



The New York Philharmonic Shelby White & Leon Levy Digital Archives

Moderated User Testing

Anna Feldman, Sayali Nikumbh, Tess Porter, Tk Cram

Pratt Center for Digital Experiences / INFO644
Usability Testing Report
December 13, 2022

Image: (New York Philharmonic Shelby White & Leon Levy Digital Archives, n.d.)

Executive Summary

The New York Philharmonic is one of the city's most prestigious cultural institutions, with a history spanning over 180 years. In 2011, they began their digital archiving project to catalog and digitize over 6 million pages of material, making their Shelby White & Leon Levy Digital Archives the “oldest and most comprehensive collection of any symphony orchestra” (New York Philharmonic Digital Archives, n.d.).

In 2020, the Digital Archives received a grant from the National Endowment for the Humanities to optimize, expand, and ensure the sustainability of their website to better serve their users. As part of this work, the Digital Archives partnered with the Pratt Institute Center for Digital Experiences to improve the discoverability and accessibility of their archival materials for a broad audience. This audience includes researchers, music students, musicologists, historians, genealogists, and casual visitors (“the general public”). The Pratt team’s goal:

1. Improve the exploratory experience for new users landing on the site, and
2. Evaluate and improve the experience for experts/researchers seeking out specific archival information.

In total, 10 moderated user tests were performed. Based on an analysis of these tests, this report presents five major findings and recommendations for the Digital Archives’ consideration:

Recommendation 1: Improve navigation usability and accessibility by updating styling, spacing, and text.

Recommendation 2: Update style and navigation elements on the carousel to make it more intuitive and accessible.

Recommendation 3: Streamline search results page with consolidated sort and filter options and highlighted search results.

Recommendation 4: Move pop-up modal underneath each filter and introduce a search bar for the filter options when opened.

Recommendation 5: Minor findings and recommendations

Table of Contents

Executive Summary	1
Introduction	3
Methodology	4
Findings and Recommendations	9
Recommendation 1: Improve navigation usability and accessibility by updating styling, spacing, and text.	11
Recommendation 2: Update style and navigation elements on the carousel to make it more intuitive and accessible.	15
Recommendation 3: Streamline search results page with consolidated sort and filter options.	18
Recommendation 4: Move pop-up modal underneath each filter and introduce a search bar for the filter options when opened.	21
Recommendation 5: Minor Findings and Recommendations	24
Conclusion	27
Appendix	28
Appendix A: User Profiles	28
Appendix B: Testing Script	29
Appendix C: Rainbow Chart	32
Appendix D: System Usability Scale (SUS) & Calculations	38
Appendix E: Consent and Pre-test Forms	41
Appendix F: Inspirations	43
References	46

Introduction

In the fall of 2022, the Pratt Institute Center for Digital Experiences partnered with the New York Philharmonic's Shelby White & Leon Levy Digital Archives to perform a usability study of their website. The study will inform website redesign decisions to be made as part of the Digital Archives' larger five-year grant project funded by the National Endowment for the Humanities.

The Pratt team met with the Digital Archives at the beginning of the project to confirm the usability study's scope and goals, and understand their mission, target audiences, and main usability questions. These goals, which framed subsequent research are as follows:

1. Improve the exploratory experience for new users landing on the site, and
2. Evaluate and improve the experience for experts/researchers seeking out specific archival information.

Our team of four UX experts conducted a total of 10 moderated user tests on Zoom over the course of two weeks. The usability study included a diverse set of participants, ranging from those with expertise with the Digital Archives to users with little to no familiarity with the Philharmonic or its archives. This report presents findings pulled from the robust quantity of data we collected from these users alongside five recommendations for addressing major issue areas.

Methodology

Test Plan

Our team selected a moderated user test methodology to conduct this usability study. Moderated user tests are a form of lab experiment that involves users as participants, is conducted in a controlled environment, and is actively moderated by a usability expert (Bierlein, 2022). We asked users to follow a “think-aloud” method and share their screens with us as they navigated a series of five tasks that tested user workflows that the Digital Archives’ team was most interested in understanding. We paired a moderator and notetaker together to facilitate each session, with the moderator prompting each user via a script to complete all tasks and the notetaker writing detailed observations for later analysis. Overall, this technique enabled our team to directly observe and share observations with each other about how participants navigated key areas of the site: what they enjoyed, and where they ran into trouble.

Once the team met with our client to confirm the study’s scope and goals, we further defined our moderated user test strategy. This included targeting specific user groups, the equipment needed to complete the tests, the format of the test sessions and tasks, and metrics collected, such as pre- and post-test questionnaires and post-task assessment questions. In order to streamline scheduling and recording of the tests, the team opted to schedule remote interviews over in-person moderated tests on Pratt’s campus. Remote moderated user testing allowed for our team to pair up moderators and note-takers based on time available, while also offering greater flexibility in recruitment, scheduling, and completing the 30-to-60 minute user tests over a two-week time period.

The overview of our remote moderated user testing strategy is included below; the full procedure and materials can be found in Appendix A: User Profiles (page 28), Appendix B: Testing Script (pages 29–31), Appendix D: System Usability Scale (SUS) & Calculations (pages 28–40), and Appendix E: Consent and Pre-test Forms (pages 41–42).

Users

The Digital Archives team took us through an overview of the site’s history and reasons for a redesign: optimizing usability and accessibility for potential and existing users. We learned that existing users are thought to be a combination of researchers regularly performing investigative searches, and non-scholarly users performing casual research — for instance, seeking records on a relative, a specific performance they attended, or a piece of music they enjoy.

With this context in mind, we identified the following three key user groups, which we named “Amateurs,” “Explorers,” and “Professors”:

- **Amateurs:** Students and other first time visitors to the digital archives site who are highly familiar with the internet and search tools. They may be looking for a specific resource, such as a piece of music or a photograph of a relative.
- **Explorers:** Young professionals with some exposure to the New York Philharmonic who are exploring what the archives have to offer.
- **Professors:** Researchers highly familiar with online archives and the Digital Archives site; specifically, those who want to do deep dive research into a subject or person.

Our team focused primarily on Amateurs (first time users) and Professors (those with site familiarity and longtime expert researchers). Explorers, while slightly more familiar with the Philharmonic, but not the archives specifically, were a secondary target group that we identified as able to potentially provide us with unique user experience insights. In recruiting across these three groups, we aimed for purposive sampling that would yield a group of test participants who were representative of all of the Digital Archives’ intended audiences (Rubin Chisnell, 2008). For moderated user testing to result in valid and useful insights, best practice is to aim for at least five user tests, but with our target user groups in mind, we aimed for roughly twice that amount in order to obtain the most robust feedback in the time we had (Nielsen, 2012). Our final user profiles can be found in Appendix A (page 28).

