Moving Spaces
Enacting Dance, Performance, and the Digital in the Museum
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Into the Space of the Digital Museum

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Abstract This chapter explores the space of the digital museum, by which I refer to the space generated by digital art and the hybrid space produced in the experience of encountering collections through technology. I will showcase a number of artworks and digital platforms showing that digital museums spaces tend to be augmented, performative and relational, operating as microscopes, by bringing visitors closer or even inside artworks, and/or as telescopes, making it possible for visitors to experience remote artworks or heritage sites. These new spaces, I will explain, form deep spaces that can be encountered both inside and outside the museum, constantly renegotiating the visitor's continuous repositioning of their own presence across different temporalities and spatial configurations.

Keywords Museum. New media art. Virtual. Augmented and mixed reality. Presence. Deep space.

This chapter analyses the space of the digital museum. By space I refer not so much to the architectural space within which the museum and the collection physically reside, but the space of digital art as well as the hybrid place produced in the experience of encountering collections through technology. I use an inclusive definition of the term digital, encompassing a wide range of technologies, including virtual, augmented, and mixed reality, as well as websites and web-based mobile apps, to show how the use of digital has radically modified the space within which visitors encounter collections inside the museum and beyond.

1 The Place of the Museum

Over thirty years have passed since Eilean Hooper-Greenhill explained in *The Space of the Museum* (1990) how internal and external museum spaces frame the way in which collections are grouped and exhibited, thereby defining how learning takes place. Ten years later, John Falk and Lynn Dierking's *Learning from Muse-*

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ums (2000) shows that learning in the museum is highly subjective and dependent on situated socio-physical contexts which include the before, during and after of the visit (2000). Building on Hooper-Greenhill's suggestion that knowing in the museum is grounded in "the three-dimensionality of the knowledge-environment" (1990, 29), Falk and Dierking showed that physical context not only informs what happens in the here and now of visiting but also shapes long-term memories of the visiting experience (2000). This chapter expands on both texts by looking into what becomes of the space of the museum when the museum experience is digital, by which I mean that the museum may be online, or that the artwork experienced may be digital, or that a non-digital collection may be experienced through a range of digital platforms.

The fact that over the last forty years, museums have become increasingly invested in digital and new media art, terms which I will use here interchangeably, has led to the integration of often complex hybrid works into exhibitions and/or collections, as well as the establishment of organisations exhibiting and/or preserving primarily digital and new media artworks, such as the Ars Electronica Center in Linz (1979), which hosts a permanent collection and a yearly festival; the ZKM Center for Art and Media in Karlsruhe (1989), which also hosts a collection, as well as yearly events and exhibitions; LIMA (2013; previously known as NiMK), which acts as a centre for the documentation, preservation and distribution of digital artworks; and Rhizome (2003), an organisation championing born-digital art and culture through commissions, exhibitions and preservation projects. This shows that organisations have been created that solely exhibit and preserve these kinds of works. Innovation in the field has had such a significant impact on the sector that it transformed not only *what* and *how* museums exhibit, but also *where* audiences experience and, to some extent, coproduce these works.

Museums not only host digital and new media artworks, but they also promote active participation in their collections through the use of a range of digital platforms, both in the galleries and online. This has led to a shift in the museum sector from technologies and discourses of the gaze to technologies and discourses of immersion and presence. Visitors are no longer just meant to look at a collection; they are encouraged to experience, document and share it. How they construct their presence in these exhibits then becomes of paramount importance even in considering the design of new museum spaces. Moreover, museums have become increasingly networked, often using third party platforms for dissemination as well as for exhibition, both inside and outside of the museum. Building on findings in new museology (Vergo 1989), a new field of study has emerged, devoted almost entirely to the analysis of virtual, augmented, mixed reality, net-based, and mobile museum experiences. These studies found that museums are now literally both "physical and virtual, fixed and mobile, closed and open" (Bautista, Balsamo 2011). They are both places for individual visiting, and social spaces of interaction and participation, increasingly invested in the delivery of audience-centred experiences (Simon 2010, 2). These, in turn, encourage visitors "to contribute their own ideas, objects, and creative expression to the institution and each other" (iii). In this sense, museums are becoming increasingly "distributed", consisting of off-site programmes in libraries, community spaces and schools (Bautista, Balsamo 2011). They no longer occupy just one but multiple spaces. Their place is complex and mul-

tifaceted, not only from a learning perspective but also from a social perspective. Visitors are no longer just encountering collections inside the museum, they access them anywhere and at any time. Acting as prosumers, visitors play a much more active and pervasive role in the functioning of the exhibitionary apparatus.

