

VOLUME 15 ISSUE 1

The International Journal of the

# Inclusive Museum

Downloaded on Thu Nov 18 2021 at 09:28:37 UTC

---

## Virtual Masterpieces

Innovation through Public Co-creation for  
Digital Museum Collections

CHRISTOPHER MORSE, CARINE LALLEMAND, LARS WIENEKE, AND VINCENT KOENIG



ONMUSEUMS.COM

## THE INTERNATIONAL JOURNAL OF THE INCLUSIVE MUSEUM

<https://onmuseums.com>  
ISSN: 1835-2014 (Print)  
ISSN: 1835-2022 (Online)  
<https://doi.org/10.18848/1835-2014/CGP> (Journal)

First published by Common Ground Research Networks in 2021  
University of Illinois Research Park  
60 Hazelwood Drive  
Champaign, IL 61820 USA  
Ph: +1-217-328-0405  
<https://cgnetworks.org>

*The International Journal of the Inclusive Museum* is a peer-reviewed, scholarly journal.

### COPYRIGHT

© 2021 (individual papers), the author(s)  
© 2021 (selection and editorial matter),  
Common Ground Research Networks



Some Rights Reserved.

Public Licensed Material: Available under the terms and conditions of the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International Public License (CC BY-NC-ND 4.0). The use of this material is permitted for non-commercial use provided the creator(s) and publisher receive attribution. No derivatives of this version are permitted. Official terms of this public license apply as indicated here:  
<https://creativecommons.org/licenses/by-nc-nd/4.0/legalcode>



Common Ground Research Networks, a member of Crossref

### EDITOR

Ameswar Galla, International Institute for the Inclusive Museum, Australia and India

### MANAGING EDITOR

Kortney Sutherland, Common Ground Research Networks, USA

### ADVISORY BOARD

The Advisory Board of the Inclusive Museum Research Network recognizes the contribution of many in the evolution of the Research Network. The principal role of the Advisory Board has been, and is, to drive the overall intellectual direction of the Research Network. A full list of members can be found at <https://onmuseums.com/about/advisory-board>.

### PEER REVIEW

Articles published in *The International Journal of the Inclusive Museum* are peer reviewed using a two-way anonymous peer review model. Reviewers are active participants of the Inclusive Museum Research Network or a thematically related Research Network. The publisher, editors, reviewers, and authors all agree upon the following standards of expected ethical behavior, which are based on the Committee on Publication Ethics (COPE) Core Practices. More information can be found at <https://cgnetworks.org/journals/publication-ethics>.

### ARTICLE SUBMISSION

*The International Journal of the Inclusive Museum* publishes biannually (June, December). To find out more about the submission process, please visit <https://onmuseums.com/journal/call-for-papers>.

### ABSTRACTING AND INDEXING

For a full list of databases in which this journal is indexed, please visit <https://onmuseums.com/journal>.

### RESEARCH NETWORK MEMBERSHIP

Authors in *The International Journal of the Inclusive Museum* are members of the Inclusive Museum Research Network or a thematically related Research Network. Members receive access to journal content. To find out more, visit <https://onmuseums.com/about/become-a-member>.

### SUBSCRIPTIONS

*The International Journal of the Inclusive Museum* is available in electronic and print formats. Subscribe to gain access to content from the current year and the entire backlist. Contact us at [cgscholar.com/cg\\_support](mailto:cgscholar.com/cg_support).

### ORDERING

Single articles and issues are available from the journal bookstore at <https://cgscholar.com/bookstore>.

### OPEN RESEARCH

*The International Journal of the Inclusive Museum* is Hybrid Open Access, meaning authors can choose to make their articles open access. This allows their work to reach an even wider audience, broadening the dissemination of their research. To find out more, please visit <https://cgnetworks.org/journals/open-research>.

### DISCLAIMER

The authors, editors, and publisher will not accept any legal responsibility for any errors or omissions that may have been made in this publication. The publisher makes no warranty, express or implied, with respect to the material contained herein.

# Virtual Masterpieces: Innovation through Public Co-creation for Digital Museum Collections

Christopher Morse,<sup>1</sup> University of Luxembourg, Luxembourg  
Carine Lallemand, Eindhoven University of Technology, Netherlands  
Lars Wieneke, University of Luxembourg, Luxembourg  
Vincent Koenig, University of Luxembourg, Luxembourg

*Abstract: In this study, we describe the results of a series of co-creation workshops in museums with the goal of designing future digital cultural collections. Ranging from exhibition teasers to comprehensive virtual galleries, digital collections are an increasingly prominent feature of many museum websites but remain a largely unexplored facet of the visitor experience. Building on research in museum experience design, which suggests that involving the public in the development of on-site museum spaces and technologies supports better engagement, we investigated how this translates into digital-only contexts. We invited members of the public (N = 12) to the Luxembourg National Museum of History and Art for a series of design jams to investigate how non-experts envision the future of digital interactivity with museums through a series of ideation and rapid prototyping activities. Our analysis of the workshops and resulting prototypes reveals the design space of digital collections across three continuums of experience: individual/social, creation/consumption, and complementary/standalone. We conclude with design implications, namely how museum professionals can apply these dimensions to the design and implementation of digital collections.*

*Keywords: Digital Collections, Public Co-creation, Museum Experience Design*

## Introduction

Involving the public in the design of museum spaces and technologies is a central facet of the growing participatory trend in museum experience design (Vermeeren et al. 2018). An important goal of participatory activities, such as co-creation and co-design, is to subvert the notion of authorized heritage discourse, wherein the complex and highly nuanced language surrounding ‘the past’ becomes inaccessible to non-subject matter experts (Smith 2006). This shift away from traditional didactic learning to embracing the non-linear, personal, and largely contextual aspects of meaning-making in museums has had important implications for museum interactivity *in-situ* (Falk and Dierking 2000; Hornecker and Ciolfi 2019) but remains largely unexplored in digital spaces (Perry et al. 2017).

In the field of human-computer interaction (HCI), co-creation and other participatory activities implemented throughout the design process have shown great potential for the creative exploration of a design problem, the development of new knowledge, serendipitous inspiration, and even long-term structural change in the design of interactive systems (Sanders and Stappers 2008; Díaz, Aedo, and van der Vaart 2015; Claisse 2017; Hansen et al. 2019). Building on this expanding body of research, the present study orients our attention to a largely unexplored design space: digital cultural collections, the online repositories of digitized museum assets available for free to the public.

Despite the wide availability on museum websites around the world and rapidly growing digital audiences (Gil-Fuentetaja and Economou 2019), studies have highlighted a number of important design challenges that impact the use of digital cultural collections, such as poor user experience (MacDonald 2015; Perry et al. 2017), lacking the authentic quality of ‘being there’ (Petrelli et al. 2013; Evrard and Krebs 2018), and perpetuating archaic models of museum education (Bertacchini and Morando 2013; Arvanitis 2013; Perry et al. 2017). In light of these

<sup>1</sup> Corresponding Author: Christopher Morse, Centre for Contemporary and Digital History, Maison des Sciences Humaines, 11 Porte des Sciences, University of Luxembourg, Esch-sur-Alzette, L-4366, Luxembourg. email: christopher.morse@uni.lu

shortcomings, we sought to investigate how public participation can offer new insights into the design of engaging museum technologies for the web and contribute to new avenues of visitor interaction with collections beyond traditional authoritative cultural discourse. We hosted a series of design jams at the Luxembourg National Museum of History and Art and recruited members of the public to work in teams to brainstorm and prototype novel experiences around digital cultural collections. Our analysis of the workshops and resulting prototypes yielded a number of design implications, namely an elicitation of the design space for these technologies, which can serve as an ideation tool for designers and museum professionals going forward.