Recruitment

Our goal was to test between six and ten participants in total, including two to three from each target user group, especially focusing on Amateurs and Professors. To reach this goal, our recruitment strategy involved broadly calling for participants from Pratt Institute via listservs and from student groups that visited the New York Philharmonic during the recruitment period. Our call for participants included a brief description of the purpose for the study as well as the incentive of a \$10 Amazon gift card for participating. Our interest form collected basic contact information and career/study fields, as well as gauged expertise generally with the internet, research, digital exhibitions, the New York Philharmonic, and specifically with their Digital Archives site. Once the team reviewed responses and classified each respondent by target user group, we followed up with those who met our criteria in order to schedule their tests and ensure they completed our consent to participate and a pre-test questionnaire. These pre-test materials can be found in Appendix E (page 41-42).

Participants

Ten participants were recruited in total, three of which were “Experts” and seven of which were “Amateurs” or “Explorers” with varying levels of familiarity with the NY Phil. Experts included those with frequent experience working with both archives in general and the Digital Archives in particular.

Participants came from a range of industries, evenly split between Art & Design, Humanities, Education, Technology, and Business & Finance. All participants both used the internet and search engines daily, and used the internet to conduct research regularly, either on a daily or weekly basis. Four were monthly New York Philharmonic visitors, eight visited the Philharmonic website weekly or monthly, and four visited the Digital Archives site weekly or monthly. All but one participant used the internet to visit digital exhibitions regularly (daily, weekly, or monthly).

Tasks

Tasks were designed to cover the major areas identified by the client and team as important to the site’s user experience. We paired each task with a relevant “user goal,” such as the ability to do genealogical and other research, find a piece of music to play, find top news and exhibitions, and generally explore the site with ease as a new visitor. These user goals, paired with the “think aloud” method and open-ended post-task questions, allowed the team to study each user’s thought process as they navigated the site, how well the most important features and sections of the site worked for different users, and how successful users felt they had been with each task (Shade, 2017).

All tasks begin on the NY Philharmonic Digital Archives homepage:

<https://archives.nyphil.org/>.

Task 0: Once you land on the home page, tell us any first impressions, thoughts, or anything else that comes to mind.

Task 1:

- (a) Find a program that includes William Lincer, a member of the New York Philharmonic orchestra in the mid 1900s.
- (b) Once you have found a program, find an image of William Lincer that is not included in this program.

User goal: I want to find a resource connected to my family member who I know was a member of the orchestra.

Task 2:

- (a) Find the music for Tchaikovsky's Nutcracker Ballet.
- (b) Find the sheet music for a clarinet.

User goal: I want to find sheet music of a piece I want to play.

Task 3:

- (a) Find the New York Philharmonic Archives' digital exhibition about its first female musician.
- (b) Once you have found the exhibition, find out where she was born.

User goal: I want to understand what types of resources are available through the NY Phil Archives website and find something that's interesting to me.

Task 4:

- (a) Find the New York Philharmonic Archives' newly digitized set of press clipping scrapbooks, which are featured on their homepage.
- (b) Once you have found the set, locate a press clipping scrapbook that documents one of the New York Philharmonic's park concert series.

User goal: I want to explore newly digitized resources that are relevant to my research interests.

Task 5:

- (a) Now, imagine you're researching how orchestras like the New York Philharmonic reached audiences during the COVID-19 pandemic, which began around March of 2020. Find a recording of one of the virtual performances offered by the Philharmonic in the first few months of the pandemic.
- (b) Going back to your search results, which soloist performed the most times during the first few months of the pandemic?

User goal: I want to find contemporary musical recordings and records for research.

Post-task questions: (open-ended and posed after each task)

1. How difficult was this task to complete?
2. How successful do you feel you were in completing this task?

Post-test

At the end of each test session, users were asked to stay on Zoom and complete a quick System Usability Scale (SUS) survey through Google forms. The SUS survey is a nonproprietary, quick, and easy way to assess usability broadly across user interfaces using ten questions asking users to rate their responses on a five-point scale from Strongly Disagree to Strongly Agree (Bangor et al., 2009). Not only is the SUS valid as a tool to help teams generally classify systems as usable or unusable, but it is also effective when used with small sample sizes like ours (Usability.gov, 2022).

In addition to the SUS, users were asked one additional emotion-focused question (“What are five words you would use to describe the Archives site?”) to gauge their experience with the Digital Archives during our tests. All users completed the SUS, but due to an error in the survey, only five of the ten completed the final emotion-focused question. More details and results of the SUS survey can be found in “Findings and Recommendations” (page 9) and in Appendix D (pages 38–40).

Analysis

After each test, the session’s moderator and notetaker spent 5–10 minutes debriefing the session and highlighting themes that arose. Notetakers cleaned their notes while moderators uploaded the test video to share with the rest of the team, who reviewed both these items. After all tests were completed, the team consolidated notes, pulling out major successes and challenges from each task using the [rainbow sheet](#) method (Cabrera-Mieles, 2019). This method allowed the team to first identify all of the issues users experienced across all sessions, then consolidate the issues that repeated across multiple tests, and, finally, count the number of users who experienced repeat issues and sort these by severity (see more in “Findings and Recommendations” on page 9).

As a supplement to the analysis, two team members conducted an ad-hoc accessibility audit with a domain expert. They reviewed the areas of the Digital Archives most frequently visited during the user tests using the WAVE system. This helped inform the recommendations the team made as well as identify other areas of work to meet the Web Content Accessibility Guidelines (WCAG).

With the list of user issues compiled and noted by severity, our team created a series of recommendations to address each issue in order of priority, as well as a brief interpretation of the System Usability Scale (SUS) survey results. We detail these findings and recommendations in the following section.

Findings and Recommendations

Overall, participants had positive first impressions of the Digital Archives. They appreciated how clearly the Search was featured on the homepage, and often commented that the site felt welcoming in comparison to other archives sites they've visited in the past. Users also commented positively about the types of resources made available to them, often commenting how interesting it was to see markups on the digitized documents.

"It's a very well designed interface. It does match the culture of the New York Philharmonic. (...) It is not a very cutting edge or interactive interface, but I think it is appropriate considering the culture and nature of the institution being displayed."

