Thiel has uploaded some of her AR artworks (however, *Unexpected Growth* is not available via this app). In parallel, she

7 *Unexpected Growth* (2019) is a site-specific AR artwork that runs on phones and tablets, which was presented at the Whitney Museum of American Art during the exhibition: *Programmed: Rules, Codes, and Choreographies in Art, 1965–2018*. The artwork 'seeks to playfully engage the public in two very serious threats to ocean ecosystems: ocean-borne plastic waste and coral bleaching caused by global warming' (Thiel and /p, 2018).

8 GitHub is a repository hosting service that manages and stores revisions of projects, being used most often for code.

has created a simplified tutorial series on how to create artworks on ARpoise to assist artists working on the *Hidden Stories* project (Dörr, n.d.) who are not familiar with the medium in the production of their artworks. Moreover, she aims to eventually incorporate this tutorial series into the main ARpoise platform (Thiel, 2021).

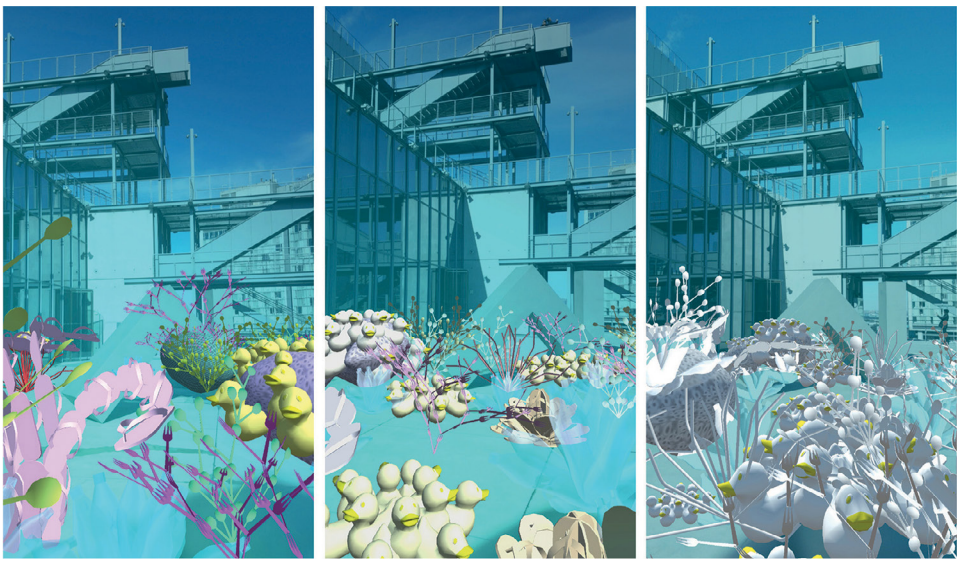

Fig. 3 → Tamiko Thiel and /p, *Unexpected Growth,* 2018. Three phases of bleaching on the Whitney Museum terrace.

Discussion

The conversations with these two VR/AR Art pioneers offered a glimpse of how artists contribute to the preservation of their VR/AR artworks, the museum's role in this process and the shifting artist-museum relationship.

Both artists were aware that the technologies they were working with were unavoidably unstable. While they each took different decisions regarding the complexity of the technology they used, they were equally prepared to work continuously to preserve their artworks. Chudak has revealed that the long migration work of *Osmose* and *Ephémère*, which was carried out internally by Char Davies's studio, has taught them to be proactive when creating new artworks. Consequently, the artist's team is now making the technology more flexible and even recording all the iterations of the work-in-progress, thus safeguarding the legacy of the piece. It seems that Thiel's choice of creating *Beyond Manzanar* in simpler software and hardware proved to be an effective decision. The artwork had the desired impact amongst its viewers, yet remained

accessible and unambiguous enough for the San Jose Museum of Art to collect it at an early stage in its development. Even though the museum did not have a protocol for the acquisition and preservation of such an artwork, the reflexive decisions by both artist and the museum professionals managed to cover the important aspects of the artwork, preserving its accessibility and longevity.

