

DIGITAL ACCESSIBILITY AND IMMERSIVE STORYTELLING FOR CULTURAL HERITAGE

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Abstract: *In history science as well as in the GLAM sector the fact is not experience, and the content is more than its` (digital) packaging. In this respect immersive storytelling as principle, methodology, apps and tools becomes important instrument for institutionalized heritage, if used appropriately. The paper focuses on defining what means and what requires appropriate and digitally accessible use of digitally presented heritage objects. Good practices for immersive user experiences are being shown, digital accessibility principles and standards are presented. Resuming, main rules for construction of technology-balanced and accessible digital storytelling are being formulated.*

Keywords: *Digital Heritage, Digital Accessibility, Digital storytelling, Immersive Technologies, Extended /Virtual/ Augmented Reality*

Introduction

The scientific context for digital cultural heritage and immersive user experience (UX) in the context of recent AI achievements and cloud technologies apps presenting museum collections as data is cross-disciplinary by default. Nevertheless it is based into museum informatics and digital humanities fields. Therefore analysis of the author has been done from such perspective. Let`s start with defining the term `digital` for heritage sector as explained in EUROPEANA *Digital Transformation Guide* (Europeana Guide, 2022); the Guide refers "digital" to Content, Services, Experiences, Data, Systems, Tools /technologies, Behaviors, Motivations and Culture. In such wide semantic and technology frame, much wider than a decade ago, Open GLAM, Open Science and Open Culture co-exist and complement each other.

Digital Storytelling and Smart Museum

Heritage and Storytelling in digital era require interdisciplinary approach, actively linking memory institutions, IT experts, and policy-makers. When a curator presents an artifact as a multimedia story via virtual reconstructions and digitized artefacts, he uses interactive storytelling. Interactivity and immersive experience is a must for every digital storytelling (DS) in GLAM sector (Kidd and McAvoy, 2019).

DS as media of the future, is an evolving methodology where the content is multimedia; it adds interaction to hypertext, audio/video material and is used in various domains from branding to education and heritage. Historical information in DS is presented in hyperlinked structures, enabling the viewer to choose his way to explore the object/situation through interaction. Virtual reality, augmented reality, eXtended reality,

mixed reality – all these technologies are increasing the value of the story, although most of them are not accessible for users with disabilities. There are various DS tech tools, licensed and open source (MOOVLY, SlideStory, Storybird, Zooburst, WriteComics, Bubbler, ShowMe Interactive Whiteboard, Anchor (open source)), which can help curators systematize their story and present it in interactive way.

Smart museum today is developing in intelligent and complex way by using tools and applying the requirements of semantic web 3.0 (Web as database, Artificial Intelligence & Enhanced web, 3D) and symbiotic web 4.0 (open, linked and intelligent web comparable with the human brain, augmented reality and Big data). Therefore, user/visitor experience in museum environment, in situ and online, becomes more and more technology dependent and all four human senses are involved in UX. This is very good outcome if we look at the good immersive practices in cultural institutions in France for ex. The two catalogues of the French Cultural institute (VR Catalogue and Cultural Innovation Catalogue, 2022) *VR immersive experiences* catalogue and *Digital Mediation and Cultural Innovation* catalogue, are representative for contemporary European (and not only) trend of providing immersive storytelling technologies in a field defined as “culture engineering”. The catalogues present around 100 original works at the intersection of virtual reality, live entertainment and visual arts; designed to introduce theatres, museums, cultural centres and present production and distribution of innovative, interactive and educational content, tools for promoting heritage and collections, visitor management and development tools, personalised technical devices and solutions. On the other side more GLAM focused and more tech-balanced is another representative guide: Handbook for museum practitioners and immersive experiences (Handbook, 2021) which is a result from brainstorm webinar in 2021 with 11 experts from the immersion industry working with museums (The Louvre, the Met and the Smithsonian, Centre Phi, Artechouse, Superblue, incl. Diversion Cinema, Marshmallow Laser Feast and MIT Center for Art). In 2022, Madrid opened a centre dedicated to immersive experiences: MAD (Madrid Artes Digitales)¹ (Fig.1). For its first exhibition, the venue is showcasing the world of Gustav Klimt. *L’Atelier des Lumières*² in Paris since 2018 when it was opened has plunged thousands into the digital works of great painters such as Van Gogh, Monet, Dalí, Paul Cézanne. What shows all these heritage related case studies in respect to quality of presentation and knowledge sharing?