Comment made while viewing the homepage.

Impressions of the site as a whole, however, were mixed. As discussed in *Methodology*, participants were asked what words they would use to describe the Digital Archives in the post-test survey, and their words illustrate this mixed-reaction well.

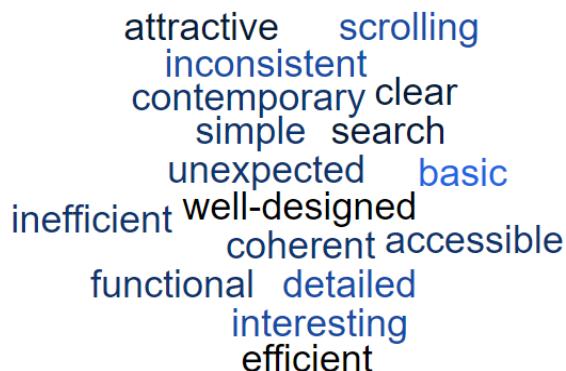


Figure 1: Word cloud generated from user responses to the post-test survey.

From this series of user tests, the Digital Archives received a raw SUS score of 60.3, equivalent to a D grade (average=68). The score is higher than 29.29% of other websites, and correlates to an "OK" rating of usability on a scale of Best Imaginable to Worst Imaginable (Bangor et al., 2009). This score is not an absolute number, but serves as an internal benchmark for testing the usability of a website after future changes and improvements are made.

We identified 48 problems, 20 of which were identified by 2+ users. Users identified an average of 8.4 problems each. These problems occurred in 6 locations: the Search Result (22), Home (10), Performance History (7), Resource (5), Features (1), and All (1) pages.

These results offer the Digital Archives a clear opportunity to improve. This report presents five detailed sets of findings and recommendations to address usability concerns selected based on their frequency and severity:

Recommendation 1: Improve navigation usability and accessibility by updating styling, spacing, and text.

Recommendation 2: Update style and navigation elements on the carousel to make it more intuitive and accessible.

Recommendation 3: Streamline search results page with consolidated sort and filter options.

Recommendation 4: Move pop-up modal underneath each filter and introduce a search bar for the filter options when opened.

Recommendation 5: Minor findings and recommendations

Each of these recommendations was directly informed by users' experiences during our tests. Each recommendation section includes both a discussion of the specific challenges users faced and a series of sub-recommendations for consideration.

Recommendation 1: Improve navigation usability and accessibility by updating styling, spacing, and text.

First impressions of the homepage and the main navigation were generally positive. Users appreciated that the search bar is featured prominently and recognized it as the main way of engaging with the Digital Archives' collection. Many users commented positively on the inclusion of the eye-catching carousel and identified it as a place to find things that the Digital Archives wanted to highlight to its visitors.

“I definitely like that the first thing I see is the ‘Search the Digital Archives’ section.”

“Nice little carousel.”

In attempting to interact with these elements, however, users ran into several issues. If solved, these revamped elements could improve the user experience of the site as a whole.

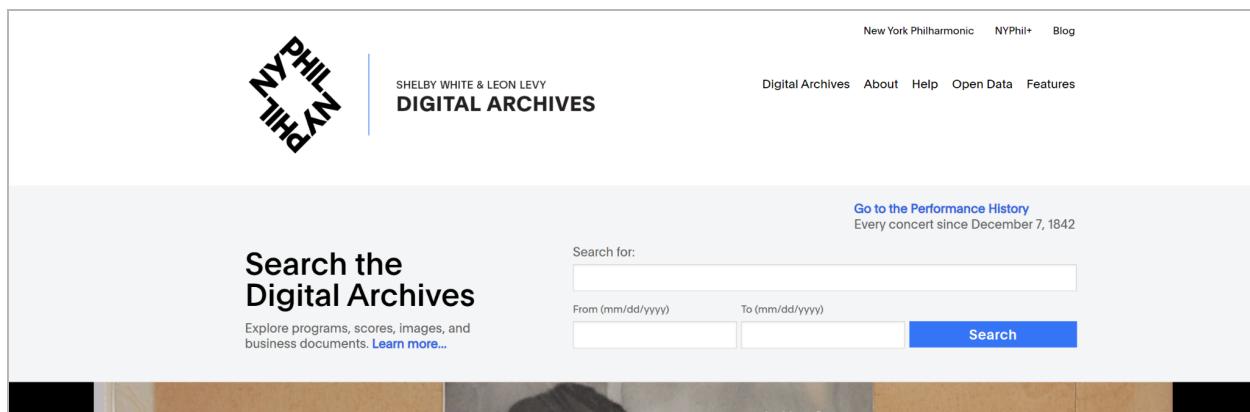


Figure 2: Main navigation and search bars on the homepage.

When visiting the homepage for the first time, several users experienced issues using the main navigation bar. Out of 10 total participants, three attempted to click the “Digital Archives” label when exploring what the site had to offer, which resulted in confusion — “Digital Archives” is the name of the homepage and is not designed to be interactive while the user is on that page. All navigation labels are styled the same regardless of whether or not they represent an active page. Their styling also matches the styling of body text and no changes occur to the labels when a user hovers over them — both signifiers that text is, or is not, interactive.

This affects usability and accessibility. WebAIM states, “Links should look like links, and nothing else should” (WebAIM, 2019). WCAG v2.1 has two accessibility success criteria that address link styling and their implementation:

- 1.4.1 Use of Color (A): Color is not used as the only visual means of conveying information, indicating an action, prompting a response, or distinguishing a visual element (W3C, 2016d).
- 2.4.8 Location (AAA): Information about the user's location within a set of Web pages is available (W3C, 2016c).

Users who interacted with the “Features” label also had difficulty understanding what it signified. Using the “Features” page was an option for completing multiple tasks in our tests, but only one user found and clicked the label to attempt to find task information.

While most users read and commented positively on the explanatory text offered under “Search the Digital Archives” about the collection’s offerings, users who were less experienced with searching archival sites, or with the New York Philharmonic, often did not understand that the Digital Archives specifically offers access to resources related to the New York Philharmonic, not traveling orchestras or other musical institutions. This confusion resulted in later issues with searching for and filtering through search results.