## Related Work

### *Museum Experience Design*

Museum experience design has grown out of advances in the field of HCI, where current research emphasizes the importance of user-centered design, also known as user experience, in the conceptualization of museum spaces, exhibitions, and technologies (Sabiescu 2018). As institutions concerned with disseminating culture and creating value, the museum mission epitomizes many of the axioms championed by current third-wave HCI, such as meaning-making, emotions, and the experiential (Sabiescu 2018; Hassenzahl and Tractinsky 2006; Bødker 2006). In response, museums have begun to move away from being collection-centric institutions to dynamic, community-centric spaces, and cultural professionals have turned their attention to enhancing the visitor experience as a central facet of this work (Samis and Michaelson 2016; Vermeeren et al. 2018).

Despite the recent emergence of museum experience design, the concept is not entirely new to museological practice. Seminal work on visitor psychology dates back to at least the 1930s (Bitgood, McKerchar, and Dukes 2013), and since that time, a number of researchers have conducted museum ethnographies (Bourdieu, Darbel, and Schnapper 1969; Véron and Levasseur 1989; Simon 2016; Evrard and Krebs 2018), as well as cognitive and behavioral studies on museum visitors (Véron and Levasseur 1989; Dufresne-Tasse and Lefebvre 1994, Falk and Dierking 2000, 2013). Museum experience design also has continuities with the participatory turn in museums, which represents a shift toward the dynamic, and interactive aspects of the museum experience, which have implications at the level of cultural policy (Bonet and Négrier 2018; Huyssen 2019), museum internal strategies (Samis and Michaelson 2016; Huyssen 2019), and in the development of public-facing content (Diaz Lema and Arnaboldi 2020).

The participatory turn in museums advances a critical aspect of the museum-visitor relationship: as experts of their own experiences (Sanders and Stappers 2008), visitors have a unique perspective that can inform museum experience design and deconstruct notions of museums as the sole purveyors of cultural interpretation and dissemination (Perry et al. 2017; Bertacchini and Morando 2013; Taxén 2004). This is especially relevant for digital cultural collections, which have not kept pace with new social and pedagogical developments in modern museological theory that increasingly embrace user-/visitor-centered design approaches (Perry et al. 2017). Often perceived as separate worlds by museum professionals, the digital infrastructures and offerings of museums do not occupy the same design space, resulting in a lack of coherence between the material collection and its digital counterpart (Petrelli et al. 2013). Moreover, research in museum experience design for digital technologies generally focuses on technologies for the in-person visit (e.g., see Homecker and Ciolfi 2019) in spite of the fact that digital museum visitors far surpass physical visitors in the world's largest museums (Gil-Fuentetaja and Economou 2019). Understanding the design space of digital cultural collections can support the development of engaging, well integrated experiences that more accurately reflect the museum's mission in digital-only environments.

### *Collective Creativity in and around Museums*

Participatory activities in museums have contributed to a variety of design interventions for museum technologies and other interactive experiences. In order to disambiguate the

terminology, we make a primary distinction between *co-creation* as any activity of collective creativity (e.g., museum hackathon) and *co-design* as collective creativity applied throughout the design process as a whole (Sanders and Stappers 2008; Díaz, Aedo, and van der Vaart 2015). Moreover, we adopt the definition of *participatory design*, as described by Hansen et al. (2019), which indicates a long-term, self-reflective process that extends beyond design into the generation of new, sustaining knowledge or organizational structures. As such, we identify the current study as a kind of *co-creation* wherein members of the public joined designers and museum professionals for a workshop-style event to produce new knowledge.

A number of case studies have contributed to our understanding of the benefits of co-creation in museums. For example, Dindler et al. (2010) investigated children's everyday engagement with computer games as a starting point for their co-creation study, which highlighted the necessity to carefully translate between domains, that is to say, to ensure that participatory approaches build on peoples' lived experiences first and foremost in order for them to contribute meaningfully. Fuks et al. (2012) found that building simple prototypes is an effective way to understand the mental models of participants in the design process, which in turn helps museum professionals empathize more readily with their users. Researchers have also reported on the role of museum professionals as stakeholders in the design process, examining their patterns of collaboration. For example, Avram and Maye (2016) discuss a co-design process to involve cultural heritage professionals in the design of tangible interactives, such as the creation of smart objects or outdoor interactivity at heritage sites. Additionally, Ciolfi et al. (2016) reported on the unfolding of collaboration during co-design among cultural professionals. These studies advance our understanding of co-creation as a process that can be refined to match the needs of different situations. However, it is unclear to what extent this may inform the design of digital collections more specifically.

Similar to museum experience design, research in museum co-creation for digital technologies tends to focus on in-person experiences, with some exceptions. For example, a case study by Ciolfi, Bannon, and Fernström (2008) invited visitors to submit their travel photos to an interactive exhibition at the Shannon International Airport in Ireland and, in doing so, highlighted the fact that participation in museum exhibits extends visitors' role into content creators, leading to new patterns of social interaction and participation with museums. Similar trends emerge in studies that feature collaborative social media use by museums (Giaccardi 2012; Diaz Lema and Arnaboldi 2020), but many challenges remain, namely the inability to predict the success of museum social media campaigns and visitor reactions to them (Holdgaard and Klastrup 2014). Designing technologies for the Internet of Things (IoT) also appears frequently in the literature, often as a complement to a museum exhibit or heritage site (Petrelli et al. 2018, 2017, 2013; Marshall 2018). As a part of this growing trend to design for the digital, museums must also begin to consider their digital cultural collections within this larger experiential trajectory.

Most recently, studies by Gil-Fuentetaja and Economou (2019) and Olesen, Holdgaard, and Løvlie (2020) have begun to shed light on the dynamics of digital collections and related design approaches. In their work on the communication philosophies of museum collections, Gil-Fuentetaja and Economou (2019) argue that Hein's (2005) model of museum communications, which features the didactic museum, discovery museum, stimulating museum, and constructivist museum, is applicable to the analysis of museum communications online as well. Their findings suggest that museums increasingly build on the constructivist model for their digital collections, giving visitors the freedom to explore and create knowledge through their experiences. Following this shift, they emphasize the importance of participation and co-creation in future designs. Olesen, Holdgaard, and Løvlie (2020) build on this idea by using a co-creation process to design an ideation tool for digital collections: the ASAP map. Designed by museum professionals for museum professionals, the ASAP map represents an important step in connecting disparate entities within the same institution to a digital design project and enabling shared communication around it. In contrast, the present study aims to establish a deeper understanding of the design space for digital collections using participatory models inclusive of the public.

## Research Objectives

Our primary aim is to understand the design space of digital museum collections from the point of view of the public, ultimately shedding light on how museums can design technologies that better fit the needs of their communities. As such we ask the following research question: how can co-creation with the public support the design of interactive digital collections for museums?

## Research Design

The design jam consisted of two standalone sessions (N = 5 and N = 7, respectively), which we advertised to the public via the social media accounts of the Luxembourg National Museum of History and Art. Participation was free and open to the public. All sessions took place during two Saturday afternoons in the museum’s workshop space. Each session lasted two hours.

### Participants

Twelve participants took part in the study (eleven females, one male; Table 1), representing nine nationalities: English, French, Irish, Italian, Luxembourgish, Polish, Portuguese, Russian, and Vietnamese. The average age was 34.41 (*Min* = 20, *Max* = 65, *SD* = 14.68). One-third of the participants reported having visited museums two to five times in the past year, one-third had visited six to ten times, and the final one-third reported more than ten times during the past year.

Table 1: Participants

<i>ID</i>	<i>Gender</i>	<i>Age</i>	<i># Visits</i>	<i>Persona</i>	<i>Session</i>
P1	Female	33	10+	Explorer	1
P2	Female	28	2–5	Explorer	1
P3	Female	35	6–10	Explorer	1
P4	Female	65	6–10	Professional/Hobbyist	1
P5	Female	27	10+	Professional/Hobbyist	1
P6	Female	25	10+	Explorer	2
P7	Female	20	2–5	Explorer	2
P8	Female	25	2–5	Explorer	2
P9	Male	25	10+	Professional/Hobbyist	2
P10	Female	55	2–5	Professional/Hobbyist	2
P11	Female	52	6–10	Professional/Hobbyist	2
P12	Female	23	6–10	Explorer	2

Source: Morse et al.