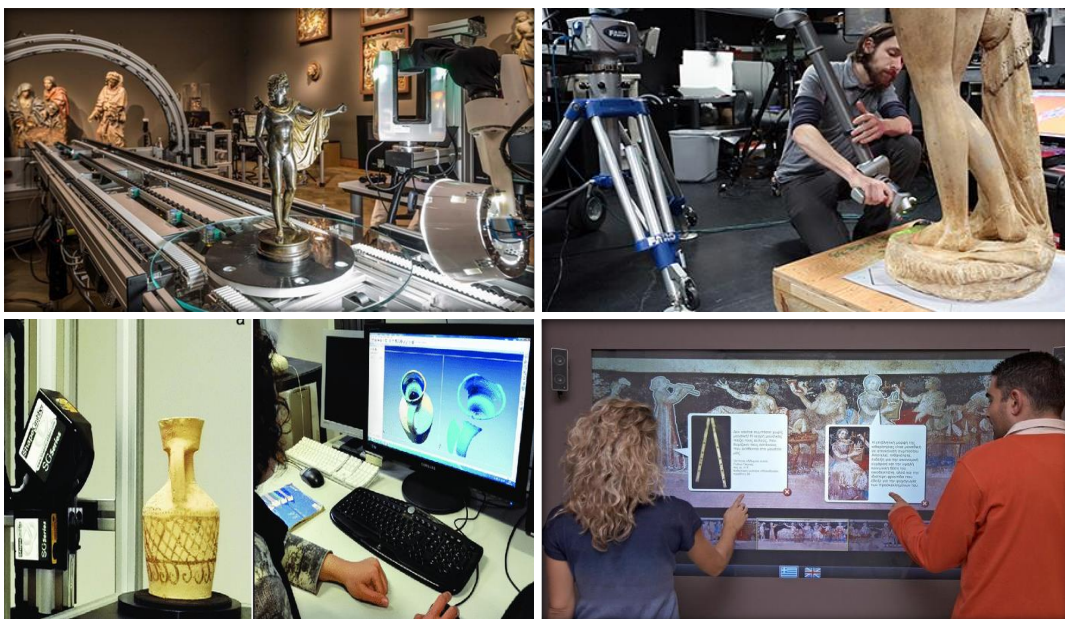
Guardian newspaper (Guardian, 2022) published interesting short analysis, entitled “Immersive exhibitions: the future of art or overpriced theme parks?” which alarmed both experts and informed visitors that the quality of such flickering message might be questioned: “... Because immersive installations do not rely on the display of rare objects, they can be reproduced on an almost industrial scale. Theoretically, you could license an art collective’s intellectual property and show it anywhere in the world, a model that has more in common with a tech platform than a museum or gallery. ...Serpentine’s Arts Technologies programme in January 2020 published a report that identified how ticketed experiences bring art closer to the financial model of circuses and theme parks. ...artists

¹ MAD website - <https://madridartedigitales.com> (Last view: May, 2023)

² L’Atelier des Lumières Website - www.atelier-lumieres.com (Last view: May, 2023)

could charge visitors entry to ticketed experiences, circumventing the traditional art establishment altogether. A Tokyo-based collective of more than 500 artists, designers and technologists, teamLab, is already doing this... In 2024, teamLab will launch “the largest museum for digital art in Europe”, in Hamburg.”

This is the current context in which Smart museum 5.0 and Open Culture co-exist altogether with Open Science. The goal of this short research in the context of Open Culture and Open Science is not to criticize the contemporary trend of engineering and selling culture, but to re-define e-heritage as collective memory first of all, collective story, told via contextualized digitized museum objects with values embedded. Immersive digital storytelling without the context is close to show or commercial installation. The balance should be found linked with museum ethics and digital accessibility in mind (ICOM Code of Ethics, n. d.).