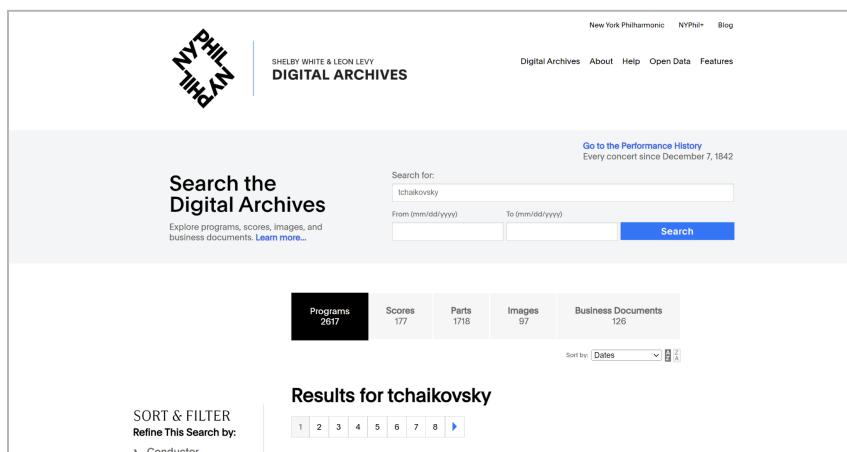


Figure 3: Screenshots of the first view of Homepage and Search Results pages.

Finally, users noted issues with the size of the navigation bar. On some browsers, such as Safari and Chrome, the size of the navigation bar pushed down the main content of the page — not just on the homepage, but also on Search Result pages — creating frustration for multiple users. One credited the size of the Navigation bar as the reason they missed the Document Type categories when searching for the part of a score.

“They’ve really made you scroll.”

Comment made while navigating past the navigation bar on a Search Results page.

“I can barely see this.”

Comment made as they were explaining that they nearly missed the carousel because of the size of the navigation bar.

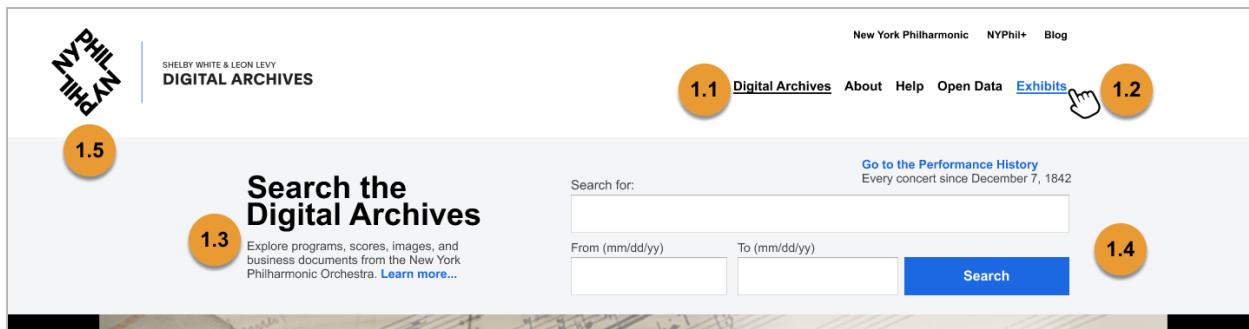


Figure 4: Annotated mockup of recommendations to improve the usability of the navigation bar.

1.1 Recommendation 1.1: Add link styling to the navigation labels to make it clear that they are interactive links and that each label on any given page signifies the active page. Per WCAG v2.1, these links should be distinguishable through means other than solely color, have a unique hover state, and display the active page. The mockup above changes all links to bold to differentiate them from body text, adds an underline to active pages, and gives them an underline and color change (#0E6AE7, Digital Archive's "brand-blue-ada") on hover.

1.2 Recommendation 1.2: Change the "Features" label to "Exhibits." The Digital Archives team may consider breaking out announcements of new digitized collections, podcasts, and other non-exhibit items into a new "Special Projects" label. Unmoderated card sorting and tree testing with users can help the team determine the most intuitive label for these section(s) (Spencer, 2004; Optimal Workshop, n.d.; Spencer, 2014).

1.3 Recommendation 1.3: Add "...from the New York Philharmonic" to the explanatory text offered about the Digital Archives' collections by the search bar. Most users in our tests did read this text, and this simple addition would make it clear to them what the site contains.

1.4 Recommendation 1.4: Shrink the top navigation slightly to ensure the primary content on all pages is emphasized. The size change in the above mockup was achieved by shrinking the height of the logo from 200 pixels to 150 pixels.

1.5 Recommendation 1.5: Make additional adjustments to improve accessibility of main navigation and search. The mockup above addresses the following WCAG v2.1 success criteria:

1. 1.5.3 Contrast (Minimum) (AA): The visual presentation of text and images of text has a contrast ratio of at least 4.5:1. All instances of the use of brand-blue

(#1276FF), which has a contrast ratio of 4.14:1 against white and 3.8:1 against the site's light gray, have been adjusted to brand-blue-ada (#0E6AE7), which has a contrast ratio of 4.95:1 against white and 4.54:1 against the site's light gray

2. 1.5.5 Target Size (AAA): The size of the target for pointer inputs is at least 44 by 44 pixels. The size of the form fields and the "Search" button have been adjusted to a height of 44 pixels.

While making these changes, the Digital Archives team may also consider adding navigation role attributes to the site's code to address WCAG v2.1 success criteria 1.3.6 Identify Purpose (AAA) (W3C, 2016b). The site already correctly marks the header, main, and footer regions, but the navigation region has not been defined. Under the same success criteria, a WAVE analysis of the homepage also determined that the form label for the "From (mm/dd/yyyy)" field is not correctly attached; however, the other form labels are working correctly.

Recommendation 2: Update style and navigation elements on the carousel to make it more intuitive and accessible.

While users often commented positively on the carousel on a first visit to the homepage, in Tasks 3 and 4 — which were designed to test the usability of finding content in the carousel — four out of 10 of users first attempted to use the search to find that content. Of the 10 total users, four described their eventual discovery of task-related content in the carousel as spontaneous and “lucky.”

"It's luck to see what the page loads on the carousel and if it wouldn't have showed up [via the automatic timing that flips through carousel banners], I wouldn't have known that it was there."