Building on sociologist Michel de Certeau's distinction between place, implying "an instantaneous configuration of positions", and space, formed by "vectors of direction, velocities, and time variables" (1984, 217), which led to the well-known statement that "space is practiced place" (217), I suggest that some of the most interesting qualities of the digital museum space are augmentation, performativity and relationality. Thus, the digital museum is 'augmented' in that it overlays different and sometimes remote places, in which visitors re-construct their presence by moving between archival or imaginary spaces; it is 'performative' in that visitors activate these spaces, literally becoming the performers of the work; and it is 'relational' in that visitors document and share their experiences of multiple works with others, both in the galleries and through social media. By exploring what becomes of the visitors' presence in this context, I show that these augmented, performative and relational spaces are reshaping not only how visitors engage with art and heritage but also how they construct and think of their own presence spatially and temporally. Crucially, within these spaces, the digital operates as a microscope, by bringing visitors closer to or even inside the artwork, or as a telescope, by making it possible for visitors to experience remote artworks, offering, therefore, access to sites which would otherwise, for various reasons, be inaccessible. These complex hybrid spaces do not exist per se but are practiced through the continuous reconfiguration of the visitors' sense of presence within them, and the subsequent physical and mental movement involved in achieving this.

2 Constructing Presence

The concept of presence is crucial to understand the operation of the digital museum, for presence literally facilitates the visitor's inscription within the complex hybrid spaces formed by the experience of digital and/or new media art. Presence has been researched in a wide range of contexts and disciplines, including computer human interaction, which is most pertinent to this study. Conventionally, the functioning of presence in virtual environments indicates the degree to which participants feel that they are somewhere other than where they physically are while experiencing a computer-generated simulation (Sheridan 1992a; 1992b; Slater, Usoh 1994). It follows that the concept of presence in virtual reality is not so much concerned with aura or awareness of self or other, but rather with "the *illusion of being here or there*" (Biocca 2001, 550; emphasis in the original).

While presence may be linked to immersion, it is important to note that presence and immersion do not coincide. Mel Slater and Sylvia Wilbur describe immersion in a virtual environment as a quantifiable aspect of a display technology, while presence refers to "a state of consciousness, the (psychological) sense of being in the virtual environment" (Slater, Wilbur 1997, 604f). For Slater, the experience of presence is "a human reaction to immersion" which means that, given the same level of immersion, participants may still experience presence in different ways (2003). Moreover, it

is known that it is not necessary for users to feel completely immersed to perceive presence, suggesting that "low immersive technology can create high presence" (Seichter in Wang et al 2009, 48).

There is evidence that presence may also be produced in response to mediations generated by artefacts, both physical and conceptual, "between actors and between them and objects both near and remote" (Mantovani, Riva 1999, 541). This proposition constitutes an understanding of presence that is "relational and interactive" (541). What is particularly interesting in this context, is that virtual, but also augmented and mixed reality environments in which presence is experienced can consequently be described as "networks in which people and things construct themselves mutually" (541). Such networks suggest that a sense of presence may therefore be a response to behaviours and relationships that arise within an ecology in which the actor, or participant, defines and co-constructs, with and in relation to others, their place in the world.

