Contributions to the AVICOM Annual Conference 2023
"The Virtual Museum" in St Andrews, Scotland - A Selection

Opening Address

Dr. Michael H. Faber
President of AVICOM

The monks of the Augustinian Order must have been wise and forward-looking people when they founded the Universitas Sancti Andreae in 1413. After all, the time-honoured university buildings, built successively since 1450, still serve teaching and research today and recently attract students from around 150 nations. The University of St Andrews is not only the oldest Scottish university; it is the third oldest university in the English-speaking world. Yet it has remained contemporary to this day, and the content of its faculties is modern, innovative, and pioneering in many ways. In 2022, the university was ranked first, ahead of Oxford and Cambridge. Isn't that sustainability?

Sustainability and innovation are important aspects that will occupy us at our conference on Sustainable Preservation and Promotion of Heritage: The Virtual Museum. What is a Virtual Museum, and how can we define it? What are the content-related and methodological criteria for a Virtual Museum, and what distinguishes it from other online museum databases like online collections of heritage? In which cases does the installation of a Virtual Museum make sense? Can and may the Virtual Museum replace the physical museum? Does the Virtual Museum pose a threat to the physical museum, or can, on the other hand, the Virtual Museum support the efficient operation of a physical museum? Are there target groups that can be reached better via the Virtual Museum than via the physical museum? What opportunities does the Virtual Museum offer in terms of barrier reduction, inclusion, and sustainability?

These and certainly many more questions will occupy us at our two-day conference. The contributions of our speakers will address questions of principle and basics, methodological approaches, present case studies, and report practical examples. All this promises to be a really exciting event.

But AVICOM's annual conference will also feature the awards ceremony for the winners of the long-established AVICOM Festival for Audiovisual Media and Innovative Museum Media Productions - a fine event that we will be treated to on Saturday afternoon. Here, too, we will be shown examples that take us into virtual museum worlds.

With an impressive presentation of the production of a virtual exploration of the cultural heritage of the Virtual Orkney North Isles, the School of Computer Science won an award at the FAIMP Festival last year in Prague. Traditionally, one of the festival prize winners hosts the next festival. I am very grateful that the School of Computer Science invited us to wonderful St Andrews this year. I would especially like to thank Dr. Kamila Oles and her boss Dr. Alan Miller, who put in a lot of work to give us an eventful conference and festival. It was also their idea to organize, in a way as an appetizer to this event, an online workshop of several hours on the topic of "Museums, Virtual Reality, and Sustainability in the Climate Emergency" on 13 September, which was also streamed. Around 180 participants were welcomed to this very successful workshop.

I would also like to thank Ildikó Fejes, the experienced Festival Director of AVICOM, for the very elaborate preparation of our festival, our AVICOM Treasurer Eszter Aczel, who keeps track of the costs of the conference, and our AVICOM Board member Marta Peinador, who is simply unstoppable when it comes to promoting and reporting on our events in social media. And there are certainly many other helpers who work in the background to make this event a success. My heartfelt thanks go to them as well.

I wish us all exciting and insightful days in St Andrews. Thank you!

“Under Construction: Defining Virtual Museums in the context of sustainability”

Part 1: Defining Virtual Museums – Workshop

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Digital technologies today demonstrate and promote possibilities in the cultural sector that were previously unattainable. The expansion of artistic, museum-related, performative, and other presentations into the digital space also enables virtual collections, presentations, and

discourses. Virtual museums have the capacity to fulfill the tasks outlined in the redefined ICOM museum definition from August 2022. They offer constant accessibility—anytime, anywhere—and unlimited opportunities for networking and collaboration. However, if it comes to terminology it becomes painfully clear, that the "*core concept of the virtual museum has not yet been clearly identified, and the delineation of the perhaps subtle difference between digital collections, online archives, and virtual museums has to be clarified."* (Schweibenz 2019)

Consequently, the endeavor to define virtual museums was made in a joint working group with the School of Computer Science at the University of St Andrews, which hosted the conference, and the Heinrich Heine University Düsseldorf, Faculty of Business Administration and Economics. In a workshop format, building upon theoretical and conceptual knowledge, different practical perspectives were systematically gathered, organized, and subsequently used to derive implications for the definition of virtual museums.

Starting Point: ICOMs definition of museums

In delineating the concept of virtual museums, a logical starting point is the extant definition of the term "museum." In 2022, the International Council of Museums (ICOM) unveiled a revised version of the museum definition, following an extensive process involving the accumulation of ideas, phrases, words, the establishment of a new committee (ICOM Define), engagement with all ICOM members, and a subsequent inquiry. The resultant definition encapsulates the essence of a museum as a not-for-profit, enduring institution in service to society, dedicated to researching, collecting, conserving, interpreting, and exhibiting both tangible and intangible heritage. Emphasizing public accessibility, inclusivity, ethical operation, and professional communication with community participation, museums are envisioned as agents fostering diversity and sustainability, providing diverse educational, enjoyable, reflective, and knowledge-sharing experiences (ICOM, 2022).

However, virtuality and digitality are neglected in ICOMs new definition. By any means there is no united definition on virtual museums at all, but a wide variety of approaches. However, to collaboratively address the impact of virtual museums on sustainability, a shared understanding of what constitutes a virtual museum is imperative. To achieve this common understanding, insights may be drawn from the museum definition, raising a central question: Can virtual museums truly function as independent institutions, fulfilling all tasks posited by ICOM?

Indeed, there is reason to believe that virtual museums can fulfill the tasks outlined in ICOM museum definition – albeit in a different manner, developing them and requiring changes in dealing with cultural heritage. Some considerations regarding the ICOM museum tasks are listed below (Forum Virtuelle Museen, 2024):

- **Researching:** Digital inventories and collection management, with robust indexing, facilitate international research networking and position virtual museums as hubs or centers of expertise within thematic domains.
- **Collecting:** Alongside digitized analogue exhibits, the emergence of entirely new, purely digital artifacts devoid of physical counterparts, such as digital art in form of videos, objects, non-fungible tokens (NFTs), VR worlds, and games, is conceivable and already underway. Noteworthy is the v-must project, highlighting the preservation and accessibility of intangible artifacts in virtual museums. Artificial intelligence (AI) is assuming an increasingly crucial role in image and art creation, as exemplified by works like the portrait of Edmond de Belamy, – although the creative work is (still) carried out by humans (e.g. with the help of OpenAI's DALL-E software).
- **Conserving:** Analog exhibits can be digitally archived, facilitating global display. Non-invasive interval scanning, aligned with advanced keywording practices, enables comprehensive data collection about visual artworks. The prospect of digital, networked online archives, exemplified by initiatives like ARTigo or Google Art Project, is feasible. Additionally, 3D printing facilitates the translation of digitized or digital exhibits into physical forms, supporting illustrative purposes or temporary pop-up museums.
- **Exhibiting and Curating:** Virtual museums afford the possibility of collaborative exhibition curation through crowdsourcing or tailoring exhibitions precisely to individual preferences. Furthermore, digital outreach programs, if integrative and engaging, have the potential to attract audiences who may not typically visit physical museums. Artificial intelligence, as demonstrated by projects like CHiM – Chatbots in Museums, offers initial forays into leveraging AI for art and cultural education.
- **Interpreting and communicating:** Whether for analogue or purely virtual museums, budget deficits can make digital communication channels appear advantageous. The use of social media, for example, not only offers potential advantages in terms of reach, networking and audiovisual presentation, but also makes it possible to get to know the digital audience in a cost-saving and relatively uncomplicated way by means of social media monitoring. Tools such as Instagram, Tik-Tok etc. are usually relatively inexpensive (although not free), but usually require a relatively high time

budget and expertise in terms of storytelling and content management. It should be borne in mind that communication takes place "at eye level" and around the clock, and that it may well be beyond the control of the operating institution.

While these identified trends do not provide an exhaustive inventory, they serve as foundational points highlighting the initial opportunities for virtual museums in reinterpreting traditional museum tasks. However, if virtual museums can fulfill ICOM’s tasks and are considered institutions in their own right, a distinct definition tailored to their unique attributes becomes imperative (Schweibenz, 2019, p. 7).

Consequently, an interdisciplinary group of scholars and practitioners has undertaken a project dedicated to the exploration of virtual museums. The result of this project is encapsulated in a publication, aiming to provide insights and stimulate contemplation regarding the establishment of virtual museums (Forum Virtuelles Museum, 2024). Yet, during the drafting process, it became evident that the definition of the 'virtual museum' remains a work in progress, given the absence of a shared foundation (Besser et al., 2004: 21). The complexity of this construction process is intensified by the interchangeable use of numerous terminologies associated with virtual museums. This realization prompted the conception of the "Under Construction-Workshop”, aligning the pursuit of defining virtual museums (or establishing a foundational scope for them) with considerations of sustainability.

Further questions to address

In the pursuit of formulating a definition for virtual museums, a preliminary clarification of terminology is compulsory, addressing key inquiries:

- What constitutes reality?
- What defines virtuality?
- What characterizes digitality?
- Consequently, what defines a virtual museum?

In colloquial discourse, the distinction between "reality" and "virtuality" is commonly established to delineate physical existence from digital representation. However, it remains uncertain whether "virtuality" inherently opposes "reality," and whether "virtuality" necessarily implies "digitality."

The conceptualization of "virtuality" and "virtual museums" traces its roots to the late 1990s, coinciding with the widespread availability of the internet. Scholars and practitioners began contemplating virtual museums, referring to digital or digitized manifestations. Nonetheless, reservations persisted (or still persist) regarding virtual museums. Ann Mintz expressed skepticism, asserting that while media can convey information, it cannot replicate the holistic experience offered by physical museums. Consequently, she argued that a true "virtual museum" may never exist, emphasizing the fundamental disparity between a media-driven virtual visit and an authentic museum experience (Mintz, 1998: 28). Mintz's proposition that brick-and-mortar museums embody the "real thing" raises the question: Are experiences in virtual museums inherently devoid of reality, prompting consideration of a "real-virtual divide"?

It is crucial to resolve the misconception that "virtual" is the opposite of "real": The original sense of "actual" refers to something presently existing, rendering "virtual" the opposite of "actual" rather than "real." In essence, the virtual harbors potential, representing what has the capacity to materialize but (perhaps) remains unrealized (Desvallées, Mairesse, and ICOM, 2010: 58; Lévy, 1998: 24, cited in Schweibenz, 2019: 6). Consequently, "actual" emerges as the opposing term to "virtual", prompting a reevaluation of "virtual" as synonymous with "potential" or an alternate form of reality.

Interestingly the quote by Desvallées goes on as follows: „An egg is a virtual chicken; it is programmed to become a chicken and should become one if nothing gets in the way of its development. In this sense the virtual museum can be seen as all the museums conceivable, or all the conceivable solutions applied to the problems answered by traditional museums." (Desvallées, Mairesse and ICOM 2010: 58) This perspective allows for a linkage between the "digital" and the "virtual", wherein technology and the internet serve as tools to actualize the potential inherent in the virtual. The advent of digitality and digitalization has profoundly impacted museums and, by extension, our broader societal landscape.
In conclusion, virtual museums have the capacity to fulfill museum tasks, albeit through an alternative modality, potentially enhancing or introducing new kinds of experiences.

Perspectives on virtual museums
As Schweibenz (2016) explains, virtual museums can be understood in two main ways:

1) on the one hand as an *exclusively digital concept* and thus separate from the analogue world or without an analogue – or "actual" counterpart,

2) and on the other hand as an *extension or supplement* to an actual museum; a position which, according to Schweibenz, has meanwhile assumed the more dominant position (p. 198).

The latter *hybrid forms of the virtual museum (2)* – such as online collections or digital exhibitions, which can be categorized as akin to a traditional analog museum and treated as an extension of such into the digital space – should initially be differentiated from *purely virtual museums* (1) lacking physical representation (Forum Virtuelle Museen, 2024). But as previously indicated, these hybrid forms assume a paramount role in practice to date, as existing museums predominantly perceive virtual museums as instruments for expanding physical counterparts.

Limiting the definition of virtual museums solely to those devoid of physical counterparts appears inadequate. However, there remains a need for further exploration to discern when digital supplements of existing physical museums qualify as virtual museums—and when they do not. Against this backdrop, the workshop sought to address these uncertainties.

Working questions and results

In a workshop format, building upon theoretical and conceptual knowledge, the different (practical) perspectives were collected and organized using four guiding questions:

1. What constitutes virtual museums e.g. concerning structures, objects, accessibility? What types of VM are there?
2. Which content and themes are suitable for virtual museums?
3. What is the relationship between actual/analog and virtual/digital in museums?
4. In what situations and for what educational tasks is the virtual in museums suitable?

To address these questions, conference participants were divided into four groups, each comprising 5-8 members. Across four roundtable sessions, these groups were tasked with discussing their assigned question within a 30-minute timeframe and subsequently presenting their findings to the audience in 5-minute sessions. To facilitate these discussions, all groups were furnished with a handout delineating four types of digital offerings, which included diverse examples for contemplation (see Table 1):

Reports on "new" digitally oriented museums by Anja Kircher-Kannemann (Forum Virtuelles Museum, 2024)

1. Digital offerings that draw on existing digital collections of other museums, archives or other cultural institutions and process them under special aspects and topics. Examples: ● Google Arts and Culture ● Europeana ● German Digital Library ● Cultural Heritage Lower Saxony ● Museum digital ● Digital State Museum Thuringia ● Digital Art Gallery ZDF	2. Digital offerings based on an analogue or partly also digital collection made visible in the digital space in the absence of an analogue space. Examples: ● Virtual Migration Museum ● Barnum's American Museum ● CIA Museum ● Virtual Museum Digital Humanities ● Virtual Grimm Museum ● Chemnitz Virtual Tram Museum ● Virtual Carnival Museum ● Nikon Virtual Museum ● "The Jeckes" - A Virtual Museum ● Winnenden Virtual Town Museum ● Virtual Museum of Science ● Virtual Museum Culture Makes Potsdam ● Virtual Fruit Tree Museum Rhineland ● Thomasberg Virtual Museum of Local History ● Virtual Museum of Caribbean Migration and Memory
3. Digital offerings that are an extension of analogue museums and/or archives. Examples: ● Virtual Museum of Antiquities Göttingen ● Saar-Lor-Lux-Alsace Literary Archive ● Zeiss Archive ● Niederzissen Synagogue ● Virtual museum for children and young people ● Virtual Museum Tramway ● Virtual Museum for Nature	4. Digital offerings that have no analogue reference and have exclusively digital representation (metaverse): ● DFC Francisco Carolinum the "first museum for NFT art in the metaverse". ● Area for virtual Art ● Musee Decentral

Conservation ● Virtual Bridge Yard Museum ● Museum of the World (British Museum) ● Dreams of Dali ● Anne Frank - The Back House ● eMuseum: Heavenly Ways ● West Highland Museum	

The main results of the group discussions can be summarized as follows:

Group 1 deliberated on the premise that the configuration of virtual museums depends upon the experiences intended to be offered. Accordingly, virtual museums should adopt a user-centered approach as well as an object-centered approach. This is because users, objects, and the desired experiences collectively determine the selection of devices, software, and other pertinent elements to be employed.

Group 2 delved into the question regarding the content and themes most conducive to virtual museums. They elaborated that virtual museums are particularly adept at exhibiting endangered objects, artifacts from museums facing threats during periods of war or environmental crises, and elements of lost cultural heritage ("lost things"). The group emphasized the prerequisite consideration that virtual museums must demonstrate a distinct advantage in the digital realm compared to their analog counterparts in order to be effectively utilized.