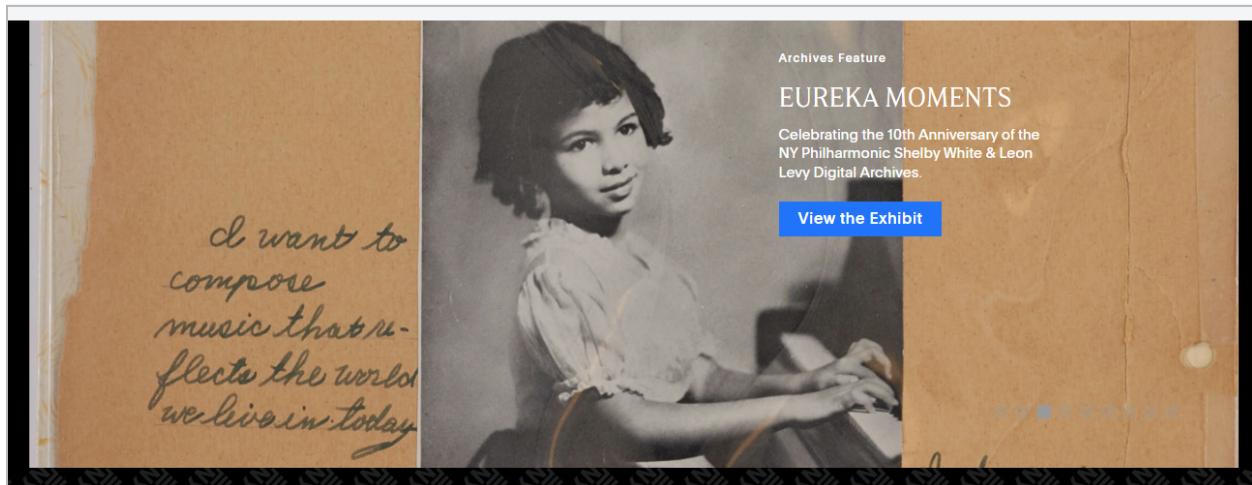


Figure 5: Screenshot of a carousel slide demonstrating hard-to-see navigation buttons.

If the user didn’t experience serendipitous discovery of the content they needed by the carousel happening to be on the correct slide when they looked, the user ran into trouble attempting to engage with and move forward through the carousel slides. There are two options to use the carousel on desktop: squares that signify how many slides there are and enable a user to navigate forward and backward, and a dragging functionality. No users attempted to use the dragging functionality, and while the squares are more straightforward, the contrast is low and few users engaged with them.

The contrast of the buttons is an accessibility issue. WCAG v2.1 1.4.3 Contrast (Minimum) (AA) requires a contrast ratio of at least 3:1 for graphics and user interface components (W3C, 2016a). The active square has a contrast of 6.14:1 against the darkest header image, but the rest land within the 2.38:1-1:1 range. The inactive have less contrast and land within 1.23:1-1.06:1.

The carousel is designed to automatically move forward, but user interaction in some form may pause it. The rules of this interaction are not obvious, and a user can become confused when the carousel stops moving, especially if they cannot see the navigation buttons.

“I think it would be helpful to have (...) more user capacity to change between the slides.”

User could not see the buttons and was waiting for the carousel to move forward on its own.

“Maybe if there’s a carousel thing that I’m missing...that’s where that’s located and I don’t know how to navigate through [it].”

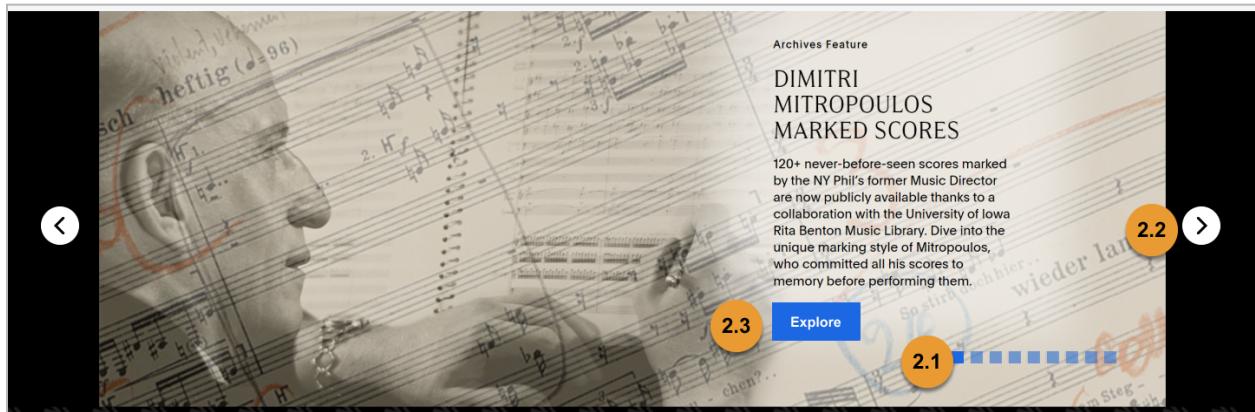


Figure 6: Annotated mockup of recommendations to improve the usability of the carousel.

Recommendation 2: Improvements should be made to the navigation options to move through a carousel. These improvements include:

2.1

2.1: Change the color of the navigation buttons. This mockup uses brand-blue-ada (#0E6AE7) at 100% for active squares and 50% for inactive squares. Note, this is not contrast accessible on all banners, so it must be used in combination with 2.2.

2.2

2.2: Navigation arrows, which are available in the Flickity carousel code, should be unhidden. This mockup uses black and white, but other color combinations can be used as long as they have a contrast of 3:1 (W3C, 2016a).

2.3

2.3: Change the color of the “Explore” buttons that appear on each header to brand-blue-ada (#0E6AE7) and the height to 44px which, as explained in Recommendation 1 (pages 11–14), is accessible by WCAG v2.1 success criteria 1.4.3 and 2.5.5.

To make this website more accessible, the Digital Archives team should consider changing the squares to buttons with ARIA roles per WCAG v2.1 success criteria 1.3.6 Identify Purpose (AAA). This will make the carousel accessible to users navigating the website using assistive technologies. Our team also noticed that the Digital Archives is using the v2.0.5 version of the Flickity carousel, which was released in October 2016. The most recent version, v2.3.0, was released in December 2021. Updating the carousel code should bring enhancements to timing, navigation, and accessibility of this widget.

The Digital Archives team may also consider redesigning their carousel or replacing it entirely with a new method to feature current exhibitions and projects to users. See Appendix F for two organizations whose current homepages may serve as helpful inspiration: the Metropolitan Museum of Art (page 44) and the Museum of Science and Industry, Chicago (page 45).

Recommendation 3: Streamline search results page with consolidated sort and filter options.