**Figure 1. SMART technologies in GLAM sector:
Virtual / Augmented / Mixed Reality, 3D and 4D experiences, incl. tactile (images taken from
Louvre and British Museum websites, last visited: 20-06-2023)**

Smart technologies in GLAM sector (Fig.1) should be used with attention both to quality output and human perception principles where neurobiology, computer vision, brain science take place (not computer science only). Without accessibility and context in mind, i.e. without universal design principles being applied any immersive experience becomes too light. In order to illustrate what this means in practice I am using two quotes below, first one shows tech-determinism, which sacrifices the context and the second one is alarming accessibility limitations of museum technologies to be overcome:

(Guardian, 2022) “...true immersion should mean more than just access to the latest tech...I recently attended a Van Gogh experience staged in a warehouse space in Shoreditch, which promised to “reinvent the concept of museums”. Photographs of the artist’s self-portraits were blown up on to canvases and a crowd of visitors watched brushstrokes of sunflowers being projected on a static vase. The space felt temporary, like

a travelling show... weird, schematic sentences. Still, people didn't seem to mind... the overall impression was haphazard, as if its creators didn't want people to look too closely at the details. One board informed us that "Van Gogh is a rock star".

Sina Bahram³ and Corey Timpson⁴ (Bahram and Timpson, n. d.) "... It is time to get out of the designer bubble and realize that most people in this world are not young, tech-savvy with perfect vision, most people don't experience your interface on 32-inch ultra HD monitors, most people just want to see what's on the screen, even if they're out in the sun, use a small, old phone or have low vision"

We could resume that technologies are developing much faster than human brain could perceive, they are good tool, good servant in museum curator's "hand", but bad master. Work on fully accessible digital stories, not so flashy, but perceivable for all is needed; in addition increasing digital maturity level (not expertise only) of museum curators is needed. In order to put an accent on accessibility of immersive tools used by the digital cultural heritage the next paper section will present main digital accessibility principles and good practices.

Digital Accessibility Principles

Digital (web, software) accessibility includes all digital resources and tools for human interaction with interface and content on desktop and mobile devices. Digital inclusion is about making technology accessible for all, independent on age, ability and culture. Digital Accessibility is about access for everyone, incl. people with visual, cognitive, physical, hearing disabilities, to multimedia content, which uses assistive technologies, standardized user interface and clear digital rights management. For museum sector this requires that museum site and collections, presented both online and in situ, are compliant with the ergonomic requirements, legislation rules, and WCAG standard (mandatory for Mobile Applications and Websites under EU), not only physical accessibility standards. Equity and inclusion for people with disabilities also means making people feel welcomed and ensuring that they are core members of the museum community as staff, developers, visitors.

Museums must begin the exhibition design process, incl. immersive experiences construction, with inclusion as a primary goal and consider not only who the targeted audience is but also who is being left out. The four principles to be taken into account and followed through relevant standards are: **DEAI** (Diversity, Equity, Accessibility, Inclusion) and **POUR** (Perceivable, Operable, Understandable, Robust) (DEAI, 2019), (Yale Peabody Museum, n. d.), (POUR, 2019), (POUR, 2021). Checking accessibility of museum websites can be done via various tools such as: wave.webaim.org, achecker.ca.

³ Sina BAHRAM, expert in Human Computer Interaction - https://coreytimpson.com/?page_id=696 (Last view: May, 2023)

⁴ Corey Simpson, expert in multi-sensory experience design (UxD) - https://coreytimpson.com/?page_id=696 (Last view: May, 2023)

Set of universal design principles, created initially in 1997 by the Center for Universal Design, funded by the U.S. Department of Education's National Institute on Disability and Rehabilitation Research (NIDRR, project no. H133A40006) are being upgraded till now in 4 different levels of detail (Universal Design, 2021). Design for All (Universal Design) as a tool for achieving accessibility in real and in virtual spaces; emphasizing communication, infrastructure, quality of different experiences (visual, acoustical, etc.) and accessibility services, incl. accessibility pictograms and QR codes. The main seven **inclusive design principles** are:

Principle 1. Equitable Use: designs should appeal to diverse populations and offer everyone a comparable and non-stigmatizing way to participate

Principle 2. Flexibility in Use: designs should provide for multiple ways of doing things. Adaptability is one way to make designs universally usable

Principle 3. Simple and Intuitive Use: Use of the design is easy to understand, regardless of the user's experience, knowledge, language skills, or current concentration level

Principle 4. Perceptible Information: The design communicates necessary information to the user, regardless of ambient conditions or the user's sensory abilities

Principle 5. Tolerance for Error: The design minimizes hazards and the adverse consequences of accidental or unintended actions. In other words, designs should make it difficult for users to make a mistake; but if users do, the error should not result in injury to the person or the product.

Principle 6. Low Physical Effort: The design can be used efficiently and comfortably and with a minimum of fatigue. In other words, designs should minimize strain and overexertion

Principle 7. Size and Space for Approach and Use: Appropriate size and space is provided for approach, reach, manipulation, and use regardless of the user's body size, posture, or mobility. In other words, designs should accommodate variety in people's body sizes and range of motion.

Combining the seven principles with current available tech tools might help for the creation of accessible immersive stories, like those mentioned in the next paper section. Legislation was a driving force in digital accessibility improvements. The Web Content Accessibility Guidelines version 2.0 (WCAG, 2012) has been established as an ISO/IEC International Standard (ISO/IEC 40500:2012) in 2012, but its main challenges still are non-latin alphabets (Chinese, Bulgarian, Serbian, Arabic) and lack of public awareness. The museum curators slowly understand

Accessible or Immersive? Both!

V&A museum. This museum is committed to accessibility and provides detailed pre-visit information online. The V&A has been offering tactile sessions for visually impaired visitors since 1985. The programme changes often thus encouraging people to

come back for new experiences; tactile books, audio descriptions, many tactile objects located throughout the museum. Visitors can pick up a touch tour audio guide to help them locate these. The V&A also caters to children and families with visual impairments through the use of a *sensory backpack*. It allows younger visitors to explore the museum through multisensory activities. The backpack contains lots of objects to touch, such as ceramic models and different materials (V&A, 2019).

PIXAR. Good Immersive Practice is collaborative project between movie giant PIXAR and Museums teaching the art and science of digital storytelling in STORYBENCH: Exploring data & digital storytelling at Northeastern University's Co-Lab for Data Impact & School of Journalism (Storybench, 2021).

Boston Science Museum. Museum curators, STEM educators, storytellers can learn a lot from Boston's Museum of Science exhibition "The Science Behind Pixar" which contains dozens of lessons in computational thinking without showing a single line of code. The museum exhibit's structure mirrors the Pixar production process: Modeling, 2) Rigging, 3) Surfaces, 4) Sets and Cameras, 5) Animation, 6) Simulation, 7) Lighting, 8) Rendering altogether with 8 separate physical areas to illuminate the art and science behind each of these processes, interactive stations "Design your grass" and "Sculpt by numbers" (Boston Science Museum, 2022).

National Gallery, Prague. Good Immersive & Accessible Practice can be seen in Prague (Fig. 2) where since 2018, the National Gallery launched "Touching Masterpieces"⁵ - a VR experience that allows visually impaired and blind visitors to 'touch' some of the museum's most famous sculptures, including the bust of Nefertiti and Michelangelo's David. They've got touching feedback from many blind people, who are able now to touch the world masterpieces.

