

Digital Catalogues Study

A cross-institutional user study of online museum collection catalogues

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Key Findings

The catalogues are attracting a large and diverse user base.

Visitor traffic to the digital catalogues is highly variable depending on each catalogue's structure and integration with its parent website, but adds up to thousands of visitors per year at a minimum. Roughly half of the users are the target audience of researchers and scholars, but the catalogues are also utilized by artists, art enthusiasts, teachers, museum volunteers, and casual browsers.

See: How much traffic are the catalogues receiving? and Who is using the catalogues?

Target audiences are familiar with digital catalogues, and previous concerns about the value or permanence of online resources are fading.

Our email survey of target audiences shows that 90% have browsed a digital catalogue in the past and 82% have used one in their work or studies. Study participants also expressed comfort citing digital catalogues in their work. Although they still have some concerns about the permanence of digital resources, this would not deter most from utilizing the catalogues.

See: Are users accustomed to using digital scholarly resources like these catalogues? and Do users have confidence in the catalogues' scholarship?

Interest in specific artworks and high-quality images are strong drivers of catalogue traffic.

40% of current users surveyed via a pop-up survey said they came to the catalogue to research a particular object, and focus group participants of target audience members indicated similar motivations. Participants were also very concerned with finding high-resolution images of artworks and valued image-viewing tools above many of the other catalogue features.

See: Why do users visit the catalogues? and What kinds of content and information are most useful to users?

Ensuring the catalogues are findable through academic search engines is critical for driving target audience traffic to the catalogues.

Currently, referrals account for only a small percentage of traffic to the catalogues, and participants expressed concern that these types of resources do not appear in their typical searches. Academic search engines provide guidance to publishers that could help museums increase the visibility of their catalogues.

See: How are users finding the catalogues? and How can the catalogues be marketed more effectively?

Users value the scholarship of the catalogues, with only a few reservations.

Participants indicated high levels of trust in the museums producing these catalogues and particularly valued the inside information these institutions can provide on object provenance, conservation, and other technical information. Some users suspect that scholarly interpretive essays contained within the catalogues may contain museum biases, but these suspicions could be reduced by calling attention to the peer-review process where applicable and to clearly indicated authorship.

See: Do users have confidence in the catalogues' scholarship?

Digital tools can greatly enhance the user experience, provided they are easy to locate.

Participants praised tools that expand the content available to them (e.g., access to archival documents or infrared images), organize information in new ways (interactive maps, side-by-side image comparisons), and provide citation guidance. Many participants, however, did not find these tools in a quick exploration of the catalogues, so catalogues must be carefully designed to call attention to these features.

See: Which special digital features are most appreciated by catalogue users?

Users want all the information, but not all at once.

Participants like that the digital interface allows museums to share vast quantities of information, but careful organization is required to prevent content overload. Users want to be able to drill down into content that interests them while easily skimming past material that is less relevant.

See: Do users understand how to navigate the catalogues and find content of interest? and What kinds of content and information are most useful to users?

Navigation sign posts are key to the user experience.

Many users do not enter the catalogues through their homepages, and the structures of digital catalogues are complex. Users need clear signals to help them navigate. Links between the catalogues and their parent museum websites are valued but also require indicators to tell users when they are in the catalogue and when they have left.

See: Do users understand how to navigate the catalogues and find content of interest?

PDFs and downloadable images are critical to users.

While study participants were comfortable navigating the catalogues online, they also expressed a strong desire to access PDF versions of catalogue content as well as downloadable images. These features allow users to take notes offline and save images for presentations or research—tasks that are ubiquitous in the work of the target audience.

See: Which special digital features are most appreciated by catalogue users?

Digital catalogues are valued for their ability to incorporate new information as research advances and for their potential to reach wider audiences.

Participants liked that the catalogues could be updated as new scholarship is generated, and expressed the hope that museums would keep information current. Users also deeply appreciate that the catalogues are being offered as open access publications, putting information in the hands of wider audiences in the U.S. and abroad.

See: What special value do digital catalogues hold for users?

Users would like to see museums stretch the possibilities of digital publishing.

Participants were excited by what the catalogues have accomplished while also envisioning ambitious new directions in terms of catalogue interactivity and connectivity. They requested tools that would allow researchers to add and curate their own information and engage in scholarly dialogue with one another. Users would also like to see museums engage with each other in an online environment by linking their resources and building tools or publications that cross institutional boundaries.

See: What other possibilities could digital platforms explore to serve users?

The Museums and Catalogues

Art Institute of Chicago

The Art Institute of Chicago (AIC) debuted its first digital catalogue, *Monet Paintings and Sculpture at the Art Institute of Chicago*, in 2014 and has published fourteen to date. The AIC was a participant in the early Getty-funded Online Scholarly Catalogue Initiative (OSCI) and has developed all of its catalogues on the Drupal-based OSCI toolkit platform. The catalogues selected for this study are all peer-reviewed, entry-based publications featuring curatorial and conservation texts on works in the museum's collection. The OSCI toolkit platform has enabled the use of zoomable images, 360-degree spins, layered and annotated images, videos, and RTI interactive images in these catalogues. The publications have been viewed by more than 125,000 users since their inception, according to the Google Analytics. The AIC intends to continue publishing collection catalogues digitally, but may need to find a new platform with which to do so in the near future, so the results of this study will inform that next step.

<https://www.artic.edu/digital-publications>

Included in this study:

- ◆ *Matisse Paintings, Works on Paper, Sculpture, and Textiles at the Art Institute of Chicago*
- ◆ *Monet Paintings and Drawings at the Art Institute of Chicago*



J. Paul Getty Museum

The Getty has published five digital catalogues since 2016, with four more slated for production in the coming years. They use a multiformat publishing tool called Quire that they are currently developing to use internally and hope to also release as open source software. Some of the central lessons from OSCI were around the need for discoverability and longevity of online publications. Quire is meant to address those challenges head on. It is centered around a static site generator called Hugo and outputs a website, ebook, and pdf versions of the publication from a common set of plain-text source files. The

multiple formats allow for both a greater distribution and a hedge against loss. Additionally, the website is such that it requires no special server setup to host, and no ongoing maintenance or updating to keep running. Of the Quire books the Getty has published so far or has forthcoming, many are collection catalogues, though Quire also supports the publication of collected volumes, scholarly monographs and other types of publications.

<http://www.getty.edu/publications/digital/>

Included in this study:

- ◆ *Roman Mosaics in the J. Paul Getty Museum*



National Gallery of Art

The National Gallery of Art launched its Online Editions (OE) platform in 2014 as part of OSCi. To date, six OE collection catalogues have been published in full or incremental releases. OE catalogues exclusively address permanent collection objects and are integrated in the NGA's main online collection pages. As is the case for all collection object pages, certain data fields are populated dynamically from TMS through an API. Static content specific to the OE, including the object entry essays and technical summaries, is housed in Adobe Experience Manager (AEM), the Gallery's web CMS. Search capabilities parallel the broader collection search tools available on the NGA's website, and new functionality developed for the collection pages is automatically integrated into existing OE catalogues. The first five OE catalogues focused on paintings; the 2019 launch of the Alfred Stieglitz Key Set expanded the OEs to the NGA's photography collection and required extensive customization of the platform to accommodate the different demands of the corpus.

<https://www.nga.gov/research/online-editions.html>

Included in this study:

- ◆ *Dutch Paintings of the Seventeenth Century*



Philadelphia Museum of Art

The PMA released its first online catalogue, *The John G. Johnson Collection: A History and Selected Works*, in 2018. It was informed by benchmarking of previous OSCi projects as well as user surveys of the target audience, and by formative evaluation (user testing) during its development. It is integrated into the museum's website, drawing some data via an API from The Museum System (TMS) collections database. It also integrates digitized archival materials from the museum's Library and Archives. It published just one small portion of a larger collection, and the intention is to continue to add content to the publication over time; it is also intended to be a model for scholarly digital publications on other parts of the museum's collections.

<https://philamuseum.org/publications/>

Included in this study:

- ◆ *The John G. Johnson Collection: A History and Selected Works*

Background Literature

Prior to developing new methods for this study, REA researchers reviewed the existing literature on digital catalogues, including usability studies, formative and summative evaluations of catalogues, reviews of the catalogues, and the final report produced by the Getty's Online Scholarly Catalogue Initiative (OSCI).¹ This literature review provided important context for embarking on a new evaluation of digital catalogues.

The OSCI final report provides a valuable overview of the challenges and lessons learned by the J. Paul Getty Museum plus nine other museums funded by the Getty Foundation to create some of the first digital catalogues. The report summarizes key insights about the catalogue creation process and provides an overview of three technology approaches for organizing and publishing catalogue content. A similar production-side perspective on the NGA's *Dutch Paintings* catalogue is presented in Henel's 2017 article for *Visual Arts Research*² and in evaluations and design reports generated by consulting firm Design for Context to aid the development of the PMA's Johnson catalogue.^{3,4} Understanding how digital catalogues are produced and some of the technological workings behind the scenes is helpful for interpreting the end product that users interact with.

Digital catalogue production is a highly iterative process that brings together multiple museum departments in ongoing conversations. Content, design, and technology all must be considered together. To achieve this, museum staff of different specialties collaborate more closely than they might in the production of a print catalogue. The technological platform chosen influences the look and functionality of the final catalogue, as well as the ways it interacts with the parent website. In terms of cost, the upfront investment for a museum's first digital catalogue may be considerable, but once the technology interface, staff responsibilities, and work flow are established, subsequent catalogues can be produced for significantly less. While most catalogue users are unaware of all the moving pieces behind the scenes, reviewing this information helped the evaluation team understand the various influences on the final design and content. The NGA's catalogues, for example, utilize museum collection pages from the larger parent website as art entries pages in the catalogue, with significant effects on catalogue traffic. (See Appendix A: Further Analyses — The Unique Structure of the NGA's Online Editions for more information on this catalogue structure and its implications.) Having this type of background knowledge on the catalogues was also helpful for considering

study participants' suggestions for catalogue features and the constraints that might act on these.

The OSCi final report and other catalogue literature also provide important information on catalogue users, the area that this report seeks to expand. Reviewing these resources allows us to look at how the catalogues have been received in the past and whether opinions are changing with time. Many findings from past studies have remained consistent, such as the way users assess the scholarly value of digital catalogues. The name of the museum continues to convey some level of trust, but users also look for established conventions such as peer review and proper citation format. Users also want to see authors' names and access footnotes easily. The content and features that users seek in digital catalogues have also shown consistency from past studies until now. Interest in the catalogues is driven largely by interest in specific artworks, and use focuses heavily on the images provided. Large percentages of visitors are also using the catalogues for teaching material. Participants care greatly about being able to download content for offline use, but at the same time expect much more than a digitized version of a print catalogue. They want digital publications to use technology tools to transform the user experience in dynamic ways. Finally, the challenges for marketing the catalogues effectively have also persisted. Search engine optimization (SEO) and listing in academic databases are key to increasing the visibility of digital catalogues and helping them to take their place among other scholarly resources.

Other user opinions, however, appear to have changed with time. An evaluation of digital catalogues by SFMOMA and the Walker Art Center in 2016⁵ and a 2017 review⁶ of the NGA's *Italian Paintings of the Thirteenth and Fourteenth Centuries* both focus on users' concerns regarding digital catalogue permanence and hesitations users have in citing online materials. Our study found, however, that users have little hesitation about citing digital works and accept that digital resources will change over time (see Do users have confidence in the catalogues' scholarship?). They are still interested in permanence but have found solace in the fact that some museums offer archived versions of the catalogues and permanent links to content.

User ideas about catalogue design are also likely to continue changing as aesthetics and conventions change. The book like design of the AIC catalogues once appealed to scholars who wanted reassurance that digital catalogue content was of the same caliber as printed catalogue content. We found that few users still prefer this format. In another example, minimalist web design has become increasingly popular in recent years, but not all users are in tune with its methods, which sometimes hide or reduce navigation elements to ensure a cleaner screen. (Read more about book-like navigation and user's perception of navigation tools in Do users understand how to navigate the catalogues and find content of interest?)

Finally, some bigger-picture questions raised in catalogue reviews were used to spark dialogue in our focus group discussions.^{7,8} What collections and objects should be singled out for inclusion in digital catalogues? What kinds of scholarly content do readers expect and want from digital catalogues? What are the implications of a catalogue that can be updated as ideas and information change? For participants' reflections on some of these topics, see the various sections in the Scholarly Content section of this report.

NOTES

1. “Museum Catalogues in the Digital Age: A Final Report on the Getty Foundation’s Online Scholarly Catalogue Initiative,” *The Getty* website, The Getty Foundation, published 2017, accessed on October 1, 2019, <https://www.getty.edu/publications/osci-report>.
2. Jennifer Henel, “New Approaches to Old Art: The Launch of NGA Online Editions’ *Dutch Paintings of the Seventeenth Century*,” *Visual Arts Research* 43, no. 1 (2017): 8-16.
3. Design for Context, “John G. Johnson Exhibition, Scholarly Site Requirements & Design Analysis,” user study and design report produced for the Philadelphia Museum of Art, March 2, 2017.
4. Duane Degler and Michael Owens, “PMA Johnson Usability Study: Observations and Findings,” evaluation report produced for the Philadelphia Museum of Art, December 21, 2017.
5. Laura Mann, “Online Scholarly Catalogues: Insights from OSCi,” (presentation at Museums and the Web Conference, Los Angeles, California, April 6-9, 2016).
6. Jodi Cranston (2017), review of *Italian Paintings of the Thirteenth and Fourteenth Centuries*, by Miklos Boskovits and Jason di Resta, *The Art Bulletin* 99 no. 2, 186-189, DOI: 10.1080/00043079.2017.1304640
7. Jill O'Neill, “Have You Looked At This: NGA Online Editions,” *The Scholarly Kitchen*, published October 27, 2014, accessed May 29, 2019, <https://scholarlykitchen.sspnet.org/2014/10/27/have-you-looked-at-this-nga-online-editions>.
8. Anne Collins Goodyear, “The Getty Online Scholarly Catalogue Initiative (OSCI),” *CAA Reviews*, College Art Association, accessed June 21, 2019, CrossRef DOI: 10.3202/caa.reviews.2016.133.

Research Methods

Research Methods

Method	Instruments	Purpose
Review of Past Evaluations and Related Literature		The evaluation team reviewed past evaluation reports on digital catalogues produced by these institutions and others. This review was used to refine research questions and methods for the study and to place our study in the context of what is already known about digital museum catalogues. (See Background Literature.)
Interviews with Catalogue Developers and Contributors	Staff Interview Protocol (PDF)	Group interviews with staff from each of the four museums provided additional context for the study and helped to further hone our research questions and methods.
Web Analytics	Analytics Data (Google Sheet)	Web analytics provided answers to simple questions about website traffic and usage patterns and suggested avenues for further exploration through surveys and qualitative data collection.
Pop-up Survey for Existing Users	Pop-Up Survey (PDF)	A brief survey embedded on three of the four museums' websites captured basic information on current users, including occupation, the purpose of their visit, and their success/failure in finding what they are seeking.
Email Survey for Potential Users	Email Survey (PDF)	A lengthier survey was distributed to potential users in order to gather more in-depth information on the catalogue content, design, and utility for different audiences. This survey asked about participants' occupation and familiarity with digital catalogues, then randomly assigned participants one of the four catalogues to explore.

Method	Instruments	Purpose
Catalogue Homework and Focus Group Debriefing	Focus Group Homework (PDF) Focus Group Discussion Questions (PDF)	Twenty-five individuals were recruited to take part in an extended qualitative review of the catalogues, completing a series of homework tasks and then participating in an online focus group to debrief about their experience. These participants were able to make comparisons of the design, tools, and content of the various catalogues. They also engaged in a deeper discussion about the purpose of the catalogues and the possibilities that this form of publishing holds.

For more, see Appendix B: Methods in Depth.