Group 3 explored the relationship between the actual/analog and virtual/digital realms within museums, swiftly delving into discussions surrounding the concept of "aura." They deliberated on whether virtual museums inevitably entail a loss of "aura" and concluded that there may indeed be an alternative of “aura”. Aligned with the perspectives of Groups 1 and 2, they underscored that the efficacy of virtual museums is contingent upon the intended experience to be conveyed. Accordingly, a virtual museum should offer distinct benefits compared to its physical counterpart, leveraging a unique form of "aura." This consideration acknowledges that certain topics and domains (as identified by Group 2) may be more suited to digital presentation than analog. Additionally, the application of Social XR was highlighted as a means of bridging the gap between solitary digital engagement at home and the communal experience within the museum setting.

Group 4 deliberated on the scenarios and potential educational roles for which virtual museums could be aptly suited. They proposed that virtual museums could serve as

educational platforms, offering training opportunities, particularly beneficial for aspiring professionals or students within the field of curation. Such platforms could facilitate learning, experimentation, and practice in curation and also mediation digitally, a task that would otherwise necessitate substantial resources in physical settings. Moreover, virtual museums could be perceived and utilized as experimental arenas for curators and artists, akin to initiatives like the NRW Forum's “virtual residencies" (https://www.nrw-forum.de/en/exhibitions/virtual-residency) or the Musee Dezentral's temporary exhibitions (https://musee-dezentral.com).

Discussion

An important finding from the group work but also the conference itself was that in practice and from a museum perspective, the understanding of virtual museums as an extension of physical museums seems indeed to be dominating.

But practical challenges, such as server and computer performance issues, often hinder seamless user experiences, as evidenced by problem reports from institutions like the Virtual National Ainu Museum (https://nam-vm.jp/en/). Simply digitizing analog content is insufficient; instead, digital offerings must be reimagined as independent entities.
In addition the results of the workshop add to the list of applications and situations, where virtual museums can be suitable for (as presented by Forum Virtuelles Museum, 2024). The list was revised based on the workshop results (**italic font*) and provides a preliminary answer to the questions: In which situations and for which problems are considerations for establishing a virtual museum worth considering?

Criteria of suitability for virtual museums by Bernd Günter (Forum Virtuelles Museum, 2024)

Virtual museums are suitable for content and themes:

- For which analogue museums do not yet exist
- Which are abstract and/or intangible, e.g. for the topic of “time”
- With a focus on international research interests, networking and co-creation
- With a focus on web and digital art: digital collections, exhibitions with digital exhibits; digital "re-composition"
- **With a focus on objects and cultural heritage that have been destroyed and/or lost ("lost art")*
- **With a historical focus and for the reconstruction of historical places, their*

surroundings and contemporary documents in the form of images and simulations based on historical, archaeological and palaeontological facts and documents - accessibility is particularly beneficial here.

Virtual museums are suitable for the following problem situations and mediation tasks:

- A (planned) museum does not own a building for its objects, collections, exhibitions etc. and is unlikely to be able to build or own one in the foreseeable future*).*
- An existing museum has no scope for expansion – except into the digital space.
- The aim of a museum is to present a complete collection and all available material and exhibits, including those from the depot.
- A museum tries to reach visitors and other stakeholders (e.g. researchers, media and others) everywhere, worldwide and at any time.
- A museum endeavours to enable complementary perspectives on themes and objects that are not physically possible.
- Topics and content should be presented that have the potential and intention to develop further with co-creation by visitors - which can be easier to implement online or via links with social media than in analogue space.
- **Exhibits and exhibitions may not or cannot be physically presented for conservation or security reasons. This also includes securing endangered objects, especially in the event of war.*
- **There is a lack of an "experimental space" for experiments in the field of curation, mediation and collection, for example in the field of digital art.*
- **There is a lack of training, teaching and learning venues for students, volunteers and professionals in further education who digitally curate exhibitions and thus "practise" curatorial and mediating practice. Virtual museums can thus create practice scenarios, just as simulations are used as learning experiences in medical training, mechanical engineering, electrical engineering and many other fields.*

Conclusion

Virtual museums often maintain institutional connections with existing physical institutions, serving as instrumental extensions. However, differing interpretations exist: some perceive virtual museums solely as representations of physical spaces and objects, while others regard them as autonomous entities with unique functions and organizational structures. These autonomous virtual museums are relatively rare, operating independently with their

own organizational frameworks—potentially existing as "digital branches" or "digital divisions" within established museums.

These considerations prompt a reassessment of the definition of virtual museums. Should we adhere strictly to a narrow interpretation of the term, or should we embrace a broader understanding? Furthermore, which target audience should be prioritized: museum professionals or broader demographics? These questions underscore the necessity for a nuanced understanding of virtual museums and their potential roles within the cultural landscape.

A first attempt to consolidate considerations for establishing virtual museums, including their characteristics, requirements, and opportunities, is provided by the publication "*Virtual Museums – A Plea: Around the Clock, Around the World*" by Forum Virtuelles Museum (2024). This publication, supported and co-published by ICOM AVICOM, offers reflections on definitions, applications, museum tasks, technical, legal, managerial requirements, and sustainability issues. This workshop facilitated the integration of significant findings into the manuscript, aiming to enrich the discourse surrounding virtual museums and establish them as integral components of the museum landscape.

Note: To recognize and employ the modern technical possibilities of artificial intelligence ChatGPT 3.5 was used. However, the use of ChatGPT was limited to improving linguistic expression and thus readability of the text above.

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Virtual museums: a threat for 'real museums' or an additional value to them?

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Abstract

As everyone, museums have been impacted by the development of technology and used it both for internal purposes and to improve the museum experience. For instance, museums have set up virtual museums throughout the last three decades so to create new relationships between collections and people. The topic of virtual museums is of the utmost importance inasmuch as they enable museums to make their collections accessible to the public and increase engagement with users. Recent literature dealt with the surge of new virtual museums conceived during the pandemic, most depicting mere replicas of physical museums in the digital realm. The aim of this study is to find out whether virtual museums threaten the existence of museums or might complement them. In order to fulfil this purpose, the Boijmans Van Beuningen Museum in Rotterdam is the case study of this research. The study focuses on the Webby Award app *Depot*, named after the *Depot*, the visible storage of the Boijmans Museum, the first visible storage in the world exhibiting the entire collection. The research is based on qualitative data gathered through direct interviews with 315 users after their visit to the museum Depot.

Available both for IOS and Android systems and on the top list of the Art & Design category apps on Google Playstore, the app allows users to create a tailored-made experience. It can be downloaded whenever and wherever people want, including before the visit to the museum with the opportunity to check out all options in advance. People can select artworks that speak to them, provoke curiosity or surprise in them, and are congruent with who they

are. Thanks to the app, they can become ‘art collectors’ since it saves their preferences in their ‘own collection’, and is never out of reach. The artworks have an interactive narrative that includes challenging quizzes, as well as facts, trivia, photographs, videos, audios and music. Furthermore, the app allows users to express their opinions about specific artworks that can be shared with other users, who can add their comments or ask questions to the museum staff, thereby creating an interactive relationship between users and the museum with its collection, as well as amongst users. The app, downloaded over 41,600 times and multi-awarded winning, can also be used within the museum to improve the onsite visit by scanning the QR code provided in each glass window. These require users to search more actively and help them obtain more information. The application also includes maps for all six floors and a schedule of events across the museum on the day of the visit. People can personalise their physical visit using this agenda, e.g., by scheduling a guided tour.

Amongst the information gathered through direct interviews, a piece of information that emerged was that many interviewees (67%) consulted the app before they visited the depot. Moreover, users revealed the things that impressed them the most while using the app were the stories behind the artworks -told in an involving manner, e.g. through games- that created a difference between the virtual and the physical museum. Additionally, many interviewees (62%) disclosed they would have consulted their ‘own collections’ in the app after the visit.

In conclusion, the findings suggest that virtual museums add value to the virtual experience and complement onsite visits, both for encouraging people to visit the museum, during the visit, and for engaging them after the visit.

Introduction

In response to the evolving landscape of technology, museums have embraced innovative strategies to enhance both their internal tasks and visitor experiences (MacDonald & Alsford, 1991; Matassa, 2011; Pearce, 1994; Washburn, 1984; Wilcomb, 1968). Over the past three decades, the establishment of virtual museums has emerged as a prominent initiative, fostering novel connections between collections and audiences worldwide. By leveraging digital tools, museums have transcended physical limitations, offering immersive encounters with their items, regardless of a plethora of constraints, such as geographical ones (Cameron, 2007; Neal & Selsdon, 2018). These virtual spaces not only broaden access to cultural collections but also catalyse dynamic interactions, redefining the traditional museum experience for the modern era (Kirillova & Lyapustina, 2023). Due to technological

improvements, virtual reality has gained popularity in many arenas throughout the years, including the museum field (Schweibenz, 2019).

In order to grasp the development of virtual museums inside society, it is necessary to provide the reader with the definition of the word virtual. The term virtual has had several definitions coming from a wide range of disciplines over time. The word virtual stems from the Latin etymology *virtus,* meaning potential and, therefore, capacity. According to the Dictionary of Museology recently published by ICOM (“Dictionary of Museology,” 2020), virtual means "that which is potential and without actual effect". Accordingly, from a philosophical perspective, virtual is not the opposite of the real, as broadly thought. It is the opposite of the actual. It means that virtual museum has a life of its own, even if not in fact (Anderson, 2008). Some studies highlighted virtual museums do not necessarily have a physical location, thus, virtual museum represents a sort of an extension of the physical museum in the digital world (Schweibenz, 2004). Most virtual museums are based on real, tangible items, and virtual museums can be considered an extension of the physical museum into the digital realm. How this extension, meaning a virtual museum, can be accessed is manifold, such as through apps, browsers, gloves, touch screens, and VR environments.

Main literature focused on virtual museums just as mere replicas of physical museum layouts or digital databases (Keene, 2014). As duplicates, previous studies showed virtual museums were less appreciated than real museums because blamed to cause the loss of the aura of original pieces of collections (Atasoy & Morewedge, 2018; Benjamin, 1936). The pandemic outbreak has attracted a growing interest in the digital realm as a tool to enjoy collections in times in which museum visits were not physically allowed (Corona, 2021; Gilis et al., 2022; Grint, 2020; ICOM, 2020; Johnson & Sobczak, 2021). Additionally, previous studies highlighted virtual museum opened museum collections to anyone, even if with disabilities, at anytime, anywhere, eradicating the overriding obstacles of the physical visit (Cameron, 2003; Neal & Selsdon, 2018). Other authors shed light on the connotation of virtual museum as a tool for educational purposes (Barbieri et al., 2017; İşlek & Asiksoy, 2024; Jones & Christal, 2002). Additionally, previous research emphasised the opportunities generated from virtual museum inasmuch as it allowed anyone to reach collections, regardless of their financial status and educational skills (Clough, 2013).

Research concerning virtual museum as a menace to the physical museum is currently lacking. This study aims to find out whether virtual museums menace the existence of museums. For this purpose, two alternative hypotheses are outlined:

a) hypothesis 1) virtual museums are mere replicas of museums and, due to their countless advantages, will replace physical museums;
b) hypothesis 2) they will support them; if so, it will be interesting to find out how the two typologies of museums can coexist.

Methodology

This study focuses on the case study of the Boijmans Van Beuningen Museum (briefly referred to as Boijmans). This research utilises qualitative data to analyse whether the virtual museum created by the Boijmans might pose a threat to the physical museum. The data was collected via individual interviews conducted with the museum personnel and through direct interviews with 315 users of the museum app after their physical visit to the museum.

Participants were selected at random to take part in the study. The analysis eliminated participants who did not complete the interview. Additionally, only visitors who used the app were admitted to taking part in the research. Participants were provided with information regarding the objective of the study and willingly agreed to offer anonymous contributions to this research. At the conclusion of the visit, the interviews with visitors were carried out in the main hall of the Depot, taking the form of a conversation. A set of 33 questions was printed prior to conducting interviews. Throughout the second phase and questioning process, notes were made regarding the primary information. It was believed that this process tended to prolong the conversation due to the need to write at the same pace as the speaker to avoid missing any information. However, the procedure heightened the probability of terminating the interviews prematurely. Consequently, an audio recorder was utilised as well. Individuals were duly notified before its implementation, and their explicit consent was secured for its utilisation. In order to mitigate the potential dangers associated with technological issues such as low battery, full memory, or excessive noise, the data was obtained by simultaneously utilising both the notes and the audio recorder.

In the third step, subsequent to the completion of the interviews, the audio recordings were transcribed using the Amberscript online service in order to enhance the data gathered during the conversation and the accompanying notes. The data underwent analysis via the Nvivo programme, which facilitated information clustering into distinct codes/themes. Additionally, the codes were categorised into various groups: onsite use and online use. Hence, all the responses were classified into distinct categories and thereafter utilised for the purpose of this study.

The case study: Background of the Boijmans Museum

The Boijmans is an art museum in Rotterdam, the Netherlands, whose collection stems from Mr F.J.O. Boijmans's bequest to the municipality in 1847 (Kisters, 2021). The collection has been accommodated in different facilities over time. Because of continuous acquisitions and the resulting lack of space, collections were often kept in unsuitable premises like attics and basements, thereby experiencing considerable loss due to fires and several floods, which compromised collections. Accordingly, collections were in peril, and 92% of collections were kept in depots, not accessible to people (Somers, 2018b). Therefore, the need to preserve items and make them accessible to people was the foremost reason that propelled the Boijmans to set up visible storage, called the Depot (Somers, 2018a).

The birth of visible storage has developed over 15 years and was not devoid of challenges. The 94 million euro cutting-edge project was realised thanks to the contributions of many stakeholders. Original initiatives were promoted, such as the adoption of singular mirror panels of the building façade from people for 1,000 euro each. Because the Boijmans is the first museum in the world whose collection is entirely on view, it has received considerable attention from the media across all continents, thereby creating value for the benefit of the entire city. Indeed, national and international acknowledgement creates direct and indirect advantages for the city and the communities (Cerquetti, 2010; Pettersson, 2021).

Results

The Boijmans Museum and the setting up of the virtual museum

The Boijmans consists of 131,000 items over the span of 170 years. It displays works of art in glass cases and stores them in internal depots within 14 rooms, where items are housed according to a previous selection based on some traits of the items, such as their sensitivity, size, material and weight. In order to enhance the accessibility of collections, the Boijmans has adopted a capillary presence on the internet, which has promoted the museum collections and enabled people to access its digital database. According to the findings, online visits (1 million) outnumbered museum visits (270,000) by around four to one. This data suggests that people are not reluctant to approach culture through the use of technology.

Amongst the solutions adopted to increase the accessibility of collections, the Boijmans let people access its virtual museum through an app, thereby making collections both enjoyable

for virtual experiences and onsite visits. With regards to the physical visit to the museum, the museum staff explained that making the decision to support the public entirely digitally during their visit to the museum was deemed a huge and risky gamble, at first sight. For this purpose, each one of the 14 rooms was provided with a QR code that can be scanned for information associated with items inside them. Indeed, as visible storage, items are devoid of labels. QR codes provides information through an app, both usable onsite and online. Because collections can be enjoyed by anyone, devoid of any constraint, the app contributes to the democratisation of collections (Ames, 2015; Bazin, 1967; Cataldo & Paraventi, 2007; Crenn, 2021; Ferriot, 1995; Gilson, 1914; Griesser Stermscheg, 2014).

