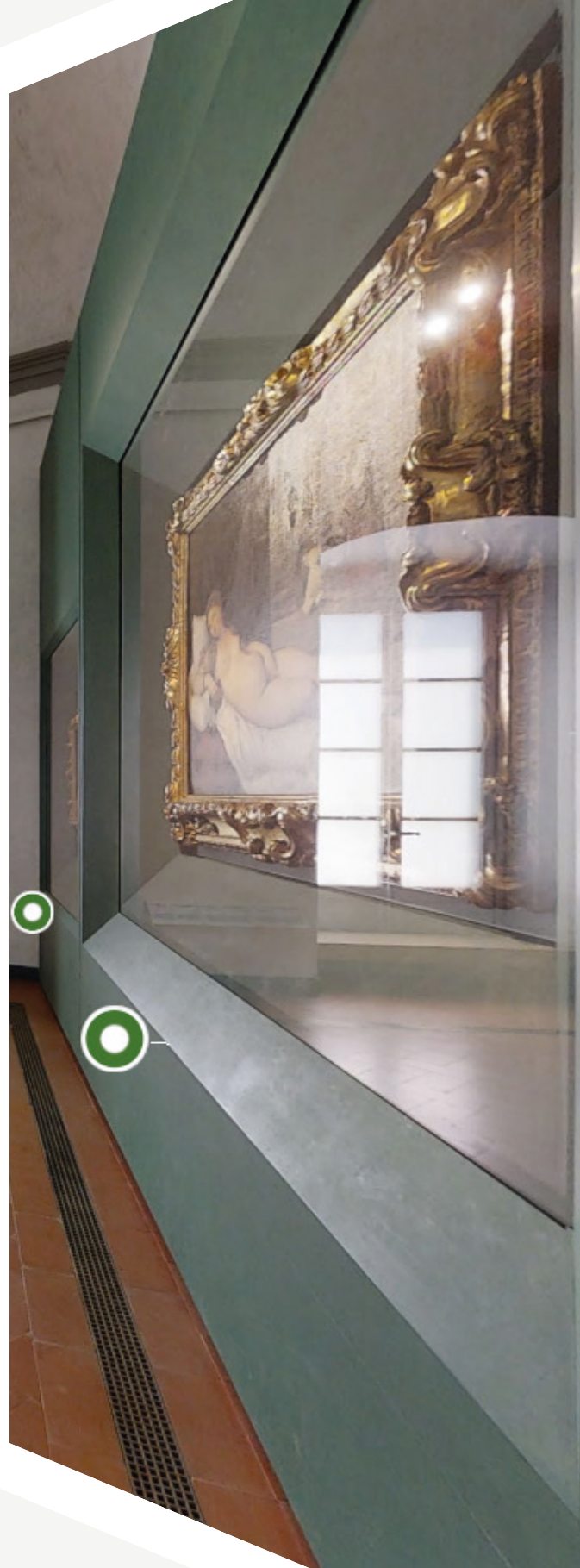


ACCESS  
POINTS  
#7

ANGELA DRESSEN  
**MUSEUMS  
AT THE  
DIGITAL TURN**  
FROM SERVICE  
PROMOTERS  
TO RESEARCH  
PARTNERS

**ACCESS**  
Kolleg-Forschungsgruppe  
Zugang zu kulturellen Gütern  
im digitalen Wandel  
**ZUGANG**



# ACCESS POINTS

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Editors:

Eberhard Ortland, Bernadette Collenberg-Plotnikov, Nora Kluck, Daniel Schlageter

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## #7

Angela Dressen

**Museums at the digital turn**  
**From service promoters to research partners**

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Cover illustration: Gallerie degli Uffizi, Florence. Screenshot of the virtual tour,  
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## Preliminary remarks: Museums at the digital turn

The last twenty years have marked a significant shift for museums in their self-awareness and mission. The digital turn has introduced entirely new concepts to the idea of what a museum is, what it can offer, and how collections can be accessed. This concerns not only the presentation of objects and the pedagogical aspect, but increasingly, the research aspect surrounding the object as well. The canon established since the 1970s of a museums' threefold mission of outreach—addressing leisure, education, and research—is diverging more and more.<sup>1</sup> The question underlying this trilogy is connected to the general purpose of a museum, and the argument is that a museum in the digital age, compared to the traditional model, can offer more in each of these three categories—especially for researchers.<sup>2</sup>

There is a changing attitude toward both the physical presentation of objects and the digital surrogate, as well as the data associated with each. While it may be said that art historians have never formed the primary audience for museums, they are the ones who can benefit most significantly from the digital turn, particularly since museums and cultural heritage institutions are now principal providers of art historical research data.

To fully understand the recent changes in all three aspects, one needs to look back at the latest history and some developments from more than half a century ago. At this time, museum displays—such as those for art objects—distanced themselves from classical rooms and were first developed over the classical model of the white cube or simple rectangular rooms with varying degrees of color, while later exhibition spaces sometimes resembled even more minimalist an artist's workshop. Apart from the exhibition spaces, beginning in the 1970s, for example with the Centre Pompidou in Paris, new concepts of engagement were introduced, leading to the inclusion of rooms for commercial and didactic purposes, serving audiences from schoolchildren to the interested general public. The museum continued to feature physical objects in display rooms, while also offering lectures on related topics. The pedagogical and commercial sides became increasingly important within the museum concept, demanding ever more physical space in architectural design. Museum shops were opened and positioned strategically for visibility. Workshop rooms offered pottery or drawing classes for children and adults, as well as introductory classes related to

1 While in general the mission of a museum includes likewise the collection, conservation and interpretation of objects (see the definition of the mission by ICOM <https://icom.museum/en/resources/standards-guidelines/museum-definition/>), I am referring here deliberately to the self-imposed initiatives offered by museums over the last decades.

2 Hubertus Kohle underlines in his research on the function and structure of museums: “Museen haben sich immer schon auch als einen Ort der Forschung begriffen und sind von daher wissenschaftsnah. Sie wurden auf dem Weg der digitalen Anreicherung zu einem Ort der Wissensproduktion [...]” (Hubertus KOHLE: *Museen digital. Eine Gedächtnisinstitution sucht den Anschluss an die Zukunft*, Heidelberg University Publishing, 2018, <https://heiup.uni-heidelberg.de/catalog/book/365>, p. 167).

the art objects. The intended outcome was either a hands-on experience—by attempting to replicate or imaginatively reinterpret works—or a more didactic approach, aimed at understanding the exhibited art, its history, and its purpose. Universities, meanwhile, used museums for occasional, object-based classes in exhibition spaces, while the storage areas—no less important for art historians—remained out of reach. When the digital turn brought new initiatives to museums for leisure, education, and research, it did so with varying breadth and depth across these categories.

## Citizen Science

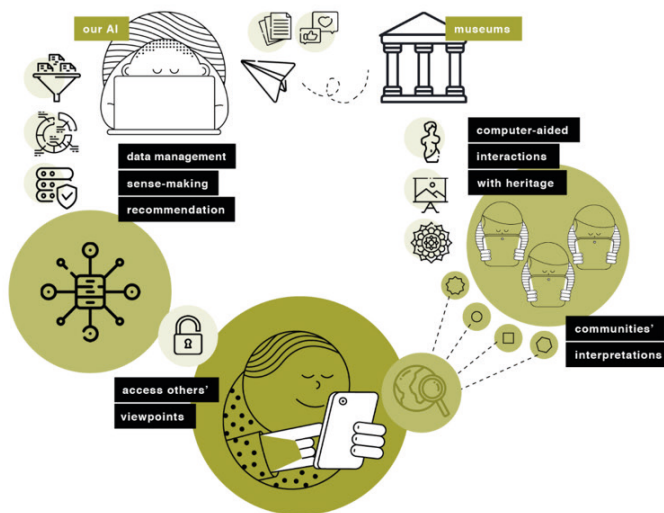
The most participatory approach in terms of leisure and education can be grouped under the umbrella of Citizen Science. As a topic oriented toward the popular museum audience, the term emerged in the 1990s, at the intersection of the traditional museum workshop experience and the advent of digital initiatives such as Virtual Reality. However, the point is not simply to offer entertaining or educational activities to fill one's leisure time, but to provide another form of active participation in which participants learn from each other in a community driven, open format and structure and, potentially, create some form of knowledge they render unstructured back to the institution. The focus lies on exchange, engagement and knowledge exchange, more comparable to a BarCamp, than any formal academic exchange.