Marketing and Demographics

**How much traffic
are the catalogues
receiving?**

13

**Who is using the
catalogues?**

15

**Why do users visit
the catalogues?**

19

**How are users
finding the
catalogues?**

22

**How can the
catalogues be
marketed more
effectively?**

24

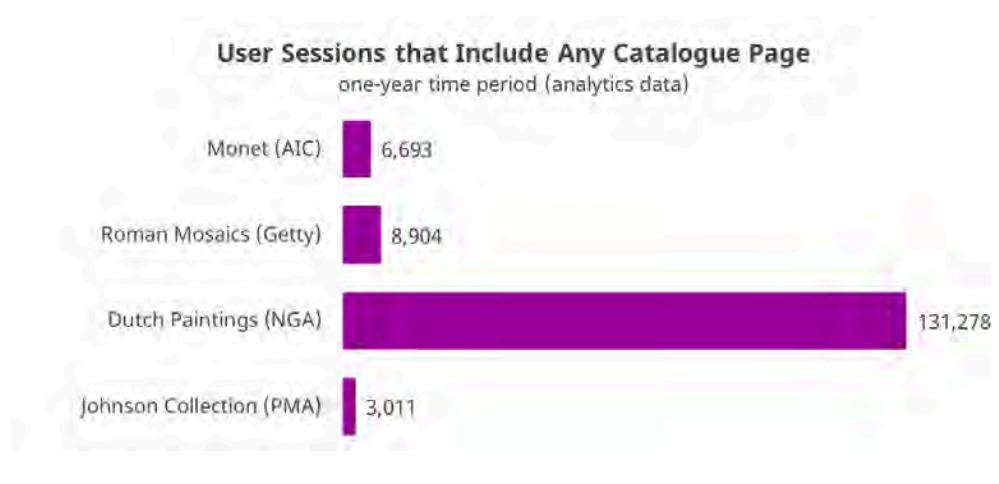
**Are users
accustomed to
using digital
scholarly resources
like these
catalogues?**

27

How much traffic are the catalogues receiving?

Web analytics provide a starting point for understanding traffic to the digital catalogues hosted by these museums. Each museum chose one catalogue to focus on for the analytics review, and analytic metrics for these four catalogues were compiled and compared, looking at overall traffic during a one-year period. (For more on the analytics study, see Methods in Depth — Analytics Review.)

Within the same one-year time frame, the four catalogues experienced widely different levels of activity when looking at the total number of recorded sessions. The NGA's *Dutch Paintings* catalogue logged over 130,000 sessions, compared to roughly 3,000 for the PMA's catalogue on the Johnson collection.



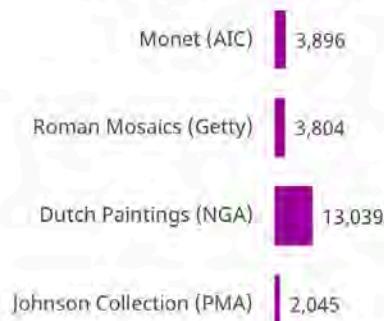
Although this discrepancy may suggest that the NGA catalogue was exponentially more popular than the others, the data should be interpreted with caution. The structure of the individual catalogues and their relationship to their respective museums' websites has a large potential impact on the analytics collected. Artwork entries in the NGA's digital catalogues are actually pages within the museum's online collection pages, so any traffic

generated by these collections pages is also tracked as catalogue traffic. Artwork entries for the other catalogues, in contrast, stand independent of their museums' online collections pages. (For more information, see Appendix A: Further Analyses — The Unique Structure of the NGA's Online Editions)

To get a better sense of traffic by users who might be aware they are viewing a digital catalogue (as opposed to users who might touch briefly on a single artwork entry while browsing the larger museum website), we also looked at user sessions that included a visit to the catalogues' homepages. Here the analytics data shows greater consistency across catalogues, although the NGA's session count still exceeds the others.

User Sessions that Include Catalogue Homepage

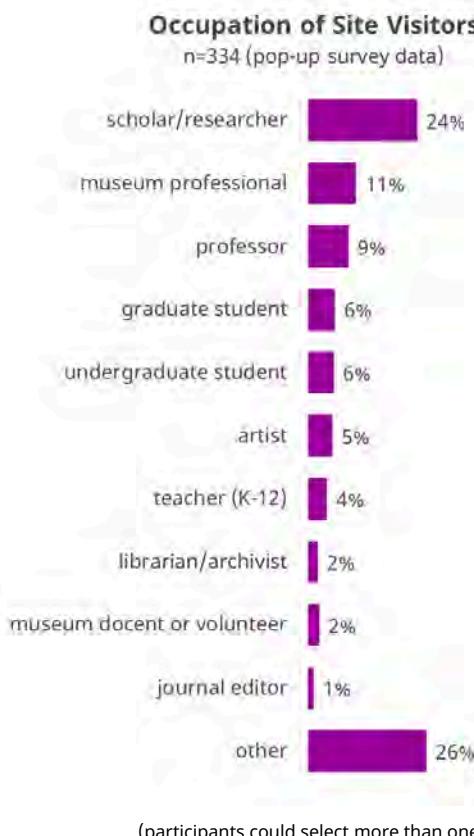
one-year time period (analytics data)



Sessions that include a visit to the catalogue's homepage also show deeper levels of engagement by users, as measured by the duration of their visit and the number of pages viewed (see What is the depth and breadth of a typical use session?). Focusing on sessions that hit upon the catalogues' homepages may therefore be one way to filter out some of the analytics "noise" and narrow in on a target audience with a deeper interest in the catalogues' content.

Who is using the catalogues?

Data from the pop-up survey and web analytics suggest the catalogues are reaching a wide audience, and not just the target audience for whom they were designed. The intended audience for the catalogues includes scholars, curators, professors, and others with a professional interest in art history. While this audience accounts for some of the online traffic to these catalogues, a surprising number of survey respondents did not fit within these categories.



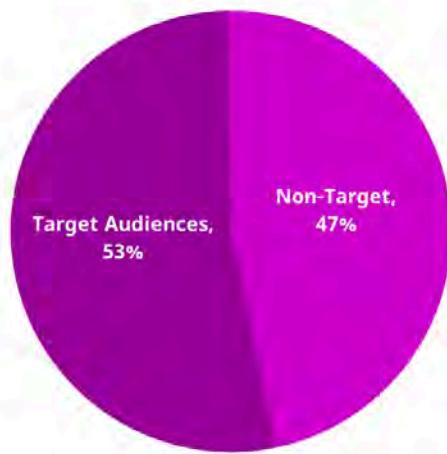
In fact, after recoding occupation data into target/non-target groups, only about half of the survey respondents selected or wrote in a profession that aligns with the target audience for the catalogues. The remaining half included teachers at the K-12 level, artists, and many who simply identified as an art enthusiast in their write-in responses. Target audiences seem to be visiting the AIC catalogues in higher percentages than the NGA catalogues. The integration of NGA's catalogues with the larger museum website may be one reason for the more diverse user base.

Digital Catalogue Target Audiences

(as defined for this study)

- ◆ Scholars/researchers
- ◆ Museum professionals and volunteers
- ◆ Professors
- ◆ Graduate and undergraduate students
- ◆ Librarians/archivists
- ◆ Journal editors

Target Audiences Versus Non-Target Among Catalogue Visitors
(pop-up survey data)

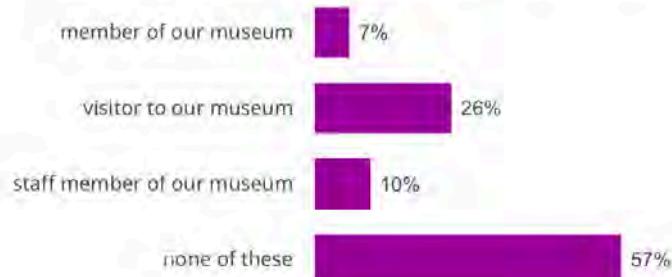


The pop-up survey also allowed visitors to identify as a visitor to the museum whose catalogue they were viewing, a member of that museum, or a staff member. Ten percent of the catalogue's users identified as staff, which may be lower than actual percentages if staff tend to ignore the pop-up survey (a scenario that seems likely). The catalogues therefore seem to have important value internally to the museums as well as externally.

A third of the pop-up survey participants identified as visitors to that institution or members. The remaining 57% did not have any specific affiliation with the museum. The catalogues therefore seem to be used by a wide variety of visitors, including those who might have in-person experience with the collections and those who might only encounter them online. (See also Appendix A: Further Analyses — User's Relationships to the Museum by Institution.)

Catalogue Visitors' Relationships to the Museum

n=334 (pop-up survey data)

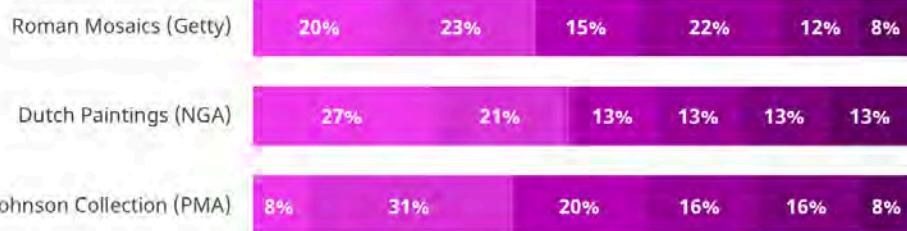


Data from the web analytics review suggests the ages of users is also varied. A common concern for digital publications is that older generations will eschew them in favor of traditional print resources. Millennials, roughly defined as those age 34 and under, do account for a large percentage of visitors to the catalogues, but not so great a portion that older generations are not well-represented.

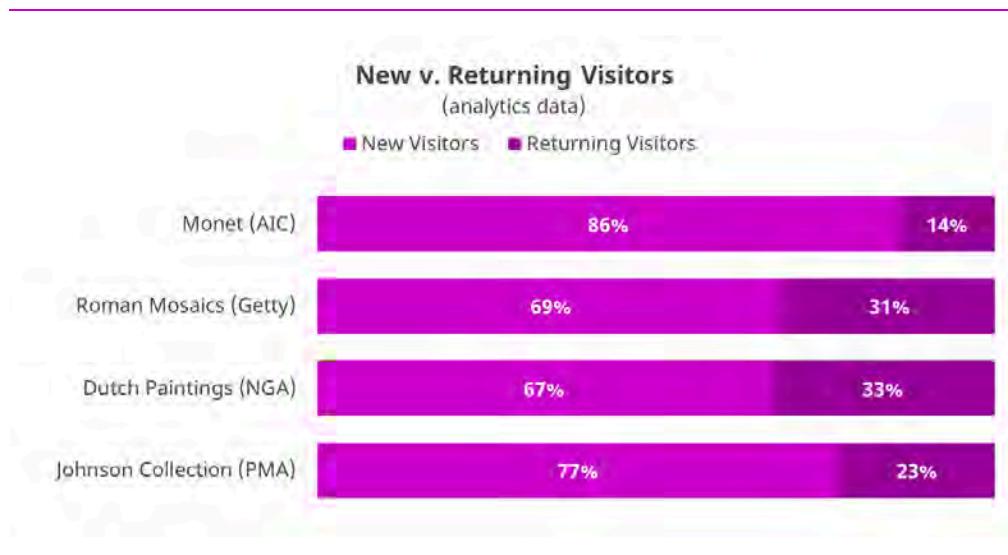
Age of Visitors

(analytics data)

■ 18-24 ■ 25-34 ■ 35-44 ■ 45-54 ■ 55-64 ■ 65+



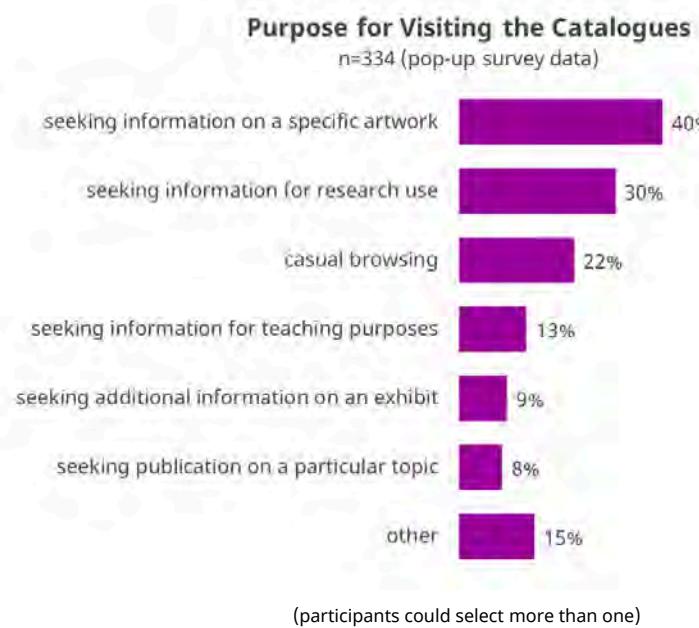
Finally, catalogue users are more likely to be new visitors than returning visitors. The NGA's *Dutch Paintings* catalogue receives the highest percentage of returning visitors, at 33%, and the Getty's *Roman Mosaics* catalogue follows closely behind.



Return visitation is a difficult metric to interpret, because it can encompass a wide range of behaviors. Returning users might be interpreted as visitors with a sustained interest in the catalogue—for example, a scholar referring back to it repeatedly over the course of a research project or a professor who frequently uses a catalogue to source images for lectures. It's not possible to tell, however, whether a user is returning for the second time or the hundredth time. While museums might like to see people returning frequently to their catalogues, new visitors are also desirable and indicate that the catalogues are reaching new audiences.

Why do users visit the catalogues?

A key question for the team was whether users come to the catalogues because they are interested in the overall topic of the catalogue (e.g., Matisse, seventeenth-century Dutch painting) or if they are more likely to end up in the catalogues in their search for information on specific artworks. The pop-up survey shows that the latter is the stronger driving force, accounting for 40% of participants. Only 8% of participants said their visit was driven by a topic interest.



Additionally, a handful of participants said they were looking for high-quality images, even if not searching for a specific piece. This finding corresponds with our focus group discussions, where most participants talked about their interest in specific pieces being the primary reason they might turn to a digital catalogue:¹

I really go with a pinpointed reason why I'm looking up an entry on an artwork—when I want to really look for a comparative image that I'm working on. I want to have that possibility to zoom in and really look closely to make comparisons with the images. So I think I use it in a very kind of flexible, fluid kind of research. And I know it's immediate, it's accessible, it's right there. And that's one of the things that I love about using them.

That being said, one focus group participant commented that she usually turns to museum catalogues to investigate a specific artwork, which might then lead her to viewing other content in the publication:

So when I go to print catalogues, I'm looking for what's been written most recently about a certain work of art. And also their bibliography that goes along with it so I can get the most up-to-date info that I can. I can imagine using digital catalogues much in the same way. And then letting the individual images that I'm looking for kind of lead me to the rest of the content.

Pop-up survey participants also wrote in additional reasons for visiting the catalogues, such as planning a visit to the museum, following up after a visit to the museum, and interest in digital catalogues as a resource (including several individuals who arrived at the catalogues via links from the final report of the Online Scholarly Catalogue Initiative (OSCI)).

Thirteen percent of the pop-up survey participants said they came to the catalogues seeking information for teaching purposes, and this aligned with focus group discussions as well. When asked how they could picture using the catalogues for their work, focus group participants repeatedly talked about teaching with the catalogues, and in a variety of ways:

I would use these as, as a teaching resource for sure... I felt that the scholarly content from some of them was really great and would be really appropriate for Masters- and PhD-level students.

I've also coincidentally assigned an Art Institute catalogue for reading for students, both for their own class work, but also kind of as a model of what a good resource is.

...I think a lot as somebody who teaches. Part of it is just grabbing images. Do you have big images I can grab immediately for a PowerPoint?

The writers of the catalogue... make an argument in the way that a scholar makes an argument. And so for getting students into making arguments to understanding how art historians work, those two catalogues [NGA and PMA] were on par with art history scholarship.

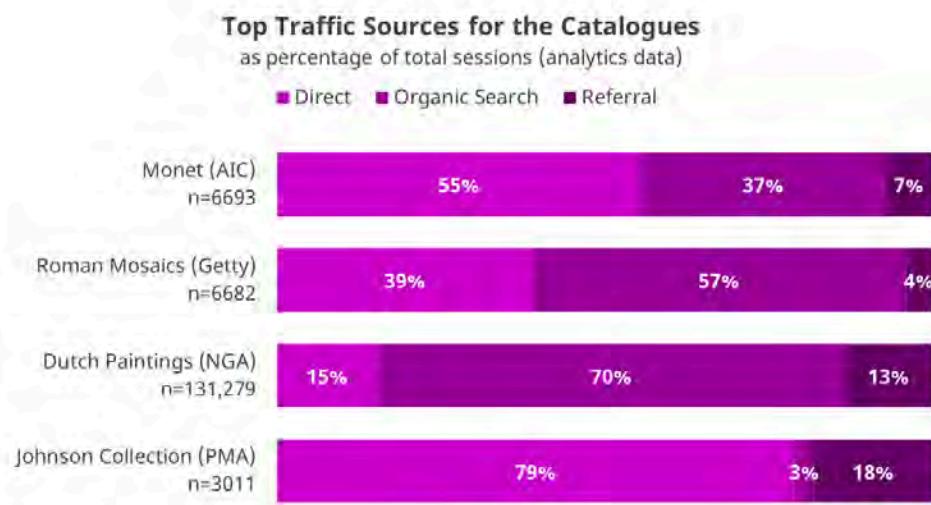
The catalogues therefore hold special value for teachers and professors by providing high-quality images for presentations, readings that can be assigned to students, and examples of how to build scholarly arguments about artworks. One professor also said she likes to have her students critique digital humanities materials, and the catalogues could be used for this purpose as well.