Users easily identified that the search function is a major piece of the Digital Archives, and the vast majority of them gravitated towards it immediately. Users found the search bar both clearly displayed and intuitive to use, and commented positively on the robust collection and breadth of information the site contained. However, in practice, the search results page and the results themselves could be confusing for users, requiring either further filtering to get to the information they were seeking or a complete restart of a search with different terms.

Two key issue areas arose: one with the results page's layout preventing users easily navigating and filtering search results, and the other with users obtaining inconsistent content in search results, such as receiving zero and/or incorrect results when searching for "nutcracker ballet." The first issue we address below, and the second we discuss on page 20 as an area for further investigation. Both areas highlight a disconnect between users' expected and actual experience obtaining search results; if addressed, this could streamline all site visitors' ability to find specific information from the Digital Archives.

The screenshot shows a search results page for the query "william lincer photo". At the top, there are five tabs: Programs (0), Scores (0), Parts (0), Images (8), and Business Documents (1). The "Programs" tab is highlighted with a yellow circle containing the number 1. Below the tabs, there is a "SORT & FILTER" section with a "Refine This Search by:" dropdown. Underneath, there are two collapsed filter options: "Conductor" and "Soloist". To the right of the tabs, there is a "Sort by:" dropdown set to "Dates" with ascending and descending arrows. A yellow circle containing the number 2 is placed near the sort dropdown. The main content area displays the message "No Results" and a note: "Sorry, your search for 'william lincer photo' produced no results for the 'Programs' document type. Click on another document type tab to see if there are results for other types."

Figure 7: A search for “william lincer photo” displaying two key issues with the layout of the Search Results page.

Regarding the page layout:

1

1: Search results defaulted to showing Programs results only. If there were zero Programs available for the search, users often did not notice the other Document Type filter options and thought there were 0 results total.

2

2: Many users looked for but could not find the Ascending/Descending sort options to make sense of their search results, and none used them.

Across our test sessions, users explored several different pathways to filter their search results. Some navigated the Document Type tabs to explore Programs, Scores, Parts, etc., while others chose to open the side bar with filters such as Composers, Event Types, etc. No user made use of the “Sort” drop-down on the right hand side of the search results page, despite one user specifically looking for a way to sort alphabetically.

“I need more information to know how to find this information”

“I had to use the trial and error method to find this...looking at all the formats, like documents, programs, scores, I wasn’t sure where to find all the information.”

Figure 8: Annotated mockup of search result recommendations.

There are several quick fixes we recommend that could address these challenges:

3.1

Recommendation 3.1: Consolidate sorting and filtering options.

1. We recommend renaming the left hand section “Filter” since “Sort” already exists in the drop-down menu to the right.
2. Though the Document Types (e.g. Programs) display results differently than Sort & Filter (e.g. Composer), we noticed that users usually only used one or the other option, and not both, even though they were both filters that updated search results in a similar way. Consolidating the filters would house them all in one place, further drawing users’ attention to the full range of filtering options.

- To make the “Sort” and “A-Z” feature easily discoverable, we recommend simply enlarging and adjusting the placement of the drop-down label and consolidating all options into the drop-down.

3.2

Recommendation 3.2: Display search results content intuitively for users by adding “All Results” and displaying them consistently.

- We recommend creating an “All Results” category to display the total list of search results by default. Users can then narrow down and filter results from “All Results” via existing filters.
- If an “All Results” category is not possible, then adjusting the filter categories to make the results “cascade” could help ameliorate this issue. The cascade effect means that if the Programs category yields “0” search results, the page would automatically display the next category with results listed instead. If no category had results, only then would the search results page display a “No results found” message.
- Creating consistency across the search results, regardless of the filter selected, will help the user orient themselves to the vast quantity of information they may be sifting through. We recommend following the format of the “Scores” document type, using a thumbnail image next to each result instead of icons (as seen under “Programs,” for instance).

We also recommend further investigation of the backend information organization and metadata to address inconsistencies with search results that our users experienced.

For example, one user received a page of 0 results when they searched “Tchaikovsky’s nutcracker ballet.” They corrected by searching “Tchaikovsky’s nutcracker ballet,” but received no results that ended up being relevant to their inquiry. Another user experienced the same issue of results not actually being relevant to their search when using the keyword “nutcracker ballet.”

One user remarked, after getting zero results repeatedly:

“When you’re searching and you get a lot of zeroes, you know you’re using the wrong terms.”

Search recommendations may help users align their searches to the keywords used in resource metadata and self-correct these searching errors.

Recommendation 4: Move pop-up modal underneath each filter and introduce a search bar for the filter options when opened.

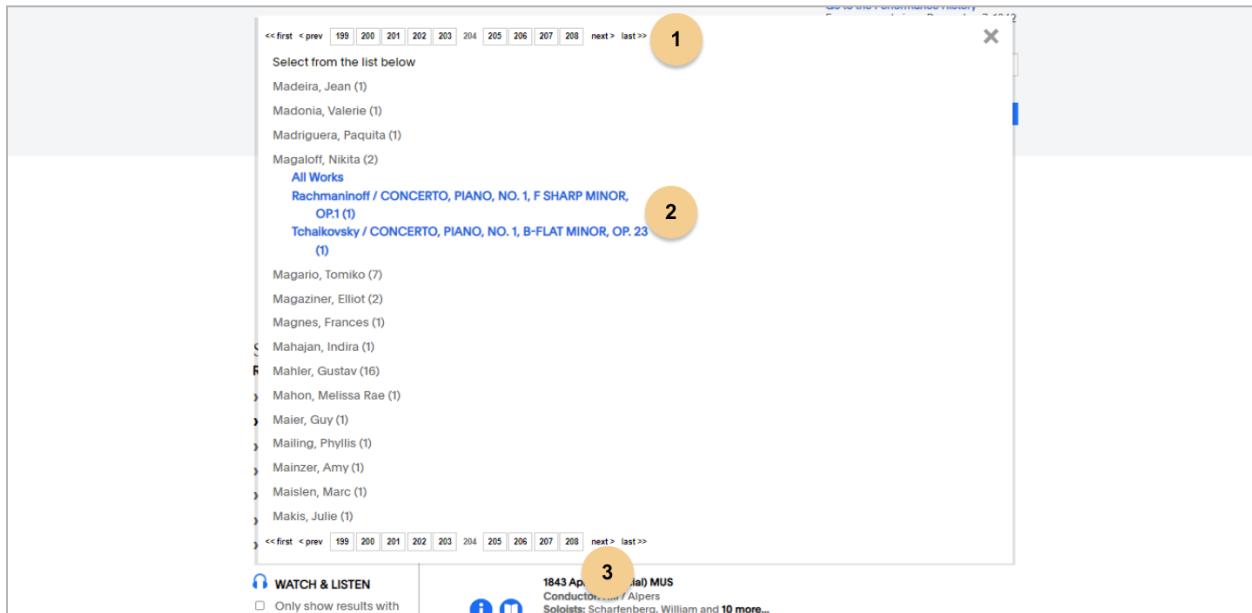


Figure 9: A search filter displaying three problems discussed in this section: 1) There are 200 pages of filter results to navigate through, 2) Clicking on the artists' name makes a dropdown menu with work both relevant and not relevant to the larger search appear, and 3) The pop-up modal overlays the majority of the users' screen, hiding the search results and the search bar.