A recent example for such an open-format community-driven exchange is the SPICE project, defined as “Digital technologies for citizen curation in museums,” financed by an EU Horizon 2020 grant (fig. 1). The intention is to study “the possibilities of digital media to create new links between the Museum and communities, by developing digital technologies that help communities select paintings, artefacts and other museum objects and share their own interpretations of these objects.”<sup>3</sup> The museum leads are based in Finland, Ireland, Spain, Italy, and Israel. The applications include gaming, treasure hunts, Pop-up VR, and Deep Viewpoints. The aim is to bring together the knowledge of younger and older people, to share a knowledge base for the objects and to learn from one another, while also providing a learning tool for people from different backgrounds, ethnicities, and communities, working towards social inclusion.<sup>4</sup> In this sense, the iteration of Citizen Science may potentially develop into its own distinct string of museum outreach, designed for reciprocal input from unlearned or semi-learned audiences.

3 Anna Maria MARRAS, Lily DÍAZ-KOMMONEN, Adam STONEMAN & Leena SVINHUFVUD: “Digital technologies for citizen curation in museums: two case studies from the SPICE project,” *ICOM Voices* (September 29, 2023), <https://icom.museum/en/news/spice-project-digital-technologies/> [9 May 2026].

4 Ibid. and project site: SPICE (SOCIAL COHESION, PARTICIPATION, AND INCLUSION THROUGH CULTURAL ENGAGEMENT): *Citizen Curation of Cultural Heritage* (2020–2023), <https://spice-h2020.eu/> [16 March 2026].

# We design methods to allow citizens to share their interpretations



We use state-of-the-art technologies to develop tools that allow users to create and annotate their own interpretations of cultural heritage. Citizens can use our tools to share their opinions and engage with a diverse range of perspectives.

Fig. 1: SPICE project. Screenshot of webpage <https://spice-h2020.eu> [29 March 2026]

Citizen Science not only focuses on potential museum user groups and their interconnections but also involves an exchange between professionals and users:

relations between citizen projects and concepts of ‘participatory museums’ [...] are increasingly scrutinized, with questions being raised about ethical issues of public contributions to professional work, changing relationships between citizens’ and research institutions, and transformations from expert-driven projects to alternative models of knowledge production and epistemologies [...].<sup>5</sup>

In this sense, Citizen Science in museums offers, from a research perspective, a wealth of topics for research theses in both Social Sciences and Art History. When it is stated that “the construction of new participatory spaces in museums and archives has highlighted a need to re-conceptualize communication between academic research, knowledge experts in organizations, and volunteer practices such as crowdsourcing in the humanities,”<sup>6</sup> the

5 Palmyre PIERROUX, Per HETLAND & Line ESBOG: “Traversing citizen science and citizen humanities: Tacking stitches,” in: *A History of Participation in Museums and Archives: Traversing Citizen Science and Citizen Humanities*, ed. by Per Hetland, Palmyre Pierroux & Line Esborg, Abingdon, Oxon: Routledge 2020, 3–24, pp. 3–4.

6 Ibid., 4.

“participatory museum” not only bridges different categories of museum visitors, but also becomes an object of study far beyond Art History and Museum Studies, including Social Studies, Cultural Heritage Marketing, Sociology, Concept Art, Psychology, Business Administration, and more.<sup>7</sup>

While the origins of museums were marked by a top-down approach to knowledge transmission and cultural participation—led first by noble collectors and then by art historians—here, it is a bottom-up initiative driven by a semi-skilled public. Their intention, in any case, goes beyond the classical approach of studying objects, instead pursuing transversal, inclusive, and performative approaches to Cultural Heritage. Citizen Science in Cultural Heritage represents a broad, engaged, integrative, and collaborative interaction with the museum itself. Nonetheless, a number of other museum initiatives are more common and wide-spread. Instead of a basic and crowdsourcing approach, where the crowd teaches the crowd, most of the museum oriented initiatives are furthered by experts, albeit with an eye on different audiences.

## Virtual museum and exhibition tours

One of the most popular digital features in the past twenty years has been virtual museum tours and virtual exhibitions, not only during times of pandemics.<sup>8</sup> While they certainly do not compensate for an onsite visit, they still offer an overview and a detailed look into a collection or historical site, which can be a permanent collection or a temporary exhibition. The added value is the ability to explore these venues from home, without barriers; thus, they are generally intended to reach the public and attract the broadest possible audience. Some have described the goals as providing a learning, entertaining, and socializing environment that also serves purposes such as gaming and escapism.<sup>9</sup> Whether for relax-

7 See for further studies on Citizen Science: Heidi L. BALLARD, Lucy D. ROBINSON et al.: “Contributions to conservation outcomes by natural history museum-led citizen science: Examining evidence and next steps,” in: *Biological conservation* 208/4 (2017), 87–97; Adam STONEMAN, Jason CARVALHO et al.: “Uncomfortable Revelations: Can citizen curation widen access to museums?” in: *Museum Ireland* 28 (2021), 64–71, [https://issuu.com/irishmuseums/docs/ima\\_journal\\_2021\\_compressed](https://issuu.com/irishmuseums/docs/ima_journal_2021_compressed) [2 November 2025]; Christopher J. GARTHE: *Das nachhaltige Museum: Vom nachhaltigen Betrieb zur gesellschaftlichen Transformation*, Bielefeld: transcript, 2022; Ziqiao WEI: *A New Approach to Digitizing Cultural Heritage: Constructing Immersive VR Experiences of Traditional Huizhou Architecture*, Duke University ProQuest Dissertations Publishing, 2023, 30312629, <https://www.proquest.com/openview/1b4568c9687ffa1ab07a387bc4f86714/> [16 March 2026].

8 See for an early technical description of virtual museum tours from 2006, including already 3D elements and aspects of Virtual Reality and Augmented Reality: Krzysztof WALCZAK, Wojciech CELLARY & Martin WHITE: “Virtual Museum Exhibitions,” in: *Computer* (Long Beach, Calif.) 39/3 (2006), 93–95, DOI: [10.1109/MC.2006.108](https://doi.org/10.1109/MC.2006.108).

9 See Mariapina TRUNFIO, Salvatore CAMPANA & Adele MAGNELLI: “Experimenting hybrid reality in cultural heritage reconstruction. The Peasant Civilisation Park and the ‘Vicinato a Pozzo’ museum of Matera (Italy),” in: *Museum Management and Curatorship* 38/4 (2023), 428–450, DOI: [10.1080/09647775.2022.2052159](https://doi.org/10.1080/09647775.2022.2052159), p. 429.

ation or education, the ultimate aim is to bring people into contact with and raise their awareness of cultural heritage.<sup>10</sup>

Beyond the many benefits that a virtual museum tour or exhibition might offer, there are two notable concerns: image rights for temporary exhibitions on the one hand, and the efforts and costs on the other—particularly the technical setup, scanning, and availability, which may have a limited lifespan due to both technological considerations and image rights. This is probably why only a small number of museums have considered this option as a valid alternative for the visitor experience.

Virtual tours of permanent exhibitions have a longer history than those of temporary installations. For example, the National Museum of Natural History in Washington (Smithsonian)<sup>11</sup> has been an early adopter of virtual tours, initially showing only a few connected rooms of the permanent collection and offering help with mobility by aiding navigation. Prominent arrows on the virtual floor indicated a suggested path through the gallery, while numbers appeared with explanations of the objects. Initially, the use of early laser scanning technology made the user experience less fluid.

Many museums have since followed this initiative, scanning a number of connected rooms or single departments, either with newer laser scanning technology or dedicated commercial software. Among these are the Louvre in Paris (fig. 2),<sup>12</sup> the Galleria degli Uffizi in Florence (fig. 3),<sup>13</sup> the Vatican Museum<sup>14</sup> and the Capitoline Museum<sup>15</sup> in Rome, the Courtauld Institute in London,<sup>16</sup> and the National Gallery of Ireland (fig. 4).<sup>17</sup> Nowadays, setting up a tour mainly requires specialized companies for Virtual Reality environments, but for a basic version, substantial preparation from the museum isn't necessarily required—once the objects are chosen and descriptions are provided.