NOTES

1. For more on this, see Scholarly Content — What kinds of content and information are most useful to users? .

How are users finding the catalogues?

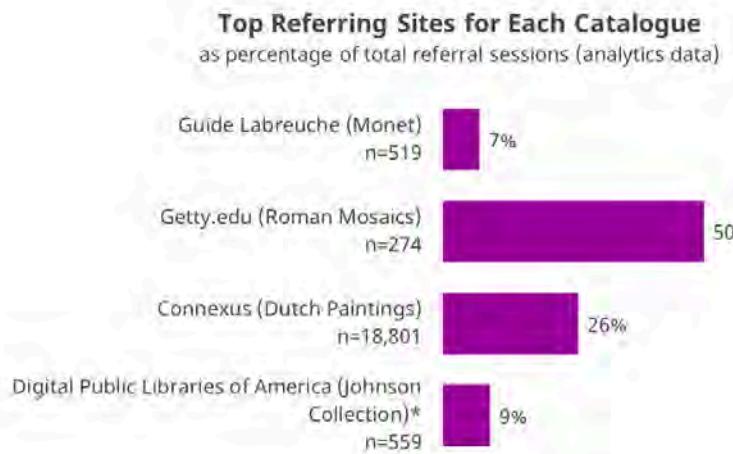
Analytics data collected across four catalogues (one from each institution) shows that the vast majority of visitors found the source through an organic search or direct access. The balance of these two sources, however, varied greatly by institution. The high percentage of direct traffic to the PMA catalogue may be due to internal staff dominating use of the catalogue in the early months after its launch, but IP address filters would have to be added to determine if this is in fact the case.



Google Analytics tags a traffic source as “direct” when the user’s browser doesn’t record any referral information on the session. This could mean the user typed the catalogue url directly into their browser or used a bookmark to access the site. In this case, the user visiting the catalogue is already aware of its existence. However, untagged links from emails, documents (such as PDFs), and mobile apps are also categorized as direct traffic by Google Analytics, which can make this category difficult to interpret. Ensuring that email marketing campaigns use UTM codes to tag links is one way to remove some of the confusion from direct traffic.

Google Analytics tags a traffic source as “organic search” when a user arrived after using a search engine such as Google or Bing. These users may be arriving at the digital catalogues after conducting a search for an artwork or other topic of interest.

Referrals (links to the catalogue posted elsewhere online) made up a smaller percentage of site traffic for the catalogues and is one indicator of the “buzz” about the catalogues on the internet or the success of various marketing efforts. Links to the catalogues from library databases also show up as referrals, although this is not a strong driver of traffic at the moment (see How can the catalogues be marketed more effectively?). Those who accessed the catalogues by referrals were directed from a diverse range of sources. For the *Dutch Paintings* catalogue, the greatest referral source was connexus.com, an education management system. The *Johnson* catalogue’s biggest referrer is Digital Public Library of America, a database of digital resources available on the web. Referral visitors to the *Monet* catalogue came most often from Guide Labreuche, followed closely by Google Arts & Culture. The *Roman Mosaics* catalogue’s largest referrer is the Getty’s own website.



Knowing which sites are posting links to the catalogues can help these four institutions as well as others generate ideas of where to promote the catalogues. (A list of the top 10 referrers for the catalogues can be found in Appendix A: Further Analyses — Top Referrers.) Internal promotion can also help drive traffic, as the Getty’s data shows and as one focus group participant mentioned as well.

How can the catalogues be marketed more effectively?

A general concern among study participants was that digital catalogues are not easy to find using their typical research habits:

I find that these catalogues often don't come up in Google searches. And so if you don't know it exists, you're not going to find it and you're not going to know it's there as a resource.

I think if it's not something you can get to through a library database or another... journal database or something like that, it's probably not going to like enter my regular scholarly resources.

When asked how they typically conduct their research, focus group participants frequently mentioned Google Scholar and the library databases of their home institutions. One focus group participant who is a librarian for an art institution said that from her perspective, these digital catalogues were *easier* to locate than their print equivalents:

I see the digital content and the format scheme very promising for discovery... We have a Primo discovery layer that can find these kinds of publications and with more granularity than it would be with any sort of printed catalogue. And I think also just for reference in general and provenance research and so on, this material is just from my point of view, much more easy to discover and use.

If users discover the catalogues via links from academic search engines or library databases, we would expect these to show up as referral traffic in Google Analytics. At the moment, however, the catalogues are not widely listed and show little traffic from sites such as Google Scholar and JSTOR. These sites provided guidance to publishers who would like their articles indexed, and adhering to their guidelines is one way museums could increase the visibility of their digital publications.^{1,2}

Catalogue	Listing status — # of referred sessions			
	Google Scholar	WorldCat	CrossRef	JSTOR
Monet (AIC)	✓ — 5 referred	✓ — 0 referred sessions	X	✓ — 0 referred sessions
Roman Mosaics (Getty)	X	✓ — 0 referred sessions	X	X
Dutch Paintings (NGA)	X	✓ — 0 referred sessions	X	X
Johnson Collection (PMA)	X	✓ — 13 referred sessions	✓ — 0 referred sessions	X

X no listing, but catalogue may be referenced tangentially (e.g., via a specific artwork or citation by another source)

✓ listed with link to catalogue

One librarian focus group participant mentioned Primo as a tool that might give her patrons access to the catalogues. Primo is a discovery service for libraries that provides patrons access to a wide range of resources. It is particularly suited to discovering digital content and allowing users to drill down to specific information of interest. In order to meet their target audiences where they are conducting research, museums producing digital catalogues should look into academic search engine optimization (ASEO) to increase the findability of their online publications in these databases.

Another focus group participant expressed a wish for a “central clearinghouse” specifically focused on online catalogues and other digital humanities projects. Other participants echoed this sentiment. One noted that he was unlikely to search through a museum website to find this kind of publication, so having it listed in a clearinghouse was preferable. Another participant agreed:

I will say even when I specifically know that there is a catalogue I am looking for, it usually takes me about 15-30 minutes to get through the museums website to even find something that I know exists somewhere.

Marketing through organizations that serve the catalogues’ target audience is another option for promoting the catalogues. A conservator who participated in the study listed the Bibliographic Database of the Conservation Information Network (BCIN) and the library of the International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM) as two key sites for locating relevant publications.

Self-promotion is another important tactic. One individual who works in digital content for a major art museum said one of their tactics is to constantly share snippets of their catalogues via social media. Doing so can prevent catalogues from being forgotten after the initial marketing buzz has died down:

At [our museum] we have some online digital publications as well. And one of the things we do is constantly share that content. Like we dig up deep stuff from within it and share it on social media because we know that there was an initial push when we launched, and we sent out a press release and there were articles. But then people forget about it and you have to continually remind people.

Museums might even consider generating their own lists or repositories to help cross promote their digital publications. The Getty's own Abstracts of International Conservation Literature (AATA) was listed by one focus group participant as a go-to location for conducting his conservation research.

Another possibility for reaching wider audiences is promoting the catalogues through sites that reach beyond academics and researchers. One focus group participant with an eye on digital humanities commented:

I personally only ever find these catalogues when they get listed on sites like Colossal or Hyperallergic or some of the others like Open Culture - websites that do a really good job of letting the general public know that these digitized collections have suddenly been released.

Colossal and Hyperallergic are online arts and culture magazines. Open Culture is a repository for free educational media, including ebooks. Each of these could be a place to promote the digital catalogues, placing them in front of the eyes of those who are closely following digital humanities but also those with a general interest in what's new in arts and culture.

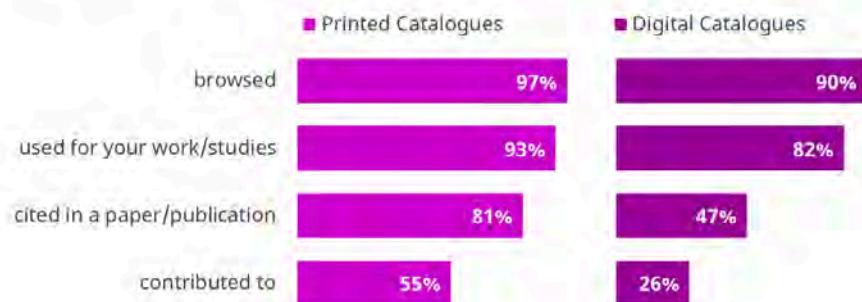
NOTES

1. “Publisher Support.” Google Scholar Support for Publishers. Google. Accessed October 3, 2019. <https://scholar.google.com/intl/en-US/scholar/publishers.html>.
2. JSTOR for Publishers. JSTOR. Accessed October 3, 2019. <https://about.jstor.org/publishers/>.

Are users accustomed to using digital scholarly resources like these catalogues?

Digital catalogues have become a familiar resource to the target audience reached by our email survey. Over 90% of participants said they had browsed one in the past and more than a quarter of the respondents said they had contributed to one. Print catalogues are more familiar to the target audience, but this gap may narrow in the coming years as digital catalogues become more common.

Target Audience Familiarity with Printed and Digital Catalogues
n=292-307 (email survey data)



Focus group participants also spoke at length about the many ways these catalogues could take advantage of their digital format and expressed high expectations for the catalogues' technological bells and whistles. Their comments suggest that not only are these audiences familiar with digital catalogues, they have begun to see certain advanced features as the new normal for their research. (For additional information see What special value do digital catalogues hold for users?)

Functionality and Design

What are users' first impressions of the catalogues?

29

Do users understand how to navigate the catalogues and find content of interest?

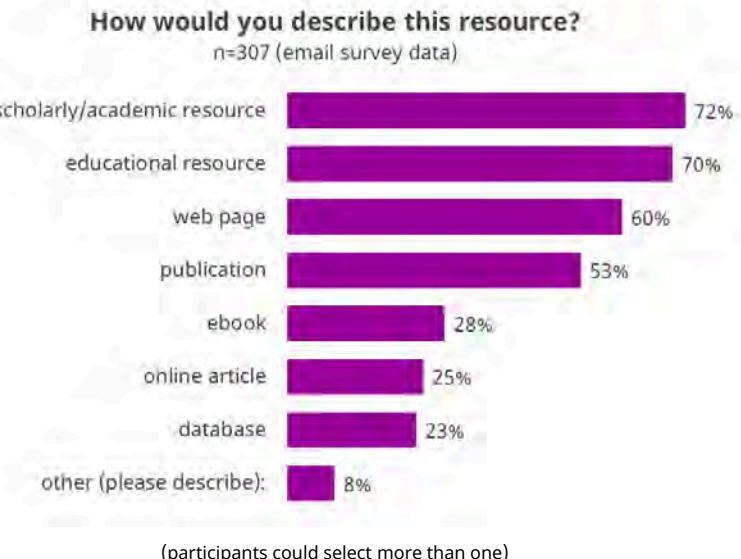
31

Which special digital features are most appreciated by catalogue users?

38

What are users' first impressions of the catalogues?

First impressions are important in a web environment, where users often scan a page briefly and make a decision about its usefulness in a manner of seconds. The four digital catalogues reviewed in the email survey have distinct designs, and one of the first questions for participants was if first glimpses of the catalogues' homepages clearly conveyed the type of resource they were viewing. A strong majority of participants described the catalogues as "scholarly/academic resources" and "educational resources."

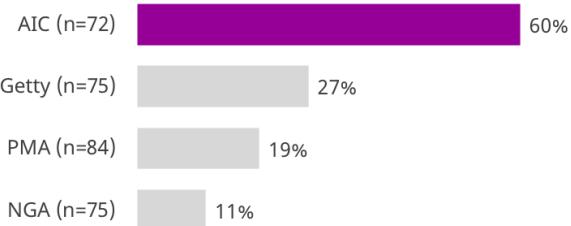


At first glance, participants were more likely to describe the catalogues as "web pages" than "publications" which may say something about the perceived formality of these resources.

The AIC's *Matisse* catalogue is intentionally designed to resemble a book, and participants were therefore more likely to describe it as an "ebook" in their survey responses. The NGA's catalogue, in contrast, was more likely than the others to be described as a "web page." Both of these findings align with focus group responses. Participants talked about the Matisse catalogue resembling a more static resource, similar to a book. Several also described the NGA homepage as "old school web" with its three-column layout and the large amount of information packed into the homepage.

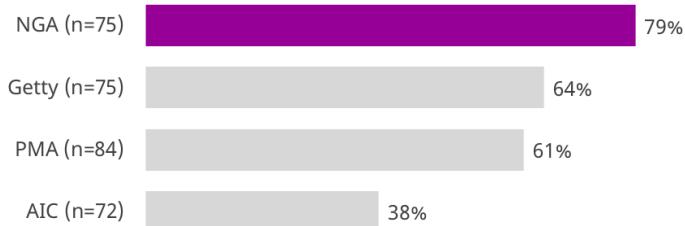
Participants who described catalogue as "ebook"

(email survey data)



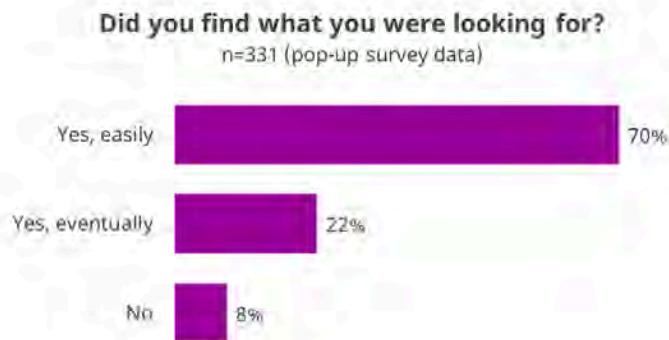
Participants who described catalogue as "web page"

(email survey data)



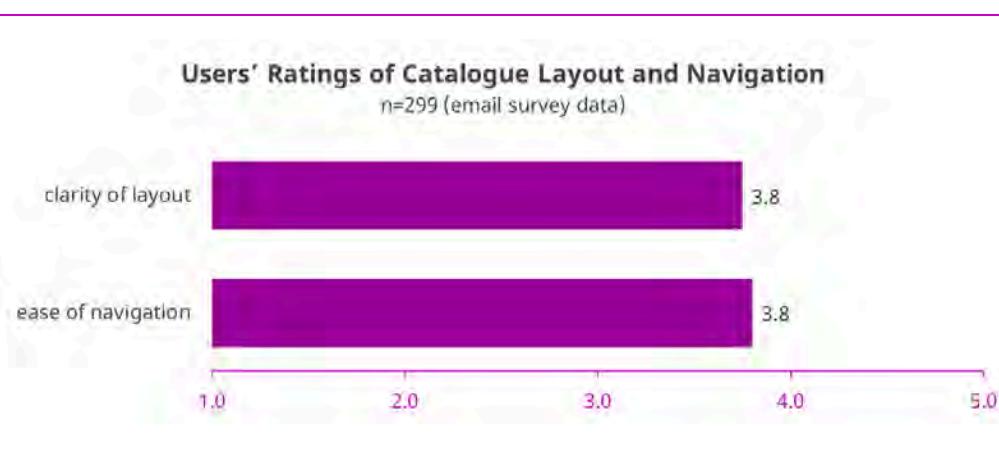
Do users understand how to navigate the catalogues and find content of interest?

Our study found that participants using these catalogues typically can find what they are looking for and with relative ease, but that there is also room for improvement. Seventy percent of pop-up survey respondents said they easily found what they needed in the catalogues, and another 22% found what they were seeking with more effort. Only 8% of respondents said they couldn't find what they needed.



Unfortunately, those individuals who failed in their search didn't often leave feedback on what they had been seeking, but the few who did (n=11) were generally looking for artworks they had seen in the past but did not know the title of.

The catalogues' layout and navigation also received fairly positive ratings at the end of the email survey, with no significant differences between the four catalogues.



The fact that all four catalogues received similar scores for clarity of layout and ease of navigation suggests that although individuals might have varying preferences, on the whole users can adapt to quite different formats. (For individual catalogue scores, see Appendix A: Further Analyses — Catalogue Layout and Navigation Scores.)