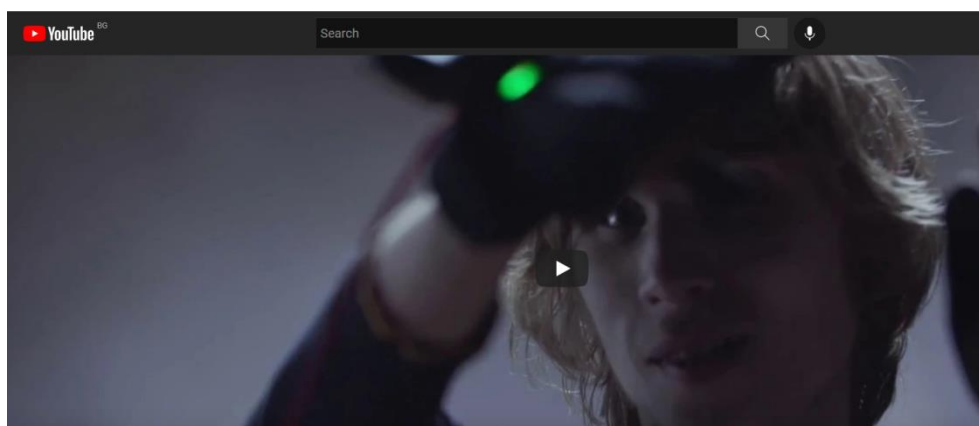


Figure 2. YouTube channel of the National Gallery of Prague Project 'Touching Masterpieces'

Murcia Archeology museum, SPAIN. Another Good Immersive & Accessible Practice in museum is QR based information system for navigation and curation *NaviLens* used in the Archeology museum in Murcia, SPAIN. Here should be mentioned not only

⁵ Touching Masterpieces - <http://www.touchingmasterpieces.com> (Last view: May, 2023)

good examples for accessible immersiveness in GLAM sector, but good *digital storytelling* practices like: **Delaware Art Museum**, which invites visitors to explore online collections and develop stories inspired by what they found [<https://edshelf.com/tool/the-art-of-storytelling/>]; **Smithsonian Learning Lab** used digital storytelling as a way to connect audiences and objects across distances; **Acropolis Museum** undertook a digital storytelling project using objects to create a storytelling-based digital guide for visitors, with “the perception of snakes in Greek antiquity” as the ‘dramatic question.’ All these good immersive *and* accessible practices prove that compromise with the context of heritage object in the curator`s story should not be made, nor with the simple message perception.

Conclusions

Resuming, COVID pandemic and the war are questioning what the museum narrative should be, how memory institutions to make both, the big and small history presented in their halls, closer to everyday life of ordinary man. Immersive experiences shown as good and bad examples from accessibility perspective, are showing that digital curation faces new challenge: need for more intercultural semantic links and less technology-determination. In GLAM universe the story itself is the core of the message to be shared, esp. in digital environment. That message could be framed using accessible for all technology tools, based on POUR and DEAI principles. The research presented analyzes low level of DA of memory institutions websites and immersive-experience apps, framing the following recommendations on improving the status quo: user and visitor experience should be both, immersive and accessible, in all layers and levels, and for every user type - starting with museum building, going through multilingualism, appropriate visuals, tangible objects, size of the screens, DA standards, and IPR. All technology tools for doing this are available, but there is missing awareness among policy makers and museum professionals; the research shows not knowing universal design laws in creating curators` stories/expositions, so, user friendly format of *digital maturity training courses* must take place in GLAM sector. Author`s involvement in such an endeavor for Bulgarian museum experts, motivated the current research paper.

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AUTHOR'S DATA WERE PUBLISHED ACCORDING GDPR RULES AND PUBLICATION ETHICS OF THE JOURNAL (<http://www.math.bas.bg/vt/kin/>)

Received: 11 May 2023

Accepted: 08 June 2023

Published: 30 June 2023

DOI: <https://doi.org/10.55630/KINJ.2023.090113>

KIN Journal, 2023, Volume 09, Issue 1

Science Series Cultural and Historical Heritage: Preservation, Presentation, Digitalization

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Published by

Institute of Mathematics and Informatics

at the Bulgarian Academy of Sciences,

Sofia, Bulgaria

Издание на

Институт по математика и

информатика при Българска академия на

науките, София, България

<http://www.math.bas.bg/vt/kin/>

ISSN: 2367-8038