Presence is a key measurement not only for virtual but also for mixed reality environments. By comparison with virtual environments, mixed reality environments present a higher complexity in that they tend to be composed of multiple displays and adjacent spaces (Benford et al 1998). One of the most common factors affecting presence in mixed reality is the co-habitation of physical and simulated elements, and the transitions from one to the other. Another is the presence of multiple entities and people. When reflecting about presence in mixed reality, versus presence in virtual reality, it is therefore important to note a shift towards "social action, interaction and construction of meaning", as multiple and often "interacting users" inhabit environments with material objects engaging a range of senses (Wagner et al 2009, 249). Social presence, the feeling of being with another person and presence, the feeling of being in a place, brought together, have been described as producing co-presence (Ijsselstein, Riva 2003), and it is co-presence that is a very important parameter for the understanding not only of what users experience in mixed reality but also how they co-operate in playing along with the illusion generated through it in the increasingly collaborative space of the digital museum. Thus, ultimately a sense of co-presence is a crucial parameter not only for the augmented, performative, and relational aspects of visiting digital museums, but also for connecting museum visitors to each other.

3 Entering the Digital Artwork

Digital and new media art comprise a wide range of artworks which include computer art, net art, interactive art, film, photography, synthetic music, telepresence, augmented, mixed and virtual reality, bioart, robotic art and cyborg art, among others. In investigating how best to exhibit and preserve these works, curators have made significant discoveries about these works' characteristics and behaviours. Among others, they found that the preservation of these works tends to be reliant on their "network of care" (Dekker 2019). This, more and more often, includes artists and curators as well as audiences who are not only viewing or participating in the artworks but also sometimes literally contributing to generate them. Hence, digital art should be viewed as a hybrid space inhabited by users who can be variously asked to act as a participant, spectator, consumer, prosumer, explorer, visitor and

even a curator or conservator of the work. The visitor of the digital museum often adopts multiple roles, sometimes over prolonged periods of time.

The space produced by the digital artwork is complex, hybrid, and multiple, consisting of the site in which the work is placed, which may be a building, a city, or a browser; the space in which the work is activated and in which the user is present; and the legacy-space in which users share the work with others, and which survives the live phase of the work. A good example is Blast Theory's *Day of the Figurines* (2006), a massively multiplayer game for text messages set in a fictional town in which players respond to tasks often based on locations in the game and to each other over a period of 24 days in the attempt to stay alive. Another is *Rider Spoke* (2007), also by Blast Theory, in which riders cycle across a city while searching for hiding places in which to leave personal recordings for others to listen to. Both works produce an augmentation of the world of the user who switches between being a listener, a spectator and the protagonist of the work.

Digital artworks are often activated or even defined by the user's input, as in Mark Napier's multi-user space *P-Soup* (2001), which uses algorithms to generate graphics when visitors click the artwork, and Andy Deck's *Open Studio* (1999) which consists of a common interface where users can work in real time on the same image (Paul 2008, 61). The fact that the input is generated by users explains why digital art tends to produce highly subjective experiences in which users operate as performers, actively consuming and producing the content of the work. In this sense, the space of digital often coincides with the space of the viewer.

Many digital artworks take place online, as is the case of Erica Scourti's *Life in AdWords* (2012), which exposes how Google uses algorithms to translate personal information into consumer profiles that advertisers pay access for, or Amalia Ulman's four-month Instagram and Facebook performance *Excellences & Perfections* (2014) in which Ulman fabricated a relatable fictional persona whose stories unfolded through social media over a period of time. Comments by the public, which in Ulman's case was unaware that it was witnessing a performance, contribute to producing the environment of the work. In this sense, these kinds of works often generate multiple audiences who variously spectate, perform, interact with and for each other.

A work that responds not just to one but multiple visitors by capturing and replaying their presence live is Raphael Lozano-Hemmer's *Zoom Pavilion* (2015). Developed in collaboration with the architect Krysztof Wodiczko, *Zoom Pavilion* is an interactive audiovisual installation featuring thirteen computerised surveillance cameras analysing the public's behaviour through facial recognition software and projecting their images on three walls **[fig. 1]**. For Lozano-Hemmer, the work is "at once an experimental platform for self-representation and a giant microscope to connect the public to each other" (Lozano-Hemmer, n.d., 3). The landscape which is produced by the visitors' presence is formed by wide shots as well as close-ups, in a "fluid state of camera movement" (3), so that visitors are always present *twice*. Not only are visitors within the exhibition space, they have also *become* the exhibition space. Simply *being* in this space, however, is not neutral – visitors here are treated as suspects, their proximity is detected, even though the charge is unknown.

