

**Mixed Reality in the Museum:
A Profile of Six Western Museums and How We Experience
Art and Learning through Technology**

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Introduction

Both Virtual Reality (VR) and Augmented Reality (AR) systems aim to enhance the way a viewer interacts with a space, an experience, or a concept of their lived reality. VR is a term designated to describe the creation of an artificial environmental experience constructed by sensory stimuli generated from a computer. By wearing a headset, VR aims to generate a reality for the viewer that only exists through a digital screen, and not in real life. In this manner, the reality VR promotes is entirely constructed—it is a virtual creation and does not exist apart from the viewing lens. In contrast, AR is a term of enhancement: AR systems do not construct new realities; rather, they enhance or manipulate the current reality for viewers to experience anew by overlaying digital information onto the existing reality. Both VR and AR rely on sensory manipulation (sight, sound) to alter the viewer’s perception of what is the real environment, and further, how the viewer is able to interact with that environment.

In the museum arena, both VR and AR are being utilized at an increasing rate by curators and museum technicians as mechanisms through which art is able to come alive to viewers in ways it perhaps had not been able to previously. Through the “machine vision” offered by VR/AR, viewers are capable of experiencing artwork or exhibits in an interactive, individualized way—often allowing the visitor to come closer or to look closer at pieces they otherwise would not be able to do so. The following six museums --- Portland Museum of Art, SF MoMA, the California Academy of Sciences, the Seattle Art Museum, the Natural History Museum of Los Angeles, and

the Denver Museum of Nature and Science --- using VR/AR technology in innovative ways to create new, immersive environments for audience viewing. Their work is proof of the rising interest in interactions between technology and art, and is capturing audience attention across the American West through reality construction, enhancement, and manipulation.

I. Portland Museum of Art

In 2017, the Portland Museum of Art featured four VR video installations created by the Los Angeles-based media artist Jennifer Steinkamp. The projections— *Orbit*, two works from the *Judy Crook* series, as well as *Kamp Tree*— were intense in their animated, virtual detail, and were shown at very large scale so as to enhance the architecture of the spaces in the museum which housed them. *Kamp Tree* displayed a tree full of vibrant leaves and blossoms created in collaboration with the children from a camp at the Hammer Museum in Los Angeles and the Portland Public Schools. Though the smallest in scale, *Kamp Tree* served as the entrance to the exhibit. *Orbit*, which encompassed an entire gallery wall itself, was the centerpiece of the exhibit, and depicted the “celestial mechanics of a planet spinning through its year.” The two works from the *Judy Crook* series— both representing trees undergoing seasonal transition as well, though in a darker manner than *Kamp Tree*— occupied the wall perpendicular from *Orbit*.

The largeness of the scale of these collective works prompted viewers upon entry to play with his or her own limits of perception, allowing each visitor to experience each projection uniquely. The works produced by Steinkamp centered around ideas of decay and growth, focusing on vegetative life and seasonal transition by allowing visitors to watch in large-scale format the manner in which nature tracks time. From virtual winds blowing through tree branches, to leaves and flowers experiencing seasonal change, each projection offered the spectator a digital window into which one could view time passing in the natural world. As an mixed reality environment, the projections allowed visitors to examine constructed time and its

impact on life in a breathable, animated manner— one that was both intimately engaging, as well as profound.

Sources:

<https://portlandartmuseum.org/exhibitions/jennifer-steinkamp/>

<http://jsteinkamp.com>

<https://www.lehmannmaupin.com/artists/jennifer-steinkamp>

II. SF MoMA

In the spring of 2018, SF MoMA launched into the world of AR in partnership with Frog—a design firm centered on the motto “form follows emotion”— to create an immersive exhibition entitled, *Rene Magritte: Fifth Season*. The exhibit featured more than 70 artworks in nine immersive, thematic galleries. The goal of the museum’s partnership with Frog was clear: they wanted viewers to *experience* the paradoxes present in Magritte’s later work (the artist died at 68) in ways that expanded beyond simply the act of looking. Working together, *Fifth Season* explored the shift Magritte’s art underwent during the stylistic crisis of the 1940s. It did so through the application of AR. Each Interpretative Gallery allowed viewers to interact in a visceral, playful manner with the artworks. This dynamic relationship was in part achieved through the use of “windows” in the gallery, each of which housed a digital version of an artwork by Magritte. Each window offered the viewer an altered or augmented perception of themselves—in unexpected ways. Some windows function as digital mirrors, with the viewer’s reflection not behaving as expected. Other windows serve as digital gateways— looking into one, a viewer might see another visitor instead of oneself. These windows function through the use of depth-sensing cameras and motion-tracking technology that aim to mimic Magritte’s own visual strategies. Through the innovative use of digital windows in this way, Magritte’s art served as both a portal to new viewing experiences and as a perceptual challenge that prompted visitors to engage with an unfamiliar version of themselves.

In sum, SF MoMA's partnership with Frog allowed viewers to experience Magritte's work in a temporally engaging, animate, and unexpected manner. The AR experience— as one enhancing and altering a reality that exists already— allowed viewers to feel immersed in a human-computer interaction that relied upon the visual tactics and palettes of Magritte's work itself. As a result, *Fifth Season* became more than a viewing experience; by providing engaging interaction that consistently surprised, the exhibit produced an immersive, lived experience for a delighted audience.