When asked to comment on the catalogues' structure and navigation, several themes emerged from the responses of our focus group participants:

Book-like navigation can feel constricting in a web environment

The AIC's Matisse catalogue gives users two options for navigation: 1) turning the catalogue page by page using arrow buttons, and 2) a Table of Contents sidebar that can be collapsed or expanded. Some participants relied on the arrows to turn the pages, which became cumbersome and didn't give the readers a sense of where they were at within the catalogue. The analytics data also shows evidence of this, in that pages earlier in the catalogue are receiving higher amounts of traffic. (See a list of top pages viewed under Appendix A: Further Analyses — Top Pages.) Even when readers were aware of the Table of Contents, they couldn't shake the feeling that the catalogue was imposing a linear direction on their reading:

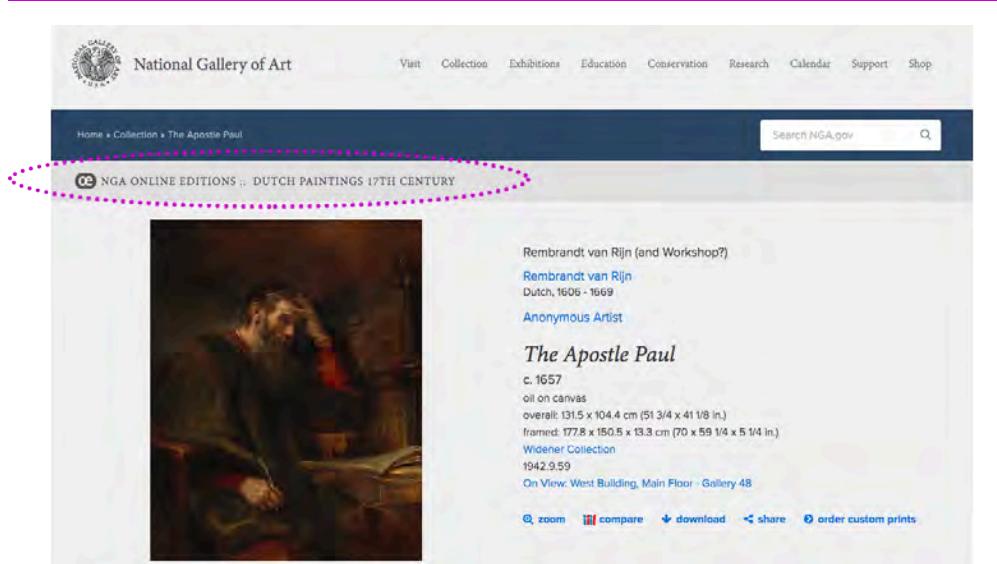
I felt like there was no opportunity for me to explore the publication as I wanted as a reader. Instead, I felt pushed into selecting the side arrows to move sequentially and progressively through the publication. For me, this feels contrary to what the digital format should be.

I think what struck me...as I was sort of doing the homework was how much I value the flexibility of how I want to move through these publications. And that with the Matisse one in particular, I felt right away, very constricted that I sort of had to move in the way that they directed me in this sequential progressive way.

This sentiment arose several times in the focus group discussions. Overall, participants expressed the desire to jump from place to place as their interest dictates and felt the layout of the Matisse catalogue hindered this.

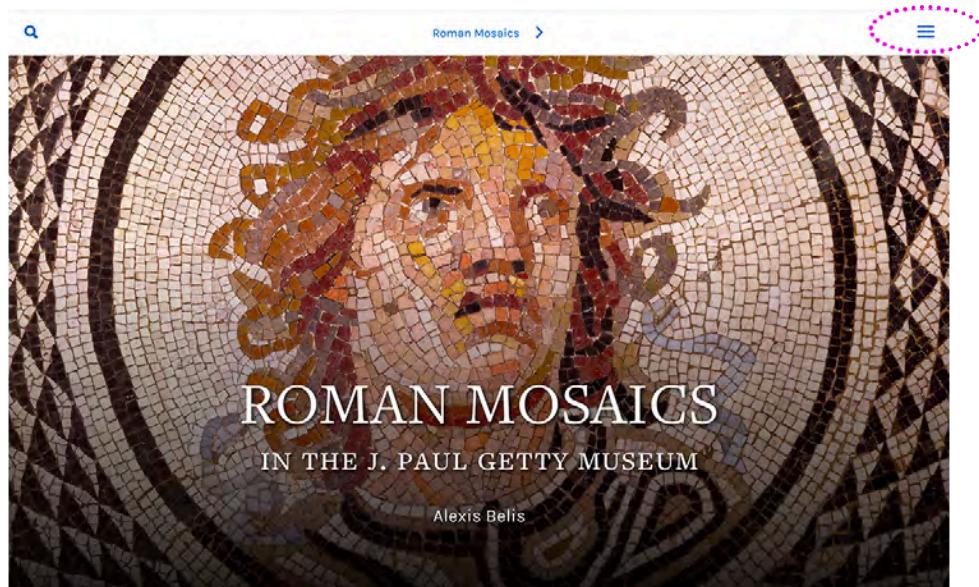
Keep navigation tools obvious and well-labeled

Focus group participants generally seemed to prefer that the catalogues use more labels, even if it means occasionally sacrificing clean design. Not everyone noticed the “breadcrumb” provided in the NGA catalogue for navigating back to the homepage. Those who found it appreciated it, and those who did not complained about having to use the back arrow on their browsers.



Navigational breadcrumb in NGA's *Dutch Paintings* catalogue

Likewise, the “hamburger menu” (three small horizontal lines) that lead users to the “Contents” page of the *Roman Mosaics* catalogue were too discreet for the taste of many users.



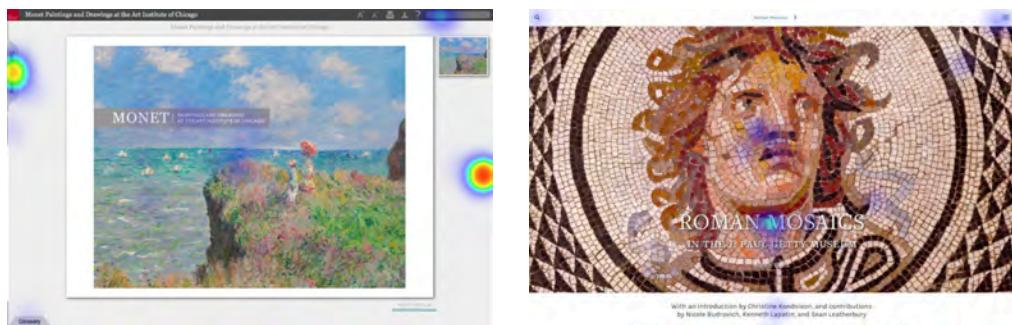
"Contents" button on *Roman Mosaics* homepage

Precise navigation is appreciated

When users want to navigate back to where they were previously in a publication, they want to be able to return to the precise spot on the page. This is an advantage of the NGA's *Dutch Paintings* catalogue as pointed out by one focus group participant. The back button on users' browsers returns them to the same spot on the page they had been viewing previously, rather than returning them to the top of the page in which case users would have to scroll down to find their place.

Homepage design can have a big influence on navigation

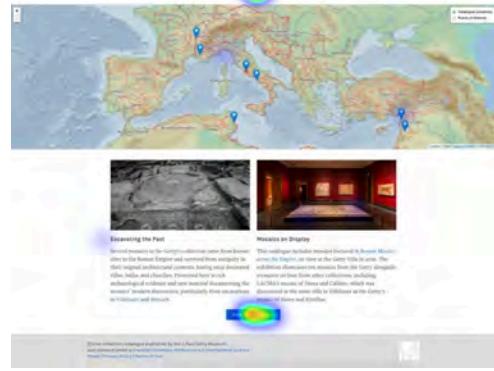
Email survey participants were asked what they would look for first when visiting a digital catalogue and where they would click to find it, and the resulting heatmaps are telling. The clean design of the Monet catalogue homepage means that visitors will be funneled in a limited number of directions. The Getty's page is longer, but still has limited entry points via bold, obvious buttons. The NGA's homepage has many links to lead users into the catalogue without a suggested hierarchy, and the heatmap shows that users are likely to click any number of places. The PMA's homepage is the longest and also has many potential entry points, but users are drawn most to the "Read More" button highlighted in red text, which will lead them into an introductory essay on the collection. A smaller percentage of users selected the "Publication Contents" link, which is less noticeable in black and white. Catalogue designers can therefore influence whether users will begin browsing a digital catalogue from the "front," refer quickly to a contents page, or dive directly into artwork entries and essays based on the layout of the homepage. Each may have pros and cons for the user experience, but designers must consider how to help users quickly get their bearings if they suddenly find themselves deep in content and seeking a way back.



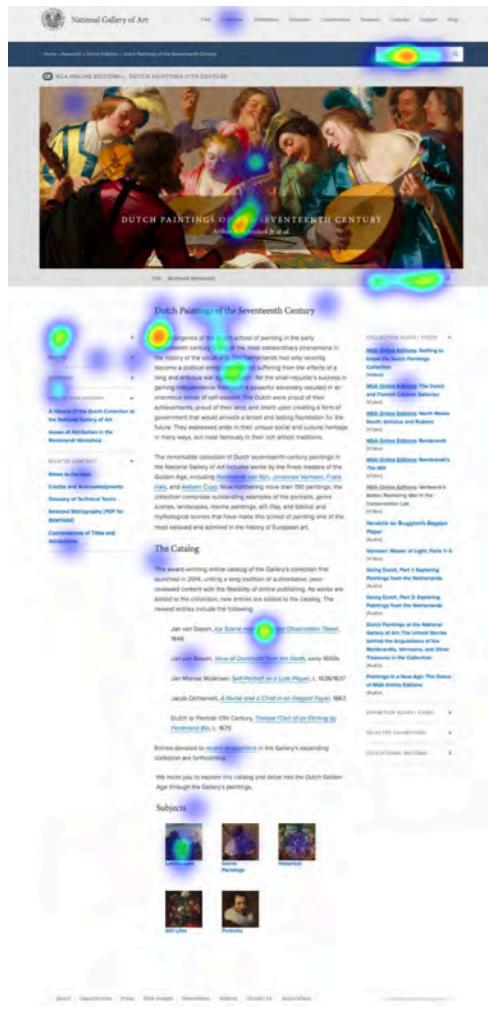
Heatmap of *Monet Paintings and Drawings at the Art Institute of Chicago* homepage indicating where users are inclined to click first



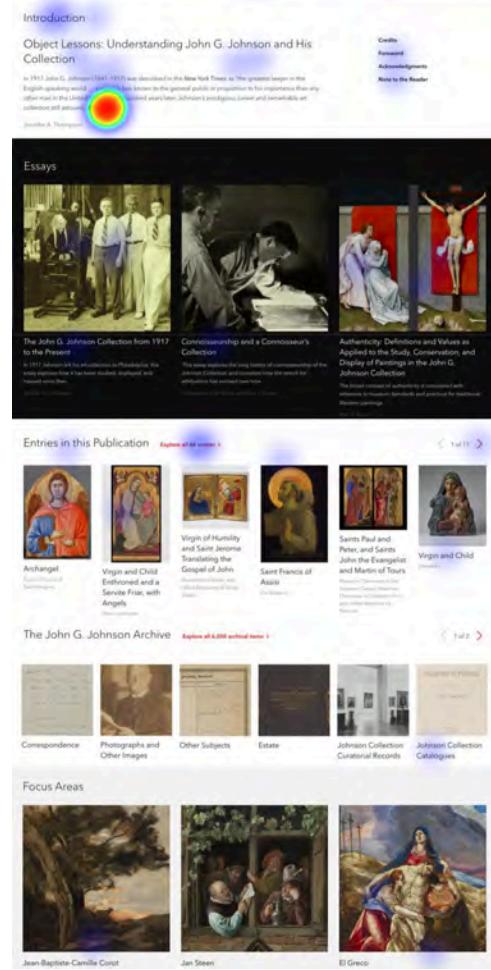
With an introduction by Christopher Kondoleon, and contributions by Nicole Ludykovich, Kenneth Lapatin, and Sean Corrington.



Heatmap of *Roman Mosaics in the J. Paul Getty Museum* homepage indicating where users are inclined to click first



Heatmap of Dutch Paintings of the 17th Century homepage indicating where users are inclined to click first



Heatmap of The Johnson G. Johnson Collection: A History and Selected Works homepage indicating where users are inclined to click first

Paths between digital catalogues and their parent museum websites are useful and must be clearly marked

Our study participants appreciated when each art museum provided links between digital catalogue content and additional content on the host institutions' webpages, but these connections were also occasionally a source of confusion. The Getty, NGA, and PMA catalogues all provide links between the catalogue and their museums' collections pages. In the Getty and PMA catalogues, the collections pages open in a new tab on the user's browser. In the NGA catalogue, artwork entry pages are one and the same with the museum's collections pages. For all three of these catalogues, users had some difficulty

distinguishing when they were within the catalogue and when they had left. If they knew they had left, they weren't always certain how to get back to the catalogue content:

One issue I found with some of them was when they did link to the larger collection, it sort of just dropped you into their main website and you couldn't find your way back.

Allowing easy passage between collections pages and the catalogues, however, is one way to drive additional traffic to the catalogues. Researchers investigating an object might be unaware of a catalogue's existence until they are linked to it through a museum's collections pages. Maintaining these connections but also clearly demarcating the boundaries of collection/catalogue is therefore a challenge for the catalogues. Ensuring that links between the two open in new tabs may be one way to signal to users when they have left one resource and entered another.

(For further discussion of how the NGA's catalogue structure affects the visitor experience and catalogue traffic, see Appendix A: Further Analyses - The Unique Structure of the NGA's Online Editions.)

Which special digital features are most appreciated by catalogue users?

An obvious advantages of digital catalogues over their print counterparts are the variety of technological tools that can be built into the interface that allow users to interact beyond just reading text and looking at static images. These digital catalogues have a range of features designed to enrich the user experience, including but not limited to: special citation generators, zoomable images, sculptures that can be rotated 360°, audio/video content, and side-by-side image comparison tools. Each of these special features takes considerable time and energy to create, so the team asked, “Do users find these tools helpful? Are they worth the investment?”

Tool Findability

The utility of the catalogues’ special tools depends first on users’ ability to find these tools. To understand whether or not users are likely to encounter the catalogues’ special features in a brief session, the email survey asked participants to spend three minutes in free exploration of their assigned catalogue. After their three minutes had elapsed, they were asked check off a list of the special features they had encountered. In three minutes of use, most of the special features listed had been discovered by less than half of the participants.

Tool Findability

Percent of email survey participants who located special features in 3 minutes of free exploration

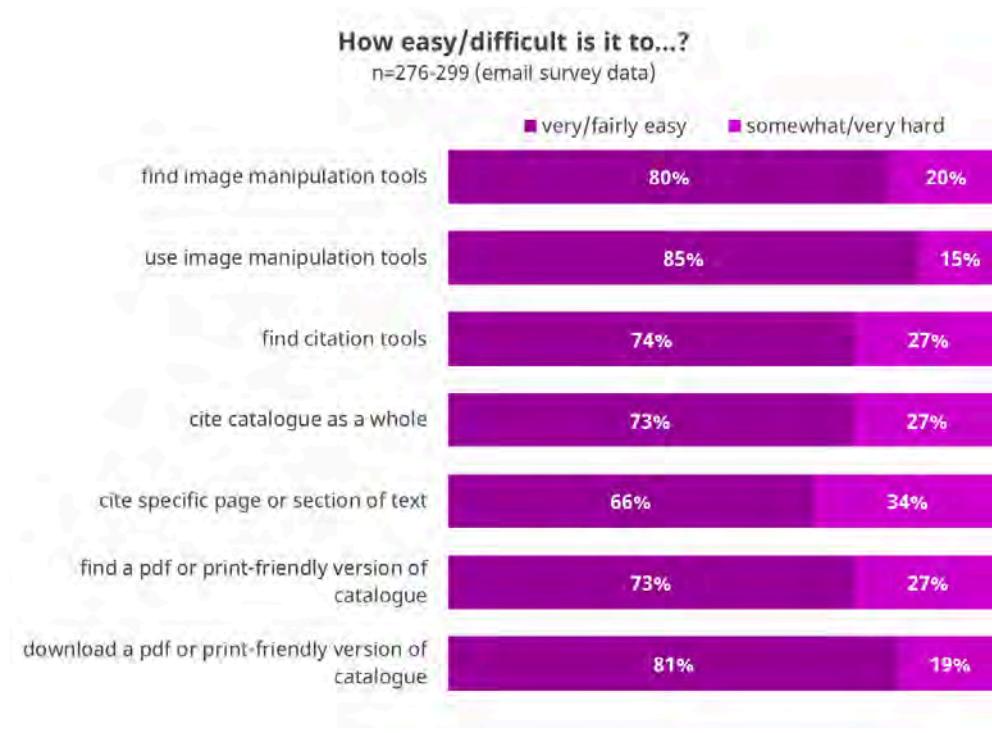
Feature	Catalogue				
	AIC n=73	Getty n=75	NGA n=76	PMA n=84	TOTAL n=288
high-resolution zoomable images	67%	69%	61%	58%	68%
citation tool	40%	37%	24%	37%	37%
PDF downloads/print friendly versions	22%	23%	37%	36%	32%
360° rotating images	8%				
interactive layered images	14%				
tutorials	7%				
glossary	59%				
login/note function	18%				
glossary and image pop-ups		48%			
interactive maps		84%			
object scale diagrams		45%			
side-by-side comparative image viewer			16%	12%	14%
reader mode (side-by-side columns)			21%		
downloadable images			51%		
audio/video content			49%		
digitized archival materials				64%	
share function				14%	
timeline				31%	

Blank cells indicate that the catalogue does not feature that tool.