We also asked participants to self-identify with a particular museum persona, which we derived from Falk’s (2009) five museum visitor types: explorer, facilitator, professional/hobbyist, experience seeker, and recharger (Table 2). Among the participants, 58.3 percent self-identified as explorers, and 41.7 percent selected professional/hobbyist.

Table 2: Museum Visitor Personas

<i>Visitor Type</i>	<i>Description</i>
Explorer	I am curiosity-driven with a general interest in the content of the museum. I expect to find something that will grab my attention and fuel my learning.
Facilitator	I am socially motivated. My visit is focused on primarily enabling the experience and learning of others in my accompanying social group.
Professional/Hobbyist	I feel a close tie between museum content and my professional or hobbyist passions. My visits are typically motivated by a desire to satisfy a specific content-related objective.
Experience Seeker	I am motivated to visit because I perceive the museum as an important destination on my list of things to see. My satisfaction primarily derives from the mere fact of having ‘been there and done that.’
Recharger	I am primarily seeking to have a contemplative spiritual and/or restorative experience. I see the museum as a refuge from the work-a-day world or as a confirmation of my spiritual beliefs.

Source: Falk 2009

The study received prior approval from the university's ethics committee. All participants provided their informed consent to take part, and we photographed and audio recorded each design jam session. Participants received compensation for their time in the form of gift vouchers and free tickets to the museum's special exhibition.

### Materials

The design jam had both an individual and group component. For the individual component, we provided each participant with an iPad, drawing paper, and writing utensils. During the group component, each team had access to a variety of rapid prototyping materials, such as colored markers, paper of various weights/sizes/colors, picture frames, easels, foam boards, and Legos, among others.

Prior to the design jam, we developed a series of museum inspiration cards (Figure 1) to help stimulate discussion and inspire design ideas during group brainstorming. Inspiration cards are effective tools to support the design process, particularly during the ideation phase (Kwiatkowska, Szóstek, and Lamas 2014; Halskov and Dalsgård 2006). Each card represents a meaningful experience in a museum setting, such as having a VIP experience where a visitor gets special access to a collection behind-the-scenes or fondly remembering a formative experience in the museum as a child. We based these cards on previous interviews with museumgoers about their most memorable museum visits. The front side of each card features the object or museum, and the back side reveals the overarching theme the experience represents (e.g., VIP or formative experience) as well as a verbatim quote from the interviews.



Figure 1: Museum Inspiration Cards  
Source: Morse et al.

**Procedure**

The design jam was comprised of three major parts: an introduction and icebreaker (fifteen minutes), a demonstration of the National Museum’s new digital platform (thirty minutes), and finally a design and prototyping session (seventy-five minutes).

We began with a brief introduction to the study as well as the concept of design jams more generally, which we defined as collaborative brainstorming activities or events geared toward generating solutions in a fun and creative environment (Participedia, n.d.). Afterwards, the participants introduced themselves to the group before beginning the short icebreaker activity. As encouraging creative thinking was paramount to this study, we asked participants to draw a house with their non-dominant hand and then describe their drawing to the group. The goal of this short activity was to prepare the group for sketching during the brainstorm, and using the non-dominant hand prevented anyone from feeling embarrassed about their artistic abilities.

Participants then received a short introduction to the museum’s digital collections platform, which had debuted to the public just a few months earlier. Consisting of two main sections, the digital platform allows users to access scanned images of artworks in high definition, as well as visit the museum’s physical spaces in 3D. Our study assumed no prior knowledge about digital cultural collections, and therefore, we used the museum’s new digital infrastructure as an introduction to the technology. We provided the following instructions during this portion of the design jam:

1. Using the iPad in front of you, visit the new digital collections page at the museum.
2. Browse the collection at your leisure, discovering objects of interest to you.
3. Find the painting “Femme accoudée” by Joseph Kutter. View the painting in high resolution and zoom in to see its individual brushstrokes.
4. Find the object “The true artist...” by Bert Theis. This object is not physically accessible in the museum. Instead, access the object’s exact location within the 3D tour of the museum.

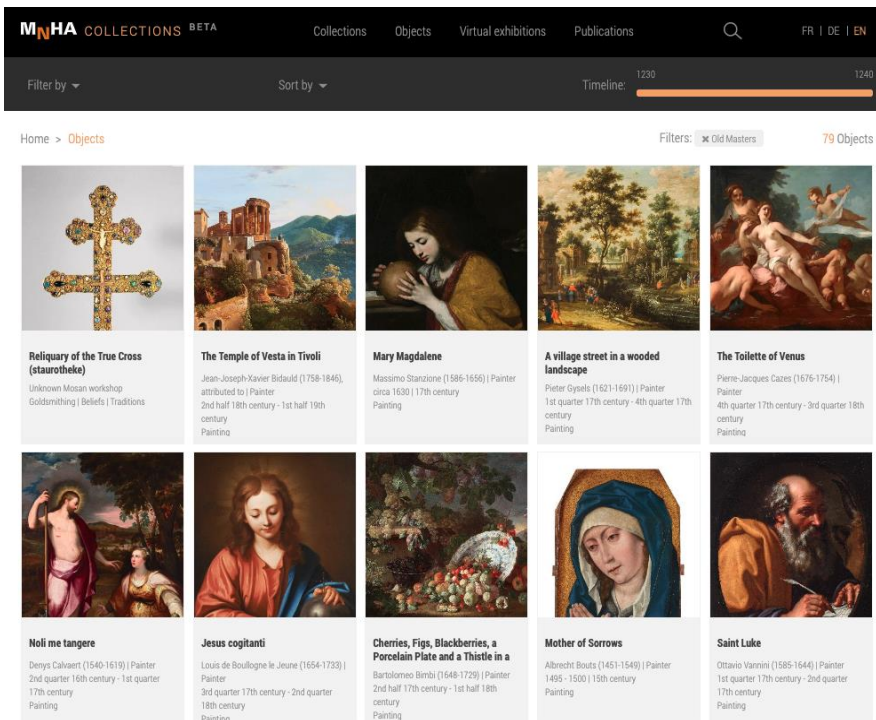


Figure 2: Demonstration of the National Museum’s Digital Collections Platform  
 Source: Luxembourg National Museum of History and Art



Participants had thirty minutes to complete this individualized portion of the design jam. During the exploration, they familiarized themselves with the digital platform by testing its various features (Figure 2). Once everyone had completed this task, we regrouped and discussed the experience, collecting feedback for the museum.

After introducing the concept of digital collections to the group, we began the ideation and prototyping portion of the design jam. We randomly assigned participants into five groups across the two design jam sessions and provided the following instructions:

1. In groups, identify a design challenge for the future of digital museum collections.
2. Then, brainstorm new kinds of digital collections that address this challenge. Assume that considerations such as time, money, and expertise are not limiting factors. For example, the year could be 3000 or the technology could be something that does not yet exist in the world.
3. Finally, using the materials provided in the workshop space, design a low fidelity prototype that represents your concept.

Before splitting off into groups, we began with a screening of the short film “HYPER-REALITY” by artist Matsuda (2016) to help inspire the groups to think outside of the box, as it can be difficult to conceptualize technology that does not yet exist. Matsuda’s conceptual work, set within a futuristic world, presents a number of different technologies, both real and imaginary, often carried to dystopian extremes. Additionally, we encouraged participants to make use of the museum experience cards (Figure 1) if they were having difficulties identifying a design challenge they would like to address. During the final seventy-five minutes of the design jam, participants brainstormed and used the various materials made available to them to construct and present their digital collection prototypes, which we discuss in greater depth in the following section.