Sources:

<https://www.frogdesign.com/work/sf-moma>

<https://www.sfmoma.org/exhibition/rene-magritte/>

III. California Academy of Sciences

The California Academy of Sciences is an institution renowned for its ability to engage visitors of all ages in the world of science, offering exhibitions ranging from a planetarium to an indoor temperate rainforest to a living roof. This past summer, however, it grabbed audience attention through a different environmental mechanism: VR. In a *Drop in the Ocean: A Social VR Experience*, the California Academy gave visitors VR headsets to watch a 7-minute long VR video experience narrated by Philippe and Ashlan Cousteau and co-produced by Conservation International and Vision3. The video took viewers out to sea— literally. Once wearing the VR headset, the viewer was immersed in a marine environment. Inside this maritime adventure, viewers were greeted by a variety of sea life presented in exquisite detail— from microscopic organisms to a whale shark. However, the California Academy's immersive experience extended beyond a marine life learning experience. It also challenged viewers with the effects of human pollution in the ocean, and prompted each viewer to consider helping to end our destruction of marine landscapes by fighting waste disposal into the sea.

This transition from learning environment to activism was seamless in the VR experience. The viewer, after experiencing in detail the beauty and many wonders of the sea, was confronted with the destructive stark reality plastics and other pollutants have created in our oceans. After experiencing both, the viewer is then offered the chance to help, and engage in solution-seeking methods to clear the oceans of pollution. As a result, the viewer hopefully left the experience with the future aim of helping to be a “pollution solution.” Through this use of VR technology, the Academy beautifully merged activism with scientific learning through a digitally generated reality.

Source:

<https://calacademy.org/exhibits/drop-in-the-ocean-a-social-vr-experience>

IV. The Seattle Art Museum

For many, it is difficult to imagine a future when you are unable to visualize it. In its recent exhibit, *Tamiko Thiel: Gardens of the Anthropocene*, the Seattle Art Museum tackled this task through the use of AR technology its Olympic Sculpture Park. In the exhibit, artist Tamiko Thiel (celebrated for her augmented reality work) constructed an AR installation that aimed to expose viewers to a near future landscape that does not yet exist. In this enhanced version of reality, the Anthropocene—defined by the museum and artist as a “new geologic time period that bears the imprint of human activity”—came to life in an immersive outdoor environment. Thiel took viewers through the real world of the park by use of an interactive app. Looking at the park through the app on their tablet or smartphone, the viewer was provided an enhanced virtual environment abundantly filled with mutated plants. The artist invited viewers to move around this altered outdoor experience at their own pace, exploring the world as it could be seen through their devices. This new landscape was centered upon surreal growth: bullwhip kelp (a marine plant) appears floating high in the sky, whilst elsewhere street signs, no longer grounded, flew

into the air. These varied mutations seen through the app are claimed to be the result of human activity on the earth's surface, and the life growing as forms mutating in accordance with changing climate conditions due to drastic human activity.

Though striking in its unusual beauty, the ethereal landscape the artist produced allowed viewers to experience a dystopian future that could become our lived reality. By allowing viewers the freedom to interact with a virtual world, however they choose, Thiel's work served as an exemplar of how human activity can negatively transform our future planet. Moreover, it displayed the immersive freedom AR technology can provide museum spaces.

Source:

<http://www.seattleartmuseum.org/exhibitions/gardens>

V. The Natural History Museum of Los Angeles

In 2017, the Natural History Museum of Los Angeles made its historical and science-based exhibition spaces more accessible to a viewing audience by introducing machine vision to its repertoire in the form of a VR exhibit called *theBlue*, created by Wevr, Los Angeles. In the exhibit, visitors put on a VR headset and explored an artificially crafted version of the ocean. The experience—a bit like being in an aquarium, if not the open sea itself—features whales swimming above the viewer, while shimmering schools of fish dash past. The environment is not static; rather, it invoked a sense of the ocean's vastness by allowing the viewer to move up and down in elevation across the ocean's layers. The experience is interactive in this exploration: to explore a deep-sea abyss, the viewer was allowed to use a flashlight to look around at the dark world of the deep.

theBlue enjoyed success as an artificial environment in the Natural History Museum of Los Angeles to be explored by visitors. One facet of this success was found in its appeal across age

groups according to visitor surveys. While children and teens enjoyed this virtual and fun interaction with marine life, older adults also enjoy it as a first introduction with VR technology.

Source:

<https://www.marketplace.org/2017/03/21/american-museums-embrace-virtual-reality/>

VI. The Denver Museum of Nature and Science

For many, VR experiences perhaps feel a bit like a videogame, albeit one that most often is lacking a controller. The Denver Museum of Nature and Science recently took this atmosphere one step further, creating their own pop-up VR arcade. Much like a normal arcade, this pop-up experience allowed the viewer to follow their own curiosity—visitors can choose from a plethora of multi or individual VR experiences and games. One featured game was a four-person “Virtual Reality Transporter” ride. On the ride, the viewer is “transported” to one of five different adventures: Spacewalk (Danger in Orbit VR), Dive into Prehistoric Seas VR, Cosmos Coaster VR, Virtual Rush, or Apollo & Beyond VR. Due to VR goggles and use of dynamic motion and 4D-effects, the visitors are immersed in each unique experience due to multi-sensory stimuli. Another VR experience on offer is “Birdly.” Viewers, after being given a head-mounted VR display, are launched into the adventure “Jurassic Flight,” and explore a high-resolution virtual landscape as if they were flying. The experience is engaging in part due to its interactive components, but also due to its use of precise sensory-motor coupling, including headwind simulation, 3D audio, and visual impact.

Through a technical approach to sensory stimuli invocation, the Denver Museum of Nature and Science managed to create with its VR arcade a virtual arena that is full of choice, interactive elements, and convincing ulterior reality experiences.

Source:

<https://www.dmns.org/visit/exhibitions/vr-arcade/>