The findability of these special features is largely dependent on the unique design of each catalogue. The map feature of the Getty *Roman Mosaics* catalogue is especially prominent on the catalogue's homepage, so it's unsurprising that it received a high percentage of usage. The side-by-side image comparison viewers featured in the NGA and PMA's catalogues, in contrast, require some digging to find. Across all catalogues, however, most participants did hone in on the zoomable images, which further reinforces our finding that images are of utmost importance to the target audience.

Email survey participants might have found the catalogues' special features through their free exploration, but they were also directed later in the survey to search specifically for image-viewing tools, citation tools, and pdf downloads/print-friendly versions of the

catalogues—three features common across the four catalogues. They then rated the difficulty of finding and using these tools. Once participants knew a tool existed, they generally didn't find it hard to find. Participants in the focus groups, however, consistently said that if they had not been specifically directed to many of the tools in their homework exercise, they would not have found them in their own browsing. The challenge for the catalogues, therefore, is raising user awareness of these special features.



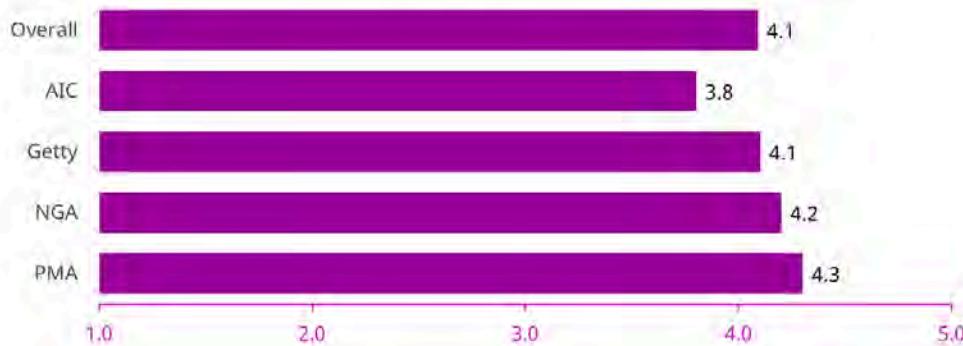
The PMA's *Johnson Collection* catalogue and the NGA's *Dutch Paintings* catalogue also tended to receive higher scores than the others on the findability and usability of its digital tools. Both catalogues group their tools together for easy access, which may be a reason for their appeal. (See Appendix A: Further Analyses — Tool Findability for a further breakdown of differences in the catalogues' tools.)

Tool Utility

The catalogues' special features—such as citation tools, zoomable images, and pdf downloads—tended to be received favorably by our study participants. When asked to give an overall rating of the catalogues' digital tools at the end of the survey, participants gave positive responses toward the "excellent" end of the scale.

Participants' Ratings of Digital Tools

n=289 (email survey data)

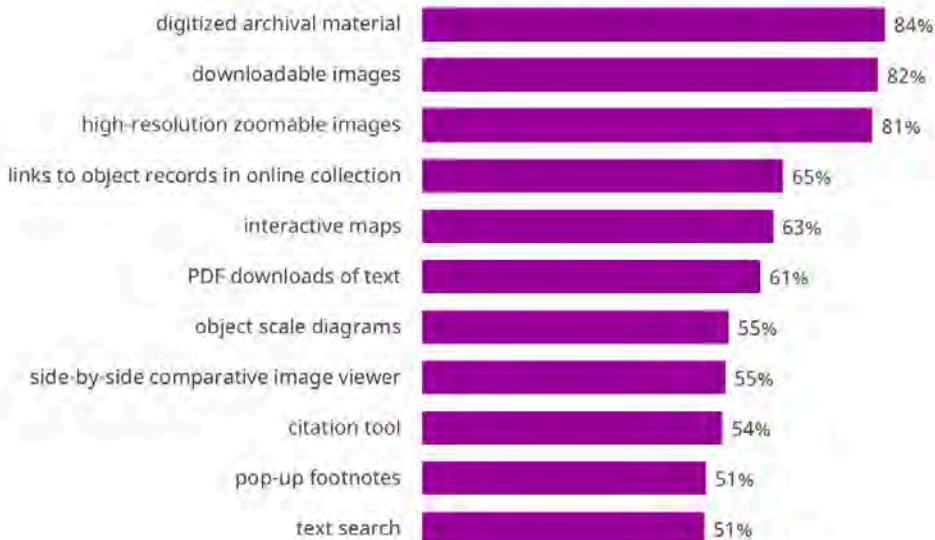


Within each catalogue, however, certain tools were rated more useful than others. The highest-ranking tools are shown below. The digitized archival material featured in the PMA catalogue was immensely popular with participants, followed by images that could be viewed in high resolution as well as downloaded.

Tools That "Greatly Enhanced" User Experience

n=32-289 (email survey data)

■ Percent of survey respondents who gave tool this rating



The PMA's Johnson catalogue is the only catalogue in this study that includes archival materials (over 6,000 items) which are cross-referenced from its artwork entries. The archives were not mentioned frequently during our focus groups, but one participant commented that they loved how the PMA catalogue "broke down the silos" between museum and archives, relieving scholars of the burden of having to search multiple databases.

Of all the digital tools in the catalogues, focus group participants spent the most time discussing the image-viewing features. Being able to view and manipulate images is of utmost importance to the catalogues' target audience:

I think if you're talking interactivity, anything that can help the scholar, the researcher understand the object better—I love that.

Participants' number-one priority in image tools was high-resolution images that could also be downloaded. They were pleased by the quality provided by most of the catalogues, but occasionally annoyed when an image couldn't be downloaded or when they had to visit a separate page to download an image. Minute details are important to the target audience. One participant noted:

If I want to share the way, for example, Matisse painted, I want to be able to see his brush strokes or um, if I want to show how a mosaic is made, I want to see the exact dimensions of the tessera or so on and so forth. So I was missing sometimes a scale bar.

The Getty catalogue does include a scale for its mosaics, which users appreciated. They wished that the other catalogues would also find ways to represent dimensions of their works.

The more complex image-viewing tools, such as the 360° views of sculptures and the layered images in the Matisse catalogue, were also appreciated, although by a somewhat smaller audience. A conservator noted that the x-ray and IR images were immensely helpful for his work and that there is never space for these images in print catalogues.

The NGA and PMA catalogues both incorporate image comparison tools, which were also praised by many users. One focus group participant noted that ability to compare preparatory drawings side-by-side with a finished work was extremely helpful to her as someone interested in artistic process. Of the two catalogues, the NGA's tool was more popular because it allowed participants to choose which images they wanted to compare.

Scholarly Content

**What is the depth
and breadth of a
typical use session?**

44

**What kinds of
content and
information are
most useful to
users?**

47

**Do users have
confidence in the
catalogues'
scholarship?**

52

**What special value
do digital
catalogues hold for
users?**

56

**What other
possibilities could
digital platforms
explore to serve
users?**

58

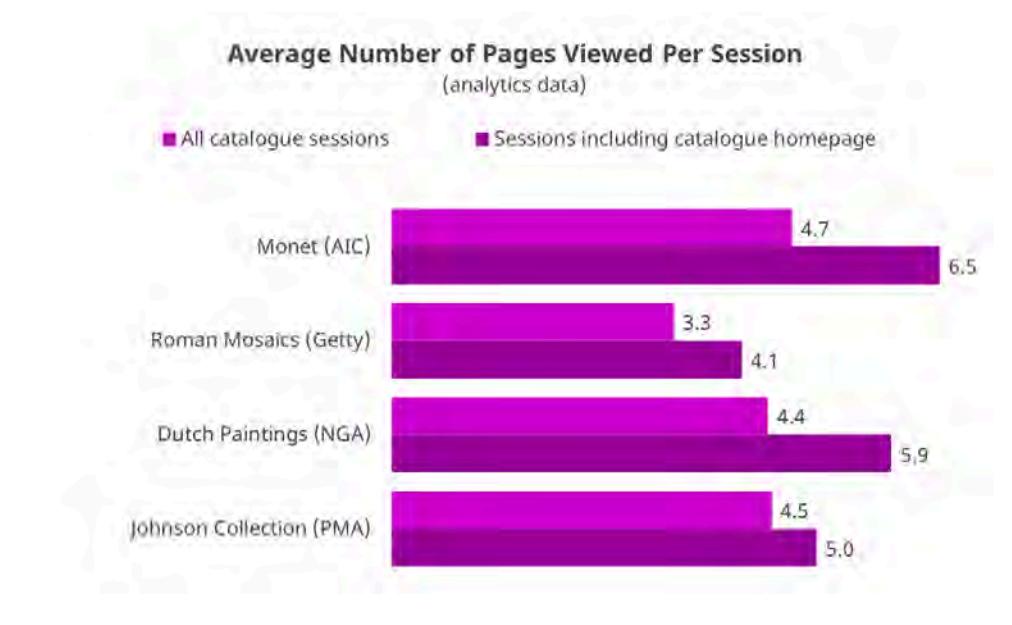
What is the depth and breadth of a typical use session?

Defining a “typical” use session for the digital catalogues is a difficult task, given the variety of audiences using the catalogues and their variety of reasons for visiting (see How much traffic are the catalogues receiving? and Why do users visit the catalogues?). We know from our survey and focus group participants that many catalogue visits are driven by interest in a specific artwork, but users don’t necessarily end their visit after finding the entry they are seeking. Any number of paths might lead them deeper into the catalogue.

Analytics data can provide some insights on the “average” visit, but also must be interpreted with care. For example, the AIC, NGA, and PMA catalogues selected for the analytics review averaged around four pages per visit, while the Getty’s catalogue averaged slightly less. A lower number of pageviews might be interpreted as lower engagement with the catalogue, but it also might mean users are able to find what they need with fewer clicks. Average session duration can also easily be skewed by large numbers of sessions that last only a few seconds. Looking at the distribution of sessions of different durations is one way to look past the outliers.

Catalogue Engagement (analytics data)			
Catalogue	Pageviews per visit	Average session length (min:sec)	Percentage of sessions over 10 min
Monet (ACI)	4.71	4:09	11.3%
Roman Mosaics (Getty)	3.32	3:52	8.6%
Dutch Paintings (NGA)	4.25	4:59	14.3%
Johnson Collection (PMA)	4.47	6:44	16.3%

Furthermore, if we look just at those sessions that included a visit to the homepage, the length and depth of a visit is extended. As noted elsewhere, this might give a more accurate picture of those users who are intentionally using the catalogue as opposed to accidentally landing on a catalogue page while browsing the larger museum website. (See How much traffic are the catalogues receiving?)

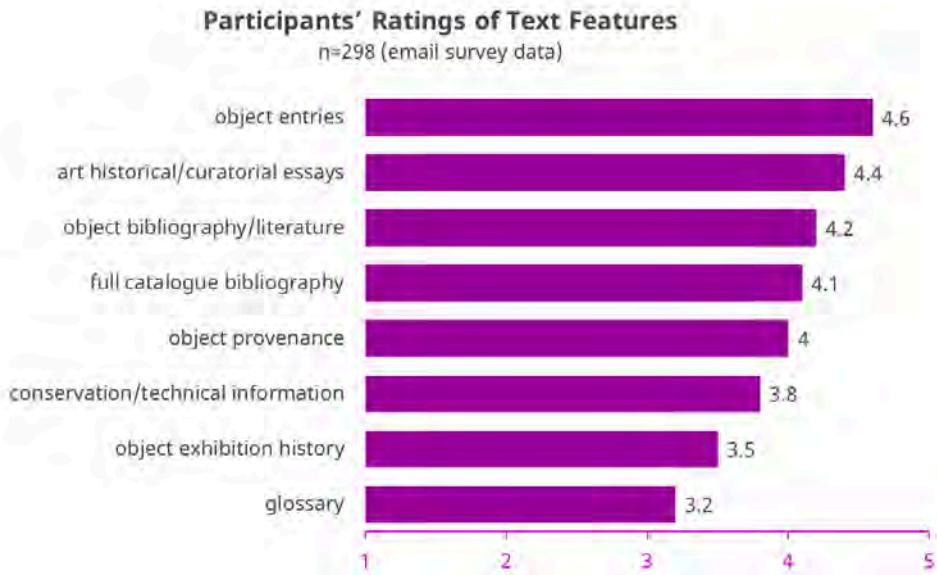




Given the notoriety of certain artworks, the team was also curious to know if particular famous works might be dominating traffic to the catalogues. The analytics show, however, that most users are arriving at the catalogues via the homepage and that no single art entry accounts for more than 5% of the pageviews received by any of the catalogues. (See Appendix A: Further Analyses — Top Pages Viewed and Top Landing Pages for more information.)

What kinds of content and information are most useful to users?

The email survey asked respondents to rate a variety of text features that digital catalogues might include, based on how important that information might be to their work. Object entries received the highest ratings. Participants expect catalogues to include these, and since catalogue use tends to focus on specific artworks (see Why do users visit the catalogues?), these entries are critical. Scholarly essays and object bibliographies were also quite important to users. More specific details such as object provenance, technical information, and exhibition history were rated lower but still fairly important in the eyes of most users. A glossary was rated closer to the middle of the scale and less critical than any other text feature. The AIC's glossary received a lukewarm response from focus group participants, while glossary features in the NGA and Getty catalogues did not receive comment and may have escaped participants' notice. The PMA's catalogue does not include a glossary feature.



Focus group discussions about the text content of the catalogues generated some of the richest feedback and reflections on what museum catalogues are and should be. Some important themes on the content users want and expect from digital catalogues follow:

Users see variability in what museum catalogues contain and don't always expect scholarly essays

One participant pointed out that the word “catalogue” can imply a lot of different things in the museum world. Sometimes it’s a “handbook of the collection” with basic information on each work provided through individual object entries. Sometimes if it’s an exhibition catalogue there are standalone scholarly essays that contain a deeper level of analysis and interpretation. She noted:

I feel like there's confusion about what to expect... Should we just expect basic information or should we expect groundbreaking scholarship and new ideas? I don't know.

Some focus group participants noted that the standalone scholarly essays they encountered in the homework are not the type of information they generally associate with museum catalogues. One participant commented on the dry mounting article in the Matisse catalogue, saying:

I never in this lifetime would have expected to find that article in that location. I would have expected it to be in a very, very different type of publication. I would have expected it to be in the AIC Annual Headings or in some other journal... It was a wonderful article, but I never would have found that.

A participant in another group made a similar comment, noting that many catalogues don’t contain these types of scholarly essays but that she was happy to find them in the NGA and PMA publications:

Well, printed catalogues can vary tremendously. They don't always make these scholarly, argumentative interpretive essays. There are only a few museums in my experience (at least in the fields I work in) that do this. So I was thrilled to see them at both PMA and NGA, and the NGA ones were fantastic, really, really, really good.

Users want museums to provide interpretations of artworks in the catalogues, both in essays and artwork entries

Users don't always expect to see scholarly essays in museum catalogues (see What kinds of content and information are most useful to users? for more info), but when they are present and done well they are appreciated. When asked if museums should focus on providing information on single artworks or making thematic comparisons, one participant commented:

I feel like it's the job of a museum and, and certainly the curators to interpret the objects that are there and put them in context with other objects. So I would hope for more kind of—online exhibition is the wrong word per se—but that kind of approach to putting content out there. So I think the permanent collection is key, but contextualizing the permanent collection is also really important and makes it relevant to the general public and other scholars.