The newest iteration of virtual museum tours generally relies on one major software, Matterport, a 3D environment app that features a 'dollhouse' view—essentially a birds-eye perspective of the museum spaces—a floor map, and a measurement tool that allows users to pin and measure the art objects *in situ*. The original commercial intention behind the app is apparent, as it was initially created for real estate companies, but it proves equally

10 Recent articles have shown the technological issues concerning the software involved, which determine the interaction and usability of the presented tools, because of the accuracy of the realization, the speed of interaction, and the more or less intuitive user interface and levels of engagement. See on issues on navigating a Virtual Reality environment: Katerina KABASSI, Alessia AMELIO et al.: "Evaluating Museum Virtual Tours: The Case Study of Italy," in: *Information* 10/11 (2019), fasc. 351, DOI: [10.3390/info10110351](https://doi.org/10.3390/info10110351).

11 <https://naturalhistory.si.edu/visit/virtual-tour> [10 November 2025].

12 <https://www.louvre.fr/en/online-tours> [18 October 2025].

13 <https://www.uffizi.it/mostre-virtuali/uffizi-virtual-tour> [18 October 2025].

14 <https://www.museivaticani.va/content/museivaticani/it/collezioni/musei/tour-virtuali-elenco.html> [18 October 2025].

15 [https://www.museicapitolini.org/it/musei\\_digitali/tour\\_virtuali](https://www.museicapitolini.org/it/musei_digitali/tour_virtuali) [18 October 2025].

16 <https://courtauld.ac.uk/gallery/virtual-tours/> [18 October 2025].

17 <https://www.nationalgallery.ie/virtual-tour/virtual-tour-grand-gallery> [18 October 2025].



Fig. 2: Louvre, Paris. Screenshot of the Petite Galerie virtual rendering, <https://www.louvre.fr/visites-en-ligne/petitegalerie/saison6/> [29 March 2026]

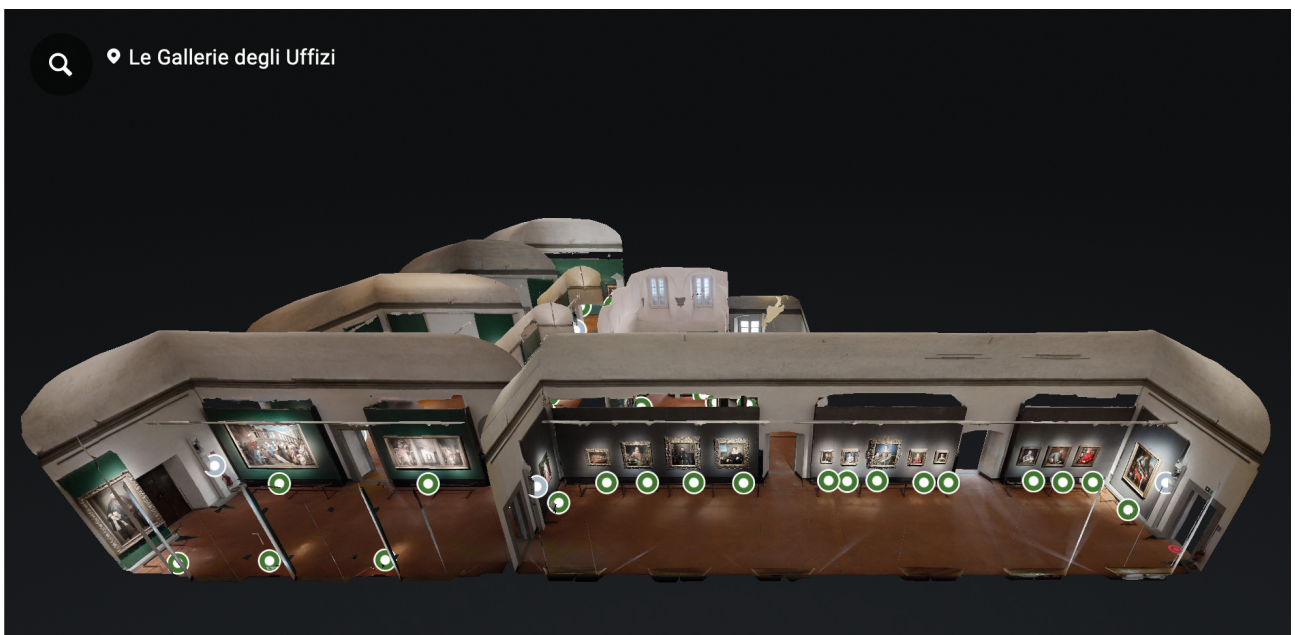


Fig. 3: Gallerie degli Uffizi, Florence. Screenshot of the exhibition spaces created with Matterport, featuring a dollhouse, stop points and exhibition labels, <https://www.uffizi.it/mostre-virtuali/uffizi-virtual-tour> [29 March 2026]

## Virtual tours of some Gallery spaces

Explore the wonders of the National Gallery of Ireland's collection, and take a leisurely stroll around some of our beautiful galleries from the comfort of your own home in our virtual tours.



Fig. 4: National Gallery of Ireland. Screenshot of the homepage showing alternatives for virtual tours, <https://www.nationalgallery.ie/virtual-tour> [29 March 2026]

effective in museum spaces. Some museums have scanned the environment, inviting virtual visitors to freely explore the space (Dublin, National Gallery of Ireland), while others have added stop-points in front of the art objects and provided object labels with basic information similar to the tags used onsite (Florence, Uffizi).

These virtual tours aim to replicate the gallery as it is, striving for a faithful reproduction to serve as an alternative to a physical visit. No additional value, experience, or information is intended. While the target audience of these virtual tours is usually the general public, with limited technical skills or subject knowledge, the tour must be visually appealing but remains technically at a basic level of engagement. Comparing virtual tours with their physical originals, the added value lies in independent access across time and space. It is the user experience that counts, and not necessarily an educational or intellectual purpose.<sup>18</sup> Jokanović sees the added value primarily when the virtual tour is developed in the context of new media art when the “exhibition space, the materiality of the artefact, audience interaction and manners of interpretations” enrich the possibilities and add content and context to the virtual rendering.<sup>19</sup>

18 See on this: Milena JOKANOVIĆ: “Perspectives on Virtual Museum Tours,” in: *INSAM Journal of Contemporary Music, Art and Technology* 5/II (2020), 46–57, DOI: [10.51191/issn.2637-1898.2020.3.5.46](https://doi.org/10.51191/issn.2637-1898.2020.3.5.46), p. 55.

19 Regarding virtual tours, Jokanović draws the conclusion that “[...] many virtual tours just copy the real-life museum setting and rely on linear storytelling. On the other hand, informed by the notion of convergence culture, the transmedia perception, as well as concepts of co-creation and co-curation, we recognized some examples of good practice when it comes to virtual museum content that fulfills the needs of the audience.” (JOKANOVIĆ: “Perspectives on Virtual Museum Tours,” 54).

Virtual tours therefore address various publics—those who cannot travel, or those who are preparing to travel, or wanting to fresh up travel-memories—by offering a digital alternative unbound by time and place. Additionally, some museums claim to use these tours for in-house education, preparing their museum interns, while others employ the tours for classroom education, or even for use in medical and psychiatric settings by health professionals.<sup>20</sup> Finally, the topic of virtual tours has itself been studied in academic research and recently featured in several PhD theses.<sup>21</sup>

For researchers, virtual tours of permanent gallery spaces are of limited importance; their relevance increases significantly when they replicate a temporary exhibition. Seeing the setup of an exhibition and the development of its themes within the space can be very important for those who cannot physically visit, or who want a second opportunity to study the concept in detail. However, given the considerable time and expense involved in scanning rooms and clarifying copyrights, only a few temporary exhibitions have undergone this process so far.