Upon reaching the results page, users often instinctively looked under the ‘Sort & Filter’ menu to specify a specific instrument, composer, or soloist. When opening options under “Sort & Filter,” users are presented with a pop-up modal that often offers over 20 pages of results to sift through. For example, over 200 pages of filtering options appear when a user selects ‘soloists’, after searching for ‘Lincer, William’. The pop-up also covers the users’ entire screen. Users did appreciate that the results displayed were in alphabetical order, however, they frequently found navigation between multiple pages of results very time consuming.

“I don’t like skimming through all the pages, I find it very annoying.”

“There must be a better way to find an individual with this very long list.”

Additionally, when the user clicked on a soloist, conductor, or composer/work they were seeking in the Sort and Filter list, another drop-down appeared listing options that were, and were not, related to the larger search being conducted. The user was then required to find and click on the option that related to their overall search in order to be redirected back to filtered search results. Users expected to be able to click on a soloist, conductor,

or composer/work to be immediately directed back to a filtered search. This process added extra steps that created confusion for several users as they were narrowing search results and trying to reach their end goal.

The image shows a user interface for searching programs. At the top, there's a navigation bar with 'Programs 47' and other categories like 'Scores 0', 'Parts 1', 'Images 85', and 'Business Documents 24'. Below this is a 'Sort by:' dropdown set to 'Dates' with options 'Z A' and 'A Z'. The main area is titled 'Results for lincer, william' with a page navigation bar from 1 to 5.

Annotated areas:

- 4.1**: A callout points to the 'Refine This Search by:' section, which includes a 'Search.....' input field and a 'Search' button. It lists filters: 'Conductor', 'Soloist', and 'Composer / Work'.
- 4.2**: A callout points to the first result card for '1943 Nov 11 (Subscription Season) NYP'. Each result card includes a blue info icon, a blue document icon, and a small play icon.
- 4.3**: A callout points to the list of names under the search input field, such as 'Anderson, Florence (1)', 'Barber, Samuel (1)', etc.
- 4.4**: A callout points to the bottom of the left sidebar, where it says 'WATCH & LISTEN' with a play icon, and 'Only show results with' has a checkbox.

Results List:

- 1943 Nov 11 (Subscription Season) NYP
Conductor: Walter
Soloists: Schuster, Joseph and 1 more...
Location: Carnegie Hall, Manhattan, NY
- 1943 Nov 12 (Subscription Season) NYP
Conductor: Walter
Soloists: Schuster, Joseph and 1 more...
Location: Carnegie Hall, Manhattan, NY
- 1943 Nov 14 (Subscription Season) NYP
Conductor: Bernstein
Soloists: Schuster, Joseph and 1 more...
Location: Carnegie Hall, Manhattan, NY
- 1944 Feb 14 (Private Concert) NYP
Conductor: Rodzinski
Soloists: Corigliano, John, Sr. and 11 more...
Location: Hotel Plaza, Manhattan, NY
- 1944 Oct 25 (Special) MEM
Conductor: Adler
Soloists: Schuster, Joseph and 1 more...
Location: Town Hall, Manhattan, NY
- 1945 Nov 01, 02 (Subscription Season) NYP
Conductor: Szell
Soloists: Lincer, William and 1 more...
Location: Carnegie Hall, Manhattan, NY
- 1945 Nov 04 (Subscription Season) NYP
Conductor: Szell
Soloists: Lincer, William and 1 more...
Location: Carnegie Hall, Manhattan, NY
- 1946 Feb 11 (Private Concert) NYP
Conductor: Rodzinski
Soloists: Lincer, William and 3 more...
Location: Hotel Plaza, Manhattan, NY

Figure 10: Annotated mockup of recommendations to streamline Sort and Filter menu.

To address these issues, we recommend the following:

4.1

Recommendation 4.1: Move the pop-up modal underneath the filter options

To make it easier for the user to see the pop-up modal options while they're scanning through filters, we recommend moving the pop-up modal under its related filter option to appear like a drop down menu. This will give the user access to see both the filters and results at the same time.

4.2

Recommendation 4.2 : Introduce a search bar under the filter options

Implementing a search bar under the filter option allows the user to search directly for a specific filter option to find the result they're looking for more quickly than the current pagination option offers alone. Removing the top pagination options minimizes redundancy and makes room for the new search bar. Users can continue to navigate through pages using the bottom pagination options. An ellipse is added inside the pagination to give the users a better sense of the amount of filters available to them.

4.3

Recommendation 4.3 : Remove the additional layer of filtration options

To save the users time and energy from clicking several times to reach the results page of that specific soloist, conductor, or composer/work, all initial options in the list are hyperlinked. The link will direct the user directly to a filtered results page of that option (for example, work filtered by the soloist they were most interested in). Removing this additional layer of the filter will save extra clicks and confusion.

If the Digital Archives team chooses to keep the existing pop-up modal that overlays search results, we recommend removing the ‘X’ option to close the modal and add a new option for closing it that is more intuitive for users: clicking on the filter they originally clicked to open it. Currently, when a user wants to go back to the full results page, they are forced to navigate back up to click on the ‘X’ on the top right of the modal.

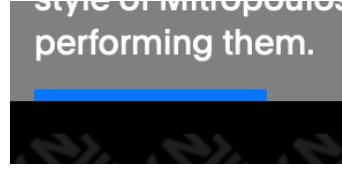
Additionally, adding a “keyboard escape” shortcut — allowing a user to press the Esc key to exit — will allow users to easily exit out of the filter and will address an accessibility barrier; no keyboard escape exists in the current pop-up modal.

For another example of how the site’s filters could function, see an interesting example from the Pratt Libraries’ search function in Appendix F (page 43).