## Results

We transcribed the audio recordings from the design jam and analyzed the results using open coding and thematic analysis. Each design jam session provided new insights into perceptions around the design and experience of digital collections. The resulting prototypes were diverse in terms of content and form, and we introduce each below.

### *Augmented Reality (AR) Migration Museum*

The *AR Migration Museum* recreates the experience of leaving a familiar place for somewhere unknown, connecting museum visitors to the lived experiences of real people across time and space (Figure 3). Using a special futuristic AR headset, visitors would have the ability to turn their surroundings into other worlds. As P2 explained, the inspiration for the migration museum idea came from the work of sociologist Georg Simmel:

This experience is cited in *The Stranger* from Georg Simmel. His theory describes what happens when somebody goes abroad—with their identity and their experiences in the host society. (P2, *AR Migration Museum*)

Central to the digital migration experience was selecting an avatar at the start of each journey. Each avatar would represent a historical individual whose life progressively unfolds as museum visitors venture deeper into the exhibition. P1 described different possibilities:

You can be a job migrant from the twenty-first century and go through the migration to Luxembourg experience. You can also be a migrant from the beginning of the twentieth century—Italian, going to America. We thought also...a Syrian refugee or a kid who follows his parents to a foreign land. (P1, *AR Migration Museum*)

The AR headset would allow participants to fully embody the historical avatars, even as far as seeing the character’s face superimposed over their own when gazing into a mirror. Additionally, elements of the character’s journey would come alive inside of rooms as AR projections, such as riding in a boat across stormy waters, first arriving at Ellis Island in New York, getting married, or going to high school. The experience would confront visitors to the complexities of immigration with the aim of teaching about peoples’ lived experiences and to generate empathy.



Figure 3: *AR Migration Museum*  
Source: Morse et al.

### *Art Remix App*

The *Art Remix App* offers visitors the chance to remix art and artifacts in an open-ended design environment (Figure 4). Visitors who access the platform encounter a blank canvas where they can add and restyle digital fragments of objects on display in the museum, such as *Mona Lisa*’s nose or a tree from a landscape painting. Powered by AI capable of identifying and meaningfully dissecting digital images, the *Art Remix App* creates a space for visitors to create virtual masterpieces of their own using familiar objects, images, and ideas.

One example the group discussed was a scene depicting da Vinci’s *Mona Lisa* rudely insulting the tourists standing around her as they complained that she was smaller than they expected or not as interesting as they thought she would be. P3 also emphasized the notion of ethics as an inspirational element in their design, leading to an app that lets you remix famous works:

It’s a question about ethics. Is it allowed to add these [insults] to any person at all? It’s ethics. Is it allowed to change some real masterpiece into something different? It’s about ethics as well. (P3, *Art Remix App*)

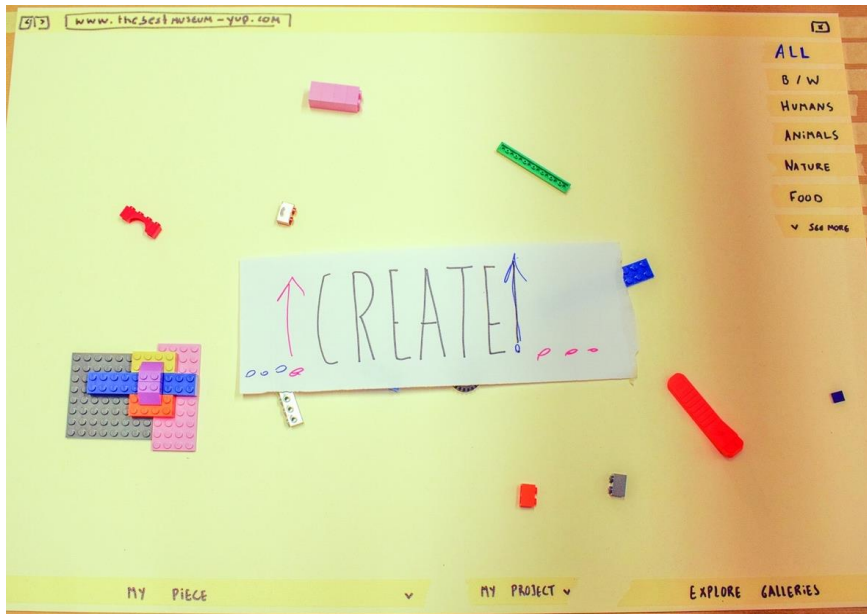


Figure 4: *Art Remix App*  
Source: Morse et al.

### *Art Storytelling App*

The *Art Storytelling App* caters to young children with the aim of connecting them to art through creative storytelling (Figure 5). P9 describes the experience as he imagined it inside of a classroom:

So now we're in class, and I'm the teacher. And every pupil will get an iPad...The idea of the project is that we want to create a narrative based on the objects in the museum...So the idea is that I pick several paintings, in our case, six paintings. And with those paintings I have to tell a story that incorporates all of the paintings. Not just one but a story for all of the paintings. (P9, *Art Storytelling App*)

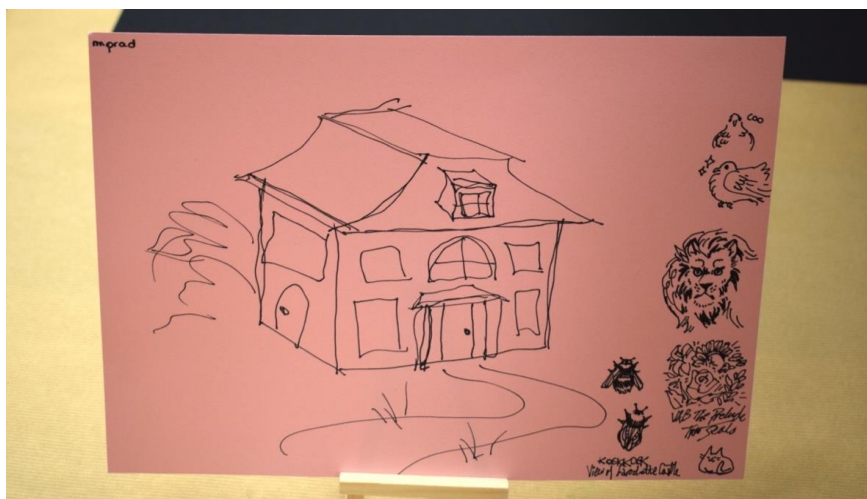


Figure 5: *Art Storytelling App*  
Source: Morse et al.

Students would use the app to browse museum collections and choose a series of images to build a story around entirely based on their own imagination. The story would not have to connect with any art historical aspects of the object. By building stories together, the students would develop personal connections with the art, and then as P8 describes:

You could go afterwards into the museum and see the paintings. Yeah, so you would choose the paintings, and then you would take [the students] in the right order, and they would tell their story. (P8, *Art Storytelling App*)

In other words, after creating new stories together, students would then have the opportunity to visit the museum in person to see the objects they chose in real life and to tell their stories there, going from one object to the next within the physical space.

### ***Museum Isolation Tank***

The *Museum Isolation Tank* grew out of the desire to be fully immersed in a museum without interruption (Figure 6). P6 described the shared frustration she and her group generally felt when dealing with other people in the museum:

We talked about going to museums, and all three of us hate the other people in the museums, so we wanted to create a possibility to not only have the museum to ourselves but also to create our own museum. (P6, *Museum Isolation Tank*)



Figure 6: *Museum Isolation Tank* Mask Designed to Block Stimuli from the External World and Create an Immersive Hyper-Personalized Experience  
Source: Morse et al.