Conceived to optimise the experience of art, the app was developed by the Boijmans with the partnership of DOOR, the cultural label of agency IN10, Thonik, and Silo. The app, named after the visible storage Depot, can be downloaded (both for free) for iOS and Android systems whenever and wherever people want. With approximately 42 thousand downloads, this app is on the top list of the Art and Design category apps on Google Play Store and has received several awards. Amidst them is the prestigious Webby Award, known as the Oscars of the internet world. Specifically, more than 2,000 members of the professional jury of the International Academy of Digital Arts and Sciences acknowledged it as the best app in the category of apps and software, art, culture, and events 2022. Amongst the other awards are the Dutch Interactive Award and the European Design Award.

The Depot app allows people to experience the stories behind the artwork wherever they want, at home on their comfortable sofa or during a physical visit to the museum. Once the app is downloaded, people can create their own unique experience by selecting the artworks that appeal to them, pique their curiosity or astonish them, and are consistent with who they are. For instance, people can search for an author or name of the artwork and simply write a keyword like a dancer, flower, and so on. The staff pointed out it was deliberately decided to convey information with a simple language so that anyone could understand it during the usage of the app. By contrast, too complex content could be not fully understood by the layman (Economou, 2008).

The app creates an active interaction with users. Regardless of the place where people are while using the app, within the museum or in another part of the world, anyone can use the app, and numerous works of art feature an interactive narrative replete with facts, trivia, photographs, videos, audio, music, and games. These require people to search more actively and give them the opportunity to learn more, especially if in collaboration with others. For instance, people can scan the QR codes on the glass cases or write a keyword

in the search field. Once an interesting item is selected, the artwork's name, author, and ad year are displayed. Going on, there is a short description of the piece. Some trivia are reported, e.g. the fact that the most famous artwork of the artist-designer Maison Margiela was conceived from a duvet coat or how the author's boot inspired new sneakers produced by Reebok. Also, the app contains audio and videos.

Furthermore, the app engages users with the museum collections through visual questions. This means making a tailored experience. Visually, titbits of knowledge and anecdotes are disseminated amongst users. For instance, here, the app provides the user with the idea expressed by the author of reworking existing clothes. These findings match with the results of a recent study according to which virtual museum creates an interactive space as a new model of communicative culture (Kirillova & Lyapustina, 2023).

The app allows people to obtain further information about artworks, such as material and technique, dimension, origin, title and year of acquisition, and technical data like inventory number and its current location. Furthermore, users can express their opinions about specific artworks or ask questions to the museum staff, thereby thriving an interactive relationship between users, the museum staff, and collections that is considered as a privileged experience (Bond, 2018).

Besides the interactive narrative, the app provides general information, such as opening hours. Moreover, a calendar of activities happening throughout the museum on the day of the visit is included in the app, as well as maps for each of the six levels. For example, by organising a guided tour, users may tailor their visit using this agenda.

The direct interviews to users of the Depot app

This part of the paper describes the results of 315 direct interviews conducted inside the Boijmans. According to the data, half of the interviewees were under 55 years old, and the other half were older, whereas 35% were from 18 to 35 years old. Most came from the Netherlands, especially from Rotterdam, and a small part (2%) came from abroad. Additionally, 83% had a master's degree or a PhD. The main reasons that propelled people to use the app are curiosity, general interest, or specific interest in the collection, especially in unseen items, and for educational purposes (İşlek & Asiksoy, 2024). This study confirms that the opportunity to access unseen pieces of collections increase people’s interest to special items, such as stored ones (Antonini et al., 2019).

Almost seven out of ten interviewees reported using the app before the physical visit to the museum. Accordingly, a complementary relationship exists between onsite and virtual visits. This study gives further support to the theory that onsite visits promotes online visits and vice versa (P. F. Marty, 2007).

Furthermore, people revealed they used the app "My Collection" function to create their own collections. This function generates a list of favourite items previously selected by the users and that are always available in their pockets.

Most interviewees disclosed they used the app to obtain information during the visit, with the contribution of some videos for a small part of them. Many users appreciated the stories behind the artworks and how those were told in an involving manner, such as the games of the challenging quizzes. For instance, an interviewee said, *"The way the stories of the artworks were told whetted his appetite. So, he decided to visit the Museum."* Moreover, many appreciated the fact they could consult the items they saw after the visit. Others revealed they liked the opportunity offered by the app to pose questions to the staff. This study corroborates previous research highlighting how people perceive the interaction with the museum personnel and the resulting first-hand expert information as privileged experiences (Bond, 2018).

Conclusion

The data of this study suggests that physical museums are distinguished from traditional museums: they are neither mere replicas of physical museums nor digital databases. Virtual museums enhance the new possibilities resulting from technological improvements. Specifically, virtual museums make collections interactive and actively involve users, for instance, through games. Additionally, they ensure accessibility and provide users with appropriate content and context, thereby achieving educational purposes (Barbieri et al., 2017). Therefore, virtual museums cannot replace physical museums, but they can add value to the virtual experience, inasmuch as they create tailored experiences that differ from onsite experiences. Finally, virtual museums encourage physical visits by engaging visitors before the visit and supporting onsite visits, both during and after museum visits.

This research suggests that virtual museums play a crucial role in preserving collections and disseminating culture, providing museums with unprecedented prospects to expand their influence beyond the limitations of physical spaces. Museums can overcome geographical constraints and provide worldwide audiences with access to irreplaceable items by digitising

their collections and developing engaging online experiences. The process of making collections accessible to a broader audience not only promotes inclusiveness but also enhances public involvement, as individuals can browse exhibitions at their preferred speed and convenience. In addition, virtual museums might enhance interactive learning experiences by including multimedia components and educational materials, so fostering a more profound comprehension and admiration for collections. As a result, the value of virtual museums extends beyond their ability to connect individuals over physical distances, encompassing their potential to foster a more integrated and knowledgeable society.

In conclusion, the findings of this research fulfil hypothesis 2). Therefore, virtual museums do not represent a threat to real museums, but rather an additional value to them.

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A new approach to museology virtual museum

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The understanding of contemporary education that emerged as a result of globalization, advanced mass media, and the advancement of technology day by day, the classical understanding of museology, which has had its impact in the field of museology as well as in many other fields, is being replaced by the understanding of contemporary museology, and the understanding of contemporary museology is gradually giving way to the understanding of Virtual museology. The use of technology as an information and communication tool and the application of this communication tool to museology has created the concept of virtual museum. The concept of virtual museology is developing as a new understanding in museology that best reveals the scope and function of contemporary museology and delivers it to large audiences. In classical museology, when the time spent by visitors to the museum, the hours served by museums, the visitor capacities of museums, and transportation to the museum are taken into consideration, the necessity of virtual museology for people is better understood.

The Covid-19 epidemic, which we have known in the recent past and has affected all humanity, and the existence of our museums, which were damaged by the large-scale earthquake in Turkey in February 2023, have made the concept of virtual museology almost mandatory. Virtual museums are undoubtedly more successful than other museums in delivering the works they exhibit to large masses of people. People with disabilities, people living in rural areas, students, elderly people with limited mobility, or individuals who are curious about museums in any country and do not have the opportunity to visit them, which we can define as disadvantaged, will greatly benefit from the concept of virtual museums. For this reason, virtual museums are not a threat to classical museums, but are a supporting element that brings classical museums to large audiences. Instead of replacing classical museums in the future, virtual museums will be effective in promoting museums as promotional promoters, reaching large audiences, and perhaps attracting visitors to classical museums.

When designed well, virtual museums are reliable and accurate resources that will make great contributions to education for out-of-school learning or lifelong learning. A visitor who visits the virtual museum may want to see the work in place, so the virtual museum will fulfill its role as a promoter or advertiser. In this study, the numerical distribution of virtual museums affiliated with the Ministry of Culture and Tourism of the Republic of Turkey, their features, the opportunities they offer, and the interest of visitors to these museums will be examined. By examining the lighting features, the popularity of these museums in direct proportion to the number of visitors will be discussed. After the data obtained, it will be discussed whether virtual museology is a threat or a supporting element.

Virtual museum

The International Council of Museums (ICOM), founded in 1946, defines museums in general; By examining and researching materials that serve the development of society, that are open and accessible, that bear witness to humans and the culture that constitutes them, and that shares the knowledge obtained as a result of this examination and research, by collecting and preserving cultural materials, and by making works available to the public for the study, education and artistic pleasure of people. It is defined as non-profit institutions that perform these duties and have functional continuity (Bae, 2013, pp. 33-36). There are many definitions of museums other than the definition of museum by the International Council of Museums (ICOM). Today's museums process the information obtained in their collections and bring them together with people, aiming to deliver them to the whole society without discrimination of class through educational activities; With this functionality, it has ceased to be a repository of historical artifacts and has begun to transform into dynamic spaces. The basis of this transformation is science and technology. There are new presentation and exhibition opportunities that emerge with the development of technology. “Museums use communication techniques and methods while fulfilling their basic functions and explaining themselves to the society and the world in which they operate as institutions.” (Papila, Kilimci ve Kahraman, 2021, s. 2).

Technological developments have had an impact in the field of museology, as in many other fields, and today a concept that we define as "Virtual Museum" has emerged. Virtual Museology can simply be defined as moving a museum collection to the internet. Virtual museum definition: Digital collections are electronic environments created with multimedia features that exceed the possibilities of physical space, where collections are collected under various categories (Vosinakis and Xenakis, 2011). Virtual museums are the result of a

new socioeconomic system that we can define as "globalization" that has affected societies since the 1970s (Papila, 2012, p. 57). Virtual museums are developing as a new understanding of museology that best complements the function of contemporary museology. Virtual museums easily deliver their works and exhibitions to a wider audience. The fact that virtual museology has come to the fore as a social need along with technological developments has necessitated new studies and suggestions in this field. The easy accessibility of virtual museums during the pandemic period has brought new visitors to the museums, consisting of various individuals. People who cannot physically visit museums due to reasons such as distance, living in a different country, physical disabilities, and health conditions, have been able to visit museums virtually on the internet, and have also been able to virtually access collections other than those exhibited in museums. Some of these visitors may become future permanent visitors of museums (Museum Booster, 2021). According to ICOM's taxonomy, virtual museums; “The brochure is divided into four: virtual museums, contextual virtual museums, educational virtual museums and virtual museums” (Shweibenz, 2004, p. 3). The COVID-19 pandemic, which affected the whole world, had a significant impact on classical museums and virtual museums. The curfews that started in March 2020 and occurred in many parts of the world also affected the way museums work. Many museums closed completely between March 2020 and November 2020, did not accept visitors, and reduced the number of employees in the museum. This situation has caused great decreases in the number of visitors to the museums. While the number of visitors of the world's 100 most important museums in 2019 was 230 million, this number decreased to 54 million in 2020. These figures show a 77% reduction (Florian and Stapley-Brown, 2021).

Virtual museum in Turkey

Museums in Turkey started to exhibit their works on the internet in the early 1990s, thus laying the foundations of virtual museology. Due to technological developments, virtual museology has gradually increased in importance. The first of the virtual museums established by private individuals and private institutions is the Eczacıbaşı Virtual Museum, which was opened in 1999. Eczacıbaşı Virtual Museum is a private museum and contains the works of artists working in the fields of ceramics and painting, as well as the works of important artists representing Contemporary Turkish Art. The site, which can be accessed via the link www.sanalmuze.org, was closed in 2011.

In the early 2000s, private museums began to be opened in Turkey with the support of foundations. This situation has been the most important indicator that the perspective on

museology in Turkey has begun to change. Sakıp Sabancı Museum was first opened in 2003 through the Sabancı Foundation. Sakıp Sabancı Museum was followed by the Eczacıbaşı Foundation Museum, which opened in 2004. And immediately afterwards, Turkey's first modern art museum, "Istanbul Modern", was opened. Then, Pera Museum was opened by the Suna-İnan Kıraç Foundation in 2005. This was followed by Garanti Gallery Platform, owned by Garanti Bank, and Istanbul Contemporary Art Museum, owned by the Elgiz Foundation. Turkey While the Istanbul Painting and Sculpture Museum, affiliated with the Ministry of Culture and Tourism of the Republic of Turkey, is the first state-affiliated virtual museum, today the Ministry of Culture and Tourism has moved many museums and archaeological sites to the virtual environment. Virtual museums affiliated with the Ministry of Culture and Tourism in Turkey are given in the table below.

These museums can be reached from the above internet addresses.
https://www.sanalmuze.gov.tr,https://www.instagram.com/officialturkishmuseums,
https://www.instagram.com/kulturvarliklari_muzeler
Virtual Museums affiliated with the Ministry of Culture and Tourism are listed below:
War of Independence Museum-Ankara
Republic Museum-Ankara
Ephesus Museum-Izmir
Troy Museum-Canakkale
Anatolian Civilizations Museum-Ankara
Gazi Museum-Samsun
Göbeklitepe Ruins-Şanlıurfa
Ethnography Museum-Ankara
Antalya Museum-Antalya
Boğazköy Museum-Çorum
Archaeological Museum-Gaziantep
Zeugma Museum-Gaziantep
Çorum Museum-Çorum
Şanlıurfa Museum-Şanlıurfa
Adana Museum-Adana
Archaeological Museum-Hatay
Van Museum-Van
Göreme Open Air Museum-Nevşehir
Ihlara Valley-Aksaray
Hattusa Ruins-Çorum
Ataturk Museum-Izmir

Nemrut Ruins-Adiyaman
Hierapolis Ruins-Denizli
Turkish and Islamic Arts Museum-Istanbul
Ahlat Seljuk Square Cemetery Ruins - Bitlis
Uşak Museum - Uşak
Archaeological Museum - Mersin
Airport Museum - Istanbul
Presidential National Struggle Exhibition - Ankara
Assos Ruins - Çanakkale
Archaeological Museum - Istanbul
Ephesus Ruins - Izmir
Eskisehir Odunpazari Modern Museum
Çanakkale Epic Promotion Center
Çanakkale Kilit Bahir Castle Museum
Çanakkale 1915 Hilal-i Ahmer Hospital Reenactment Area
Çanakkale Hamidiye Bastion, Gallipoli Wars History Museum
Police Museum - Ankara
ASBU - Treasury Museum
Ankara University Toy Museum
Gökyay Foundation Chess Museum
Hacı Bayram Veli Museum - Ankara
Erzincan Museum

According to the newspaper news published in Turkey, it was stated that the number of visitors to the Virtual Museum of the Ministry of Culture and Tourism was visited by 23 million 714,564 people in 2022. (www.evrensel.net) Although the lighting on some of the works in the showcase creates glare, it can be said that the lighting of these museums is generally sufficient from the entrance. Most of the virtual museums in the list above are Archaeological Museums, followed by Ethnography and Turkish History Museums and Ruins. According to the data of the Ministry of Culture and Tourism, Göbeklitepe Archaeological Site, War of Independence Museum (First Parliament Building), Ephesus Museum, Anatolian Civilizations Museum, Troy Museum, Republic Museum, Gazi Museum Samsun, Ethnography Museum, Antalya Museum, Çorum Boğazköy Museum, Gaziantep Archeology Museum, Zeugma Museum, Gaziantep and Çorum Museum, (https://www.mucerret.com/kultur/salgin-doneminde-sanal-muzelerin-ziyaretci-sayisi-) are the most visited museums.

When the virtual museums affiliated with the Ministry of Culture and Tourism are examined from a technical perspective, it is seen that virtual museum visits start at the entrance of the museum and in some museums, garden parts are also included in the visit. The surrounding natural beauties have been included in open-air museums such as Göreme Ihlara Valley and Assos Museum, and the natural beauties of the country have also taken their place in the virtual museum. It is a fact that museums have been seen as educational institutions since the 20th century. Virtual museums, which are the transfer of classical museums in a virtual environment, play an active role in educational activities both inside and outside the museum, just like real museums (Barlas Bozkuş, 2014; Çolak, 2006).