One focus group spent some time critiquing the ways museum scholars interpret objects for exhibitions and publications. This group, which consisted primarily of graduate students, said they didn't always trust the scholarship of museum catalogues and suspected that the writing contains more biases than peer-reviewed articles. One individual noted that the language in catalogues can sometimes sound outdated, such as when artists are praised for their "genius." Another commented that the museum that employs a curator can have an invisible influence on their writing. Despite these criticisms, one professor ended the conversation by giving these scholars and their works credit:

But the essays [in catalogues], I think we would all say they matter, They matter to people starting out. They matter to people cutting across fields. And even though I can kind of turn up my nose, I will say sometimes I'm looking at an essay and I go, "Oh, [right]."

Focus group participants also wanted to see interpretation within the artwork entries. One focus group participant expressed disappointment that the Matisse catalogue focused more heavily on technical information and featured less in the way of scholarly interpretation:

To me that seemed like the weakest one of all of them, just because, you know, there wasn't much interpretation. There was kind of description, and then there was so much technical information from the conservation perspective, which you know, I guess I was wondering to whom was this a digital catalogue directed?

All of the catalogues produced by the Art Institute of Chicago take an "object-centered" approach in order to highlight artistic process, and the heavy focus on technical and conservation information is an intentional decision by the team that produced these catalogues.¹ If this intention is not clearly indicated for readers, they may be left wondering as this participant was.

Users want catalogues to provide technical information, as well as the ability to navigate past it

Heavily technical information on artworks, such as conservation information, is not relevant to the work of every catalogue user, but those who need it note that museums catalogues are one of the only places to find such information:

I always appreciate the technical information because that's something you're not going to get from any sort of peer-reviewed journal. You're not going to get it from anywhere else but from the museum.

I think the area in which I do tend to trust them and lean into them is for technical art history and knowledge of the object... One of the things I liked was the catalogues that leaned into that. The NGA descriptions of their works were beautifully written and really helpful because - that someone who actually has experience with the object itself, that kind of, that intimate knowledge of knowing it.

Another participant pointed out that technical information and interpretive information complement each other and are useful to find together in a single resource. A curator who expressed an interest in artistic process stated she wanted both from museum catalogues:

The technical can really help inform maybe other aspects of the text...it can help inform and give you a really fuller, picture—you know, how the artist's process played out in a certain situation. It's bringing together the cooperation of art history and technical studies.

That being said, some participants requested that technical information be organized such that users can navigate past it easily if they are looking for other types of text. A few participants were turned off by the amount of technical detail included in the Matisse catalogue, for example, even though this information was praised by others as extremely useful.

Users value cohesion and catalogue narrative

Focus group participants expressed a wish that digital catalogues exhibit cohesion in their style of writing. They also talked about the value of having an interpretive narrative to tie the catalogue together, rather than the entries being presented merely as a list of items. One focus group noted that introductory material that explained the catalogue topic for non-experts was useful. Participants noted that the NGA provided introductory material on the Rembrandt project and the Getty provided similar information. Another participant talked about how the PMA's catalogue had a cohesive theme that made it easier to reflect on the objects featured:

I liked how the John G. Johnson collection... they're talking about these objects, but they're talking about them in the scope of John G. Johnson's collecting practices. And so..., it's easier to get some purchase or traction on those things.

Not all participants agreed on what gives a catalogue cohesion. One participant felt the Matisse catalogue lacked narrative to tie everything together, while another participant felt the Matisse catalogue felt unified but the Dutch Paintings catalogue did not. Another participant with experience in digital catalogue design discussed the pros and cons of a

catalogue with a strong narrative, noting that while it can provide cohesion for the work, it can also filter out potential users who might be interested in individual artworks or a different angle on the collection than the one highlighted by the catalogue.

Select users are interested in the history of art interpretation, which can be lost in a digital environment

Although most focus groups didn't dwell long on the temporal nature of the catalogues, one group raised some interesting concerns about the roles of traditional print catalogues and what might be lost if they take on a wholly digital format. Several members of this focus group were interested in exhibitions and art interpretation from a historiographical approach. For their work, print catalogues capture valuable information about a moment in history and how art was being discussed and displayed at that time:

I do research with catalogues a lot because I look at exhibitions theoretically, like as landscapes. So I do end up spending a lot of time in catalogues because that's the best way to reach that—the ephemera of what an exhibition was—especially if it includes like notes on like programming and stuff.

One of the things that museums do that's really important is that they can create really pivotal cultural moments that actually do shift art historical dialogue or do shift cultural dialogue or do shift popular culture movements. And if museums stop producing catalogues and they stop documenting what those events were like, then we lose them, we lose them to history.

Another participant who researches how Native American art has been displayed and interpreted through history said that print catalogues capture important information about a specific moment in time, and these details are likely to be lost in an online catalogue that is continually updated with new language and images. A conservator raised a similar question regarding the catalogues' permanence:

We [conservators] so often go back to explain what happens in the last a hundred years and at what moments in time certain alterations were made or certain restorations were done. And so looking back at old catalogues, old images, et cetera, et cetera. You can piece things together. And with especially moving towards an only-digital catalogue, that becomes a little gray in the future. So I'm looking ahead. How are we going to look back in 50 years on these catalogues, and do they actually still hold the information, and are they still accessible?

One way to address these participants' concerns is to provide archived versions of catalogues, as the NGA does. Providing dates when pages were last updated could also help users understand the context of the writing.

NOTES

1. Martha Lucy, "Digital Scholarship at the Art Institute of Chicago: The Impressionism and Post-Impressionism Series," *Association of Historians of Nineteenth-Century Art Newsletter* 26, no. 1 (2019): 1-3.

Do users have confidence in the catalogues' scholarship?

Most email survey participants expressed trust in the catalogues' content, with no significant differences between the four catalogues reviewed. Many noted that the names of the four institutions instill trust that the text in the catalogues has scholarly value. Some participants may also have discovered that the catalogues (with the exception of the Johnson publication) are peer-reviewed, but they were not alerted to this fact, and focus group discussions suggested most users don't find this information in a brief session. Despite this, 80% of survey participants said they would feel comfortable citing the catalogue in their work.

Is this resource something you would feel comfortable citing for your work?

n=300 (email survey data)



Participants who said they would not feel comfortable citing the catalogues gave a number of reasons, the most common of which was the difficulties in citing these resources. These participants said they had trouble finding the citation tools, couldn't find page numbers, or just generally had difficulty or concerns about citing online publications correctly.

Reasons users don't feel comfortable citing these catalogues

n=300 (email survey data)



A smaller subset of participants had concerns about the quality of the text or its scholarly value:

I'm not sure. It doesn't feel "scholarly" enough.

I spent my three minutes reading one catalogue entry. Not only were there some writing (grammar) errors, in my opinion it had insufficient citations, which makes me reluctant to use it for my own work. I would definitely use it to lead me to other sources, however, so it's a good research tool.

I would assign it to my students as a class resource, but believe its content is too general info/encyclopedia-like to include in a scholarly article.

A few participants didn't specifically question the scholarly value of the catalogues, but instead stated they had a general preference for print publications over digital. The remaining handful of respondents voiced concerns about the permanence of the text and links to the catalogues, general frustrations with the catalogue platform, and concerns about peer-review.

Given time to explore the catalogues, however, many participants' opinions of them changed. Seventy-two percent of respondents described the catalogues as "scholarly/academic resources" after a scan of the homepage, but this number increased to 81% at the end of the survey when participants were asked to describe the resource once more.

Participants who would describe the catalogue as a "scholarly/academic resource"

n=299-307 (email survey data)



Focus group participants spent more time critiquing the scholarship of the catalogues and were sometimes divided in their opinions of the various works. Typos and grammar problems were called out as obvious issues. A focus group comprised largely of graduate students also expressed some general mistrust about the scholarly value of museum catalogues and the biases that the writing might contain:

That's probably one of the most common places you run into really bad art history is in a catalogue, and if you are offering it as a resource to a student, it's like a 50/50 shot that they're going to get some useful or, and then it's going to derail them.

I found a lot of the language to be off-putting and sort of old school [in the NGA catalogue]. Like the catalogue entry essay that we read about Rembrandt begins off the bat with a discussion of his genius, and the object entry that we read focused a lot on attribution. And I thought that the focus on the individual painter themselves and what a special hand they have behind the object read to me of this old school, genius-centered approach to art history that's more celebratory than critical of the ways that the stories have been told like in the past.

In some ways it's like museum wall texts [exhibit labels], and so you don't know if it's being quirky or not—you know, if they've been told, "Don't be too controversial," or "Don't give your opinion." On the other hand, it may be completely out to lunch.

There are a number of ways, however, that the catalogues can instill more trust in their readers:

Digital catalogues should highlight authorship, peer review, and works cited

Not all focus group participants paid attention to the authors of the catalogues. When individuals did notice the authors, however, this increased their level of trust in the scholarship:

The other one I feel really confident citing is the Philadelphia one because it lists the author of everything that's written on every page with a hyperlink to who that author is.

Arthur Wheelock, the primary author of the NGA's Dutch Paintings catalogue, was called out multiple times in the focus groups as a trusted name in the field.

Most participants did not note whether or not the catalogues were peer-reviewed during their homework exercises. One group commented that they don't generally think about peer review when using a website. One participant noted that the importance of peer review depended on the content she was looking at within the catalogues:

I guess if they were publishing analytical data I would expect things like that, but none of the technical sections were quite that in depth. It was mostly imaging and I wouldn't necessarily really require that to be reviewed. I would base my assessment more on what references they had cited.

As the quote above notes, seeing a proper amount of citations to support arguments is another way users evaluate the scholarship of the digital catalogues, especially if the author is not well-known and respected:

I didn't feel there was enough citation to support the arguments they were making...What we read from the NGA was written mostly by Arthur Wheelock. You can't argue with Arthur Wheelock. He is really the top of the top scholarly [sic], and the PMA didn't have top of the top scholars, but they were making arguments that to my mind were not sufficiently proven and therefore would not have been success in peer review literature.

Address the temporality of digital resources through version transparency and DOI

The email survey demonstrated that only a few participants had strong concerns about citing the catalogues because of updates in the online environment (see Do users have confidence in the catalogues' scholarship?). The rest have accepted that modern research relies on digital resources that may change over time:

I don't know how that can be an issue in 2019 because what do we do but cite stuff on the web.

All the same, users were very interested in knowing how to access earlier versions of the catalogues and having an understanding of what had changed over time:

That's what I really liked about the NGAs, um, website - that they had the archived earlier versions and you know, so that you could, you could track the, the history of that publication, that it was still all available, but you know, it was, you knew it was also very up to date.

A few participants also called attention to the DOI numbers featured in the PMA catalogue. These individuals—including a librarian and a museum professional with experience producing digital catalogues—said that the DOI imprint gives them more faith that they will be able to refer back to this resource over time:

So that to me engenders some trust. Even though citing online sources is thankfully more ubiquitous, I think having that DOI imprint...it informs others who might be reading a text that you've cited that it is a trusted resource.

Many users, however, did not know what the DOI imprint means. Museums may need to find a way to educate users in order for it to have a reassuring effect.

What special value do digital catalogues hold for users?

Throughout the focus group conversations, participants expressed a number of expectations for these catalogues by virtue of them being digital resources. Some of the most consistent sentiments shared include the following:

Digital catalogues can and should push beyond print limitations in terms of interactivity and navigation

One thing clearly communicated by the focus group participants is that they want the catalogues to take advantage of the many affordances of the digital format and push beyond what printed books or ebooks can offer. This means including digital interactive features and allowing participants to navigate the text in different ways:

Some of them are really published books. I'm not a millennial, and I still hope that the millennials will buy books (especially when I have written them). But it's clear that some of these catalogues didn't really use the potential of digital possibilities.

The Matisse publication and the Getty publication were still very tightly formed to that model of an actual hard copy book, whereas the NGA and PMA catalogues felt like they were really taking advantage of the digital platform... These kinds of publications I think can and should be different, to use what is possible in the digital world.

Although there will always be users who prefer books, participants didn't express the need for these catalogues to mimic that format. Those who prefer a hard-copy environment said they would simply download and print a pdf to read.

Digital catalogues can change over time to include new information and interpretations

Focus group participants had strong expectations that digital catalogues would be updated as new information on the collections becomes available. Having access to the

latest information on works was seen as a significant advantage of the digital format. On the whole, participants liked that digital catalogues are dynamic resources:

When it's more like a book that just seems to have been made into something digital, it feels like it's finished. And something that I really value for a collection catalogue that is digital is the fact that you can, and I think that you should be able to add to it and keep it dynamic.

It feels like we don't have to have like a cutoff of what it has to look like in its finality. Like I wonder if digital catalogues should ever have like a final form. I think that's one of the limitations about thinking about past catalogues rather than some like new form of knowledge sharing.

Digital catalogues can reach wider audiences

One participant pointed out that print museum catalogues have a smaller audience than digital catalogues. The digital catalogues can be accessed easily by anyone who has an interest, whereas print catalogues require more effort to acquire and tend to be used only by scholars and researchers.

Having these digital publications...does make all of this information really accessible. We know how to do research and going to the library and so forth and so on. But I think the fact that anyone can go and explore more, see these objects, read more about them...I think that's encouraging.

I know museums and galleries have been trying to get mobile for the last 30, 40 years. They've been trying to reach out to a new audience...This is just a natural next step forward. And I think accessibility is key.

Not only does the online environment extend these institutions' reach among general audiences in the U.S., but it provides opportunities to serve audiences in other countries as well. One participant who works in west Africa spoke passionately about how these kinds of online, open-access resources could be extremely valuable to students and scholars in developing nations who have less access to libraries or databases such as JSTOR:

So what I view to be an amazing strength of all four of the projects we've looked at is that they are something that someone can look at on a smartphone, which is way more widely used and available among university students who I've met abroad than books in a library or articles that exist behind databases that are pay-based.

What other possibilities could digital platforms explore to serve users?

Focus group participants freely admitted that they have become spoiled as more and more academic resources become available online and publications such as these catalogues have made valuable information and images open access to the public. They talked about how much the nature of research has changed over the past twenty years and how quickly their expectations also change as new tools become available. When reflecting on where these digital catalogues might go in future years, the following ideas emerged from the conversations:

Digital catalogues should reach beyond their own museums to make connections with other institutions and scholarship

Focus group participants pointed out that a major advantage of putting catalogues online is the ability to link the catalogues to content anywhere else on the web. Although the catalogues reference work beyond their institutions, participants wanted to see these references take the form of live links so that researchers can continue to explore a topic beyond the boundaries of a single institution:

I feel like all of these were so siloed that they're not taking advantage of what exactly it is the digital humanities can offer, which is a much broader access to that. So I wanted things to be able to go broader, kind of from a scholarly perspective instead of stand locked within their institutions.

The Getty catalogue was praised by one participant for actually showing objects from other museums:

One of the things I loved about the Getty catalogue, and this was a really interesting and meaningful step they took on two counts: that they would show things from other museums, that when they made a comparison it's like, "Okay, here is the one in the British Museum that backs up what we're saying." And wherever they could, they went to the commons, and having the Getty acknowledge the commons—I hope you noticed how many of their images were Wiki Commons hosted—is like I think an incredible embrace of the

public sphere, and if these institutions would be willing to have more connectivity with each other, that would be really cool.

Participants criticized other institutions and publications that are too self-referential or digital works that don't allow interaction. The Heilbrunn Timeline developed by the MET was mentioned as an example of an innovative online scholarly resource, but one which would be much improved if it was not restricted to internal use only. Our participants felt strongly that digital catalogues and museums owe it to the field to make connections beyond their own walls.

Catalogues from multiple institutions could increase usability by incorporating standardized conventions

Some focus group participants also expressed a hope that there will be a standardization across different institutions in how digital catalogues are presented:

You know, I found myself wanting some sort of standardization. Can we all agree that this is how we will find citations? And I realize that, you know, we're in the wild west in publications right now and eventually something will happen and we'll all decide this is the way we're going to do this.

Many researchers have embraced citation management tools such as EndNote and Zotero, and to serve these audiences many scholarly databases now allow users to download references directly to their personal citation libraries. Incorporating standardized features such as these across institutions could greatly improve the user experience and perhaps make users more inclined to seek out digital catalogues as scholarly resources.

Interactive tools that allow users to add their own information could be used to enhance individual research and encourage scholarly discourse

When asked about other ways they might like to interact with the catalogues, participants had many ideas on ways catalogue tools could be expanded to serve the individual user better but also to encourage dialogue between researchers.

One participant wondered if it might be possible to allow varying points of view or different interpretations to be added to the catalogues via a juried comment system. This is one way the digital platform could be used to engage scholars and extend the discussion on their collections.