The world captured in Lozano-Hemmer's *Zoom Pavilion* shows what may become possible through the metaverse, the persistent shared digital world in which people work, socialise, play sport in, under a condition of permanent surveillance. As museums too are entering the metaverse, future vis-

Figure 1 Rafael Lozano-Hemmer in collaboration with Krzysztof Wodiczko, *Zoom Pavilion*. 2015. © Rafael Lozano-Hemmer

itors will most probably be able to encounter, purchase, create or even preserve art in the metaverse. Operating simultaneously in the metaverse and the physical world, visitors are likely to become present across multiple physical and digital spaces, performing several roles, often in collaboration with others, forming part of different on- and off-line communities. Art produced in the metaverse might require new types of exhibition, curation and conservation strategies. Metapurse, for example, the NFT funded Singapore-based cryptocurrency Metakovan, is planning to build a virtual museum as a home to Beeple's (aka Mike Winkelman) *Everydays: the First 5,000 Days* (2021), the first standalone NFT (non-fungible token) artwork to be sold at auction (Stoilas 2021). Here, people would not only be able to access the work through a browser but also experience it in virtual reality, showing how future digital museums may emerge in response to or as a consequence of the creation of a digital artwork.

To sum up, digital artworks often consist of augmentations, whether of an everyday space (*Day of the Figurines* and *Rider Spoke*), or a museum gallery (*Zoom Pavilion*), superimposing digital and physical spaces. These augmentations are activated by visitors who become the performers of the work. What is exhibited is no longer an object, but an environment (*P-Soup*, *Open Studio*, *Zoom Pavilion*), which responds to one or multiple users who often find themselves literally inside the artwork. These environments may disclose important findings about the technologies that form them (*Day of the Figurines* and *Life in AdWords*), shedding light on how these technologies shape our presence and construct how this is interpreted by others (*Zoom Pavilion*). The overlay of physical and digital environments makes it sometimes difficult to disentangle art from life itself (*Day of the Figurines*, *Rider Spoke* and *Excellences & Perfections*) and to differentiate between the object of art and its circulation (*Excellences & Perfections*). The fact that some of these works are archival in nature (*Rider Spoke*, *Excellences & Per-*

fections, *Zoom Pavilion*), occur online (*P-Soup*, *Open Studio and Excellences & Perfections*), and take place outdoors (*Day of the Figurines* and *Rider Spoke*) has inspired museums to redefine their collection and exhibition practices by looking specifically at the relationship between the collection and the archive, the galleries and the web, the inside and the outside of the museum, the work of art and the metaverse, the self-referential universe in which museums are increasingly also exhibiting themselves exhibiting.

4 Re-Locating Collections

In addition to hosting digital artworks and engaging with their documentation and conservation, museums have also been exploring novel ways of encountering non-digital collections which have often involved the use of virtual, augmented, and mixed reality, and, in more recent times, artificial intelligence (AI). Here, I show how these practices have led to novel forms of visiting which are immersive, performative and encourage relationality, making it possible to visitors to encounter artworks under different spatio-temporal conditions and reconstruct their presence in these contexts.

From a technical point, virtual reality can be delivered in three ways: firstly, in an immersive or inclusive way (through goggles, gloves or datasuits). In this case, the participant feels as if she or he is inside the graphic, or virtual world. Secondly, it can be delivered through a desktop virtual reality, which involves viewing the 3D world through a window or a screen. The third way of delivering virtual reality is through third-person virtual reality, in which one views and steers an image of oneself interacting with other elements in the virtual world (Tice, Jacobson 1992, 281). All three delivery systems, which are concurrently used in the museum sector, refer to three-dimensional visual worlds in which a viewer can interact with the environment and the avatars or agents this may contain as if he or she were present "inside the image" (Robins 1996, 44; emphasis in the original).