Virtual exhibition tours gained sudden importance during the Covid pandemic, as few visitors were able to travel to the sites and exhibitions frequently opened and closed. One example was the Washington exhibition *Raphael and his circle* (National Gallery of Art, February 16 – November 15, 2020, with a temporary closure in between).<sup>22</sup> The virtual environment software Matterport was utilized to its fullest extent, with stop-points in front of objects, information tags, and a measurement tool to outline the objects and conduct calculations—a notable addition compared to the physical visit. While the exhibition was made available for at least two additional years, it was later taken offline. This is, however, not (yet) the case for other temporary exhibitions in other museums, where there is a growing intention to preserve the concept of an exhibition for future online visitors. The Gallerie d’Italia in Milan, for example, had to close their exhibition *Tiepolo. Venice, Milan, Europe* early due to Covid (2021), but provided a digital surrogate in an easily navigable

20 See on virtual museum tours as a preparation for interns: Kamna Singh BALHARA, Paul Logan WEYGANDT et al.: “Creating Community and Exploring Identity. Integrating a Virtual ‘Museum Tour’ Into Intern Orientation,” in: *Journal of graduate medical education* 14/3 (2022), 335–336. See on virtual museum tours for schools: Maria ARISTEIDOU, Theodora KOUVARA et al.: “Virtual Museum Tours for Schools: Teachers’ Experiences and Expectations,” in: *2022 IEEE Global Engineering Education Conference (EDUCON)*, ed. by Ilhem Kallel, Habib M. Kammoun & Lobna Hsari, 201–209, DOI: [10.1109/EDUCON52537.2022.9766548](https://doi.org/10.1109/EDUCON52537.2022.9766548); Margot KELLY-HEDRICK, Natasha CHUGH et al.: “The Online ‘Personal Responses Tour’: Adapting an Art Museum–Based Activity for a Virtual Setting,” in: *Academic Psychiatry* 46/4 (2022), 510–514, DOI: [10.1007/s40596-021-01505-z](https://doi.org/10.1007/s40596-021-01505-z).

21 For example: Roman SHIKHRI: *A 360-Degree Look at Virtual Tours. Investigating Behavior, Pain Points and User Experience in Online Museum Virtual Tours*, University of Haifa (Israel) ProQuest Dissertations Publishing, 2022, 29133625, <https://www.proquest.com/openview/1df36eb171f740939183cd1ed07015ff/> [16 March 2026].

22 Now offline, the exhibition had the address: <https://www.nga.gov/features/raphael-virtual-tour.html>. Exhibition description: <https://www.nga.gov/exhibitions/raphael-and-his-circle> [18 October 2025].

space, including information from the exhibition's labels.<sup>23</sup> Since then, the Gallerie d'Italia has added several thematic videos on topics related to the pictures in the gallery (for example: *Grand Tour: l'esperienza immersiva, Canova e Thorvaldsen a 360°*), which can be seen as an alternative to onsite thematic workshops.<sup>24</sup>

As an early (pre-pandemic) explorer of virtual tours, the National Museum of Natural History in Washington, DC, (Smithsonian) remains a leader in the field. They now offer not only technically up-to-date explorations of some gallery departments, but also provide access to current and past exhibitions on their homepage.<sup>25</sup> The preservation of past exhibitions is a notable added value, especially for researchers.<sup>26</sup> However, it is clear that there are significant hurdles to preserving a physical exhibition in the virtual space with persistent software, negotiating extended image rights, and doing so without additional income, since virtual tours and exhibitions are usually offered for free—unlike in-person exhibitions.

Other museum initiatives regarding physical collections are reworking the visitor's experience by introducing visual effects into a cultural heritage setting, such as Virtual Reality, Augmented Reality, Mixed, or Hybrid Reality. These tools aim to enhance visitors' intellectual interaction with the exhibited objects while transforming their experience at the cultural heritage site. One such site is the Abbaye de Cluny, where a Virtual Reality application was installed as early as 2011.<sup>27</sup> During the visit, the former appearance of the partially destroyed abbey of Cluny III could be experienced with the help of Augmented Reality on a tablet. By holding the device up to a specific area, it would display a virtual reconstruction of the precise location, enriching both the experience and the informational aspect of the site.<sup>28</sup>

23 GALLERIE D'ITALIA: *Tiepolo. Venezia, Milano, L'Europa*, <https://gallerieditalia.com/it/milano/mostre-e-iniziative/mostre/2020/10/30/tipolo-venezia-milano-l-europa/> [18 October 2025] (exhibition's home page); <https://gallerieditalia.com/it/musei-online/virtual-tour/giambattista-tiepolo-il-tour-virtuale/> [18 October 2025] (virtual tour of exhibition).

24 Thematic tours and videos: <https://gallerieditalia.com/it/musei-online/virtual-tour/> [18 October 2025].

25 Among the past exhibitions, there figure, for example: *Western Culture, Outbreak. Epidemics in a Connected World, National Geographic: Into Africa*. See: National Museum of Natural History, Smithsonian Institution, <https://naturalhistory.si.edu/visit/virtual-tour> [10 November 2025].

26 It should be shortly mentioned that there are also a number of initiatives who are recreating past exhibitions in a virtual space. See on these: Chiara DI STEFANO & Laura MOURE CECCHINI: "Digital technologies and exhibition culture: reactivating art installations through virtual reconstructions," in: *Visualizing Venice*, ed. by Kristin L. Huffmann, Andrea Giordano & Caroline Bruzelius, London / New York: Routledge, 2018, 84–91; Patrick RÖSSLER, Rolf KRUSE & YVONNE BRANDENBURGER: "Bauhaus meets VR. Time travel into a virtual reconstruction of the German Building Exhibition of 1931," in: *Kultur und Informatik*, ed. by Johan Habakuk Israel, Christian Kassung & Jürgen Sieck, Glückstadt: Hülsbusch, 2020, 167–177.

27 *Cluny Abbey. Augmented Reality*, 2011 [video], <https://www.youtube.com/watch?v=P4OBNgNWaLo> [25 October 2025].

28 Nowadays, there is a complete virtual reconstruction of Cluny III available in a video: <https://www.cluny-abbaye.fr/en/discover/virtual-reconstruction-of-the-abbey-church-of-the-former-cluny-abbey-known-as-cluny-iii> [18 October 2025].



Fig. 5: Virtual Reality Exhibition: Meissener Porzellan im virtuellen Fokus, TU Dresden, 2026, <https://meissenerporzellan.wordpress.com/> [13 April 2026]

A similar idea, now within a museum gallery, was introduced a few years later at the Bayerisches Nationalmuseum, using Augmented Reality on a tablet and Google Glasses (Google X), this time to be held up to individual museum objects. The visualization aided in understanding the original setting of each object by showing missing parts or situating the object in its original location, as with altar paintings in their respective church environments.<sup>29</sup> While it is true, that both these projects visualize reconstructions based partially on hypothesis, but also often on simplification,<sup>30</sup> the hypothetical aspect is often (and nec-

29 See on this KOHLE: *Museen digital*, 163–165. For a short, user generated video by Hannes Schlee on Augmented Reality in the Bayerisches Nationalmuseum (2014), see [https://www.youtube.com/watch?v=s1YD7TS\\_\\_8s](https://www.youtube.com/watch?v=s1YD7TS__8s) [25 October 2025].

30 See on criticism of historical reconstructions, for example Joseph INGRUM: “Museums, Virtual Reality, and Historical Context,” in: *The State of Museum Digital Practice | 2022: A collection of graduate essays*, by Alyssa Barilotti, Samantha Bateman, Grace Bautista et al., Washington, D.C.: GWU Museum Studies, 2022, <https://GWU-Museum-Studies.github.io/Museum-Digital-Practice-2022/essays/essay-14/> [16 March 2026]; Maximilian C. FINK, Diana SOSA et al.: “Authenticity and interest in virtual reality. Findings from an experiment including educational virtual environments created with 3D modeling and photogrammetry,” in: *Frontiers in Education* 8 (2023), DOI: [10.3389/feduc.2023.969966](https://doi.org/10.3389/feduc.2023.969966); Liselore N. M. TISSEN: “Authenticity vs 3D reproduction: Never the twain shall meet?” in: Sophia Hendriks, Merel Oudshoorn, Lieke Smits & Tim Vergeer (eds.): *Arts in Society: Academic Rhapsodies*, Universiteit Leiden, 2020, 21–40, <http://hdl.handle.net/1887/85535> [16 March 2026].

essarily) based on many (written) research reconstructions, while the visualization wants to render an idea, making the object more plausible for the general public, or proposing a visualized point of discussion for the academic community.<sup>31</sup>

These two very innovative projects have so far seen few followers. At the cutting edge for leisure, education, and research benefits, they provided high-level information at an easily accessible level, enabling a deeper engagement with the object itself. Virtual reconstructions add significant context to an object in a museum, in ways that were unprecedented in the pre-digital era. While most historical reconstructions occur within research projects, they are now brought to the general public as a benefit for all three types of museum visitors: leisure, education, and research. The shift in digital realities leads us ultimately to entirely un-tactile virtual spaces, where the haptic experience can be enforced, contrary to the permissions in a physical exhibition tour.