Another participant requested a map and timeline feature that allows users to add their own works. The *Mapping Titian* project was also brought up as an inspirational example of digital humanities. Mapping Paintings was listed as another that allows users to interact and visualize their own data.

Participants also envisioned ways that image comparison tools could benefit scholars if they could reach across institutional boundaries, allowing researchers to virtually reunite

objects from collections that have been divided or make scholarly comparisons of works across multiple museums:

Speaker 1: I mean, just comparisons are great because so many of these paintings—especially if we get to provenance, and we can get a bunch of paintings that were once owned by one person, and we can have the ability to see them and see a taste for collecting that may not be possible in the current form because they've all been spread out. That would be a fantastic way that museums can use their properties for these greater connections.

Speaker 2: And things from a set. So much that I work on is broken up: assemblages or multiple pieces. I mean how much Medieval and Renaissance painting is multi-part stuff where the parts are in 8 million places? And significant comparisons. I mean, interesting comparisons. And hyperlink allows a museum (if they'll agree) to link to each other to make comparisons in a way that I think might be really stimulating to the museum essay as an art form and the online essay as an art form.

The comment above makes an interesting point—that expanding catalogues in these ways has potential benefits not just for the researchers who value the information they are providing but also for museums in allowing them to build new forms of arguments and move the field forward in innovative ways.

Measuring Success

Producing digital catalogues is a time- and resource-intensive activity. Through this study, we have produced a wealth of data that suggest digital catalogues are a worthwhile endeavor for museums. These publications reach thousands of visitors, are respected for their scholarly merit, and offer significant advantages to users over print publications through the amount of information they make available and the tools they provide for navigating and working with that information. This study has also helped our team identify some of the metrics that work best for measuring the success of digital catalogues. We found that certain metrics of success could be gathered with relative ease using web analytics or close-ended questions on pop-up surveys. In other cases, the rich qualitative data provided through focus group conversations and open-ended survey questions provided deeper insights that require more effort to digest. Conducting this study also highlighted the ways that the definition of success might vary depending on contextual factors and each museum's goals for their digital publications.

Measuring Reach and Engagement

With careful interpretation, analytics data can provide many quantitative measures of success for digital catalogues, such as the number of visitors a catalogue receives and the depth of their engagement with the catalogue. Even more important is discoverability, since a digital catalogue that does not appear in web searches will not gather any new visitors. In almost all cases, analytics metrics mean little on their own but can take on greater significance when compared to other data, such as:

- ◆ A catalogue's performance in a previous time period (e.g., How did the catalogue do in the first month of its launch, versus after a recent marketing push?)
- ◆ The performance of a comparable catalogue or resource on the museum's website (e.g., Is the catalogue receiving similar traffic to one featuring a very well-known artist? How does traffic to the museum's collections pages compare to traffic to the catalogue?)
- ◆ The reach of a similar print publication (e.g., How many copies did a comparable print publication sell in the first year, and how does this compare to the number of engaged visitors the digital catalogue received in that time period?)

Web analytics that can be used as a basis for making these comparisons include the following:

Analytics for Measuring Reach and Engagement	
Analytics Metrics	Interpretation
Discoverability: ◆ Percentage of organic search and referral sessions	Referral sessions indicate catalogue users are finding links to the catalogue from other websites, including academic search engines, arts and culture blogs, or the websites of professional organizations. This type of traffic suggests the catalogues are accessible to the scholarly audiences they are intended to serve. Organic search sessions indicate users are arriving at the catalogues after conducting a search via Google or another search engine. This traffic may be important for reaching additional audiences beyond the catalogues' primary target groups. (For more information on discoverability, see How are users finding the catalogues?)
Traffic to the catalogues: ◆ Number of sessions ◆ Number of visitors	Drilling deeper to discover the number of sessions or visitors that land on the catalogue's homepage, table of contents, or other pages of significance can help museums distinguish between visitors who are making use of the catalogue as a whole versus visitors with awareness of or interest in only limited pages. The web structure of the catalogue and its relationship to other pages on the museum website are also important considerations. (For more information on how web structure affects catalogue traffic, see Appendix A: Further Analyses — The Unique Structure of the NGA's Online Editions)
Depth of engagement: ◆ Session duration ◆ Percentage of sessions over x minutes ◆ Pageviews/session	The length of time users spend in a catalogue is one measure of their engagement with the material. As an analytics metric, average session duration can be misleading due to outliers and the fact that Google records bounced sessions as having a duration of 0. The distribution of session duration gives a more complete picture of visitor engagement, or staff can focus on the percentage of sessions that last over 10 minutes (or an alternative target set by staff).

In comparing analytics data for this study, we found that defining what counts as a catalogue session is open to interpretation and can make a tremendous difference for measuring catalogue reach and engagement. The experience of visiting a single web page within a digital catalogue does not guarantee a visitor's awareness of the catalogue as a whole in the same way they would have if holding a print publication in their hands. We found that the analytics data varied considerably depending on whether we looked at all catalogue sessions or just sessions that included a visit to the catalogue homepage. Museums may therefore want to set some minimum standard for what counts as a

catalogue visit. (See How much traffic are the catalogues receiving? for more information.)

Measuring Usability and Performance

A digital catalogue can only be deemed successful if users are able to navigate it and find content of interest. Usability was therefore one focus of this study. We found that some of the keys to usability success included visitors being able to easily 1) access the table of contents, 2) determine their location within the publication as well as the larger museum website, and 3) find and use tools of interest. Some usability metrics can be tracked through analytics data:

Analytics for Usability and Performance	
Analytics Metrics	Interpretation
Depth of engagement: <ul style="list-style-type: none">◆ Session duration◆ Percentage of sessions over x minutes◆ Pageviews/session	Depth of engagement is also a measure of usability, since visitors are unlikely to persist in using a digital catalogue if they cannot find what they are looking for. (For more information on interpreting engagement metrics, see Measuring Reach and Engagement.)
Use of key pages and tools: <ul style="list-style-type: none">◆ Percentage of sessions with homepage/TOC pageviews◆ Percentage of sessions over x minutes	Users who access the homepage and table of contents during a session are likely to encounter some key wayfinding signals that help them navigate the catalogue. Tracking the use of special tools in digital catalogues (such as downloads of PDF versions and use of citation tools or image viewing tools) requires experience in setting up analytics conversions and goals, which was beyond the scope of this study. Doing so, however, can give museums concrete data on how frequently these tools are used and if they contribute to deeper engagement.

We also found that a simple question on the pop-up survey—"Did you find what you were looking for?"—provided a quick measure of usability. While our focus group homework and discussion questions also collected usability data, we found participants' opinions were highly varied and sometimes contradictory. (See Functionality and Design

for the full discussion.) This qualitative data helped us to identify a few key trends and areas in which the catalogues might be improved, but we also discovered it did not help to get bogged down by the comments of a few disgruntled users.

Measuring Value to Audiences

An important measure of success for this study was the extent to which audiences view these catalogues as trustworthy, scholarly sources. Analytics metrics can provide certain indirect measures of scholarly value by telling us how visitors arrive at the catalogues and how deeply they engage with the content:

Analytics for Measuring Value to Audiences	
Analytics Metrics	Interpretation
Scholarly referrals: <ul style="list-style-type: none">◆ Percentage of referral sessions from academic search engines or other sites related to scholarly research	Referral sessions from academic search engines or other sites related to scholarly research are an encouraging indicator that users are finding these catalogues in the same places they find other scholarly material.
Depth of engagement following a scholarly referral: <ul style="list-style-type: none">◆ Session duration◆ Percentage of sessions over x minutes◆ Pageviews/session	Measuring visitor engagement for sessions referred by academic search engines or other scholarly sites can hint at how much these visitors value the content they find. (For more information on interpreting engagement metrics, see Measuring Reach and Engagement.)

While analytics are easily collected, we found survey and focus group feedback indispensable for understanding how visitors are assessing the value of these digital catalogues. Some of the key questions that helped us measure this dimension of catalogue success include the following:

- ◆ Please rate this resource on a scale of 1–5 for the following criteria: *informative text*
- ◆ Is this resource something you would feel comfortable citing for your work? (response options: yes, no, N/A)
- ◆ How do you feel this digital catalogue compares to printed resources you use in your work?
- ◆ Are the scholarly essays in these catalogues on par with other kinds of sources you might cite?

Close-ended questions such as the first and second bullet above are useful for providing a quick quantitative assessment of a catalogue's scholarly value, but the conversations generated by open-ended questions in this study (such as bullets three and four) provided valuable insights that can only be gleaned from qualitative data. (See Scholarly Content for a full discussion.)

This study also demonstrated that while these catalogues are respected as scholarly resources, they are being used for many purposes beyond scholarly research. They have a strong appeal as teaching resources, and they are also generating large amounts of traffic from art enthusiasts for personal use. (See Who is using the catalogues? for more information.) Future studies may seek to establish their own metrics for success based on how digital catalogues are serving these additional user groups.

Appendix A

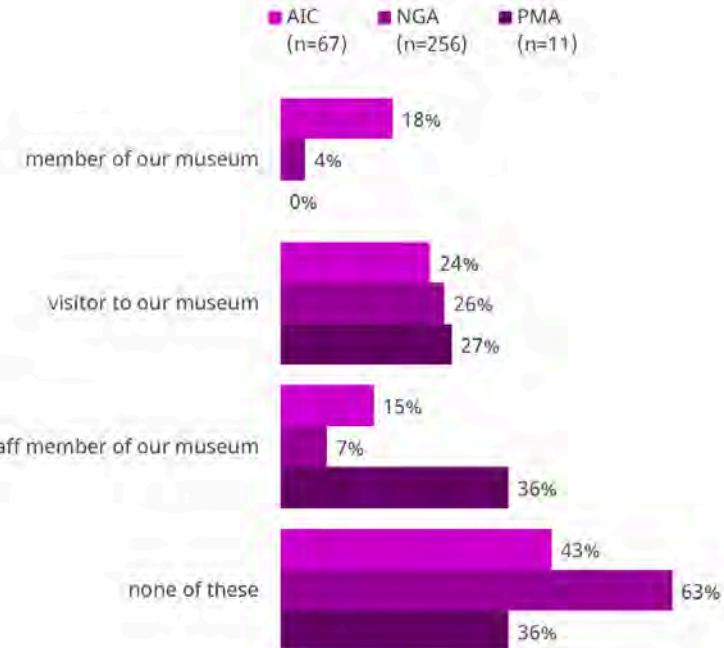
Further Analyses



Users' Relationships to the Museum – Breakdown by Institution

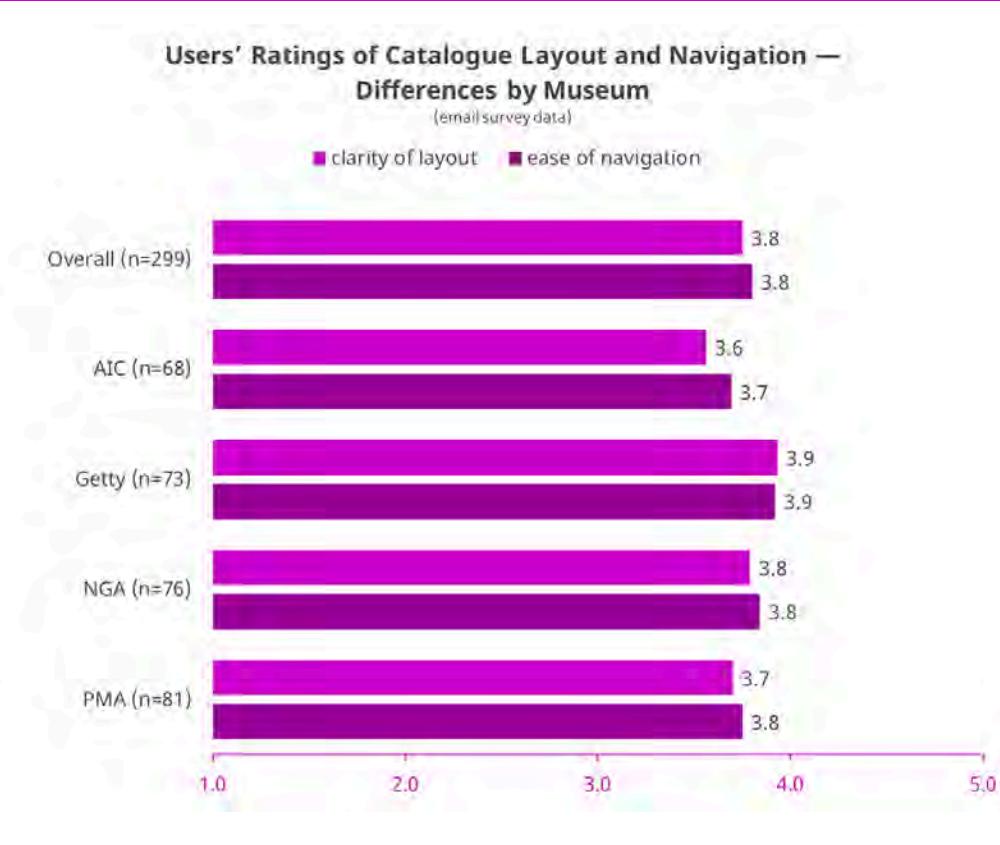
According to pop-up survey results, the AIC catalogues appear to be receiving more traffic from their members and staff than the NGA, where 63% said they had no affiliation with the institution. Due to the small sample size of PMA respondents, it is difficult to draw any conclusions about the makeup of their visitors from the pop-up survey data.

Catalogue Visitors' Relationships to the Museum — Differences by Museum (pop-up survey data)



Catalogue Layout and Navigation Scores — Breakdown by Institution

Email survey respondents were asked to provide overall ratings on the catalogue they reviewed on its clarity of layout and ease of navigation. All four catalogues reviewed received fairly high scores, with no significant differences between them. This consistency in scores despite the variation in the catalogues suggests that users are adaptable to a range of designs.



Top Landing Pages for the Catalogues

Knowing where visitors land first when they enter the catalogues is important for understanding the user experience and providing proper navigation throughout the catalogues. The analytics reviewed for this study show that the bulk of users land first on the catalogues' homepages. The NGA's *Dutch Paintings* catalogue is again the exception owing to its unique structure, which ties the catalogue into the museum's general collection pages (see The Unique Structure of the NGA's Online Editions below).

Top Landing Pages for the Digital Catalogues (analytics data)		
Catalogue	Page	% of sessions started here
Monet (ACI) n=6695 sessions	Homepage	50%
	Object entry	3%
	Homepage (url variation)	3%
Dutch Paintings (NGA) n=131,420 sessions	Object entry	9%
	Homepage	7%
	Object entry	4%
Roman Mosaics (Getty) n=5913 sessions	Homepage	42%
	Geographic grouping - North Africa	9%
	Geographic grouping - Italy	7%
Johnson Collection (PMA) n=3011 sessions	Homepage	61%
	Publications home	4%
	Homepage (different url)	3%



Top Pages Viewed in the Digital Catalogues

Considering individual artworks are driving many users' interest in these digital catalogues, the team asked whether traffic to particular artwork entries is dominating their sites' overall traffic. A glance at the top ten pages for each catalogue shows this is not the case. At the most, a single object entry might account for up to 5% of the total pageviews received by a catalogue, and this is true only of the Getty's *Roman Mosaics* catalogue. This catalogue has fewer art entries overall, so single artworks necessarily receive a higher percentage of the traffic. In the other catalogues, single artworks only account for up to 3% of the total pageviews logged. Instead, the catalogues' homepages generally receive the most traffic, although significantly less for the NGA's catalogue, owing to its unique structure (see The Unique Structure of the NGA's Online Editions below).