Some museums have embraced the term 'virtual' to describe a wide range of practices which span from the introduction of digital and primarily web-based to the use of immersive practices taking place in virtual and, increasingly, augmented and mixed reality. One of the first museums which called themselves virtual was the WebMuseum in Paris, founded online in 1994 as the WebLouvre. This was the first of a number of initiatives in Europe, the USA, Canada and Asia which showed the potential of web museums to make visible vast quantities of items in their collections. Subsequently Google Arts & Culture, established in 2011, started to take high resolution images from galleries from all over the world to create novel forms of engagement with collections and to make it possible for them to bring together dispersed artworks. This was the case in their collaboration with the Mauritshuis Museum (2018), and subsequently seventeen other museums, in which the Google Arts & Culture high resolution images were used to create a virtual exhibition of Johannes Vermeer's work.

Virtual museums can engage different or even all senses. Thus, Wendy Mackay in her 1998 study of virtual reality applications in the museum context talks about the early use of head mounted displays in the late 1960s through which users could "hear and touch artificially created objects and become immersed in virtual computer environments" (Mackay 1998). One of the earliest examples of virtual reality, *Sensorama*, conceived by the Amer-

ican inventor Morton Heilig in the 1950s, was called an "experience theatre" (Mackay 1998). An immersive, multi-sensory machine, the *Sensorama* involved different senses. Viewers could watch films such as *Motorcycle*, sense the movement produced by steering, hear the sound of traffic, feel the breeze of the wind and even smell the pollution. Museums have since continued to explore the creation of multi-sensory experiences aimed at widening visitors' encounter with art from a phenomenological point of view. An interesting example is the Shitang Village created in the Taizhou Museum (2016) whose *People at the Seashore* exhibit of a typical fishing village in Shitang, Taizhou, shows local houses and immerses visitors in "the sound of waves, the touch of sea breezes, the odor of fish mixed with breezes and flavour of small dried fish" (Wang 2020, 4). The *Shitang Village*, like the *Sensorama*, constitutes increasingly life-like immersive stages onto which visitors become the performers of the work.

Increasingly, virtual reality is used to create a sense of immersion in habitats or environments which no longer exist, so as to enrich gallery spaces or to literally make it possible for visitors to penetrate the artwork and explore it from within. An example of the former is the *InstaVR* platform which was used in the Renwick Gallery at The Smithsonian in Wonder 360 (2015) to show a collection of site-specific, gallery-sized installations produced by nine artists. An example of the latter is the Shanghai Museum's *China's Treasures: Episode 5; Ancient Chinese Landscape Paintings* presented in VR (2020), which allows visitors to meander within ancient Chinese paintings.

A number of museums have used virtual reality from a conservation point of view, to provide contextual information about the lives of artists or to preserve sites at risk of destruction. An example of the former is Tate Modern's *Modigliani Retrospective* (2017), in which visitors could explore a 3D model of Modigliani's studio in Paris and learn more about the artist's life and technique. An example of the latter is Sarah Kenderdine's *Pure Land: Inside the Mogao Grottoes at Dunghuang* (2012), which immerses visitors into the heritage of Dunghuang's Buddist grotto temples, letting them inspect the paintings in great detail and, thanks to a collaboration with the Beijing Dance academy, even watch the painted dance scenes come to life **[fig. 2]**. The work, which was shown in VR, AR, HMD and full-dome, showcased how this technology would work for presentation as well as for conservation.

More and more often, especially after COVID-19, museums have started to create exhibitions to connect remote audiences to their collections and each other, exploring, for example, the possibility that visitors at the Tate could experience the collection of the Shanghai Museum and viceversa, facilitating intercultural exchanges during the visiting experience either through the use of apps or immersive environments (Benford 2020). For both museums this kind of project makes it possible to generate new audience experiences, relating to different art histories while also supporting novel forms of engagement.