Their goal was to design an isolation tank that gave users total control over virtually every aspect of the visitor experience. For example, if the user hoped to see a Rothko exhibit in Vienna but was unable to travel to Austria, they could visit the museum via their isolation tank mask that propelled them into a virtual simulation of the museum. While there, they could even manipulate the simulation, such as by covering the walls around them with Rothko paintings. Moreover, the isolation tank was meant to be as sensory as possible, as P6 explains:

So, we wanted to enhance the experience—not just have visual but also other sensory [experiences]—so we could choose our own music to hear while we walk through collections, and we could choose our own smells to accompany it. (P6, *Museum Isolation Tank*)

An important element for this group was the ability to smell. The mask came equipped with olfactory receptors to incorporate the smell of the museum and to truly give the impression of being there but alone. This exclusivity stands in contrast to the usual experience of blockbuster exhibits, which as P10 added:

It can be distracting and disturbing being in a crowded museum where popular exhibits are very busy, and you don't have this nice space around you to really get into the piece of art that you're looking at. (P10, *Museum Isolation Tank*)

P11 stated that using this technology, which allowed for unprecedented personalization, “you're the creator of your own experience, the queen of the museum.” (P11, *Museum Isolation Tank*)

### *Virtual Reality (VR) Sensory Museum*

The *VR Sensory Museum* makes museums around the world more accessible to people who would otherwise be unable to visit due to distance, cost, time, or any other limiting circumstance (Figure 7). The technology comes with a VR headset that transports visitors to a photorealistic version of the museum of their choice. As P7 describes, “you'd be able to see who else was visiting the museum at that time...you might initiate a chat with these people to see what they think of the exhibit” (P7, *VR Sensory Museum*).

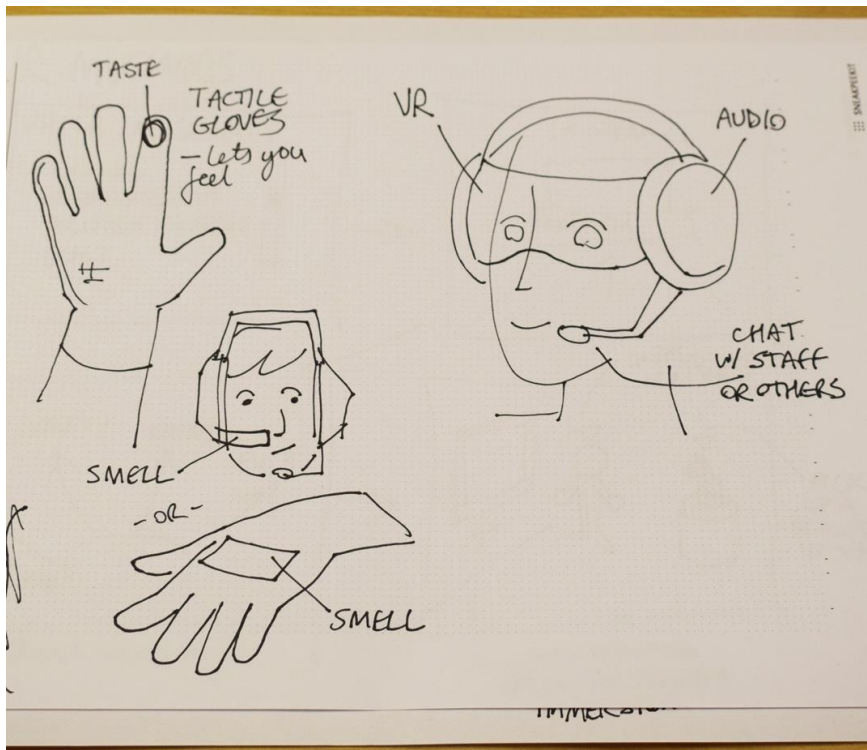


Figure 7: *VR Sensory Museum*  
Source: Morse et al.

In addition, the technology comes with gloves equipped with haptic functionality, allowing visitors to touch objects and interact more intuitively. The gloves include a taste feature so that visitors can even taste art, such as testing the flavor of different fruits in a still life painting. With the application’s social component, visitors can travel to far off museums together with friends who they can interact with throughout the visit. Finally, the application also connects to museum professionals, allowing visitors to ask questions or engage in discussions about an object or exhibition.

**Prototype Analysis**

We conducted a thematic analysis using open coding on the prototypes and group presentations. For each team, we identified the primary design challenge being addressed by the new technology, such as creating empathy or connecting children with art. We also coded the different modes of interaction using keywords that represented how the technology would be used, such as augmented reality or olfaction. Finally, we identified general themes relating to the type of experience visitors would encounter, such as free-form creation or social experience. We summarize this thematic analysis in table 3.

Table 3: Thematic Analysis of Prototypes

<i>Project</i>	<i>Challenges Identified</i>	<i>Interaction Keywords</i>	<i>Themes</i>
<i>AR Migration Museum</i>	Creating empathy	AR; embodiment; simulation; physical space	Guided exploration; individual experience
<i>Art Remix App</i>	Ethics of use and reuse copyright	Remix; artificial intelligence; design	Free-form creation; standalone experience
<i>Art Storytelling App</i>	Connecting children with art	iPad; media storytelling	Group storytelling; complementary experience
<i>Museum Isolation Tank</i>	Large crowds/people in museums	VR; touch; olfaction; auditory	Hyper-personalization; individual experience
<i>VR Sensory Museum</i>	Museum access (distance, cost, time, etc.)	VR; touch; taste; conversational	Museum simulation; social experience

Source: Morse et al.

We then synthesized the emerging themes into a series of thematic continuums: individual/social, creation/consumption, and complementary/standalone. These dimensions of the digital museum experience comprise the diversity of interactions contributed by each design team and represent the design space more generally.

**Discussion**

Our thematic analysis of the design jams identified a series of thematic continuums which represent the experiential dimensions of digital museum collections from the perspective of non-expert users. This approach to conceptualizing museum experience design offers new insights for museums professionals engaged in developing interactive systems. In this section we discuss the three axes and their resulting design implications. Additionally, we visualize each of the design jam prototypes along these axes in Figure 8.

**Individual and Social**

The individual/social continuum distinguishes the type of audience the technology caters to during use. In general, the groups approached the social experience embedded within their respective technologies in different ways, falling along a spectrum of hyper-individualized to communal. The *Museum Isolation Tank*, for example, caters to visitors who want a very private experience. We might associate this behavior with the recharger personality type of Falk (2009), who seeks a reflective or spiritual experience. Features such as creating a special ambiance,

playing a personalized soundtrack, or conjuring familiar scents may enhance this possibility. In contrast, the *Art Storytelling App* and *VR Sensory Museum* bring visitors together around a common theme, story, object, or location. Whether connecting with curators or meeting up with friends and strangers, these latter experiences prioritize the social aspects of the visit.

With this in mind, digital collections may benefit from a flexible personalization system that can adapt to different social contexts. In the design of digital systems, museums should carefully consider the balance between personal and social. While extreme personalization may appeal to some, too much personalization isolates visitors and creates hyper-individualistic experiences that are unnatural to the museum context (Not and Petrelli 2018). Tending to either extreme can lead to disparate constellations of abandoned ‘personal’ museums or to museums becoming lost in a sea of social computing (Marty 2011). However, unlike physical museums, digital museums are well equipped to offer strong individual or social experiences (even simultaneously) and depending on the subject of a collection or exhibition, one approach might fit better than the other. Therefore, one can and should choose the relevant personalization system based on these kinds of criteria.