Museums are one of the most effective out-of-school learning methods. The importance of virtual museums has been better understood due to reasons such as accessibility and lack of time, especially the Covid-19 epidemic in recent years and the earthquake in 2023. Integrating virtual museums at different educational levels is important in evaluating virtual museums from an educational perspective. Within the scope of the "museum education" cooperation protocol signed between the Ministry of National Education and the Ministry of Culture and Tourism, the "Museum Education Certification Program" was launched by the General Directorate of Teacher Training and Development in order to ensure the employment of teachers. One of the important factors why teachers prefer virtual museums during the pandemic period is that virtual museums provide reliable information for students. It has been observed that teachers most commonly prefer the virtual museum website, which belongs to the Ministry of Culture and Tourism, to virtualmuze.gov.tr.

Museums are institutions that are considered as effective educational environments today. Museums provide students with a learning environment by living and doing, thus making it easier for students to assimilate all the values accumulated in various disciplines, from science to art, from culture to history. Various reasons such as financial inadequacies, transportation problems, and difficulty in obtaining permits make it difficult to carry out educational museum trips. Virtual museums, which are independent of time and space, are seen as an option in museum education when real museum visits cannot be made. Research shows that educational activities carried out in virtual museums have positive effects on students' cognitive and affective gains (Demirboğa, 2010).

Conclusion

The concept of virtual museology is developing as a new understanding that reveals the content and function of contemporary museology in the most beautiful way. Virtual museums make it easier to deliver the works they preserve and their existing collections to larger

audiences and put this technological development at the service of people. Nowadays, Virtual Museology has come to the fore as a need, and the inadequacy of data that examines this need alone and the scarcity of studies in this field reveal the importance of this study.

The word virtual can be seen as a great technological achievement. Virtual museums offer visitors a unique experience in the field of culture and art. While visitors learn about the physical museum through virtual museology, the concept of distance disappears and the time of visit is determined by the visitor. It is also clear that virtual museums offer visitors an enjoyable time, as well as providing information. Virtual museums enable visitors to perceive the place they visit in real terms and to obtain information about many museums. It is of great importance that virtual museums are easily accessible in the field of education and training. Virtual museums, as a means of making Art, History, Nature, Ethnology, Zoology, Archaeology, Biology and similar sciences easily accessible, have caused technology to be discussed in terms of its impact on the socio-cultural structure. As mentioned before, the most important factor why virtual museums have gained such importance is that they are easily accessible regardless of time and place. The Covid-19 epidemic, which has affected the whole world, has imprisoned all humanity in their homes, and in this process, virtual museology has once again demonstrated its importance, bringing museums and people together without the concept of time and space. During the earthquake that occurred in Turkey in 2023 and resulted in loss of life and property, the importance of virtual museums came to the fore and museums and historical sites that were closed to visitors could be visited in the virtual environment. Regardless of where they are in the world, the elderly, the disabled, and people living in villages who do not have the opportunity to visit a museum can visit any museum they want, thanks to virtual museology. The suspicion that virtual museology trivializes traditional museology may come to all of our minds as a concern. However, when we look at the visitation data of traditional museums, it becomes clear that this concern is extremely unfounded. A visitor who visits the Topkapi Palace Museum in Turkey or the Louvre Museum in Paris in a virtual environment will be impressed after this visit and will want to turn his virtual visit into a physical visit at the first opportunity he gets. As a matter of fact, the role of promotion in tourism is very big. It is the biggest promotional tool in virtual museums today.

The innovations brought by technological developments have begun to affect and change societies in every aspect. Museums that transfer the cultural heritage of societies from the past to the future have also been positively affected by technological developments and have created virtual museums that can be defined as new with arrangements for today's

needs. Especially during the COVID-19 global epidemic period, which has affected the whole world since March 2020, the importance of virtual museums has clearly emerged in the educational, cultural, artistic and social fields, and the task of classical museums has been fulfilled by virtual museums. Today, virtual museums that exist with technology are seen as competitors to classical museums. One of the main factors in the emergence of this perspective is the lack of understanding of the importance of virtual museums. Virtual museums are seen by some people as virtual environments that prevent classical museology from being taken seriously. When we look at world museum activities, we see that this idea does not reflect reality. Because virtual museums have the power to be visited free of charge, without the perception of time or space, and to transport the museum they represent to completely different parts of the world. In this respect, the fact that virtual museums are not bound to certain patterns and are easily accessible is one of the reasons for positive criticism. Another feature that makes virtual museums more advantageous than classical museums is that these museums are updated faster than classical museums. In addition, the mass of people who like any museum through the virtual museum may also want to visit this museum physically, as a matter of fact, the food source of tourism is promotion. Virtual museums can also be seen as a promotional and advertising element. The Monalisa in the Paris Louvre Museum has a worldwide reputation, so much so that people who meet the Monalisa painting in the virtual environment want to visit it physically in the Paris Louvre Museum. In Turkey, the Ministry of Culture and Tourism has provided virtual museum services to many visitors and has increased the quality of this service day by day.

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The transnational Museum With No Frontiers (MWNF) Programme
Online Museums – Online Exhibitions – Online Galleries
hosting the largest online resource dedicated to the artistic legacy of Islam

Eva Schubert
Museum With No Frontiers (MWNF), Vienna

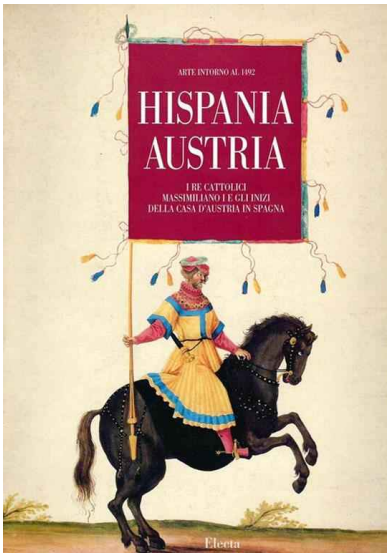
When it comes to presenting MWNF it is always difficult to decide where to begin. For St Andrews – considering the topic of the Conference – my focus was on the digital / virtual reality of MWNF, which now constitutes 90% of our activities. However, I will take advantage of this written summary to provide a bit of context that will help explain the physical roots of our online museum.

One of the aspects that underpins all of our work at MWNF, and why I decided to mention it at the beginning of my presentation in St Andrews, concerns accessibility: for us, easy access to all of our available content – especially in those countries with limited web access – is a priority. In line with this, we only use technologies that can be easily downloaded and avoid those applications that require high-speed internet access to be fully enjoyed.

Background and Context

Our journey began in 1992, when I, on behalf of two Austrian Ministries, was the brain child of, and then also responsible for, an international 'double-exhibition' project organised as a cooperation between Austria and Spain on the occasion of the EXPO '92 in Sevilla. The Austrian part, titled 'Hispania Austria. Kunst um 1492. Die Katholischen Könige, Maximilian I und die Anfänge der Casa de Austria in Spanien' took place at Ambras Castle in Innsbruck, a branch of the Kunsthistorisches Museum in Vienna; whilst the Spanish contribution, organised by the Ministry of Culture of Spain, with the title 'Reyes y Mecenas. Los Reyes Católicos, Maximiliano I y los inicios de la Casa de Austria en España', was hosted at the Museum of Santa Cruz in Toledo. The Exhibition catalogue for both exhibitions was published by Electa. This project was the starting point of my work in the world of museums, having a background as actress and director.

Exhibition catalogues covers



The overwhelming success of 'Hispania Austria' in every respect was followed, in 1993, by the invitation from the regional government of Tyrol and the city of Innsbruck, to conceive and organise another exhibition. After the considerable expenditure for 'Hispania Austria', it was imperative to keep the costs as low as possible. After some field work to get fully

familiar with the Tyrolean museum landscape, I came up with the idea of organising a cycle of three exhibitions that invert the usual procedure: instead of taking the works of art to the visitor, it would be the visitor travelling around to discover the selected artefacts within their natural environment. The result was three so-called ‘Tiroler Ausstellungsstrassen’ (Tyrolean Exhibition Trails) focusing on Gothic Art (1994), Baroque and Rococo (1995) and the artistic legacy of the Habsburg Emperor Maximilian I (1996). The exhibition catalogues, published in German and Italian, acted as thematic guides during the visit that included selected artefacts in museums as well as monuments and sites. The curatorial committee was composed of the head of the Tyrolean Heritage Authority, curators from Tyrol’s main museums and a dramaturgic advisor.

At that time, the Cultural Routes of the Council of Europe and of UNESCO were still in their infancy and not the well-known institutions we know today.

Covers of the thematic guides for the MWNF Exhibition Trail pilot project

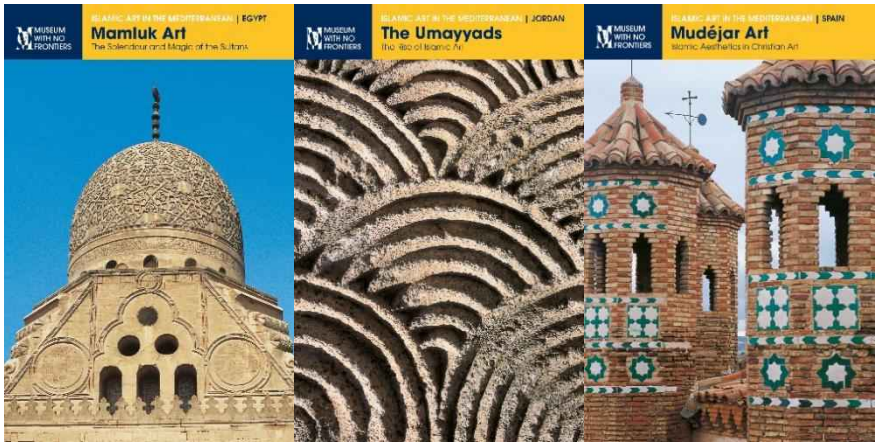
In parallel to my work in Tyrol, I started to dedicate a lot of time to my main area of interest, the Mediterranean basin. At the outset I had the chance to meet a visionary Tunisian Minister of Culture, Mongi Bousnina, who endorsed my idea to transfer the methodology developed within the Tyrolean Exhibition Trails and extend this across the entire Mediterranean basin. At the time, the auspices were good and it really seemed like I was in the right place at the right time, as the world watched with bated breath for the outcome of the ‘Oslo talks’ (1993), which gave concrete hope that peace between Israel and Palestine would come to pass. Alongside this, the European Union launched its so-called ‘Barcelona Process’ to promote unity between the two shores of the Mediterranean in all areas including politics, the economy, as well as social and cultural cooperation. Three consecutive Mediterranean EU presidencies – France, Italy and Spain – made it possible to take significant steps forward. MWNF was invited by the three presidencies to present its project

of a Euro-Mediterranean ‘Exhibition Trail’ cycle focusing on the artistic legacy of Islam. When the regional funding programme Euromed Heritage was launched in 1996, MWNF’s ‘Islamic Art in the Mediterranean Exhibition Trails’ project was among the first actions selected for European Union funding.

It then took two years before the funds were finally received in 1998. Whilst we waited, this time did not go to waste thanks to the generous support from Tyrol, Spain and Sweden: the Tyrolean government financed a three-week training of the future production managers of the ‘Islamic Art in the Mediterranean’ Exhibition Trail cycle; Spain organised and co-financed various meetings that made it possible to start working on content development; and Sweden hosted a ‘Panoramic Presentation’ of the project at Medelhavsmuseet Stockholm.

The period between 1999 and 2001 would witness eight Exhibition Trails inaugurated in Egypt, Italy, Jordan, Morocco, Portugal, Spain, Tunisia and Turkey. On the occasion of the inauguration an international press tour was organised in close cooperation with the local authorities. The accompanying guides were published in up to six languages in co-edition, specifically to include local publishers from all countries, as well as one European publisher for each language. Today these books are available to print on demand in paperback and as eBooks.

Covers of three thematic guides for the ‘Islamic Art in the Mediterranean Exhibition Trail cycles: Egypt, Jordan, Spain



The Exhibition Trails in Algeria, Palestine and Syria followed between 2002 and 2007.
In the meantime, the political situation, as a consequence of 9/11, had massively deteriorated. The Palestinian Exhibition Trail and guide were ready in 2003 but because of the tense situation in the country it was impossible to galvanise any support from local organisations, as is the norm. Consequently, the presentation took place at the British

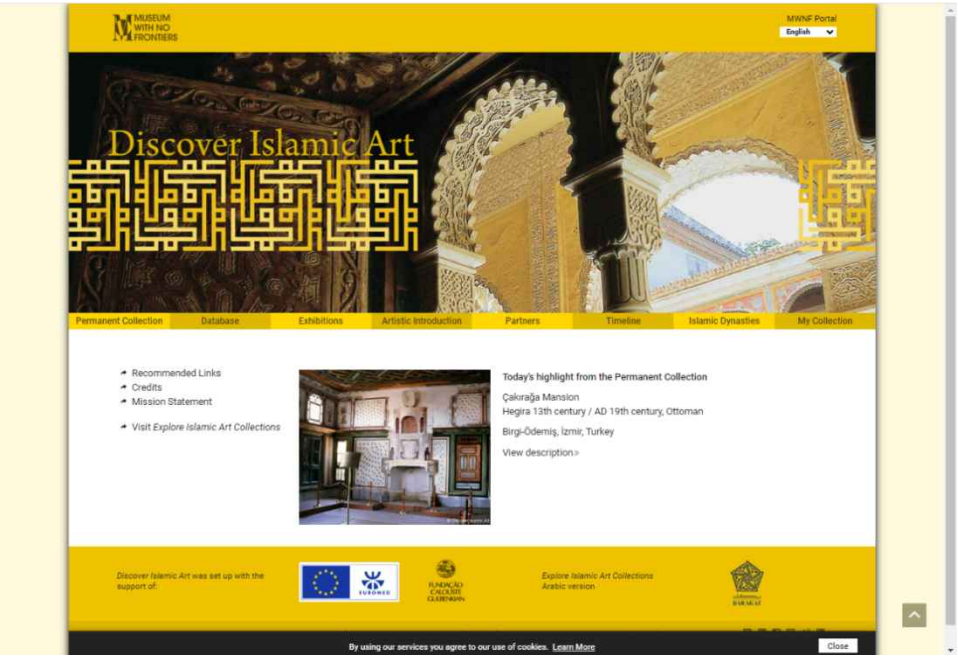
Museum, where the Islamic art collection included many artefacts related to the region, and was presented as an imaginary gateway to the Itineraries across the Westbank and the Gaza Strip.

Discover Islamic Art online museum

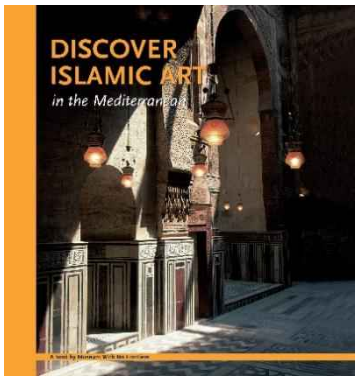
The experience at the British Museum would ultimately become the foundation stone for 'Discover Islamic Art': the development of an online museum that brings together virtually, in one space, what had been separated by history. This combined objects from Islamic art collections in museums on the one hand, with Islamic monuments and sites in the countries surrounding the Mediterranean basin on the other. The idea was received enthusiastically on both sides of the Mediterranean. Thanks to another round of funding from the European Union, MWNF, in cooperation with Partners from 14 countries – Algeria, Egypt, Germany, Italy, Jordan, Morocco, Palestine, Portugal, Spain, Sweden, Syria, Tunesia, Turkey, and the United Kingdom – set up 'Discover Islamic Art'. In just 36 months (2004 – 2007), thanks to the dedication of all involved, it was possible to complete a truly transnational museum. This included a Permanent Collection containing 850 objects and 385 monuments, a Database, a cycle of 18 Exhibitions and a Timeline based on the local interpretation of history in each country. Furthermore, for each object and monument users have access to a fantastic variety of Related Content on Database pages.