Increasingly, museums have started using augmented and mixed reality as a way to enable access to elements in the collection which are difficult or impossible to access. Both are often used in conjunction with gameful components, to enable the connection between the experiential and the interpretative aspects of learning. The terms come from Paul Milgram and Fumio Kishino's taxonomy of mixed reality displays, which includes the "virtuality continuum" that covers a spectrum of different forms of mixed reality from purely physical environments at one extreme to purely virtual, or digital, en-

Figure 2 Sarah Kenderdine and Jeffrey Shaw in collaboration with the Dunhuang Academy, *Pure Land Inside the Mogao Grottes at Dunhuang*. 2012. Photographer: Catherine Leutenegger for the Laboratory for Experimental Museology. © Sarah Kenderdine

vironments at the other. In between these two extremes lie augmented reality, i.e. physical environments that are enhanced with digital information, and augmented virtuality, in which virtual environments are superimposed with physical information (Milgram, Kishino 1994). With the advent of the HoloLens, Magic Leap and other similar devices, it is most likely that in years to come digital and physical exhibits will cohabit and digital versions of both could be experienced in multiple locations, including the visitors' own homes. Crucially, augmentation through mixed reality enables visitors to inhabit multiple worlds concurrently and to experience elements of the collection that are not visible to the naked eye, or that have deteriorated or been destroyed.

An interesting use of augmentation allowed audiences to learn from a curator figure about the use of complementary colours in a painting by the French artist Jean Baptiste Camille Corot. This included the sight of a 'pentimento' in the work which could not be seen without the augmentation (Tillon 2010, 69). Likewise, at SFMOMA's *René Magritte: The Fifth Season* (2018), a project developed in partnership with Frog Design, the final room in the exhibition was designed to be an augmented reality gallery, which allowed visitors to interact with digital reinterpretations of Magritte's works. Interestingly, this augmentation required no smartphone or headset and instead used stand-alone windows which contained depth- and motion-sensing cameras integrating images of the viewers within Magritte's paintings (Kraus 2018). Another compelling example of an augmented museum is *The Met Unframed* (2021), a mobile only experience which offers immersive access to digital galleries augmenting some of the most famous artworks at The Met. Using Verizon 5G Ultra Wideband, *The Met Unframed* features over ten galleries which evoke The Met's actual galleries, and nearly fifty artworks, inviting visitors to play games that unlock augmented reality versions of the work that could be then exhibited at home for 15 minutes. The games include

trivia, riddles and a 'zoom and sport' challenge and a game called 'analysis', using The Met's infrared and XRF conservation documentation scans, which give users a glimpse of underdrawings and other hidden details of well-known Met paintings. These encourage close observation and disclose elements in the works which are not visible to the naked eye. Interestingly, *The Met Unframed* offers some of the most complex experiences of augmented visiting and has shown to produce fairly sustained engagement (Davis 2021).

Museums nowadays also often take advantage of visitors' own devices by offering self-paced tours on smartphones. Thus, *Streetmuseum*, created in 2010 by the Museum of London, is a location-based application that allows users to overlay physical locations with historical photographs as they travel around London. Among the most interesting and widely used tours are those hosted by Google Arts & Culture which were developed with partner cultural organisations all over the world. Thanks to their collection of high resolution images, Google Arts & Culture offers 'microscope views' which means people can zoom into masterpieces and analyse a feature or a hidden detail in great detail, explore a virtual gallery 'in your pocket' and so literally wander around some of the best known art at home, as well as have various encounters which, for example, allow users to create selfies to study their resemblance to well-known works, solve artistic jigsaw puzzles, and bring culture and specimen to life with augmented reality. These initiatives are aimed at bringing visitors into closer contact with the art, facilitating playful engagement with the collection and (re-)building their sense of presence in relation to it.