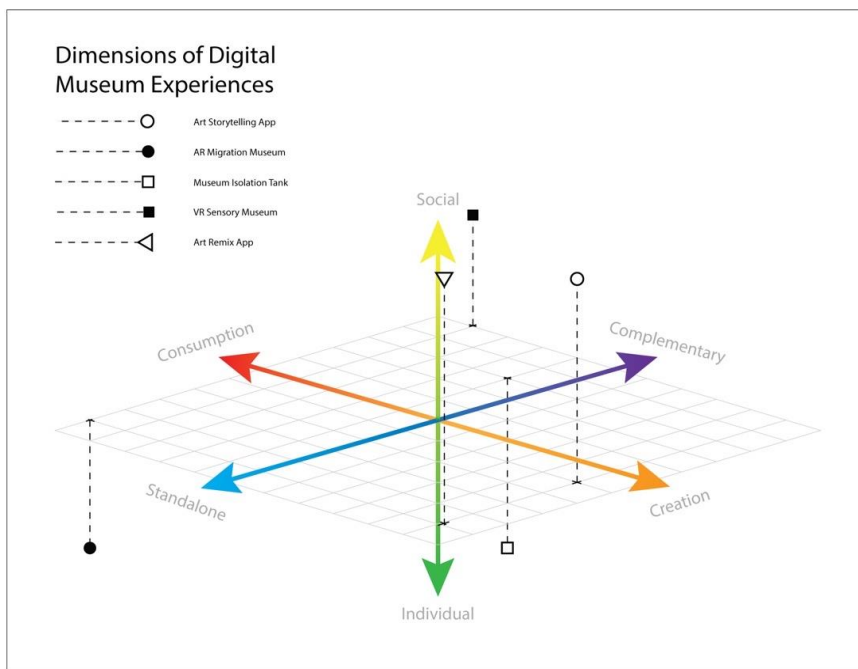


Figure 8: Dimensions of Digital Museum Experiences

Source: Morse et al.

The aim of adaptable social features is to fulfill the needs of different kinds of audiences. For art lovers who find blockbuster exhibits jarring because of crowds (such as was described by P6), museums might instead design special VIP or personalized events around their digital presence that complement the museum’s exhibition schedule. Along this continuum, a separate feature that allows small groups of friends, family, or even strangers anywhere in the world to coordinate digital visits mediated through storytelling, gaming, or even one-on-one interaction with museum professionals may incentivize the social experience of a digital collection.

### **Creation and Consumption**

A second thematic axis relates to visitor engagement during use. Are visitors engaged in a story unfolding before their eyes, or are they creating new artwork in a hands-on virtual environment? The *AR Migration Museum* takes visitors on a highly curated journey, but once inside, visitors have the

ability to freely explore within the confines of the story. The experience establishes an entry point for visitors (e.g., choose an avatar), but beyond that, visitors do not contribute to the experience themselves. In contrast, the *Art Remix App* focused on pushing the boundaries of remixing, re-curating, and subverting art in digital spaces. The responsibility to keep things interesting on this platform is left largely to the visitor and the communities on the app. This axis also relates to notions of the constructivist versus didactic museum, which prioritizes self-generated knowledge versus knowledge passed down, respectively (Gil-Fuentetaja and Economou 2019; Hein 2005). However, in developing a digital experience, designers are not limited to either/or. Instead, an experience may consist of varying levels of these contrasting functionalities throughout the duration of use.

This theme suggests that the experience is best served by adapting to the different contexts underlying the digital visit. Here, we derive additional insights from the museum persona types (Falk 2009). For example, the largely exploratory *AR Migration Museum* was designed by two participants who self-identified as explorers. Experiences that take explorers on a journey might pique their interest and satisfy their curiosities. In the *Art Remix App* team, however, professionals/hobbyists outnumbered the explorers, and their final design centered around active engagement with collections and community. We theorize that this may relate in part to the fact that those with prior knowledge of an artwork's meaning (e.g., professionals and hobbyists) are more likely to appreciate how remixing it can be interesting or subversive.

### ***Complementary and Standalone***

While digital collections may not be substitutions for an in-person visit (Evrard and Krebs 2018), an important theme that emerged was the extent to which collections should complement museum exhibitions or act as standalone experiences that simply make use of museum objects. Each group conceived of their digital museum experiences along this spectrum. Some designs endeavored to recreate a photorealistic museum setting, whereas others were more abstract or even entirely removed from the museum's physical setting.

An example of the standalone experience can be found in the *AR Migration Museum*, which uses technology to transform visitors into another human being to experience life through their eyes. This prototype imagines a digital museum that extends far beyond the traditional in-person visit into the purely experiential by allowing users to embody an avatar. These kinds of experiences draw parallels to apps like *The Scream VR* (Paugam and Ayats 2019), which mixes interactive storytelling with famous artworks to bring art history to life. In contrast, the *VR Sensory Museum* prioritizes being there and experiencing the museum as if you were visiting in real life.

The *Art Storytelling App* falls somewhere in between, as it was designed for creative storytelling in a classroom setting. It overlooks the contribution of the museum at first, instead asking students to create their own meanings from the works on display before paying a formal visit to the museum at a later time. These represent divergent approaches to the online museum experience. Here, we build on Watkins, Sellen, and Lindley (2015) who suggest that digital collections can play a role in public identity, and designers can enhance the value of collections by demanding a level of skill, knowledge, or effort. With this in mind, museums may consider creating benefits for those who interact with complementary exhibits or recognition for those who participate in standalone activities. In the context of complementary exhibits, museums may design special content around a digital exhibition that, when completed, provides a discount or free entry to the physical exhibit. In the case of standalone activities, such as the remixing platform, rewarding participants for their creations by featuring them on the museum's website or social media channels more prominently may promote user interaction.

### ***Articulating the Design Space of Digital Collections***

Through creative engagement with the public, we identified three experiential continuums relating to digital museum collections: individual/social, creation/consumption, and complementary/standalone.



Designers can use these axes during the ideation process to brainstorm and map different kinds of interactions with collections. As an example, the *VR Sensory Museum* would rate highly as a social-complementary-consumption experience because it brings people together, even connecting them directly to museum staff, while also recreating the physical setting of the museum and allowing interaction with the objects on display. In contrast, the *AR Migration Museum* is highly personal. Insofar as the embodied avatars represent the lived realities of historical people, visitors connect to others but nevertheless engage as individuals. This experience creates an entry point for visitors to interact through storytelling, but visitors consume the stories rather than creating them for themselves.

In Figure 8, we have mapped the various prototypes to the dimensions obtained through our analysis, but one can also imagine mapping individual features within the same platform. Indeed, a successful digital collection or virtual museum is likely to target different audiences, contexts, and motivations for the visit. For example, its features may contain engaging, interactive elements designed for entertainment, coupled with sophisticated browsing tools for those who want to take a deep dive.

## Limitations and Future Work

We acknowledge certain limitations in our study that influence current and future work. First, as a series of co-creation workshops, the design jams represent only a limited phase in the design process. Unlike a participatory design approach, which would involve users and stakeholders at every step, the co-creation workshops served instead as a window into the ways that collective creativity can advance the field and flatten the hierarchy of cultural heritage discourse. One might imagine, for example, extending the *AR Migration Museum* into a full participatory project by co-designing the different avatars with members of the public who wish to share their immigration stories or those of their families. This can help to assure that storytelling is authentic, respectful, and representative of the communities impacted by the exhibit. In future work, we expect to build upon the design implications discussed herein, allowing us to draw more nuanced conclusions about their effectiveness.

Additionally, because the study was advertised via the social media channels of the museum, the sample represents people who had access to those advertisements. This self-selection bias implies at least a base interest in the museum itself, if nothing more. An additional limitation is the lack of diversity among museum personas based on the system of Falk (2009). Our sample consisted solely of professionals/hobbyists and explorers. Future work that includes those who identify as different personas would allow for a more in-depth study of different motivational contexts that may arise.

## Conclusion

We argue that digital collections remain an underrepresented yet increasingly important dimension of the modern museum visit. We investigated how co-creation activities can elicit new insights for the design of digital collections and focused on the needs, expectations, and perceptions of non-expert users. Although digital collections may not be substitutes for the in-person visit, our findings suggest that cultural professionals can and should design engaging experiences that cater to visiting contexts outside of the museum space. In addition, we demonstrate that by co-creating with members of the public, museums can better understand these contexts and how to adequately design for them. We discussed the results of two design jam sessions and introduced the resulting design space, wherein we identify three continuums of experience: personal/social, creation/consumption, and complementary/standalone. Understanding these dimensions of the user experience can serve as a compass to help brainstorm and orient novel interactivity for digital cultural collections going forward.