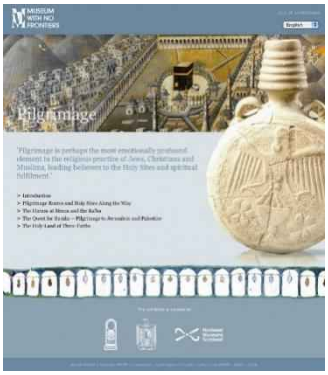
A total of 34 meetings – four plenary meetings and 30 thematic meetings – enabled the Partners to jointly develop concepts, select suitable artefacts, discuss discrepancies, and elaborate together shared interpretations of the period and topics under scrutiny. Database descriptions are available in Arabic, English, French and Spanish plus additional country languages if provided by the Partner; the Exhibitions – with focus on the history and artistic legacy of the Islamic dynasties that have ruled in the countries surrounding the Mediterranean – can also be freely visited in German, Italian, Portuguese, Swedish and Turkish. The Permanent Collection was launched in 2005, the Exhibitions in 2007, and both of which saw local events held in all participating countries. The launch of the Exhibitions was accompanied by the publication of a hard cover book on the same topic, published in the same nine languages in co-edition with local publishers in all countries.

Discover Islamic Art homepage

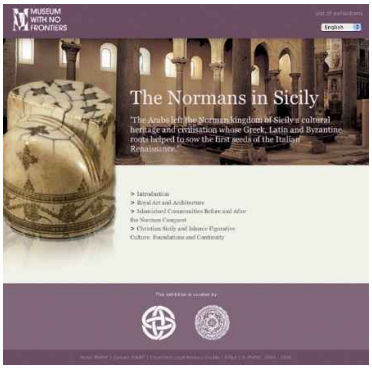


Discover Islamic Art Exhibitions overview page, Discover Islamic Art book, Exhibition homepage





Exhibition homepages



Immediately after the end of the European Union funded period of ‘Discover Islamic Art’, thanks to the excellent and wide spread media coverage, MWNF received requests from other Museums that expressed interest in joining the platform. Aware of the potential of the project, way back in 2006 the ‘Discover Islamic Art’ cofounding museums and MWNF signed a Cooperation Agreement to set the criteria and rules for any future development of the platform.

Since 2008 the database has increased more than fivefold and the network of Partners now spans four continents. Whereas the initial focus was on the artistic legacy of Islam in the Mediterranean region only, new contributions concern all periods of Islamic history and all regions of the Islamic world. New entries are available in English and Arabic. To allow distinction and make users aware of this language difference, new entries are uploaded under the follow up project ‘Explore Islamic Art Collections’, which is fully integrated in ‘Discover Islamic Art’.

Today ‘Discover Islamic Art’ is the largest specialised online resource about the topic and the only one with standardised access that provides curatorially accurate material from different museums and different countries, compiled by local experts in each country.

Discover Baroque Art **online museum**

Even before the completion of ‘Discover Islamic Art’, it had already been decided to set up a second thematic online museum to test and further consolidate the methodology. The decision of some ‘Discover Islamic Art’ Partners to add an Exhibition focusing on ‘Western Influences in Ottoman Lands’ – the so called ‘Westernization’ period of North Africa and the Middle East marked by clear neo-baroque influences in Egypt, Jordan, Syria, Tunisia and Turkey – led to the decision to dedicate the ‘test’ project to lesser known aspects of Baroque art and architecture. ‘Discover Baroque Art’ was set up in cooperation with Partners from seven countries – Austria, Croatia, Czech Republic, Germany, Hungary, Italy and Portugal – who entirely self-financed the realisation of the project. ‘Discover Baroque Art’ went live in 2010. It has the same components as ‘Discover Islamic Art – Permanent Collection, Database, Exhibitions, Timeline – although the descriptions are only available in English.

Sharing History **online Exhibition cycle**

With the start of the so-called Arab Spring (early 2010) the cooperation with the countries of North Africa and the Middle East became extremely challenging and funding opportunities in Western countries changed radically to focus on new priorities.

In this scenario, in early 2010, MWNF was invited by the League of Arab States (having its head office in Cairo) to present the ‘Islamic Art in the Mediterranean’ Exhibition Trail cycle and the ‘Discover Islamic Art’ online museum as part of the Arab League’s stand at the EXPO 2010 in Shanghai.

As a result of the outstanding success of this cooperation, in December 2010 MWNF and the League of Arab States signed a Memorandum of Understanding aimed at raising awareness about the history and artistic legacy of Islam. A manual for teachers in Arab Countries to facilitate the use of ‘Discover Islamic Art’ as an educational tool, was followed by the joint realisation of a truly unique project: between 2012 and 2015 Partners from 22 countries set up an online Exhibition cycle analysing, for the very first time, Arab-Ottoman-European relations in the XIX century, taking into consideration the perspectives of all concerned: ‘Sharing History. Arab World – Europe | 1815 – 1918’ includes ten thematic exhibitions focusing on the big topics of the XIX century such as ‘Economy and Trade’, ‘Great Inventions’, ‘Migration’ or ‘Reforms and Social Changes’, just to name a few. The project was entirely self-financed by the participating institutions, and included participation in four international Partner meetings. Apart from the Exhibitions, ‘Sharing History’ offers a Permanent Collection, a Database (including many items made accessible for the first time) and a Timeline.

In recent years, ‘Sharing History’ has also attracted attention from people and organisations outside the Euro-Mediterranean region, namely in the United States, where it is admired for its broad range of contents about one of the most complex periods in XIX century history.

Sharing History homepage

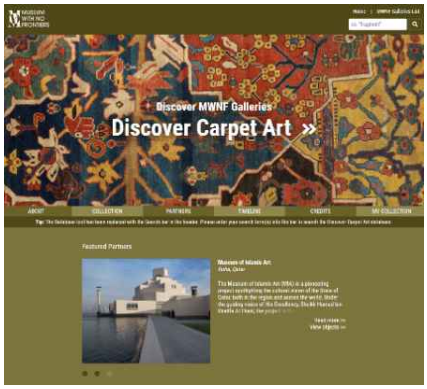
My Collection

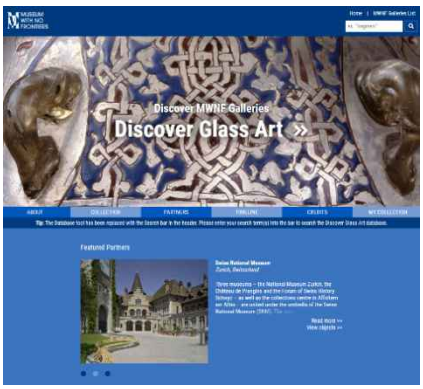
Visitors to www.museumwnf.org have access to a ‘My Collection’ tool, making it possible to set up personalised collections and to include items from all the various applications that make up the MWNF platform.

MWNF Galleries

In 2020, ‘MWNF Galleries’ were launched not only to provide a new avenue for exploring the artefacts in the MWNF Database, but also to cater to the ever increasing requests from users and visitors with specific interests. So far, there are 37 ‘MWNF Galleries’, within which artefacts from all applications are sorted by medium or type of object. Each new entry into the MWNF Database is also available in the corresponding Galleries and many new Partners join the MWNF platform specifically to add material to one or more Galleries. So far, two Galleries – Carpets and Glass – have been developed as Virtual Museums providing access to other related material, e.g. paintings including carpets or items concerning glass production.

MWNF Galleries homepages: Carpet, Glass

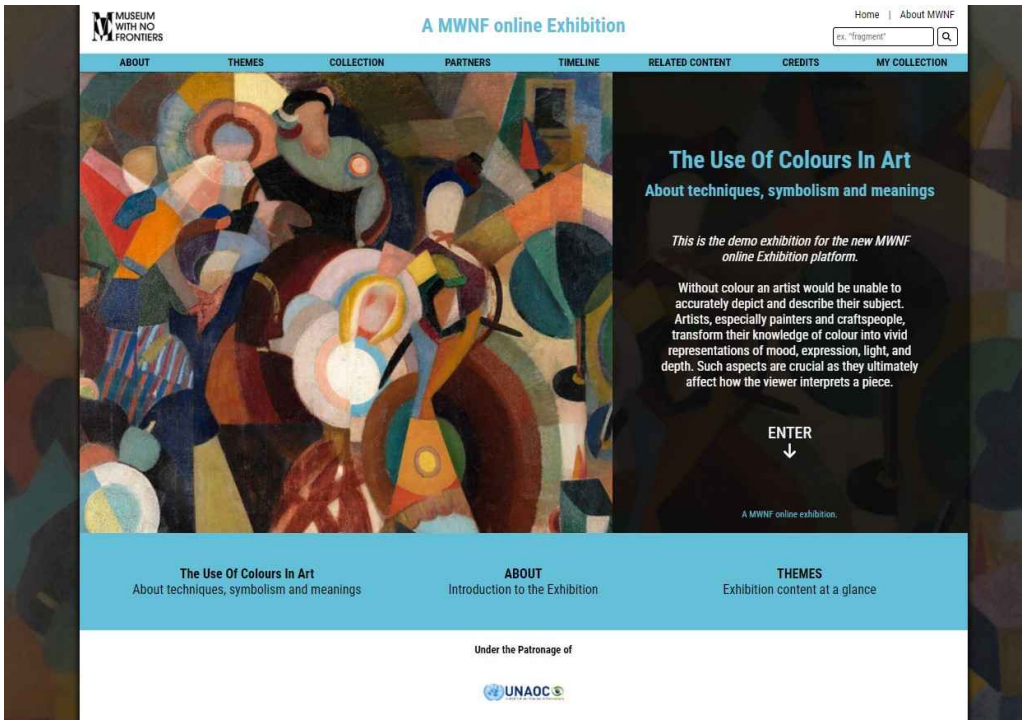




Exhibitions

Building on the behind-the-scenes infrastructure set up for MWNF Galleries, MWNF launched a new online Exhibition tool in spring 2023, enabling MWNF to set up new exhibitions without the involvement of a web team. The new application is based on pre-defined templates and an auto set up process. A demo exhibition, ‘The Use of Colours in Art. About techniques, symbolism and meanings’ was launched in June 2023 and is accessible from the MWNF portal homepage.

Homepage of the Demo Exhibition for the new MWNF Exhibition auto set up tool



Thanks to this new tool, MWNF Partner institutions, alongside any new Partners from different countries and cultural backgrounds, are in the position to jointly plan exhibitions without being limited by logistic or economic circumstances. This can be done by simply using material from the MWNF Database, or by selecting new material from their own collections specifically for an exhibition. That new material will then remain available in the MWNF Database so that it can be used for the benefit of all in future exhibition projects.

The new platform can also be used by MWNF Partners to create online exhibitions related to physical exhibitions or to present video-recorded tours through physical exhibitions.

The first exhibition projects that will be presented on the new platform are:

‘The Table Is Set. Food traditions and legacy in the Islamic World’ online Exhibition involving a large number of MWNF Partners and new Partners (foreseen launch: spring 2025; an invitation to participate has been published at AVICOM: https://avicom.mini.icom.museum/the-table-is-set-food-traditions-and-legacy-in-the-islamic-world-invitation-to-participate/

‘With Brush and Qalam’ online Exhibition based on a physical Exhibition organised by the Museum of Islamic Art Berlin, a ‘Discover Islamic Art’ co-founding Partner (foreseen launch: May 2024).

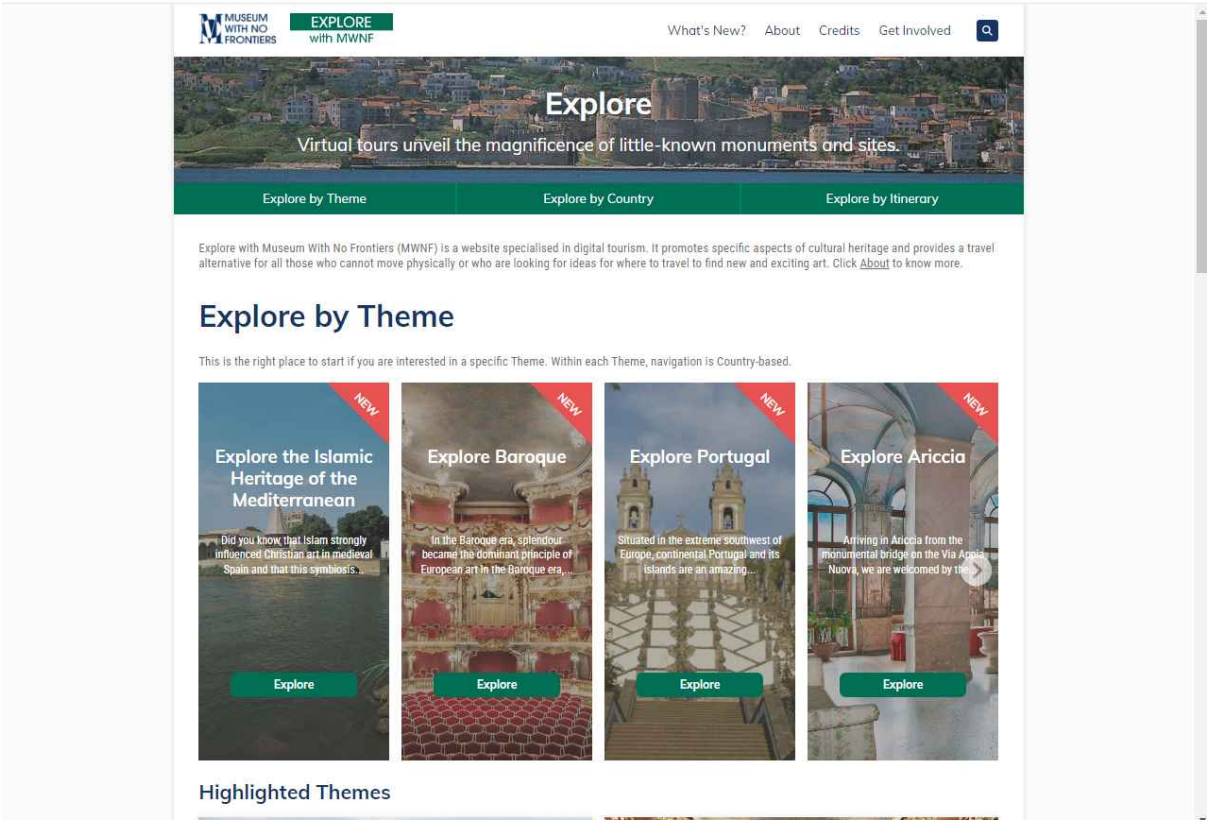
‘Dining with the Sultan. The fine art of feasting’ video-recorded tour through the Exhibition organised by LACMA Los Angeles, which inspired MWNF’s ‘The Table Is Set’ online Exhibition (foreseen launch: summer/autumn 2024).

Explore with MWNF

In addition to the artefacts from the collections belonging to our Partner Museums, the MWNF Database includes a large amount of monuments and sites related to the topics of our online Museums. Since 2018 ‘Explore with MWNF’ – conceived as a virtual travel platform – allows users to explore monuments ‘By Country’, ‘By Theme’ or ‘By Itinerary’; the latter is based on the MWNF Exhibition Trails such as ‘Islamic Art in the Mediterranean’ and can be reached through ‘Related Content’ links from relevant Database pages.