Top Pages Viewed in the Digital Catalogues (analytics data)		
Catalogue	Page	% of pageviews received
Monet (ACI) n=31,516 pageviews	Homepage	22%
	Object Entries Home	10%
	(Unknown - invalid url)	9%
	Object entries	3%
	Object Entries Home (url variation)	3%
	Object entry	1%
	Homepage (url variation)	1%
	Object entry	1%
	Object entry	1%
	Object entry	1%
Dutch Paintings (NGA) n=582,980 pageviews	Object entry	3%
	Homepage	3%
	Object entry	2%
	Object entry	2%
	Object entry	1%
Roman Mosaics (Getty) n=9045 pageviews	Homepage	41%
	Geographic grouping - North Africa	6%
	Object entry	5%
	Object entry	5%
	Geographic grouping - Syria	5%
	Geographic grouping - Italy	4%
	Essay - Excavations at Antioch	4%

Catalogue	Page	% of pageviews received
	Object entry	4%
	Introduction	4%
	Foreword	3%
Homepage		23%
Object Entries Homepage		5%
Essay - Timeline of the Collection		4%
Homepage (old url)		3%
Photographs and Other Images (url now invalid)		3%
Search results		3%
Essay - Object Lessons		2%
Publications home		1%
Essay - The Johnson Collection 1917 to Present		1%
Object entry		1%

-

Top Referring Sites

Top Referring Sites for the Digital Catalogues

(analytics data)

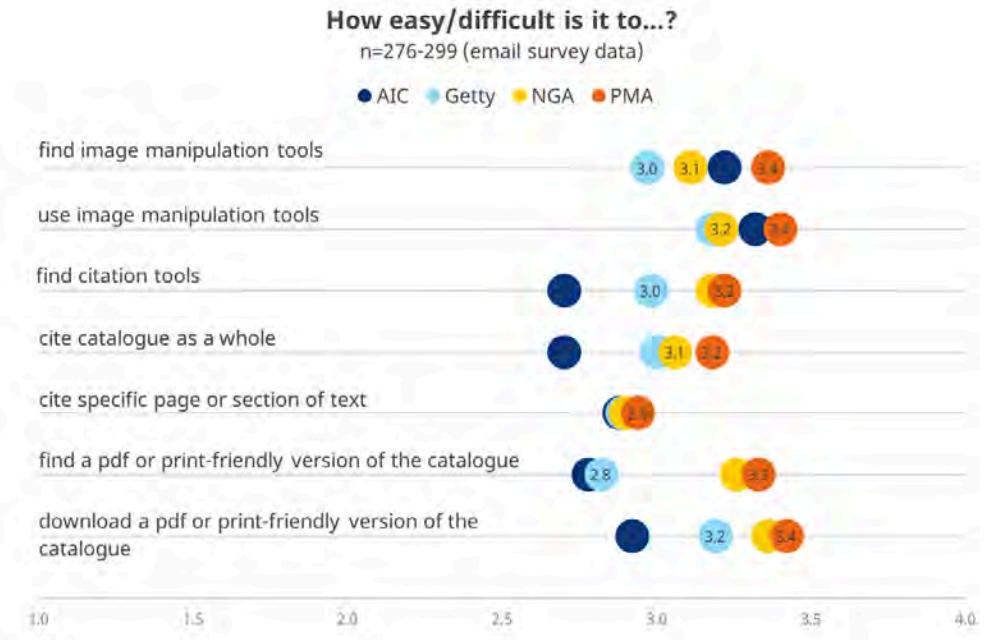
Catalogue	Source	% of sessions
Monet (ACI) n=519 sessions	labreuche-fournisseurs-artistes-paris.fr	7%
	artsandculture.google.com	6%
	en.wikipedia.org	6%
	mail.google.com	5%
	www3.nd.edu	5%
	lms.brocku.ca	4%
	aic.prod.a17.io	3%
	getty.edu	3%
	m.weibo.cn	3%
	blogs.getty.edu	3%
Dutch Paintings (NGA) n=18,801 sessions	connexus.com	26%
	brightspace.indwes.edu	5%
	m.facebook.com	5%
	classroom.google.com	4%
	wps.prenhall.com	3%
	openculture.com	3%
	essentialvermeer.com	2%
	thecatholicthing.org	2%
	thedailybeast.com	2%
	en.wikipedia.org	2%
Roman Mosaics (Getty) n=274 sessions	getty.edu	50%
	duckduckgo.com	6%
	gettydocs.volunteerportal.org	6%
	joanannlansberry.com	6%
	ku-primo.hosted.exlibrisgroup.com	6%
	netfind.com	6%
	pinterest.co.uk	6%
	t.co	6%

Catalogue	Source	% of sessions
	yandex.ru	6%
	207.246.94.144	40%
	localhost:3000	11%
	dp.la	9%
	pacscl.exlibrisgroup.com:48994	8%
Johnson Collection (PMA) n=559 sessions	omnia.le	4%
	philamuseum.createsend.com	3%
	academia.edu	2%
	arlisna.org	2%
	librarystack.org	2%
	philadelphiamuseumofart.sharepoint.com	2%



Tool Findability – Differences Between Catalogues

Email survey participants were asked to search for and use a variety of specific tools while exploring their assigned catalogue, and report back on both the ease of finding these tools and the ease of using them. For a variety of tools (but not all), the PMA's *Johnson* catalogue and the NGA's *Dutch Paintings* tended to perform better while the AIC's *Matisse* catalogue and the Getty's *Roman Mosaics* catalogue performed slightly worse.



Both the NGA and PMA group their tools in a single spot, which appealed to participants in the focus groups. The NGA also clearly labels the tools with text, while the PMA uses ScreenTips to explain the function of their tool icons. These conventions result in a slightly less streamlined design (for example, compared to the AIC's discreet gray icons) but quicker navigation for users.



Reinier Nooms, called Zeeman

Dutch, 1623 or 1624 - 1664

*Amsterdam Harbor Scene*

c. 1658

oil on canvas

overall: 61 x 81.8 cm (24 x 32 3/16 in.)

framed: 81.9 x 102.2 x 5.72 cm (32 1/4 x 40 1/4 x 2 1/4 in.)

The Lee and Juliet Folger Fund

2011.3.1

On View: West Building, Main Floor - Gallery 49

[compare](#) [download](#) [share](#)
[Cite](#) [PDF](#) [Archived Version\(s\)](#)

search this oe catalog

NGA Dutch Paintings catalogue with tools to the right of image and below

Matisse Paintings, Works on Paper, Sculpture, and Textiles at the Art Institute of Chicago
Cats. 7–8 Left: *Madame Matisse with Her Fan*, 1906 (cat. 7) Right: *Nude in a Folding Chair*, 1905

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*Madame Matisse with Her Fan*¹
Paris, 1906²
Pen and black ink over graphite on cream wove paper; 49.4 x 31.2 cm (19 1/8 x 12 in.)
Signed: *Henri-Matisse* (lower right, in pen and black ink)
The Art Institute of Chicago, gift of Dorothy Braude Edinburg to the Harry B. and Bessie K. Braude Memorial Collection. 1998.709

Cats. 7–8 Left: *Madame Matisse with Her Fan*, 1906 (cat. 7) Right: *Nude in a Folding Chair*, 1905 (cat. 8)

[PREVIOUS SECTION](#) [NEXT](#)

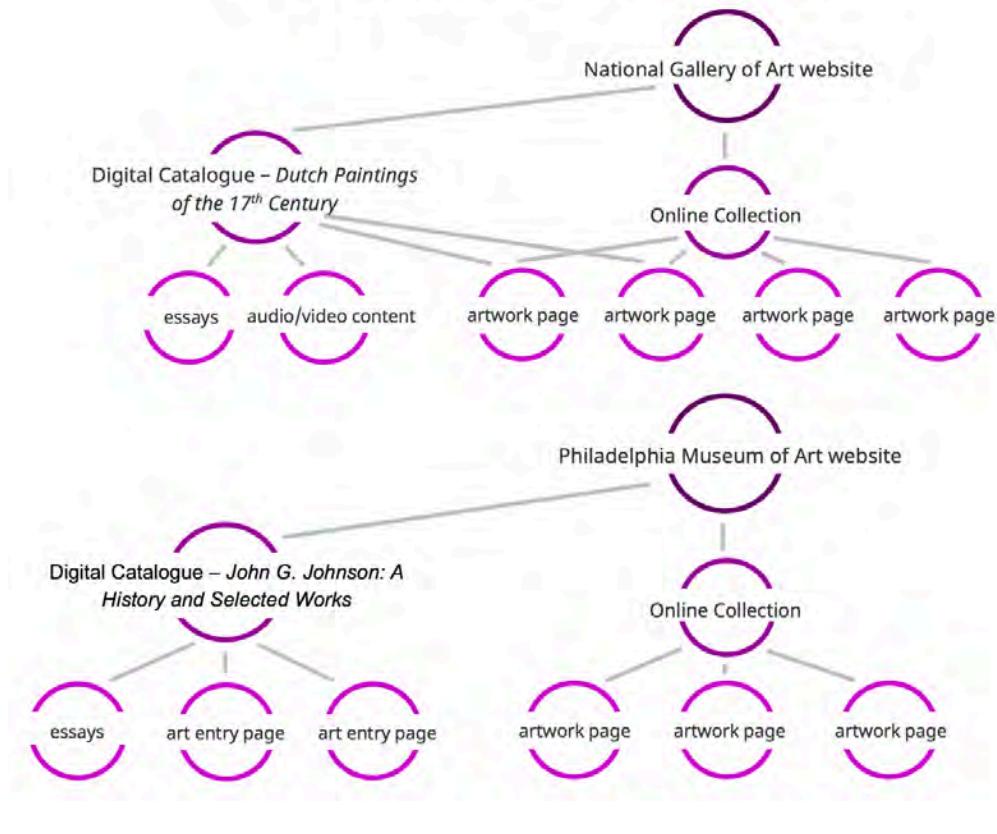
AIC's Matisse catalogue with grey menu bar at top

**The Unique Structure of the NGA's Online Editions**

Unlike the other catalogues in our study, the NGA's *Dutch Paintings* catalogue and all of their Online Editions incorporate art object pages from the museum's online collection as artwork entry pages in the catalogue, essentially allowing the pages to do double duty for the catalogue and online collection. This structure has a number of implications for

the catalogue, its visitation, and how Google Analytics tracks traffic to the catalogue. The collections pages on the NGA website receive large numbers of visitors, which Google Analytics therefore interprets as catalogue traffic, regardless of whether visitors are aware of the catalogue. As a result, the *Dutch Paintings* catalogue appears to be receiving a much higher level of traffic than the other catalogues in this study (see How much traffic are the catalogues receiving?). Its homepage, however, receives a much smaller percentage of traffic in relation to other pages in the catalogue and serves as the landing page (entry point) for only 7% of catalogue visitors. (See Top Pages Viewed and Top Landing Pages above.)

Catalogue Web Structure – NGA v. PMA



Although the structure of the NGA's catalogue means that its analytics must be interpreted with care, the art object pages have the potential to draw in additional users who otherwise might not have known about the catalogue. The challenge for the museum is helping users understand the relationship between the catalogue and the museum's online collections, and when they've crossed over from one to the other.

Appendix B

Methods in Depth



Research Plan



Analytics Review

A number of strategies were considered when undertaking the analytics review for this study. The team weighed the pros and cons of looking at all of a museum's digital catalogues versus a specific subset and in the end chose to focus on a single catalogue per museum. Knowing that each of the catalogues produced by these museums is highly unique—not only in subject matter but in the context surrounding its creation, the way it may have been marketed, the notoriety of the art or artists within it, and so on—we hoped that by focusing on just one catalogue per museum we could reduce the number of confounding variables. The catalogues selected were each originally launched within the past five years, to avoid comparing old and new publications.

Digital Catalogues Selected for Analytics Review	Initial Launch Date
Monet Paintings and Drawings at the Art Institute of Chicago	2014
Roman Mosaics in the J. Paul Getty Museum	2016
Dutch Paintings of the Seventeenth Century (NGA)	2014
The John G. Johnson Collection: A History and Selected Works (PMA)	2018

The time frame of data collection is also of importance for reviewing web analytics. The team considered focusing in on the first six months or first year after each catalogue's

initial publication, but in the end opted to look at the same one-year time frame for all four catalogues—June 1, 2018 through June 1, 2019. Knowing that the landscape of digital catalogues has changed over time, the team wished to avoid comparing data from 2014 and 2019.

Once the catalogues and time frames of interest were selected, the team identified a set of research questions that could be investigated through the analytics and chose a list of metrics to compile and compare. One concern for the team was whether or not to include analytics generated by users internal to each museum—for example, staff members who reference the catalogue for their work. Not all of the catalogues are currently set up to filter out this internal traffic, so the data reported here is representative of all users, including staff members.

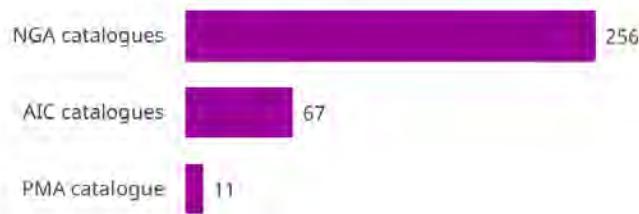
- ◆ Analytics Data (Google Sheet)



Pop-Up Survey

The pop-up survey was designed to use generic language which could apply to any of the institutions and any of their catalogues. The survey was built in Survey Monkey which produces coding that is easily embedded on any website. The NGA and AIC embedded the survey invitation on all of their catalogues (a total of six catalogues for the NGA and fourteen for AIC). The *Johnson* catalogue is the PMA's only catalogue, and the pop-up survey was also implemented there. Each institution placed a delay on their pop-up survey to allow users a chance to begin browsing the catalogue before receiving the survey invitation. The NGA chose a 10 second delay, while the PMA and AIC both used 20 second delays.

Pop-Up Survey Responses



The pop-up surveys collected a total of 334 responses over a 44-day period between late July and early September. The bulk of these responses were gathered from the NGA catalogues, possibly due to the shorter delay set on their pop-up invites.

- ◆ Pop-Up Survey Instrument (PDF)



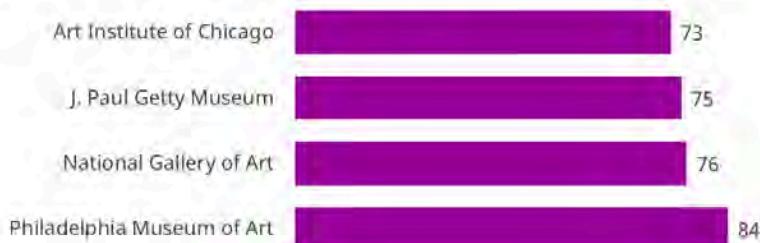
Email Survey for Potential Users

The four partner institutions each selected one catalogue to focus on for the email survey, making sure that the catalogues selected included key features that the team wanted reviewed. Participants who took the survey were randomly assigned to review a catalogue from one of the four partner institutions.

The email survey for potential users was distributed to over 1400 contacts. These contacts primarily came from mailing lists generated by the AIC/Getty/NGA/PMA team. The lists included NGA's CASVA alumni (individuals who have studied at the NGA's Center for Advanced Study in the Visual Arts), marketing targets contacted by the PMA in the course of their front-end catalogue research in 2017, and departments of art history and related disciplines at institutions of higher education across the United States and abroad. The survey was also distributed via listservs and through professional organizations that represent the target audience of the catalogues, such as Curators of Dutch Art (Codart), the Conservation distlist, and the Association of Art Museum Curators (AAMC). Participants who completed the survey were entered in a gift card drawing to incentivize participation. The survey ran for just under a month from late July to late August 2019 and collected 308 responses in that time.

The random assignment of catalogues ensured roughly even sample sizes for the four institutions. Not all participants completed the survey after beginning it, however, which resulted in slightly higher counts for some catalogues than others.

Email Survey Responses by Institution



The email survey also served as a recruitment tool for the focus groups. At the end of the survey, participants had the option to check a box if they were interested in participating in the focus groups in exchange for a \$150 honoraria.

- ◆ Email Survey Instrument (PDF)



Focus Groups

Email survey participants were able to indicate their interest in being a part of the focus groups at the end of the survey. Once the email survey had run for several weeks, this list

of potential participants was organized by profession in order to seek equal feedback from the following groups:

- ◆ museum professionals
- ◆ professors/scholars/researchers
- ◆ conservators
- ◆ librarians and archivists
- ◆ graduate students

Five individuals were recruited from each group for a total of 25 individuals. Once individuals were recruited, they were provided with their homework assignment and given approximately one week to complete it in advance of their scheduled group discussion. The homework required participants to review the same four catalogues from the survey in greater depth and provide feedback on the following:

- ◆ initial reactions to the catalogues
- ◆ catalogue structure and navigation
- ◆ artwork entries and images
- ◆ text and scholarly content (paying attention to both object entries and standalone scholarly essays)
- ◆ special features (variable by catalogue and selected by each institution)

The focus groups themselves were conducted via Zoom videoconferencing, with 4-6 individuals per group. The group discussions were used as an opportunity to debrief on the homework exercises but also to explore further questions on the catalogues' findability, utility for different types of scholarship, and other possibilities that target audiences would like to see the catalogues explore.

- ◆ Focus Group Homework (PDF)
- ◆ Focus Group Discussion Questions (PDF)

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The online edition is hosted on GitHub at <https://digpublishing.github.io/catalogues-study>, and the code and content repository can be found at <https://github.com/digpublishing/catalogues-study>.

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