Today, we see that new media art protocols like the one that the Whitney Museum of American Art is applying are being further developed to include the intricacies of VR/AR artworks. Of the institutions that were interviewed, the Guggenheim has an equally elaborate acquisition protocol and the Zabludowicz Collection has a video art protocol that is being constantly upgraded to address VR/AR artworks, while the Akron Museum and Arsenal Contemporary Art are beginning to work on their own methodologies. It is still a work-in-progress for most collecting institutions, which nevertheless reveals a shift towards a new code of practice regarding VR/AR Art and new media art in general.

All institutions remain in contact insofar as possible with the creators of the acquired artworks, mostly for re-exhibition and preservation-related issues. Although Chudak (2020) believes that exhibiting and acquiring such artworks should be an easy process for museums, it does, of course, depend on how ready both the museum and the artists are. According to him, museums should prepare by employing technology experts capable of understanding new media artworks, as well as the artists' requirements; at the same time, artists should themselves prepare their artworks for exhibition and acquisition, defining which parameters are critical for preserving the work's artistic vision. New media artworks – and especially VR/AR artworks – have a life of their own. As their unstable technology means that they continue to be dependent on their creators, it seems that VR/AR artists remain an active stakeholder in the artwork for as long as they are around, since the technological changes have a fundamental effect on the artwork, making it hard for conservationists and curators to take decisions without the artist's agreement.

It is evident that technology has redefined artistic and museum-related practices. An inherent distinction between the institutional futures of new media art and more "traditional" artmaking is evident, demanding collaborative synergies between creators and museum professionals. In her closing remarks, Thiel (2021) stresses that the art world is a latecomer on the new media art scene, which has been developed and is mostly sustained by the academic

and engineering community. She adds that 'the art world has been dependent, especially in the past, by the theorists and curators to interpret and theorise around artworks' (Thiel, 2021) but this is not necessarily true for VR/AR artworks. In fact, 'The whole tech and New Media world have always been a lot flatter in terms of hierarchy [...] no matter who you are, you need help and advice from other people' (Thiel, 2021). The artist talks about the spirit of collaboration and the exchange of experiences, not only amongst practising artists and technology experts, but also amongst the conservation community, something that also became evident through the interviews conducted with the museum professionals in this research.

For Thiel (2021), the Whitney's archiving procedure for *Unexpected Growth* AR is important, as it includes the open-source platform that hosts the artwork itself. This could lead to a two-point preservation process, connecting the museum with the developer community. She and her husband hope to form 'a community that uses the same platform [for AR artworks]' (Thiel, 2021), consisting of creative and technically competent people who can approach the museum and suggest working together in order to upgrade the artwork's hosting platform. This community could make the works and the whole platform more stable, possibly leading to more museums or collectors becoming interested in collecting VR/AR works. This further supports the idea of a broader tech-competent community that is able to contribute to maintaining and developing the technologies behind such artworks.

Conclusion

When Char Davies and Tamiko Thiel began working with VR/AR with the exploratory spirit of technological innovators, they grasped the essence of the technological revolution of their time. They succeeded in creating emblematic works of art that communicate their socio-political, environmental and philosophical concerns, expressed through new immersive frontiers.

Their practices evidently contribute to the shaping of new institutional etiquettes regarding such artworks. Their long experience has enabled them to realise, and act upon, the need to ensure their artworks' longevity, with each of them proposing a pre-emptive practice. Daniel Chudak (2020), the Project Manager at Davies's studio, notes that recording the legacy of the artwork from its early steps, planning a regular update and making the artworks "museum

ready" could be effective practices for any new media artist. On the other hand, Thiel endorses the evolving museum protocols and also suggests a new preservation stakeholder: a broader ArtTech community with programming capacities and the willingness to collaborate.