New content is added to ‘Explore with MWNF’ through special projects carried out in cooperation with local entities.

Explore Start Page



MWNF Books

Since the beginning, MWNF has also been running a diversified publishing programme that includes thematic travel books, books related to the MWNF online museums as well as educational books. Most publications are available in a print on demand paperback edition and as eBooks.

Individual Artists platform

In particular, in connection with Islamic art and culture, MWNF receives more and more requests from individual artists who wish to present their works at the MWNF platform. To help facilitate this, a new application dedicated specifically to individual artists is being created.

Conclusion: is MWNF a Museum?

The question whether MWNF, according to the new Museum definition, can be considered as a museum or not, has been discussed many times. Your opinion about this would be of great interest to us. If you are ready to share your interpretation, here my personal email address eva.schubert@museumwnf.net.

Empowering Small Museums in Creating Virtual Museum on Social Media Platforms A Case Study of Longxi County Museum, China

Yuqiao Hu
School of Museum Studies, University of Leicester , United Kingdom

I am currently pursuing a PhD in Museum Studies, with my research focusing on the opportunities and challenges museums encounter in utilizing social media to engage with a Chinese audience. To this end, I conducted a series of interviews with museum directors and staff to gather insights into their social media strategies. Additionally, I had the opportunity to participate in several digital projects undertaken by museums.

Last year, I represented the Dunhuang Academy at the Festival of Audiovisual International Multimedia Patrimony (FAIMP), where the animated short video we submitted was awarded the bronze prize. This year, the academy unveiled its new digital project, the Digital Library Cave. This ambitious project goes beyond simple digitization of collections; it leverages advanced gaming technologies to recreate the historical ambiance of the Library Cave. This remarkable initiative is a collaborative effort between the Dunhuang Academy, a UNESCO World Heritage Site, and Tencent, a leading technology company in China. As with other exemplary virtual museum projects, it necessitates substantial support in terms of manpower, technology, and funding. While national and large museums may find it relatively easy to access these resources, small to medium-sized museums, especially those in rural areas, face significant constraints. These include limited staff and insufficient funding, posing challenges to digital museum development. One might wonder why small museums should pursue virtual museum projects and how they can feasibly do so.

To explore these questions, I interviewed a museum in the same province as the Dunhuang Academy. The Longxi Museum, although small and located in an underdeveloped county, offers insights that are broadly applicable. Despite only being removed from the country's poverty list in 2020, the museum has been proactive in increasing its visibility and optimizing its resources through digital means. The museum's head of the education department shared insights into local perceptions of museums, which are often seen as static repositories rather than dynamic cultural institutions.

“Museum is like warehouse displayed the old things that I don’t know. The work of the museum staff is very leisurely, drinking tea and reading newspaper.” To challenge these

stereotypes and extend its reach, the museum embraced social media and intend to establish a virtual museum on the platform to reach audiences. This initiative was facilitated by the First General Investigation of National Movable Cultural Relics in 2016, which allowed the museum to reorganize its collection and reconsider its public presentation. Recognizing the local popularity of short video content, the museum director began experimenting with social media, posting photos and videos of the museum's collection. After receiving some positive feedback from early posts, the museum bought some equipment such as camera, smartphone, lightings, tripods and some mounts. Creating social media content has become one of the daily tasks for the director and education department. Nowadays, this approach has evolved from simple handheld recordings to more stylized and professional content, reflecting significant progress over time.

The museum's efforts on social media have demonstrated that a virtual museum can be effectively established through strategic content creation, catering to platform-specific user preferences. Their active online presence even attracted the attention of social media influencers and leveraged algorithms to enhance visibility among local residents.

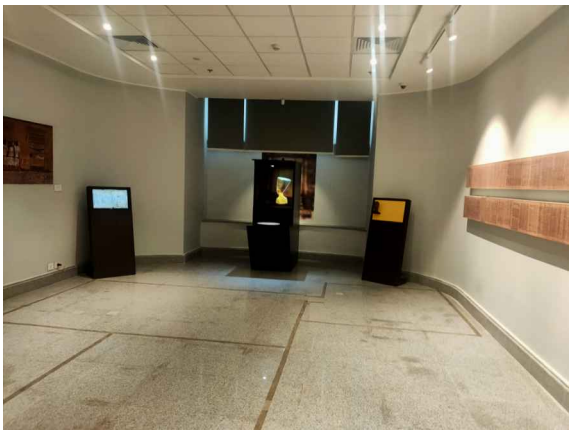
In summary, museum leadership should embrace emerging technologies and trends, fostering a team equipped with digital literacy. Addressing resource limitations through cost-effective methods like smartphone-based content creation is crucial. Finally, compelling content is paramount; a virtual museum is not merely a digital archive or collection but a platform for engaging narratives that connect with audiences.

Building a Virtual Museum Within a Museum: The Zafaran Museum

Mohamed Ismail Ahmed Ibrahim
Ain Shams University, Cairo, Egypt

The Zafaran Museum, one of Egypt's modern-times historic buildings, is housed within the Zafaaran Palace, which is situated on the main campus of Ain Shams University in Cairo. It was opened in May 2023. It is an educational museum that primarily serves academics, researchers, and university students interested in museums and cultural heritage. With 167 pieces on display from ancient Egypt to the modern era, the museum provides an experience that captures the richness of Egypt's remarkable history and ancient civilization. Within the Zafaran museum, a virtual museum has been established on-site. The concept behind this virtual museum is to use interactive systems and a variety of technologies to

present themes related to Egyptian heritage. These systems serve as a permanent infrastructure that enables museum staff to modify display content and change the show's theme. In this sense, the virtual museum can be considered as a temporary thematic exhibition.



The main objectives of creating this type of museum were to display some artifacts that were not part of the museum collection but have connections to the theme of the existing exhibit, allow users to visit sites where artifacts were discovered, engage visitors, provide archaeological knowledge in an engaging manner, and go beyond the constraints of display space.

The Zafaran Virtual museum offers a variety of experiences, including:

The interactive map

An interactive map with NFC markers (pins) on the locations of the world heritage sites in Egypt, the visitor may visit the sites virtually by using the NFC capability on his/her smartphone By swiping the smart phone close the pins. If a visitor's phone does not have NFC capabilities, they may use the printed QR codes instead.

AR apps

The second experience is a tablet equipped with two augmented reality applications. Visitors can use the first application to read the hieroglyphic texts found on one of the most important medical papyri in ancient Egypt (Ebers Papyrus), and the second application for an audio explanation of an ancient egyptian inscriptions (applied on Tutankhamun's tomb).

VR Apps

using the use of a VR headset, users can explore historically significant locations using two different applications: one offers a virtual tour of Tutankhamun's tomb, while the other focuses on Nefertari's tomb.

Interactive floor

Through two interactive kiosk stations, visitors can explore multimedia content and get more details about the collections or related subjects. One kiosk station features content about Egypt's modern history, while the other station focuses on ancient astronomy.

Blind kiosk

Visitors who are blind can interact with a 3D-printed replica (Nefertiti's head) at a dedicated blind kiosk, which also has a Braille label as well as a headphone for audio interpretation.

Interactive hologram

A holographic interactive exhibit featuring several objects from Egypt. Visitors can select a card representing a single artifact; by placing the card on the rotating table, the artifacts will be displayed on the hologram, allowing them to interact and examine it from multiple angles.

Training

Offering students specialized training on the use of digital technologies for heritage documentation and dissemination is one of the duties of Zafaran virtual museum.
After receiving training in virtual heritage, our students were able to produce a virtual tour of the museum, a virtual tour of Nefertari's tomb, and a 3D scan using photogrammetry for one of the museum's collections (hathor head capital). Their VR application is currently on display in the museum.

Digital Transformation in Museums: A Critical Analysis Through the Lens of the National Ainu Museum

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Abstract

This study delves into the digital transformation journey of museums, underscored by the rapid adoption of digital technologies such as Virtual Reality (VR), Augmented Reality (AR), and 3D scanning. Through a case study of the National Ainu Museum, this article evaluates the dual aspects of museum digitization—its benefits and the challenges encountered. The aim is to provide insights into the strategic integration of digital technologies in museums, their impact on accessibility, education, and preservation, and the hurdles of technological reliance and cultural sensitivity.

Introduction

In the digital era, museums worldwide are navigating the complex transition towards digitization, a movement propelled not only by technological advancements but also by societal shifts, including the global response to the COVID-19 pandemic. This paper explores the paradigm of digital transformation within the museum sector, focusing on the

National Ainu Museum (NAM) as a pivotal case study. It scrutinizes the advantages of adopting digital technologies in museums, such as enhanced accessibility and interactive learning, against the backdrop of challenges like technological dependence, ethical considerations, and sustainability. The discourse contributes to the broader understanding of digital transformation's role in redefining museums' functions, engagements, and cultural preservation efforts.

1. Digital Initiatives at the NAM

1.1 Overview of the National Ainu Museum:

Situated in Shiraoi, Hokkaido, the National Ainu Museum (NAM) stands as a testament to Japan's dedication to preserving and promoting the rich heritage of the Ainu people. Opened in July 2020, the museum has strived not only to deepen the understanding of Ainu culture but also to act as a vibrant center for creating new cultural expressions within "Upopoy," a symbolic space for ethnic coexistence. The COVID-19 pandemic accelerated the museum's digitization efforts, enhancing the accessibility of Ainu heritage worldwide.

Portrait of the museum

1.2 Launching the Virtual Museum:

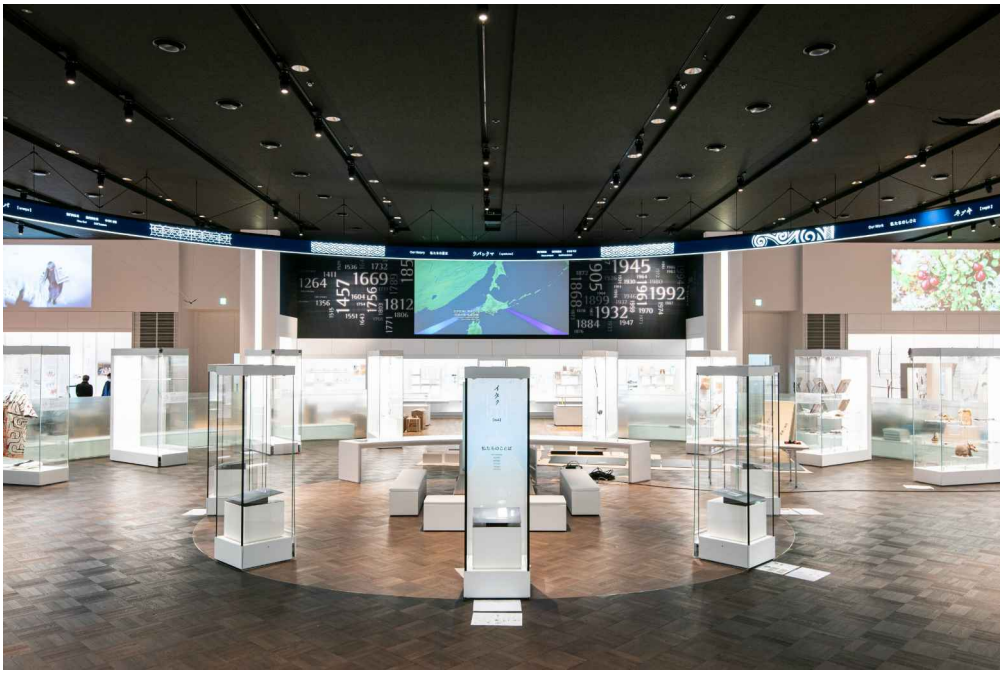
The digitization initiative at the NAM took off with the visionary goal of creating a virtual museum. In response to the extended influence of the COVID-19 pandemic, the Agency for Cultural Affairs presented the idea of a virtual museum in May 2021, a concept NAM eagerly adopted. The exhibition planning department led the charge, ensuring that the online depiction of Ainu culture was both precise and respectful. The primary objectives were to provide online access to exhibition rooms, cater to a demographically diverse audience, and

offer multilingual support for an international audience. In September, NAM initiated a competitive search for a technological collaborator to render its cultural exhibits into a dynamic digital form.

The bird view of Upopoy

The first step involved a comprehensive capture of the Upopoy facility using drone technology, followed by 3D filming of both the museum's interior and exterior. The public spaces, distributed across two levels, comprise a theater, exchange rooms, and a museum shop on the first floor, and the main exhibition space, a special exhibition room, and a panoramic lobby on the second. Next, ten significant artifacts were selected for 3D scanning, producing rotatable models viewable from any angle. This meticulous filming process spanned 20 days in total.

The permanent exhibition hall

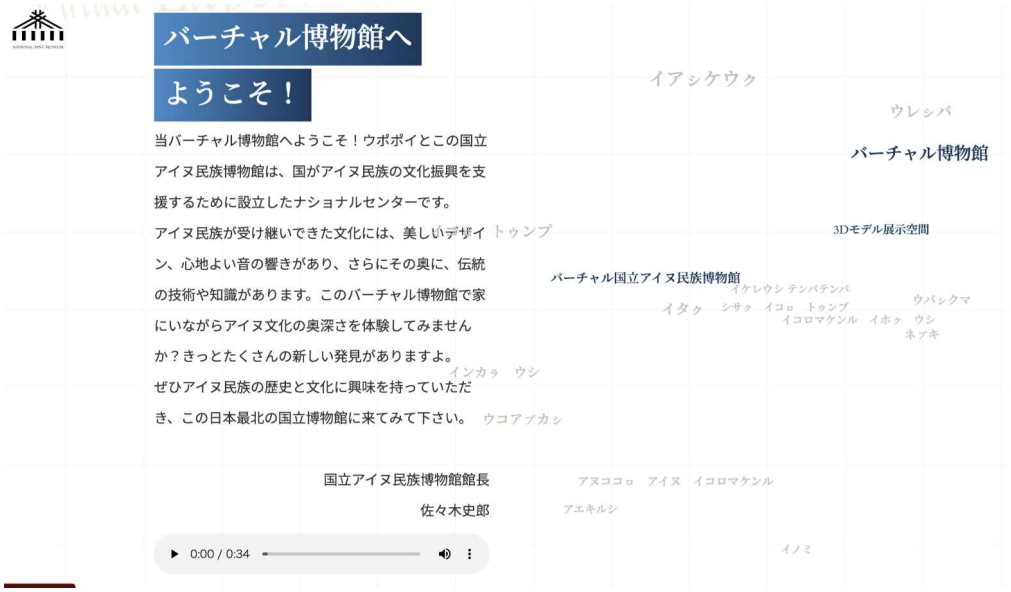


The collected data was then integrated into Matterport's virtual environment, laying the groundwork for the digital museum design. In honoring NAM's linguistic diversity, the virtual space featured translations in several languages, with Ainu as the primary language, accompanied by Japanese, English, Chinese, Korean, Russian, and Thai, resulting in four distinct language versions of the museum.

Inside the virtual basic exhibition room, visitors encounter data-rich narratives in each language, detailing main themes and sub-themes, accompanied by explanatory texts. Notably, virtual displays were equipped with video monitors mirroring those in the physical space, providing direct links to the museum's artifact database. A special exhibition room was also designed, offering a digital-only space that leverages 3D modeling to allow unfettered exploration by virtual visitors. Moreover, the museum shop expanded its presence into the digital domain, enabling the online purchase of Ainu handicrafts.