In 2026, a seminar at Dresden University of Technology (joint class of Art History and Digital Humanities) has produced a Virtual Reality exhibition (fig. 5), showing digitized objects in an entirely virtual museum room. One of the biggest advantages of this virtual exhibition is that objects can be taken from their consols and turned around, enabling the visitor, for example, to look at the back side, or the bottom showing a manufacturing mark, or even enabling virtual restorations. In order to produce this Virtual Reality environment, the student group was allowed to take 3D scans of physical museum objects (museum: Meissen Porzellan-Stiftung), whereafter followed the modelling of the polygon meshes, the creation of the virtual space, and the description and evaluation of the objects.<sup>32</sup> In this specific case, many virtues fall together: the multi-leveled study approach for the students, the time and access independent space, a “haptical” interaction with the objects by the museum visitors, and an engaged learning effect for all groups.

## Museums and Data Science

So far, we have examined different stages of engagement with cultural heritage objects, which have either a general and educational purpose or, additionally, a research value. The areas where museums have engaged exclusively with the needs of researchers, beyond the study of the physical artifact, are twofold. Regarding images, researchers benefit from public domain images that are available for download and publication, along with the implementation of new digital image standards. Regarding data, they benefit from the widest possible range of images and their metadata, artworks and their metadata, and all related information, such as the artist and the date of the artwork, its material, measurements, conservation data, provenance data, and much more. All these resources that are

31 This is, in the end, not so different from research paper presentations.

32 Virtual Reality exhibition *Meissener Porzellan im virtuellen Fokus*, Dresden University of Technology in cooperation with Meissen Porzellan-Stiftung, 2026, <https://meissenerporzellan.wordpress.com> [13 April 2026].

now accessible to researchers represent a significant enhancement and lead to new fields of study, or enable new feasibility for existing studies. Many new research questions are now emerging due to the availability of information that would previously have been difficult and expensive to collect. The digital turn is allowing cultural heritage collections to provide access to their collections in an unprecedented way.<sup>33</sup>

Museum data are usually geared primarily toward museum professionals and art historians, but also, in a secondary sense, to economists and social scientists. While the first category of data concerns object-related information, the second category relates, for example, to analyses of visitor behavior and interaction. These can be addressed through big data methods<sup>34</sup> or artificial intelligence.<sup>35</sup> Such data may be gathered from direct visitor feedback, for example through online questionnaires accessed via apps, or through the automated documentation of visitor behavior. While some of this data is potentially of interest to other researchers as well, it is primarily intended for museum professionals, supporting their didactic strategies and marketing research. AI concepts focusing on museum data can be used, for example, to calculate visitor experiences in different areas of the museum, to estimate necessary space for exhibitions based on models trained on previous events, to project staffing needs for specific hours on a given day, and to determine ticket pricing relative to less busy times.<sup>36</sup> Most of these efforts are related to marketing and therefore fall beyond the scope of this essay.

## Images and their data

Many museums have digitized their artworks and placed a selection in their online catalogs. A digital image usually comes with the image data itself, along with metadata related to the image. In many museum online catalogs, images are embedded in the page, often with the option only to view them or save them in a so-called Lightbox. This is the case,

33 See for an example of museum data querying: Angela DRESSEN: “Medieval and Early Modern European, African and Asian ivories seen through the Data Lens,” in: *Cultural Heritage Data for Research. Opening Museum Collections, Project Data and Digital Images for Research, Query and Discovery*, ed. by Angela Dressen, London: Open Library of Humanities, 2025, 1–48, DOI: [10.16995/olh.16575](https://doi.org/10.16995/olh.16575).

34 See, for example, Georgios PAPAIOANNOU: “Documenting and mining museum big data: challenges addressed by a new research project in Qatar,” in: *CIDOC 2018* Heraklion, Crete, Greece meeting (archived at [https://web.archive.org/web/20210121205958/http://network.icom.museum/fileadmin/user\\_upload/minisites/cidoc/images/CIDOC2018\\_paper\\_161.pdf](https://web.archive.org/web/20210121205958/http://network.icom.museum/fileadmin/user_upload/minisites/cidoc/images/CIDOC2018_paper_161.pdf) [16 March 2026]), reiterated at the MBD 2024 Conference by Georgios PAPAIOANNOU & Matthew DAMIGOS: “Museum Big Data: Emerging Practices, Challenges, and Opportunities in Museum Contexts – A Preface and a Synthesis of the MBD 2024 Conference,” in: *MBD2024: 3rd International Conference On Museum Big Data, November 18–19, 2024, Athens, Greece*, <https://ceur-ws.org/Vol-4021/preface.pdf> [2 March 2026].

35 Oonagh MURPHY & Elena VILLAESPEA: *The Museums + AI Network. AI: A Museum Planning Toolkit*, London: Goldsmiths, 2020, [https://themuseumsai.network/wp-content/uploads/2020/02/20190317\\_museums-and-ai-toolkit\\_rl\\_web.pdf](https://themuseumsai.network/wp-content/uploads/2020/02/20190317_museums-and-ai-toolkit_rl_web.pdf) [19 November 2025].

36 *Ibid.*, pp. 6–7.