Over the last few years, leading museums have begun building capacities for acquiring and preserving VR/AR artworks. In the case of the institutions interviewed for this research or mentioned by the artists, it seems that they are flexibly adopting practical, collaborative and non-hierarchical practices. In this context, the potential of an open-source community contributing to the maintenance and development of hosting platforms could prove invaluable for the survival of VR/AR artworks. But is the open-source community on the doorstep of the museum? In what other ways could VR/AR artists steer art museums and other collecting institutions towards more effective conservation methodologies and approaches?

Acknowledgements

This paper results from the *MuseumArtTech* project, which was funded by the Cyprus Research Promotion Foundation's 'Restart 2016-2020' programme and coordinated by the Visual Sociology and Museum Studies Lab (VSMS Lab) of the Cyprus University of Technology. We would like to thank Dr. Doros Polydorou, Dr. Marinos Koutsomichalis, and Dr. Kleanthis Neokleous for their invaluable contributions during the early stages of the research and the CYENS Centre of Excellence for hosting the authors. Finally, a huge thank you to all the interviewees, who offered their experiences, expertise and insights, which informed this research.

References

ADA – Archive of Digital Art (1999-2020) *Osmose.* Available at: https://www.digitalartarchive.at/database/general/work/osmose.html (Accessed: 4 October 2021).

Chudak, D. (2020) Interview with the authors. Skype, 21 July 2020.

Flick, U. (2009) *An introduction to qualitative research*, (4th edition). Thousand Oaks, CA: Sage Publications Ltd.

GitHub (2021) *ARpoise - Augmented Reality point of interest service environment.* Available at: https://github.com/ARPOISE/ARpoise (Accessed: 4 October 2021).

Grau, O. (2003) *Virtual Art: from Illusion to Immersion*. Chicago: MIT Press.

Grau, O., Coones, W. and Rühse, V. (2017) *Museum and Archive on the Move: Changing Cultural Institutions in the Digital Era*. Berlin: De Gruyter.

Grau, O., Hoth, J. and Wandl-Vogt, E. (eds.) (2019) *Digital Art through the Looking Glass – New strategies for archiving, collecting and preserving in digital humanities*. Krems a.d. Donau, Austria: Donau-Universität.

Dörr, T. (n.d.) *Hidden Stories.* Available at: https://hiddenhistoriesjtown.org/documentation/#!index.md (Accessed: 4 October 2021).

Immersence Inc. (n.d.) *Osmose.* Available at: http://www.immersence.com (Accessed: 4 October 2021).

Mason, J. (2002) *Qualitative Researching,* (2nd edition). London: SAGE Publications.

McRobert, L. (2007) *Char Davies' Immersive Virtual Art and the Essence of Spatiality*. Vancouver: University of Toronto Press.

Post, C. (2017) 'Preservation practices of new media artists: Challenges, strategies, and attitudes in the personal management of artworks', *Journal of Documentation*, 73(4), pp. 716–732.

Rinehart, R. and Ippolito, J. (2014) *Recollection: Art, New Media and Social Memory*. Cambridge, MA: MIT Press.

Rinehart, R. (2016) 'One of Us! On the Coupling of New Media Art and Art Institutions', in Paul, C. (ed.) *A Companion to Digital Art*. Hoboken: John Wiley & Sons, pp. 482–493.

Thiel, T. (2021) Interview with the authors. Skype, 9 March 2021

Thiel, T. and Graf, P. (2018-2021) *ARpoise: Augmented Reality point of interest service environment*. Available at: https://arpoise.com/ (Accessed: 4 October 2021).

Thiel, T. and Houshmand, Z. (1998-2001) *Beyond Manzanar*. Available at: https://www.mission-base.com/manzanar/index.html (Accessed: 4 October 2021).

Thiel, T. and p/ (2018) *Unexpected Growth*. Available at: http://tamikothiel.com/unexpectedgrowth (Accessed: 12 March 2021).

Wildemuth, B. (2009) *Applications of Social Research Methods to Questions in Information and Library*. Santa Barbara, CA: Libraries Unlimited.