To enrich the visitor experience further, an automated audio commentary, synchronized with the virtual tour software, was implemented. Personalized greetings and detailed explanations by the museum director, as well as relevant researchers and curators, were recorded in various languages, including Ainu, reinforcing the museum's commitment to cultural authenticity and accessibility. The inaugural version of NAM's virtual museum was unveiled to the public in April 2022.

Director‘s greeting in Ainu language



1.3 Evolution and Enhancement:

The National Ainu Museum's (NAM) commitment to digital innovation earned international recognition when the "National Ainu Museum Virtual Tour" film won the Gold Award in the "Augmented Reality and Virtual Reality" category at f@imp 2021-2022, organized by AVICOM. The accolade was presented at the ICOM conference in August 2022, affirming the museum's efforts in promoting its virtual museum.

Despite this success, the initial launch was viewed as a stepping stone for further enhancements. User feedback pointed to the need for improved navigation and a more inclusive design to cater to a diverse audience, including individuals less acquainted with digital environments. Responding to this, NAM unveiled a more accessible user interface in the second version of the virtual museum in April 2023. This iteration featured clearer navigational cues, comprehensive multilingual support, and enriched interactive components, all designed to elevate the user experience.

The updated version introduced a host of new features, notably streamlined pathways in the first-floor lobby, guiding visitors seamlessly between the basic and special exhibition rooms right from the entrance. The thematic organization of the basic exhibition was refined to facilitate at-a-glance comprehension, allowing visitors to tailor their exploration according to personal interest. In the virtual special exhibition room, complete 3D models of all ten artifacts were made available, enhancing the interactive exploration. Furthermore, the basic exhibition's floor plan on the virtual museum's homepage was embedded with links, offering narrated introductions by museum staff accompanied by video guides through the six principal themes and exhibition areas, all supplemented by multilingual narratives by the staff themselves.

3D model of an Ainu house

プ　倉（模型）
3D Model

In a testament to its pioneering role, NAM was invited to showcase its virtual museum project at The Best in Heritage IMAGINES in 2023. This category, founded in 2016 and associated with ICOM, is dedicated to recognizing innovative projects that effectively integrate cutting-edge technologies. NAM's participation marked the first time a Japanese museum was featured in this distinguished category, spotlighting its contributions to the intersection of technology and cultural heritage.

2. Digitization Challenges in Museums

The march towards digitization in museums comes with its own set of obstacles. While the advantages are evident, the shift towards digital interfaces and archives ushers in a complex spectrum of challenges that span technological dependencies to cultural sensitivities. This section examines both the external and internal hurdles that institutions such as the NAM encounter in their digitization endeavors.

2.1 External Challenges

2.1.1 Government Influence and Sustainability Concerns

Museums typically function within the framework of government policies, which can heavily influence their approach to digitization. Digitalization in Japan commenced later than in other developed countries but has seen a rapid escalation since 2020. Between February and May of 2021, bills related to digital reform were introduced to the National Diet by the Ministry of Internal Affairs and Communications, leading to their enactment. In September 2021, the establishment of the Digital Agency further underscored the government's commitment to digital transformation. The Ministry of Economy, Trade and Industry, along with the Ministry of Land, Infrastructure, Transport and Tourism, issued guidelines to augment digitalization from economic and tourism standpoints. Meanwhile, the Agency for Cultural Affairs launched targeted programs and grants to digitize museum operations and materials, evidenced by initiatives like the "Introduction of Digital Technology in Buried Cultural Property Protection Administration," and projects aimed at enhancing the allure of Japanese culture through advanced technology. The swift creation of a robust and focused digital infrastructure emphasizes the criticality and vigor of Japan’s commitment to digitalization.

The genesis of NAM’s virtual museum was also part of these wider digital transformation (DX) initiatives and served as a countermeasure to the challenges posed by the pandemic. Governmental bodies need substantial time to craft appropriate policies and guidelines; however, museums are often compelled to implement these rapidly, potentially compromising long-term planning and consideration for sustainability.

The presence of various systems and grants offered by different government entities can create a complex environment for museums when selecting the most suitable support system. Factors such as the extent of system-related research, museum size, management structure, and financial backing can influence the museum’s choice and its resultant challenges. It is often observed that museums with greater financial resources tend to receive more favorable evaluations, which can lead to disparities that may not serve the collective goal of promoting digitization across the industry.

Hence, a deep understanding of the actualities faced by museums is imperative, as is the need for a cohesive approach in the design and application of governmental systems and policies. Finding equilibrium between the swift pace of digital advancements and the overall stability and needs of the museum industry represents a significant and foundational challenge.

2.1.2 Technological Dependence and Vendor Selection

Selecting the appropriate technology partners is crucial yet fraught with challenges for museums venturing into digital projects. In the current market, the variety of technological options complicates the selection process for museums aiming to meet specific needs. Opting for particular applications or systems can present risks, such as the financial burden of transitioning between technologies and overreliance on selected vendors. This is compounded by potential issues like vendor bankruptcy or the challenge of migrating away from entrenched systems due to the rapid introduction of new technologies. Careful consideration of system security and sustainable maintenance policies is paramount, especially when museums co-manage operations with vendors.

Collaboration with technology partners is generally vital for museum exhibitions, but the digitalization process has magnified this need. Traditionally, museum researchers and curators guide the construction of physical exhibits with their expertise. However, digitalization demands that museums seek input from tech companies and solicit specialized proposals, recognizing that keeping abreast of the latest technological advancements internally is a challenge. During NAM's request for proposals for its virtual museum, the institution faced numerous intricate queries and dedicated months to researching and evaluating technical options, although not all questions could be fully addressed. Selecting appropriate technologies for exhibition themes necessitates insights from companies with specific expertise. Additionally, the proprietary nature of companies' technologies may lead

to incompatibility issues, risking a long-term dependency on certain services and posing financial and logistical barriers to changing systems.

Thus, museums must carefully assess potential partners, anticipate risks to minimize overdependence, and engage in continuous dialogue with the digital sector. Considering new methods of collaboration is essential for museums to effectively strategize their digitalization approaches.

2.2 Internal Challenges

2.2.1 Defining Digital Objectives within Museums

Aligning digital initiatives with a museum's overarching goals is a critical internal challenge. NAM faced this issue when deciding the purpose of its virtual museum: Should it replicate physical exhibitions or act as a standalone platform for innovative storytelling? This conundrum emphasizes the necessity for precise strategic objectives to guide the deployment of digital technologies, aiming to enhance rather than replace the physical museum experience.

It is one of modern museum management's most daunting tasks to comprehend the purpose, definition, and role of digitization within the institution. At NAM, whether the virtual museum was to be a digital archive of tangible exhibitions or an entirely new form of exhibit has sparked much debate. The essence of digitalization and its ultimate aim are critical questions that need addressing. Traditional exhibitions have revolved around presenting tangible objects within a defined space, while digitization often supplements this experience. Virtual museums, VR immersions, and AR interactions are typically viewed as augmentations to the physical experience rather than standalone offerings.

Just as it can be difficult to determine the starting point for digital adoption, deciding on its limits presents a similar challenge. With continuous scientific and technological evolution, museums face decisions about embracing the latest developments. Balancing the pressures of limited resources, system compatibility, and the need for updates can be overwhelming. The potential of digital spaces, like the Metaverse, has sparked extensive dialogue about the future of museum experiences. These flexible virtual environments could shape how we perceive and interact with museum content, potentially leading to a paradigm shift from static physical displays to dynamic, creative digital experiences.

As the digital world evolves, so too does our perception of museums. The transition from passive viewing to engaging and creating in multifaceted digital spaces reflects a shift towards more fluid representations of culture and history. Addressing the challenges of digitization proactively while preparing for future developments is crucial. However, given that technology is not a universal solution and that each museum's context and goals are unique, defining the role of digitization in alignment with specific institutional needs remains a foundational challenge for the digitization of museum exhibitions.

2.2.2 Organizational Adaptation to Digitalization

Museums are traditionally structured around long-established roles, frequently without considering the need for dedicated digital innovation teams. At NAM, as is the case with many institutions, digital responsibilities were initially distributed across various departments without a unified strategy. This dispersion of duties can impede the smooth integration of digital technologies into museum operations. Hence, the creation of an organizational framework that champions and enables digital innovation is vital for museums to skillfully navigate the complexities of the digital realm.

In Japanese museums, organizational structures have historically been aligned with specific functions like exhibition, research, education, and conservation. Yet, these structures often do not include dedicated digitalization units. As a result, when the need for digital expertise arises, museums may resort to outsourcing to external contractors, perceiving digitalization as a supplemental tool rather than an integral part of the museum's function. It is not uncommon for virtual museum creation to be managed by exhibition departments or for digital archiving and database maintenance to be relegated to the collections management team.

Digitalization, however, affects all aspects of a museum's operations, not just exhibitions. For instance, constructing a museum in virtual space demands collaborative efforts from multiple departments: the exhibition team designs the digital rooms, the collections department handles 3D modeling and database links, the translation and international relations departments manage multilingual offerings, and the education, research, administration, and public relations departments engage in the application and dissemination of the digital content. Without a department specifically dedicated to digital initiatives, these tasks may become disjointed, hindering the possibility of a cohesive approach.Interactions with the digital industry and tech companies are also essential. The absence of specialized

departments for such engagements can lead to uneven information exchange and an over-dependence on third-party services.

2.2.3 Human Resources and Digital Expertise

The cornerstone of successful museum digitization is a well-equipped team with essential digital skills. Museums must not only focus on upskilling their existing staff but also on attracting new talent armed with the digital competencies necessary to harness the benefits of technological progress. Developing human resources stands as a crucial challenge in the digitization of museums. This endeavor demands the deployment and nurturing of flexible and versatile personnel. Beyond mastering state-of-the-art digital technologies, staff members must be capable of integrating a broad spectrum of knowledge—from cultural understanding to legal and marketing acumen—into the museum's operations. The provision of comprehensive training programs and workshops to support this holistic development is vital.

Moreover, the inclusion of fresh perspectives and innovative ideas is key to the human resource evolution in the digitization process. This involves fostering collaboration with experts across different domains. Creating a supportive environment that values diverse skill sets, fosters deep analytical thinking, encourages stepping beyond conventional boundaries, and promotes ongoing education and professional growth poses a complex challenge for museums in this digital era.

2.3 Ethical and Legal Considerations

The journey towards digitization introduces various ethical and legal challenges, especially concerning data protection, copyright issues, and the respectful depiction of cultural heritage. NAM initiative to digitize Ainu cultural artifacts highlights the need for thorough consideration of these matters to ensure that digital representations respect the cultural significance of the source material and adhere to applicable legal and ethical norms.

2.3.1 Data Protection and Security:

The digital era necessitates the collection and sharing of information online, whether for accessing digital exhibitions or conducting surveys. Protecting personal data and ensuring robust security measures are paramount, particularly with the implementation of online information-sharing efforts. Museums must comply with data protection laws, such as the EU's General Data Protection Regulation (GDPR), and adhere to stringent cybersecurity

practices. Failure to do so not only damages the institution's reputation but also poses a significant risk to user privacy.

2.3.2 Copyright and Use of Digital Media:

The management of copyrights and related rights is critical in the digital production of exhibitions and content. When adapting copyrighted materials for digital use or publishing exhibition content online, obtaining explicit permission from copyright holders or securing appropriate licenses is essential. NAM, for example, faced restrictions on using certain explanatory texts, requiring direct negotiations with authors for digital permissions.

2.3.3 Handling of "Difficult Heritage":

The concept of "difficult heritage," as defined by Macdonald (2009), relates to aspects of heritage that complicate the reconciliation of past events or narratives within modern contexts. A prominent example is the Holocaust, where its digital representation, for instance, through social media videos, can significantly affect viewers' emotions and perceptions, thereby introducing intricate ethical dilemmas. In the case of NAM, sacred artifacts of the indigenous people, including ritual objects and idols, possess elements that are not meant for public disclosure, accompanied by restrictions based on certain roles or genders. Nevertheless, modern digital technologies such as Virtual Reality (VR), 3D modeling, and CT scanning techniques have the potential to reveal the hidden or private aspects of these culturally sensitive items to a broader audience. Creating a digital environment that allows unrestricted public interaction with these items demands prudent management to respect cultural and religious sensitivities.

Kidd & McIntosh (2016) have posited that social media could enhance engagement with challenging heritage, encouraging deeper reflection and critical thought. However, the ethical ramifications of revealing such information and the permissible extent of its disclosure are subjects of ongoing debate. As the incorporation of digital technology in museum exhibitions continues to expand, the necessity for continued discussion regarding these ethical concerns becomes ever more critical.

In summary,throughout the digital transformation process, museums confront intricate legal and ethical dilemmas. Given that museums are custodians of materials rich in human history, emotions, beliefs, and identities, addressing these concerns requires careful

scrutiny. Museums are tasked with navigating these obstacles to evolve and meet the new era's demands successfully.

3. Advantages of Digitizing Museums

Despite the multifaceted challenges posed by digitization, the transformation of museums into digital realms offers a plethora of undeniable benefits. This section elucidates how digitization efforts, exemplified by the initiatives of the National Ainu Museum (NAM), enrich the museum experience, expand educational outreach, and pave the way for innovative research and preservation methods.

3.1 Enhancing Accessibility and Engagement

Digital platforms break down geographical and physical barriers, offering unparalleled access to museum collections and exhibitions. NAM’s virtual museum project exemplifies this benefit by allowing a global audience to delve into Ainu culture and heritage. Such digital engagement not only promotes inclusivity for those who are physically unable to visit but also accommodates visually impaired individuals through specialized audio guides. The option of virtual visits introduces a level of personalization and immersion to the learning experience, granting visitors the liberty to interact with exhibits at their leisure and revisit them whenever they choose.

A key strength of virtual museums is their capacity to engage audiences worldwide. The NAM virtual museum, for instance, presents its permanent exhibition with audio guides available in five languages, enhancing accessibility for visually impaired visitors. Additionally, virtual museums play a crucial role in elevating awareness about the cultures and histories of Indigenous communities, which might remain obscure beyond their local context. The convenience and adaptability offered by virtual museums surpass that of their physical counterparts; visitors can navigate the exhibitions at their preferred pace and return to them at any point, thereby enriching the educational experience.

The redefined concept of museums, as highlighted at the ICOM (International Council of Museums) Prague Conference 2022, emphasizes the importance of offering diverse experiences and modes of communication. These elements are inherently aligned with the capabilities of digital technology.

In physical settings, the application of various technologies can create multi-sensory experiences, extending beyond mere visual stimulation to cultivate immersive encounters that leave lasting impacts on visitors and augment the educational value. On the other hand, virtual environments eliminate geographical constraints, facilitating access for a broad spectrum of users. This democratization of access permits individuals to explore and engage with content tailored to their interests and preferences. Consequently, a wider audience can appreciate the value of museums and partake in the creation of new experiences. Moreover, the digitalization of content opens up potential avenues for generating revenue through online stores and virtual exhibitions.

3.2 Transforming Museum Education

Digitization brings dynamic and interactive elements into museum education, vastly expanding its reach and impact. Utilizing digital tools and online resources, the museums can provide educational programs that engage a wide range of audiences, from schoolchildren to scholars worldwide.Furthermore, digital technologies facilitate the use of "spaced repetition," a teaching strategy that boosts memory retention by periodically revisiting the material, thereby enriching the understanding and appreciation of cultural heritage.