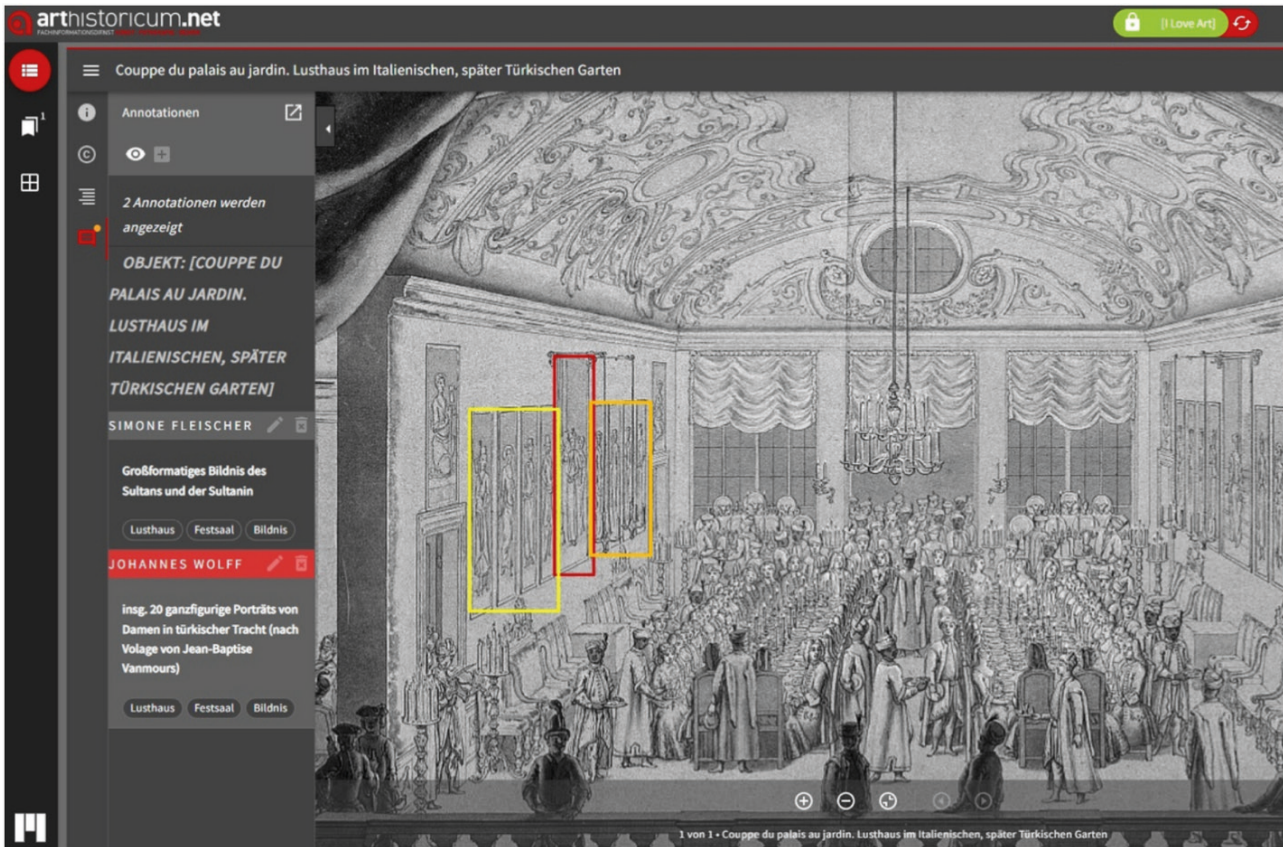


Fig. 6: Arthistoricum.net. Screenshot of the explanation of the custom-built Mirador viewer with possibilities for annotation and collaborative working, <https://nfdi4culture.de/news/annotations-with-mirador-3.html> [29 March 2026]

for example, with the National Gallery in London and the Rijksmuseum in Amsterdam, where registered users can create image collections with their own selections, while the images themselves remain within the same database environment. Museums thus encourage users to explore their online sites and activities with minimal technical barriers, often aiming these features at the general public or students. Museums that follow an open access strategy have made their images available under a CC0 license, which means placing them in the public domain. These images can be downloaded from the online catalog and used freely, including in publications. This is the case, for example, with images in the Metropolitan Museum of New York's online catalog.

The new digital standard for museum catalogs (and in general for GLAM institutions)<sup>37</sup> has become IIIF (International Image Interoperability Framework), which an increasing number of museums and cultural heritage institutions are adopting. IIIF was established in 2011 and formalized as the IIIF Consortium in 2015. It offers high-resolution images independent from the original database and collection, and is used by many institutions from the GLAM sector as well as in many digital projects.<sup>38</sup> Images are coded so they

37 GLAM stands for Galleries, Libraries, Archives and Museums.

38 Homepage of IIIF consortium and information: <https://iiif.io> [25 October 2025].

can be used in different image viewer environments, not only in the original database of the owner institution. Sets of shared APIs (Application Programming Interfaces) link images between different databases and image viewers, so that the image generally “lives” in one catalog but can be visualized and worked with in other environments. Additionally, images can be manipulated and annotated—also collaboratively—and offer ways to add and share metadata (fig. 6).<sup>39</sup> They become fully-fledged digital images that researchers can work with, even in collaborative settings. Many museums have adopted this standard, such as the Getty Museum in Los Angeles, the Victoria & Albert Museum in London, the Princeton University Art Museum, the Harvard Art Museums, and many more. Images in the public domain and image standards with interoperable metadata are currently the two areas where a variety of museums stand out, helping researchers in their work.

## Objects and their data

While museums offer online catalogs of digitized objects, only a portion of the information held in a museum’s internal database becomes visible to researchers through the museum’s website. The broader opening of object and collection data to the (academic) public is an invaluable resource for study. While only limited data is available through the front end of a public museum catalog, much more can be queried via the back end through specific processes, allowing access to a museum’s internal collection database. Researchers with the necessary computational skills can now access data and information related to artworks, such as the artist, date of execution, materials, colors, conservation data, provenance data, exhibition data, and more. All of this information can serve as valuable data on which research queries can be built. Until now, museum collections have been made available either by granting access to the physical object onsite or by providing a digitized version of the artifact online. With new tools and query methods from the field of Digital Humanities, collections are now opening the data behind the objects for computational approaches, offering new possibilities for academic research.

So far, only a few museums offer both approaches: the traditional front-end catalog and back-end queries, while the vast majority do not yet make the back end accessible. The Rijksmuseum in Amsterdam provides both search options, with the public front end guiding online visitors through the collection’s holdings. Users can refine searches for a specific period or by categories such as maker, object type, color, place, material, technique, sub-

39 See for possibilities of using IIF images for research: Paola MANONI: “Discoverability in the IIF digital ecosystem J LIS.it,” in: *J LIS.it [Italian journal of library and information science]* 13/1 (2022), 312–320, DOI: [10.4403/jlis.it-12770](https://doi.org/10.4403/jlis.it-12770); Annalise WELTE: “Navigating IIF in Art Research: How Two Institutions Engage with IIF,” in: *Art documentation. Journal of the Art Libraries Society of North America* 43/2 (2024), 197–208; Johannes WOLFF, Astrid PROBST & Eva BODENSCHATZ: “Bringing researchers together with IIF,” in: *Art libraries journal* 49/1 (2024), 37–43, DOI: [10.1086/735803](https://doi.org/10.1086/735803); Matthew J. WESTERBY: “Annotating Upstream: Digital Scholars, Art History, and the Interoperable Image,” in: *Open Library of Humanities* 10/2 (2024), DOI: [10.16995/olh.17217](https://doi.org/10.16995/olh.17217).

ject, and more, with guidance through available search terms.<sup>40</sup> The approach is granular: one might start with a category like material or artist and then add further categories to narrow the results. Some search categories can be combined and refined, although not all combinations are possible. These guided searches are useful for researchers seeking specific information from a single database, even though the user is limited to the given options and search strategies. The search structure remains guided, designed for use by everyone regardless of prior preparation. While the methods described in online museum catalogs allow guided searches using the provided categories, for researchers, such guided searches are not always ideal, as they may restrict what can be queried at any given time. More advanced approaches, however, require significant preparation, skills, and setup—both from the data provider and the researcher.

At present, most museums and cultural institutions are developing their own query methods and endpoints. Only a very few projects aim for a common approach that incorporates multiple institutions into one query. Art UK began in 2019 with eight project partners for a shared data harvesting project. This initiative is now operational, allowing guided searches of more than 700,000 artworks in over 3,500 institutions, based on shared ontologies and vocabularies necessary to address each dataset in a standardized way. The advantage is easy access to information, without the need for specialized skills. However, for research, there is a clear disadvantage—for example, not being able to combine categories freely. The search produces an object list with images but does not provide a downloadable dataset.<sup>41</sup> Art UK and Joconde in France are currently the only nationwide functioning catalogs. Otherwise, there are local projects in some cities, such as the Daphne catalog in Dresden and d:kult in Düsseldorf, both based in Germany. One of the most interesting initiatives is museum-digital, which started in Germany but has grown since 2009 into an interdisciplinary project with more than 600 museums now participating via a shared public interface.<sup>42</sup> Additionally, this international initiative is also working to provide query possibilities for digitally skilled researchers via query endpoints, demanding the knowledge of computer languages like Python or SPARQL.

Indeed, current trends in Digital Humanities show how computational queries can be used to probe internal databases via query endpoints. These querying methods assume consistent data that follows established standards for data queries and Linked Data principles. In this case, researchers are working with structured data derived from a knowledge base. Data compiled and managed by museums is currently, beyond the museum itself, of exclusive interest to researchers.<sup>43</sup> This field is at the intersection of Data Science, Museum

40 Amsterdam, Rijksmuseum online database <https://www.rijksmuseum.nl/en/collection> [19 October 2025].

41 Art UK project <https://artuk.org> [20 October 2025].

42 Museum-digital, <https://en.about.museum-digital.org> [20 October 2025].

43 See for an introduction to data querying from museum databases: Angela DRESSEN: “Cultural Heritage Data for Research: An Introduction,” in: *Cultural Heritage Data for Research. Opening Museum Collections, Project Data and Digital Images for Research, Query and Discovery*, ed. by Angela Dressen, London: Open Library of Humanities, 2024–2025, 1–15, DOI: [10.16995/olh.18710](https://doi.org/10.16995/olh.18710).