Of course, much of the future of the digital museum is likely to depend on innovation brought on by research in AI. Google's use of AI to recreate historical streetscapes using deep learning and crowdsourcing can give people the feel of what it was like, for example, to walk through Manhattan in the 1940s (Kiveris 2020). While Google Street View allows people to explore a terrain or map, Google's latest experiment allows users to travel back in time through the browser-based toolset *rə*, an open source scalable system running on Google Cloud and Kubernetes that reconstructs cities from old maps and photos. *Rə*, which intends to refer to principles of "reconstruction, research, recreation and remembering" (Kiveris 2020), could therefore potentially allow visitors to re-enact past experiences or experience an environment that is far away as if they were present within it.

AI is also used to explore personalised tours of collections through chatbots and to research archives, recognise features, track audiences and even reintroduce visitors to artists who may have died long ago. Thus, the *Dalí Lives*[1] at the Dalí Museum, created in partnership with Goodby Silverstein and Partners in 2019, uses AI to allow visitors to interact with a life-like Salvador Dalí on a series of screens through the galleries in the museum. As pointed out by Jeff Goodby, the Co-Chair of the company, what we see is not an actor or a person wearing makeup, but Dalí himself (*Dalí Lives*) whose uncanny presence is reconstructed from a series of photos and films.

In the future, AI might become a strategy for curation. A pilot project used a robot to develop 64 different curatorial statements based on data from the Whitney Museum of American Art and the Liverpool Biennial (Cascone 2021). The project, hosted on Artport, the Whitney's portal dedicated to commis-

1 https://thedali.org/exhibit/dali-lives/.

sioning and displaying web-based art which has been curated by Christiane Paul since 2001, is a collaboration with art collective Ubermorgen, digital humanist Leonardo Impett and the curator Joasia Krysa. Upon entering the site, each click produces "a new biennial universe" (Cascone 2021), showing the creative potential of AI not only to create art, or to preserve it, but also to curate displays and exhibitions using works from different museums.

5 Conclusion

These examples illustrate how museums have been experimenting with a range of technologies to generate novel kinds of encounters with artworks and heritage, so as to develop more participatory immersive experiences. Some of these experiences augment the world of the viewer by relocating them to places which no longer exist, or are too remote, or dangerous. Others encourage them to experience an artwork from within or see elements of it which are not visible to the naked eye. Some encourage them to relate an exhibit to the physical world or offer a multisensory experience. Others yet make it possible for them to adopt multiple roles and even create and/or curate their own exhibits. Some platforms use all these strategies concurrently, turning the act of visiting into an active experience in which visitors become the performers of the work, often in collaboration with other visitors.

As a consequence of the introduction of digital art and/or digital platforms, museum spaces are not only changing, but they are also literally characterised by shifts and movements. Museum spaces, overlaid with exhibition spaces which have conventionally been constructed as sequential (chronologically or by school or artist or theme), with a clear beginning and end, and an intended order (Hein 1998, 27; Black 2005, 148) as well as, more recently, relationally (Bourriaud 1998) to facilitate exploration and meandering, are being overlaid with augmented, performative, and relational 'deep' spaces. Within these deep spaces, which are occupied not only in the museum but also, increasingly, in the metaverse, outside of the museum, visitors continuously reposition themselves in time and space, recreating their presence, and so their *self in the world* accordingly.

In conclusion, the space of the digital museum acts both as a microscope and telescope. It augments, enlarges, brings closer, lets visitors penetrate the work of art or the item of heritage so that they can become part of it. The space produced by the digital museum is hybrid and continuously shifting. It is a space that constantly changes, relocating visitors interacting with artefacts and each other between the physical and digital world. Here, visitors do not only learn about art or heritage, but also adopt multiple roles through which they coproduce that art or that heritage. What is at stake here is not only the art or heritage but their own act of 'presencing' in relation to them. It is important to remember that while these spaces are said to be accessible to all, a large part of the world population still has no access to computers or the web. Hopefully, the digital museum of the future can address this inequality so that being present in these new kinds of *deep visiting spaces* becomes more of a right and less of a privilege. These new spaces could then be used to create novel histories of art, bringing to the fore new collections or even art and heritage which has not yet been collected that will help visitors to rewrite not only the history of art or even history more broadly but also their presence within that.

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