The employment of digital programs and apps for museum education, particularly in remote settings, has emerged as a potent means to extend educational offerings. The deployment of interactive exhibits and gamified elements holds the promise of markedly boosting participant interest and involvement. A significant benefit of digital educational content is the facility of its reuse. The "spaced repetition" method enhances comprehension and memory consolidation through periodic reviews of knowledge and skills. Moreover, advancements in AI enable multilingual support and easier provision of exhibit explanations, making the content accessible to visitors from diverse linguistic backgrounds.

The progression towards digitization not only amplifies the educational and experiential value for visitors but also deepens the understanding of the museum's mission and the cultural depth it represents. Consequently, museums transform into vibrant cultural venues that fuse learning with experience, going beyond simple transmission of information.

3.3 Facilitating Advanced Research and Preservation

The digital transformation within museums is revolutionizing the methodologies of research, preservation, and dissemination of collections. Digital archives provide researchers and

academics with remote access to extensive information databases, facilitating cross-disciplinary and international collaborative studies. Therefore, digitization not only protects physical artifacts from deterioration but also enhances their scholarly value by incorporating them into a dynamic, evolving knowledge base.

Digitization serves as a gateway to new research possibilities within museum collections. CT scans, for example, allow the exploration of artifacts' internal structures that are otherwise hidden from view. This access benefits researchers and students who are unable to visit the museum in person, offering them the opportunity to engage with exhibits and resources remotely. Real-time data retrieval and analysis enable scholars to work concurrently on the same digital materials, thus promoting collaborative research efforts across global boundaries.

Moreover, digital representations of artifacts, such as 3D prints and models, mitigate the risk of damage through natural wear or handling. Digital content can be effortlessly updated and maintained, ensuring its preservation for future generations. Additionally, the transition to digital exhibitions opens avenues for the creation of novel displays, laying the groundwork for what could be recognized as "virtual heritage" in the coming years. This innovative approach not only preserves traditional cultural heritage but also adapts it for the digital age, expanding the possibilities for museum education and engagement.

3.4 Fostering Cultural Sustainability and Innovation

By digitizing collections and exhibitions, museums like NAM play a crucial role in the sustainable preservation of cultural heritage. Digital platforms allow for the creative reimagining of cultural narratives, engaging new generations and encouraging the co-creation of cultural content. The potential of virtual and augmented reality technologies to simulate immersive cultural experiences can further enhance the public's connection to and appreciation for diverse cultures, and promoting a global sense of community and shared heritage.

In conclusion, the digitization process undertaken by museums, as demonstrated by NAM, offers a transformative path to improve accessibility, education, and preservation within the cultural sector. Despite the substantial challenges encountered, the benefits of digitization are immense, heralding a future where museums persist in inspiring, educating, and connecting global audiences through innovative approaches.

The digital transformation marks a pivotal shift in the operational, functional, and interactional paradigms of museums with their audiences, accompanied by a suite of technical, legal, and ethical challenges. Museums are anticipated to navigate these hurdles and adapt to the evolving demands of the contemporary world. Virtual museums boast notable advantages such as enhanced accessibility, flexibility, and the ability to showcase artifacts and narratives in novel ways. However, they also encounter obstacles in fostering community and connectivity, alongside issues related to convenience, development, and financing. This paper has outlined the challenges and benefits associated with museum digitization. While digitization offers myriad advantages, it also poses significant challenges that necessitate deliberate strategy and consideration, including fundraising, online revenue generation, legal and ethical issues, and collaborations with local governments and communities. Due to this paper's scope, an exhaustive exploration of these challenges is beyond reach. As we navigate the rapid advancements of the digital era, museums, as custodians of human history, culture, emotions, and memories, are poised to address these challenges, embracing change and innovation to fulfill the demands of a new era.

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From Physical to Virtual: Information and Communication Technologies Strategies adopted by the National Museum of Brazil and Shurijo Castle in Japan after a destructive fire.

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Abstract

Fast and destructive fire resides at the top of the concerns of museums and cultural heritage professionals worldwide. In this paper, the focus is on two institutions that suffered a fire that destroyed most of their collection or physical space, making it inaccessible to the public for a long period while they are in the process of reconstruction. The main question here is: what should be done to keep providing access to their audience without a physical space? How to remain relevant to society with the doors closed? The answer to both institutions was ICTs. However, their approaches are different. The National Museum of Brazil, located in Rio de Janeiro, faced a big fire in 2018, the same year the institution was celebrating its bicentennial. On the other side of the globe, a year later, Shurijo Castle, a World Heritage Site recognized by UNESCO and located in Okinawa, also suffered a fire that destroyed its main building. Both cultural spaces have international recognition and have received attention from the media during and after the fire, but they are also important for the history

of Brazil and Japan, having more than one role inside society. This research constitutes an ongoing PhD thesis, and the findings presented here are the initial outcomes.

Cultural Heritage, Exhibitions and Technology

Significance is a value given by humans. Within the Cultural Heritage and Museum field, it is a process or multiple processes of intentional choice of what will be kept for the next generations to come and what stories will be told. Bosch (1999) considered that objects can become documents when we consider the potential to carry information about humans and their lives. This type of document becomes symbolic or representative of the identities of one or more social groups. From the moment, its context is added to an informational layer beyond its practical and daily context. For example, an object inside a museum represents something or different things depending on the way it is exhibited to society, and the way this happens is also very important.

The International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM) Toolkit for Museum Collections, utilizes three approaches to present the objects of a collection and how to guarantee the integrity of the pieces and the contact between the society and the objects: storytelling, co-creation, and mentoring. Each of these has different levels of interactivity, but they all rely on the connection between the tangible and intangible.

Iwasaki and Pederzoli (2022) with the ICCROM campaign ‘Our Collection Matter’, conducted a study to find the impacts of heritage collections on people's lives, with a survey available in 22 languages and 2,384 responses, the authors divided the answers into themes: Identity, Roots, and Belonging; Continuity Between Past, Present, Future; Our shared History and Memory; Leisure and Enjoyment; Resource for Knowledge and Learning; Enabler for a better world; Livelihood; Spiritual Enrichment. In this study, it is possible to perceive that the way individuals recognize the presence of Cultural Heritage in their lives is not unique, which is one of the challenges that museums and other institutions face when planning an exhibition with this type of collection.

For Cavalcanti and Tucherman (2010) this is a privilege of museums, transforming it into a valuable space to analyze the construction of social identity and discover new uses for science and technology, art is the ability to express emotions, and science is the possibility of constructing a better future. Showcasing the debate for the presence of both inside a cultural representation space through tangible and intangible heritage, and as a result of the

relation between the art and the science inside a cultural heritage institution, it is possible to find usage of technology.

Technology in the most recent decades representation can be found in different formats and usages, for example, an object, a document, as support for information, or to create a communication channel between the museum and its audience beyond the physical space. It can also, according to Bittencourt, Berrío-Zapata, and Oliveira (2019), appear as a method of interactivity with the audience that transforms its role inside an exhibition into a more active role.

The types of technology addressed in this study are Information and Communication Technologies (ICT) and their role in museums and cultural heritage institutions after a disaster. More specifically, the digital products that are produced after the fire, as a communication path between the institution and the audience during the reconstruction process, and the physical space are unavailable for more than one year.

Taking into consideration the type of digital product and content is not produced with the objective of replacing what exists physically, but as a platform to inform the audience of what is happening to their heritage, the fire outcome, and others. As Wilson-Barnao (2017) highlights, this type of digitalization of collections makes them more accessible to the public, but at the same time, they become more prone to the commercial logic of the private third-party companies that own the platforms. Creating in this matter, for this author, a path to this companies to collect the data from the audience and their choices of what and how to access their desired content. In addition, the institutions in this study utilize different types of platforms, content, and production to keep this communication path active during their closure period for reconstruction, as shown further in this paper.

National Museum of Brazil

The Royal Museum was created in 1818 by King John VI when Rio de Janeiro was home to the Portugal Kingdom and the capital of Brazil, and in 1830, the institution changed its name to the National Museum of Brazil (Guedes and Kellner, 2022). The origin of the National Museum of Brazil can be traced back to Campo de Sant'Anna (also known as Campo da Aclamação), which served as its initial location in the heart of Rio de Janeiro. Later, in 1892, the museum relocated to the Paço de São Cristovão or Boa Vista Palace, part of the Quinta da Boa Vista, which was previously utilized as the residence of Brazil's Emperor and was subsequently transformed to accommodate the museum. The Quinta da Boa Vista Park area is not only home to the museum, but also for gardens, different statues, and a popular zoo.

The palace is the place where different important events in Brazil happened, for example, the Independence Declaration from Portugal was signed there, and Marie Curie and Albert Einstein visited when they went to Brazil.

Museu Nacional no Campo da Aclamação (1856)

Source: Wikimedia Commons – authorship of P. G. Bertichem.

In 1946, according to Rodrigues-Carvalho (2021), is when the ownership of the museum was transferred to Brazil's University, which afterward was transformed into the Federal University of Rio de Janeiro, in 1946. The institution can be classified as a Natural History and Anthropology Museum with an estimated collection of 20 million items. Hosting one of the largest collections in Latin America is not only noticeable by size but also by its diverse range of examples from Zoology, Archaeology, Botany, Ethnology, Geology, Paleontology, and Biological Anthropology, which has attracted the attention of 200,000 people every year (Guedes and Kellner, 2022).

The Fire of the National Museum

The year 2018 was intended to be a significant year for the National Museum, with an extensive and diverse schedule of events planned to commemorate the bicentennial of the institution, following the overcoming of various challenges in the preceding years. However, the unforeseen event of the palace being consumed in flames was not part of these plans. The fire occurred on September 2nd, and according to the 2018 Annual Report of the National Museum, the staff of the museum was trained to properly react in case of disasters, but the fire took place on Sunday evening after closing hours.

In addition to this, other misfortunes were part of the challenges of that night. The conservation materials of part of the scientific collection acted as a boost for the flames, and the highly sensitive collection was mostly destroyed. Also, Alexander Kellner, director of the institution which stepped into the role in the same year, addressed on the 2018 Report that when the firefighters arrived at the location, the hydrants near the palace were dry, and - by the time the document was released – still were. According to Guedes and Kellner (2022), the flames reached very high temperatures, up to 1,000ºC, and destroyed almost everything it touched, both the collections and the palace, where the third and second floors collapsed into the ground floor.

Three years later, in 2021, the museum released a book called *500 Days of Rescue* which shows how the rescue of the collection was first realized and how the reconstruction is being managed, with the reconstruction campaign being named *Museu Nacional Vive* or National Museum Lives in English. The rescue was divided into phases: Planning, Rescue of Collections, Screening, Sieving, Photographic Record, Sanitization and Stabilization, and Packaging. The reopening of the palace is scheduled for 2026.

Shurijo Castle

Shuri Castle or Shurijo (Shuri-jô) is in Okinawa Island, Japan, and it is part of the UNESCO World Heritage Site, as part of the Gusuku Sites and Related Properties of the Kingdom of Ryukyu. According to the institution's website, the castle can be divided into an inner ward, which was completed in the 15th century, and an outer ward, which was completed in the 16th century. The castle is a symbol of the exchange between Japan and China, having cultural representation of both countries in its architectural features, and just like the National Museum, Shurijo was the residence of the king and the royal family. Later, it was transformed into the Okinawa Prefecture, a Japanese military post, and, after the war, it was changed to a campus for the University of the Ryukyus.

Shuri Castle / Palace Building

Source: Wikimedia Commons – authorship of Suicasmo

In 1945, the castle was destroyed because of the Battle of Okinawa in World War II, and as a result, the United States military occupation of Okinawa started in the same year. The University of the Ryukyus was constructed at the site and opened in 1950, “[…] starting with six departments, 562 students and 44 faculty members.” (Notredame-Shurijo Website, 2019). In 1972, Okinawa was returned to Japan, and the castle ruins were designated as a Historic Heritage Site. Additionally, the National Okinawa Memorial Park Shurijo Castle development started in 1986, after the relocation of the university.

The Fire of the Shurijo Castle

Differently from the National Museum, it was not the first fire or destruction that the castle faced. Even before the Battle of Okinawa, there were records of reconstruction on the ground. The most recent one occurred on October 30, 2019, and similar to the fire previously mentioned, it quickly spread and consumed predominantly wooden structures. The fire-detecting systems worked properly, and firefighters were called rapidly to the scene. Even though they did not face the same challenges as the Brazilian firefighters, the building structure was more delicate than the museum.

Nine buildings were destroyed after the fire died down, and although an investigation was conducted, the cause of the fire was not identified (Road to Revival Shurijo Website, 2019). According to the Notredame-Shurijo project, beyond the buildings, the exhibitions and collections stored were also destroyed, resulting in 1,510 items and 391 artifacts and materials being lost to the flames. The reconstruction of the Castle also has its special campaign with the name 里城復興へのあゆみ or Road to Revival Shurijo, with the reopening scheduled also for 2026.

Methodology

This paper aims to examine the digital products produced by cultural heritage institutions after the near-complete destruction of their physical space and long closure period, exploring the possibility of usage and choices to keep the communication path between the institutions and their audiences active. The methodology chosen for this research is a descriptive study using an observational approach, taking as a starting point the typical user of online platforms and their free content. Methodological procedures were applied to analyze the mediation of information between the two subjects using Microsoft Windows Operational System, Android OS, iOS, and iPadOS. The Charter on the Preservation of Digital Heritage (UNESCO, 2003) was used to characterize the institution's actions, its challenges after the transformation to digital reality, and how to achieve continuity. Following the study developed by Lima (Lima and Mendes, 2009; Lima 2019) and the categorization of self-proclaimed virtual museums, more specifically Group 2 of the study, which is represented by museums and collections that are from the material world, occupying a ‘real’ space and having an immaterial representation online, presenting the virtual objects and exhibitions not as replacements, but as virtual replicas of the physical objects.

Preliminary results

A general overview of the types of different information and communication technology (ICT) Internet-based digital products produced by the two institutions after the fire and until the present moment of this paper (December 2023). Using the museum website as a starting point, a total of 115 digital products were identified, with Shurijo accounting for the largest proportion at 77 products (73 from Shurijo Castle Park itself, 3 from Okinawa Prefecture, and 1 from the Notredame-Shurijo project), followed by the National Museum with 38 products.

The categorization of the products of ICT utilized by the cultural heritage institutions involved identifying ten distinct types, which were later classified and divided into the following groups: Websites, Virtual Exhibition, Videos, E-books, Documents, Web and Hybrid Courses, Virtual Models, Metaverse, Manga, and Audio-guide. The type of content was also categorized, classified, and divided into groups, by taking into consideration the sort of information that was made available to the audience and how it was presented, resulting in the subsequent groups: Lecture, Informational (just plain updates or presentations of data by text/subtitles), Informational with human guidance, Exhibition, Special Event, Documentary, Virtual Reality, Time-lapse, Drone Video, and 3D Models.

Conclusion and Future Steps

It is possible to notice the effort made by the National Museum of Brazil and the Shurijo Castle to give their audience plenty of content to keep their interest in the reconstruction process and future reopening, but not transforming all the actions into the virtual world, there are in-person events held after the pandemic in both institutions, although it was not considered to this research since the focus is on their virtual presence and actions toward its public. Virtually Shurijo is the most active, having new content available every month until this moment. On the other hand, the National Museum has more translated material available, with all the reports available in Portuguese and English, and some of the books are also written in both languages.

I plan to keep in contact with the staff of the institutions and interview them for further details on their plans and changes for their collections and spaces, considering their objective is to have a fresh start and not erase the fire memory of the history of the institution and how they still organizing on how they will represent it on their space. Going forward, I will take this experience with their internet-based ICT and compare it with other cultural institutions that faced similar situations and analyze what path and narratives they chose to portray and manage their reconstruction and post-incident image of the institution to their audience.

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