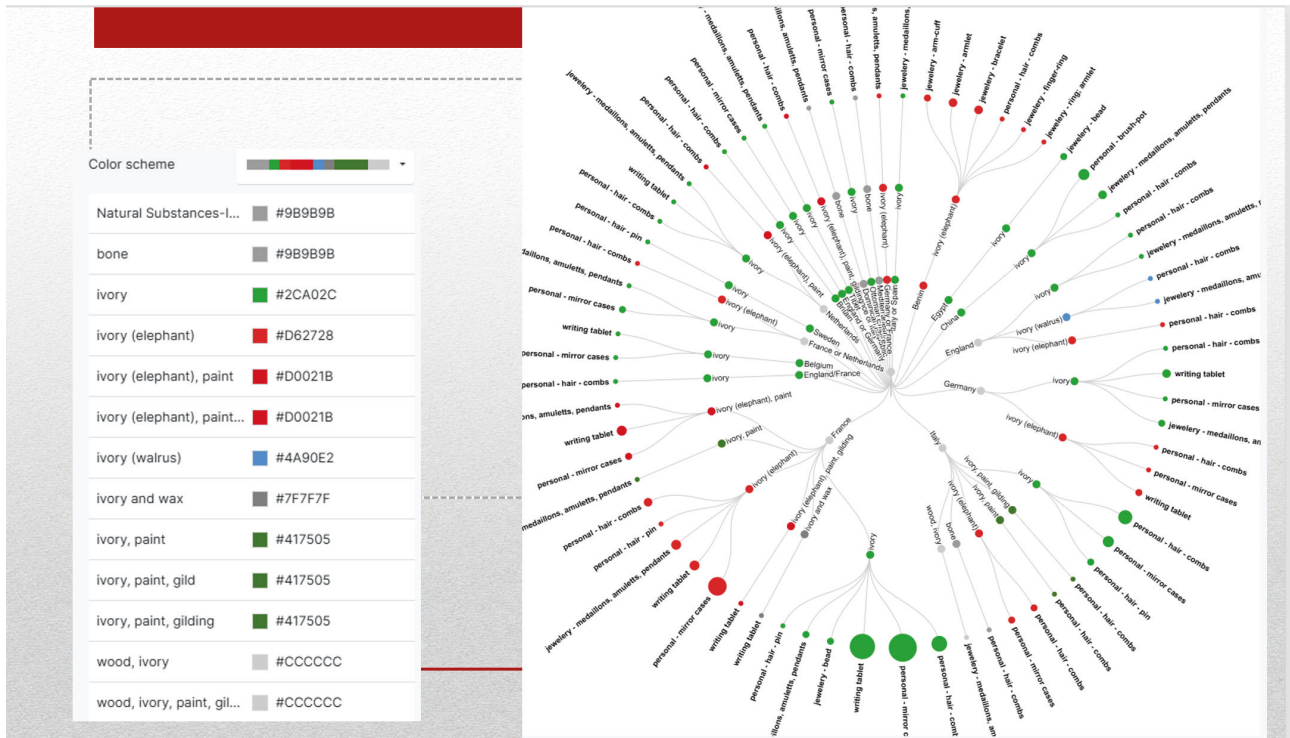


Fig. 7: Initial visualization of a dataset (tool: RAWGraphs) on elephant and walrus ivory, showing the range of objects in a specific material, divided by country<sup>44</sup>

Studies, and Digital Art History (fig. 7). Museums have been gathering information and data for centuries on card files and, for decades, in internal databases that were inaccessible to anyone outside the institution. Organizing the data and establishing query endpoints is a complex task for the institutions involved—especially if an endpoint is meant to serve multiple institutions or consortia. The completeness of datasets offered by museums varies, depending on what categories each museum decides to make available. While some offer only artist names and work titles, others include data such as acquisition date, provenance, exhibition history, loans, and more. A major benefit of this method is the ability to access information on both displayed objects and those in storage. Naturally, researchers prefer datasets that are as complete as possible, to address complex research questions that are difficult to approach using traditional art historical methods. Ultimately, these kinds of queries enable broader research questions about objects based on quantitative results, as well as analyses of museum policy and comparative studies. With these new query methods, museums become much more transparent and open up to a wide range of art historical and cultural heritage studies.

<sup>44</sup> See on this study: Angela DRESSEN: “Medieval and Early Modern European, African and Asian ivories seen through the Data Lens”.

## Provenance data

One topic currently in high demand is provenance research, following the 1970 UNESCO convention on the trade of cultural property.<sup>45</sup> Provenance can be approached either from a Big Data perspective or from the history of the individual object. While it has always been of interest to learn more about the history of an object—how it entered a museum and who its former owners and collectors were—in recent years, provenance research has mainly been driven by debates around possible restitution policies connected to potentially illegal ownership. For example, the Metropolitan Museum in New York is currently highlighting artworks in their online database that came to the museum during a certain period (with a checkbox filter for “Nazi-era provenance”). Provenance information has both scholarly and user-oriented implications and applications across the fields of art history, archaeology, and anthropology, as well as in galleries, libraries, archives, and museums (GLAM). In the context of GLAM, provenance is seen as a “chain of custody.” Museums use provenance information to shape research priorities, establish industry standards, and help their audiences understand their resources.

The Getty Research Institute has the longest-standing record in provenance research: the Getty Provenance Index (GPI) relates to “the history of ownership of a valued object, such as a work of art. A full provenance provides a documented history that can help prove ownership, assign the work to a known artist, and establish the work of art’s authenticity.”<sup>46</sup> The GPI includes archival inventories, sales catalogs, dealer stock books, and other datasets, which are accessible through a dedicated data hub. Decades ago, the Getty transformed their data into a database, becoming the first institution and museum to do so, and they remain a leader in the field with a completely restructured data hub. Now, they offer a guided search in the database, but also provide, for computationally skilled researchers, API endpoints and a SPARQL query for more complex data exploration. This pioneering enterprise has inspired several more recent followers, with many museums currently investigating how to make their provenance data available.

45 UNESCO Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property (1970), <https://www.unesco.org/en/legal-affairs/convention-means-prohibiting-and-preventing-illicit-import-export-and-transfer-ownership-cultural> [19 October 2025]; Paul GROTH & Luc MOREAU (eds.): PROV-Overview. An Overview of the PROV Family of Documents. W3C Working Group Note 30 April 2013, latest published version: <http://www.w3.org/TR/prov-overview/> [19 October 2025]: “Provenance is information about entities, activities, and people involved in producing a piece of data or thing, which can be used to form assessments about its quality, reliability, or trustworthiness.”

46 Getty Provenance Index <http://www.getty.edu/research/tools/provenance/search.html> [17 March 2026] (new Linked Open Data structure); <https://piprod.getty.edu/starweb/pi/servlet.starweb?path=pi/pi.web> [17 March 2026] (old database version). Selected datasets from the Getty Provenance Index are available via GitHub (<https://github.com/thegetty/provenance-index-csv> [17 March 2026]) for open and convenient access to researchers as part of the Getty Provenance Index Remodel project (<https://www.getty.edu/projects/remodeling-getty-provenance-index/> [17 March 2026]).

In more recent times, other museums have followed, using different approaches to make this information accessible, such as the Carnegie Museum of Art in Pittsburgh. While still working on a database, they have decided in the meantime to upload their records to GitHub, where they can be downloaded for further use.<sup>47</sup> Currently, several museums are working to set up databases dedicated to provenance research, such as the University of Oxford, the National Galleries of London and Washington, and the Frick Collection in New York. This is no easy task. A lot of effort, time, and money go into these projects, and every institution realizes that the setup of a database optimized for querying is a much larger endeavor than initially imagined. Finding the right standards for data and query capabilities is a significant challenge. It should also be noted that almost every museum working in this area is still trying to find its own solution, rather than joining efforts and sharing knowledge. The more concerning aspect is the likelihood that multiple, potentially incompatible standards will be created, which may become a problem if these museums wish to join forces in the future. As a result, these projects might also miss out on a broader vision of museum data as a whole, where provenance data are just one component of a complex query. For computationally skilled researchers, provenance data are of immense value—especially when provided within a fully accessible dataset.