## Acknowledgement

We would like to thank the National Museum of History and Art (MNHA) for their support, especially Prof. Dr. Michel Polfer, Gilles Zeimet, Elise Bougelet, Sonia da Silva, and Dr. Michèle Platt. Special thanks to the Human-Computer Interaction Research Group and the Centre for Contemporary and Digital History (C2DH) at the University of Luxembourg. This work was supported by the Luxembourg National Research Fund (FNR) (10929115).

## REFERENCES

- Arvanitis, Konstantinos. 2013. "Museums Outside Walls: Mobile Phones and the Museum in the Everyday." In *Museums in a Digital Age*, edited by Ross Parry, 496. London: Routledge.
- Avram, Gabriela, and Laura Maye. 2016. "Co-Designing Encounters with Digital Cultural Heritage." In *Proceedings of the 2016 ACM Conference Companion Publication on Designing Interactive Systems—DIS '16 Companion*, 17–20. Brisbane, AU: ACM Press. <https://doi.org/10.1145/2908805.2908810>.
- Bertacchini, Enrico, and Federico Morando. 2013. "The Future of Museums in the Digital Age: New Models of Access and Use of Digital Collections." *International Journal of Arts Management* 15 (2). <https://www.jstor.org/stable/24587113>.
- Bitgood, Stephen, Todd L. McKerchar, and Stephany Dukes. 2013. "Looking Back at Melton: Gallery Density and Visitor Attention." *Visitor Studies* 16 (2): 217–225. <https://doi.org/10.1080/10645578.2013.827024>.
- Bødker, Susanne. 2006. "When Second Wave HCI Meets Third Wave Challenges." In *Proceedings of the 4th Nordic Conference on Human-Computer Interaction: Changing Roles*, 1–8. New York: Association for Computing Machinery. <https://doi.org/10.1145/1182475.1182476>.
- Bonet, Lluís, and Emmanuel Négrier. 2018. "The Participative Turn in Cultural Policy: Paradigms, Models, Contexts." *Poetics* 66:64–73. <https://doi.org/10.1016/j.poetic.2018.02.006>.
- Bourdieu, Pierre, Alain Darbel, and Dominique Schnapper. 1969. *L'amour de l'art: les musées d'art européens et leur public*. Paris: Les éditions de Minuit.
- Ciolfi, Luigina, Gabriela Avram, Laura Maye, Nick Dulake, Mark T. Marshall, Dick van Dijk, and Fiona McDermott. 2016. "Articulating Co-design in Museums: Reflections on Two Participatory Processes." In *Proceedings of the 19th ACM Conference on Computer-Supported Cooperative Work and Social Computing*, 13–25. CSCW '16. New York: ACM. <https://doi.org/10.1145/2818048.2819967>.
- Ciolfi, Luigina, Liam J. Bannon, and Mikael Fernström. 2008. "Including Visitor Contributions in Cultural Heritage Installations: Designing for Participation." *Museum Management and Curatorship* 23 (4): 353–365. <https://doi.org/10.1080/09647770802517399>.
- Claisse, Caroline. 2017. "The Augmented House Museum: Co-Exploring Tangible Interaction to Increase Engagement with Heritage in House Museums." In *Proceedings of the 2016 ACM Conference Companion Publication on Designing Interactive Systems—DIS '17 Companion*, 380–381. Edinburgh, UK: ACM Press. <https://doi.org/10.1145/3064857.3079162>.
- Díaz Lema, Melisa, and Michela Arnaboldi. 2020. "The Participative Turn in Museum: The Online Facet." In *International Conference on Social Media and Society*, 265–276. Toronto, CA: ACM. <https://doi.org/10.1145/3400806.3400837>.
- Díaz, Paloma, Ignacio Aedo, and Merel van der Vaart. 2015. "Engineering the Creative Co-design of Augmented Digital Experiences with Cultural Heritage." In *End-User Development*, edited by Paloma Díaz, Volkmar Pipek, Carmelo Ardito, Carlos Jensen, Ignacio Aedo, and Alexander Boden, 42–57. Cham, CH: Springer International Publishing.

- Dindler, Christian, Ole Sejer Iversen, Rachel Smith, and Rune Veerasawmy. 2010. "Participatory Design at the Museum—Inquiring into Children's Everyday Engagement in Cultural Heritage." In *Proceedings of the 22nd Conference of the Computer-Human Interaction Special Interest Group of Australia on Computer-Human Interaction (OZCHI '10)*, 8. New York: Association for Computing Machinery. <https://doi.org/10.1145/1952222.1952239>.
- Dufresne-Tasse, Colette, and Andre Lefebvre. 1994. "The Museum in Adult Education: A Psychological Study of Visitor Reactions." *International Review of Education/Internationale Zeitschrift Für Erziehungswissenschaft/Revue Internationale de l'Education* 40 (6): 469–484. <https://www.jstor.org/stable/3444321>.
- Evrard, Yves, and Anne Krebs. 2018. "The Authenticity of the Museum Experience in the Digital Age: The Case of the Louvre." *Journal of Cultural Economics* 42 (3): 353–363. <https://doi.org/10.1007/s10824-017-9309-x>.
- Falk, John H. 2009. *Identity and the Museum Visitor Experience*. Walnut Creek, CA: Left Coast Press.
- Falk, John H., and Lynn D. Dierking. 2000. *Learning from Museums: Visitor Experiences and the Making of Meaning*. Walnut Creek, CA: AltaMira Press.
- . 2013. *The Museum Experience Revisited*. London: Taylor & Francis.
- Fuks, Hugo, Heloisa Moura, Debora Cardador, Katia Vega, Wallace Ugulino, and Marcos Barbato. 2012. "Collaborative Museums: An Approach to Co-design." In *Proceedings of the ACM 2012 Conference on Computer Supported Cooperative Work—CSCW '12*, 681. Seattle, WA: ACM Press. <https://doi.org/10.1145/2145204.2145307>.
- Giaccardi, Elisa, ed. 2012. *Heritage and Social Media: Understanding Heritage in a Participatory Culture*. London: Routledge.
- Gil-Fuentetaja, Ion, and Maria Economou. 2019. "Communicating Museum Collections Information Online: Analysis of the Philosophy of Communication Extending the Constructivist Approach." *Journal on Computing and Cultural Heritage* 12 (1): 1–16. <https://doi.org/10.1145/3283253>.
- Halskov, Kim, and Peter Dalsgård. 2006. "Inspiration Card Workshops." In *Proceedings of the 6th ACM Conference on Designing Interactive Systems—DIS '06*, 2. University Park, PA: ACM Press. <https://doi.org/10.1145/1142405.1142409>.
- Hansen, Nicolai Brodersen, Christian Dindler, Kim Halskov, Ole Sejer Iversen, Claus Bossen, Ditte Amund Basballe, and Ben Schouten. 2019. "How Participatory Design Works: Mechanisms and Effects." In *Proceedings of the 31st Australian Conference on Human-Computer-Interaction*, 30–41. Fremantle, AU: ACM. <https://doi.org/10.1145/3369457.3369460>.
- Hassenzahl, Marc, and Noam Tractinsky. 2006. "User Experience—A Research Agenda." *Behaviour & Information Technology* 25 (2): 91–97. <https://doi.org/10.1080/01449290500330331>.
- Hein, George E. 2005. *Learning in the Museum*. Abingdon, UK: Routledge.
- Holdgaard, Nanna, and Lisbeth Klastrup. 2014. "Between Control and Creativity: Challenging Co-creation and Social Media Use in a Museum Context." *Digital Creativity* 25 (3): 190–202. <https://doi.org/10.1080/14626268.2014.904364>.
- Hornecker, Eva, and Luigina Ciolfi. 2019. *Human-Computer Interactions in Museums*. San Rafael, CA: Morgan & Claypool.
- Huyssen, Andreas. 2019. "The Metamorphosis of the Museal: From Exhibitionary to Experiential Complex and Beyond." In *Women Mobilizing Memory*, edited by Ayşe Gül Altınyay, María José Contreras, Marianne Hirsch, Jean Howard, Banu Karaca, and Alisa Solomon. New York: Columbia University Press.