## Resumé

After twenty years, the digital turn has significantly broadened the range of offerings museums can provide and has, in fact, had the greatest impact on the historical concept of the museum as a space, and as a place for leisure and education. Both temporary and permanent exhibitions are inventions of the 17<sup>th</sup> century—with the 1665 Paris Salon as a temporary exhibition space and the Ashmolean Museum in Oxford, founded in 1683, as a dedicated physical space for permanent display, being two telling examples. In England, it was a social movement that called for a publicly accessible museum for the leisure and education of the population, a privilege that had previously been granted mainly to noble or wealthy private patrons.<sup>48</sup> These movements can be seen as forerunners of the Enlightenment, demanded for and by the populace, to participate in two privileges: education beyond mere necessity, and the ability to use leisure time in a cultivated and productive

47 The most interesting provenance data project currently underway, but not yet fully realized, is the Art Tracks project at the Carnegie Museum of Art (CMOA). This project aims to capture images and metadata using structured data, which will later enable semantic queries about the artworks using a suite of open source software tools. The standard used is JSON, which is also known to be used for IIIF queries. The Carnegie Museum does not yet seem to be considering a possible combination of these options, but in my view, this would open up interesting prospects for the future that could make images and metadata semantically usable. See: CARNEGIE MUSEUM OF ART: Art Tracks, <https://www.museumprovenance.org> [20 October 2025].

48 See on the origins of the physical museums: Jeffrey ABT: “The Origins of the Public Museum,” in: *A companion to Museum Studies*, ed. by Sharon Macdonald, Malden, MA: Wiley-Blackwell, 2006, 115–134.

manner. In a way, the digital turn is reviving these ideas and making them more effective, as well as more focused in their three areas of leisure, pedagogy, and research, which can either target specific groups or be addressed collectively—although most digital initiatives, both then and now, are directed toward the general public.

While the initiatives are manifold, certain categories stand out for their application and popularity. Virtual tours are among the most popular features in many countries and can have the broadest impact in all three areas: leisure, education, and research. They allow for an exploratory approach to collections with few technical barriers, even when interactive elements like Augmented or Mixed Reality are included. They serve a diverse audience, ranging from couch tourists to classroom learners, from those with economic or geographic restrictions to people across age and social groups, and from gaming enthusiasts to education-focused visitors. Many factors explain their widespread use. Virtual tours within the realm of pedagogy or under the umbrella of Citizen Science—including interactive and contributory elements—have become a subject of study in their own right. How can museums attract people, the general public, or certain societal groups to interact with artworks or develop their own artistic concepts? As a research field for empirical, social, or pedagogical studies, these initiatives have also entered the university setting. For researchers, however, virtual tours are most beneficial when they present temporary exhibitions. For those who did not have the opportunity to travel, modern software can at least partially recreate some aspects of the onsite experience, while virtual exhibitions with an interactive engagement with the object seem to be the most promising engagement in many respects. Summing up the majority of efforts and projects taking place in museums, it's clear that while the pre-digital era essentially offered a view of the object itself in permanent or temporary exhibitions, the 20<sup>th</sup> century added practical workshops and scholarly lectures, and the 21<sup>st</sup> century has developed a significant list of services addressing leisure and gaming, education and research—all adding substantial amounts of information and context.

While researchers have often been less visible in the focus of most museums, there has been a notable change underway at several major institutions since 2011. These include online catalogs of objects with descriptions, guided search tools through the catalog, images with public domain licenses, IIIF-compliant images allowing for further processing and collaboration, and, most importantly, the opening of museum data as research data. Today, museum data is becoming the most important primary data source for art history.<sup>49</sup> The importance of research data—whether open and shared or privately collected—has become recognized only in the past decade, even though such data has existed for much

49 See for a definition of research data the source on DARIAH-DE: “Unter digitalen geistes- und kulturwissenschaftlichen Forschungsdaten werden innerhalb von Dariah-DE all jene Quellen/Materialien und Ergebnisse verstanden, die im Kontext einer geistes- und kulturwissenschaftlichen Forschungsfrage gesammelt, erzeugt, beschrieben und/oder ausgewertet werden und in maschinenlesbarer Form zum Zwecke der Archivierung, Zitierbarkeit und zur weiteren Verarbeitung aufbewahrt werden können.“ (Johanna PUHL et al.: “Diskussion und Definition eines Research Data LifeCycle für die digitalen Geisteswissenschaften,” in: *DARIAH-DE Working*

longer. Museums, archives, and projects now provide open research data of the highest standards. These are valid primary sources for researchers, offering new avenues of inquiry that were previously impossible.<sup>50</sup>

Museums and research data—whether as image data or object-related data—address researchers first and foremost. They operate at the intersection between institutional and university research. Although primarily developed by cultural heritage institutions and applied to their own collections, these resources ultimately serve researchers. Traditional art history, digital art history, and data science are increasingly converging. This is a significant opportunity for the field of Art History, which until now has been divided into two areas: the field of Art History and the more practically oriented Cultural Heritage Studies. Now, cultural heritage institutions are being given the opportunity to provide working materials and data as primary sources, which are vital for art historical research and make an important contribution to research in directions that go far beyond their traditional fields. Likewise, cultural heritage institutions are also increasingly involved in the core areas of Digital Humanities and Digital Art History. This requires both museum professionals and researchers to gain knowledge in new methods, such as the Semantic Web and Data Science. At present, what museums offer in terms of Data Science is accessible only to a small number of students and researchers. Yet, apart from digital reconstructions, this is an area where museums and cultural heritage sites are coming closest together in the realm of digital research. Museum data as primary sources are slowly establishing a very promising new field at the intersection of Art History, Cultural Heritage Science, and Data Science.

*Papers* 11 (2015), <http://nbn-resolving.de/urn:nbn:de:gbv:7-dariah-2015-4-4> [16 March 2026]). This definition does not necessarily take museum data into account. Museum data are gathered around the object, and is based on information, that has been gathered since centuries for the same purposes. But now that these information in the form of machine-readable data is offered for further use, it makes it a fundamental source for primary research data. The definition of Research Data from OPENAIRE: “Research data are the evidence that underpins the answer to the research question, and can be used to validate findings regardless of its form (e.g. print, digital, or physical). These might be quantitative information or qualitative statements collected by researchers in the course of their work by experimentation, observation, modelling, interview or other methods, or information derived from existing evidence. Data may be raw or primary (e.g. direct from measurement or collection) or derived from primary data for subsequent analysis or interpretation (e.g. cleaned up or as an extract from a larger data set), or derived from existing sources where the rights may be held by others. [...]” (8 January 2019, <https://www.openaire.eu/research-data-protected-what-is-research-data> [16 March 2026].)

50 See on Humanities Research Data in general: Fabian CREMER, Lisa KLAFKI & Timo STEYER: “Der Chimäre auf der Spur: Forschungsdaten in den Geisteswissenschaften,” in: *o-bib* 2 (2018), 142–162, DOI: [10.5282/o-bib/2018H2S142-162](https://doi.org/10.5282/o-bib/2018H2S142-162); PUHL et al.: “Diskussion und Definition eines Research Data LifeCycle für die digitalen Geisteswissenschaften.”

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## ACCESS POINTS

# #7

**ACCESS**  
Kolleg-Forschungsgruppe  
Zugang zu kulturellen Gütern  
im digitalen Wandel  
**ZUGANG**

## MUSEUMS AT THE DIGITAL TURN

The concept of the museum has evolved throughout history, starting with the 18<sup>th</sup>-century public museum for educational leisure, followed by the pedagogical and commercialized museum of the 1970s, and most recently reaching the digital turn. This latest shift is now reviving and enhancing these earlier ideas, with an even more intense focus on leisure, pedagogy, and research. While researchers have often received less focus from most museums, there have been notable changes underway at several major institutions since 2011. These include online catalogs of objects with descriptions, guided search tools through the catalog, images with public domain licenses, IIIF-compliant images allowing for further processing and collaboration, and, most importantly, the opening of museum data as research data, making the Cultural Heritage institutions a valid research partner.

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