- Kwiatkowska, Joanna, Agnieszka Szóstek, and David Lamas. 2014. "(Un)Structured Sources of Inspiration: Comparing the Effects of Game-like Cards and Design Cards on Creativity in Co-Design Process." In *Proceedings of the 13th Participatory Design Conference on Research Papers—PDC '14*, 31–39. Windhoek, AF: ACM Press. <https://doi.org/10.1145/2661435.2661442>.
- MacDonald, Craig. 2015. "Assessing the User Experience (UX) of Online Museum Collections: Perspectives from Design and Museum Professionals." *MW2015: Museums and the Web 2015*. <https://mw2015.museumsandtheweb.com/paper/assessing-the-user-experience-ux-of-online-museum-collections-perspectives-from-design-and-museum-professionals/>.
- Marshall, Mark T. 2018. "Interacting with Heritage: On the Use and Potential of IoT Within the Cultural Heritage Sector." In *2018 Fifth International Conference on Internet of Things: Systems, Management and Security*, 15–22. Valencia, ES: IEEE. <https://doi.org/10.1109/IoTSMS.2018.8554899>.
- Marty, Paul F. 2011. "My Lost Museum: User Expectations and Motivations for Creating Personal Digital Collections on Museum Websites." *Library & Information Science Research* 33 (3): 211–219. <https://doi.org/10.1016/j.lisr.2010.11.003>.
- Matsuda, Keiichi. 2016. "HYPER-REALITY." YouTube video, 6:15. May 19, 2016. <https://www.youtube.com/watch?v=YJg02ivYzSs>.
- Not, Elena, and Daniela Petrelli. 2018. "Blending Customisation, Context-Awareness and Adaptivity for Personalised Tangible Interaction in Cultural Heritage." *International Journal of Human-Computer Studies* 114:3–19. <https://doi.org/10.1016/j.ijhcs.2018.01.001>.
- Olesen, Anne Rørbæk, Nanna Holdgaard, and Anders Sundnes Løvlie. 2020. "Co-designing a Co-design Tool to Strengthen Ideation in Digital Experience Design at Museums." *CoDesign*. <https://doi.org/10.1080/15710882.2020.1812668>.
- Participedia. n.d. "Design Jam." Accessed January 20, 2020. <https://participedia.net/method/4620>.
- Paugam, Sandra, and Charles Ayatas. 2019. *Le Cri (VR) [The Scream (VR)]*. CinéTévé.
- Perry, Sara, Maria Roussou, Maria Economou, Hilary Young, and Laia Pujol. 2017. "Moving beyond the Virtual Museum: Engaging Visitors Emotionally." In *2017 23rd International Conference on Virtual System Multimedia (VSMM)*, 1–8. <https://doi.org/10.1109/VSMM.2017.8346276>.
- Petrelli, Daniela, Luigina Ciolfi, Dick van Dijk, Eva Hornecker, Elena Not, and Albrecht Schmidt. 2013. "Integrating Material and Digital: A New Way for Cultural Heritage." *Interactions* 20 (4): 58–63. <https://doi.org/10.1145/2486227.2486239>.
- Petrelli, Daniela, Mark T. Marshall, Sinéad O'Brien, Patrick McEntaggart, and Ian Gwilt. 2017. "Tangible Data Souvenirs as a Bridge between a Physical Museum Visit and Online Digital Experience." *Personal and Ubiquitous Computing* 21 (2): 281–295. <https://doi.org/10.1007/s00779-016-0993-x>.
- Petrelli, Daniela, Nick Dulake, Mark T. Marshall, Andrew Roberts, Frances McIntosh, and Joe Savage. 2018. "Exploring the Potential of the Internet of Things at a Heritage Site through Co-design Practice." In *2018 3rd Digital Heritage International Congress (DigitalHERITAGE) Held Jointly with 2018 24th International Conference on Virtual Systems & Multimedia (VSMM 2018)*, 1–8. San Francisco, CA: IEEE. <https://doi.org/10.1109/DigitalHeritage.2018.8810061>.
- Sabiescu, Amalia. 2018. "A Critical Reflection on Three Paradigms in Museum Experience Design." In *Museum Experience Design: Crowds, Ecosystems and Novel Technologies*, edited by Arnold Vermeeren, Licia Calvi, and Amalia Sabiescu, 259–276. Cham, CH: Springer International Publishing.
- Samis, Peter, and Mimi Michaelson. 2016. *Creating the Visitor-Centered Museum*. Abingdon, UK: Routledge.
- Sanders, Elizabeth B.-N., and Pieter Jan Stappers. 2008. "Co-creation and the New Landscapes of Design." *CoDesign* 4 (1): 5–18. <https://doi.org/10.1080/15710880701875068>.

- Simon, Nina. 2016. *The Art of Relevance*. Santa Cruz, CA: Museum 2.0.
- Smith, Laurajane. 2006. *Uses of Heritage*. New York: Routledge.
- Taxén, Gustav. 2004. “Introducing Participatory Design in Museums.” In *Proceedings of the Eighth Conference on Participatory Design: Artful Integration: Interweaving Media, Materials and Practices*, vol. 1, 204–213. New York: ACM. <https://doi.org/10.1145/1011870.1011894>.
- Vermeeren, Arnold P. O. S., Licia Calvi, Amalia Sabiescu, Raffaella Trocchianesi, Dagny Stuedahl, Elisa Giaccardi, and Sara Radice. 2018. “Future Museum Experience Design: Crowds, Ecosystems and Novel Technologies.” In *Museum Experience Design*, edited by Arnold Vermeeren, Licia Calvi, and Amalia Sabiescu, 1–16. Cham, CH: Springer International Publishing.
- Véron, E., and M. Levasseur. 1989. *Ethnographie de l'exposition: L'espace, Le Corps et Le Sens* [Ethnography of the Exhibition: The Space, the Body, and Meaning]. Paris: Centre Pompidou.
- Watkins, Rebecca D., Abigail Sellen, and Siân E. Lindley. 2015. “Digital Collections and Digital Collecting Practices.” In *Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems—CHI '15*, 3423–3432. Seoul, KR: ACM Press. <https://doi.org/10.1145/2702123.2702380>.

## ABOUT THE AUTHORS

**Christopher Morse:** Doctoral Researcher, Centre for Contemporary and Digital History & Human-Computer Interaction Research Group, University of Luxembourg, Esch-sur-Alzette, Luxembourg

**Carine Lallemand:** Assistant Professor, Department of Industrial Design, Eindhoven University of Technology, Eindhoven, Netherlands; Senior Research Associate, Human-Computer Interaction Research Group, University of Luxembourg, Esch-sur-Alzette, Luxembourg

**Lars Wieneke:** Head of Digital Research Infrastructure, Centre for Contemporary and Digital History, University of Luxembourg, Esch-sur-Alzette, Luxembourg

**Vincent Koenig:** Assistant Professor and Head of the Human-Computer Interaction Research Group, Department of Behavioural and Cognitive Sciences, University of Luxembourg, Esch-sur-Alzette, Luxembourg

***The International Journal of the Inclusive Museum***

addresses the key question: How can the institution of the museum become more inclusive? The journal brings together academics, curators, museum and public administrators, cultural policy makers, and research students to engage in discussions about the historic character and future shape of the museum.

In addition to traditional scholarly papers, this journal invites case studies that take the form of presentations of museum practice—including documentation of organizational curatorial and community outreach practices and exegeses analyzing the effects of those practices.

*The International Journal of the Inclusive Museum* is a peer-reviewed, scholarly journal.