Recommendation 5: Minor Findings and Recommendations

While the above recommendations cover the most frequently experienced issues with the most severe impact on users' experiences of the Digital Archives, users also noted other issues worth consideration. In our findings below, we detail where these issues were encountered and provide recommendations for addressing them.

Topic	Location	Problem	Recommendation
Accessibility Note: This report's recommendations have worked to address accessibility concerns wherever possible, but are in no way comprehensive. To conduct a comprehensive audit, we suggest contacting an independent accessibility auditing firm.	Sitewide	Blue content does not consistently meet color contrast.	Change all '--brand-blue' items to '--brand-blue-ada'
	Sitewide	Alt-text missing on pagination icons, information buttons	Ensure all icons have alt-text
	Search Results	Alt-text missing on result thumbnails	Ensure all images have alt-text
	Search Form	'Search from' form field isn't associated with its label (currently "search-dates-type-range")	Change label to 'search-dates-from'
	Sitewide	Keyboard users cannot tell visually where they are on the page	Add focus rings and/or hover states
	Document Viewer	Document viewer cannot be exited without browser controls (i.e. user moving back to a previous page)	Add a close button and/or 'return to information' link
	Document Viewer	When searching documents, user could not see text highlights	Increase visibility of text highlights and/or create additional markers
Metadata	Search Results	Query "Nutcracker ballet" lead to failure point	Include 'Score type' in metadata
	Search Results	Query "Press clippings, new lead to failure point	Allow for less strict searching, even as fallback

Topic	Location	Problem	Recommendation
	Search Results	Query “William Lincer image” lead to failure point	Allow document type to be searched
	Search Results	Query “First female musician” lead to failure point	Include Digital Archives articles and exhibits in search results
	Image Results	Users were unable to associate names with individuals in photos	Ensure name order matches image and/or label individuals on image
	Performance History	Virtual performances are tagged inconsistently in event type	Review virtual performances for correct tags
User Interface	Homepage	At narrow viewport sizes, ‘explore’ button is hidden behind footer 	Ensure the carousel expands to fit all text content
	Image Results	Users clicked multiple times on an image in order to open modal	Make ‘loading’ message more prominent
	Image Results	Users confused by the mismatch between stated number of images and image thumbnails	Provide feedback for images that are present in results, but yet to load e.g. thumbnail frame
	Search Results	Users confused why their filters disappeared when looking between document types	Unify and persist filters

Topic	Location	Problem	Recommendation
Links and labels Note: The label text suggested here are recommended as a starting point. We suggest conducting A/B tests to determine which labels work best for the Digital Archives specific user base.	Performance History	User uncertain of the differences between 'NY Philharmonic Ensemble' and 'New York Philharmonic' e.g.	Create modal with information about the different groups
	Search Results	Users uncertain what "555" meant in context "Press Scrapbooks"	Link to "Press Clippings" series filter rather than ID search query
	Program Details	Users attempted to click "Found in" breadcrumbs	Make breadcrumbs clickable/lead to appropriate search
	Search Results	Users uncertain what "Business documents" filter contained	Consider "Administrative documents", and potentially splitting into multiple filters
	Performance History	Users uncertain what "Performance History" contained	Consider "Search Performance History" label or "Advanced Performance Search"
Knowledge Organization	Program Details	Users occasionally missed media player to view performances	Provide skip link in results to jump to performance
	Search Results	Users wished to see how results were relevant to their search	Visually highlight keywords in metadata preview for each resource on a search results page
	Search Results	Users wished to quickly filter based on their query. E.g. "William Lincer" is on page three of the 'Soloist' filter when searching for "William Lincer."	Consider alternate rankings for filters i.e. rank by number of results, not alphabet

Conclusion

The New York Philharmonic Shelby White & Leon Levy Digital Archives is working to improve the discoverability and accessibility of the archival materials in the digital repository. To inform larger work being conducted under a five-year grant project funded by the National Endowment for the Humanities, they partnered with the Pratt Institute Center for Digital Experiences to conduct a series of remote user tests for the Digital Archives. These tests involved ten participants, ranging from amateur to expert users, completing a series of five tasks over Zoom in the presence of one moderator and one notetaker from the team. The results of these sessions, along with participant questionnaires and the team's domain knowledge, were then synthesized into the findings outlined in this report.

Participants emphasized many of the positive aspects of the Digital Archives. This included the overall aesthetic, the prominence of the search functionality, the breadth of content, and the implementation of the carousel. Unfortunately, users also experienced a variety of usability issues as they completed the test tasks, such as their search queries returning unexpected or incorrect results, failing to understand how to interact with the content, and an uncertainty as to what certain functions accomplished.

To help address these issues, the team recommends taking the following actions:

Recommendation 1: Improve navigation usability and accessibility by updating styling, spacing, and text.

Recommendation 2: Update style and navigation elements on the carousel to make it more intuitive and accessible.

Recommendation 3: Streamline search results page with consolidated sort and filter options.

Recommendation 4: Move pop-up modal underneath each filter and introduce a search bar for the filter options when opened.

Recommendation 5: Minor findings and recommendations

We believe that following these recommendations will improve the overall user experience on the Digital Archives. Improvements to site usability can be tracked by running further System Usability Scale (SUS) surveys (see “Methodology,” page 8 and “Findings and Recommendations,” page 9), and comparing new scores to the current score of 60.3. Topics for further investigation include a comprehensive accessibility audit, A/B testing of components and labels, card sorting/tree testing of the sitemap, and additional moderated user testing once changes have been implemented.

Appendix

Appendix A: User Profiles

User Profiles	Amateur Alice	Explorer Ethan	Professor Polly
Occupation	Student	Young Professional	Researcher/Academic
Product Familiarity	Never visited the site	Familiar with NY Phil, but not necessarily the Archives	Familiar with the archive
Search Experience	Google, Tik Tok	Google	Archives, Research Libraries, NY Phil Archives
Cultural Experience	Musician/music lover	NY Phil attendee and/or donor	Deeply immersed in the field
Engagement	Get in, get out	Takes time to look around	Will work to find what they're looking for
Goal	Find specific resources	See what the archives have on offer	Find out everything they can about a subject
Site requirements	Save and share archive files	Easy navigation, discoverability	Cross reference, in depth search
Recruitment Goal	2-3 participants	2-3 participants	2-3 participants

Appendix B: Testing Script

Pre-Intro

Hey, [NAME], my name's [NAME], thanks for joining us for some user testing today.

Before we formally begin and I start recording our session, I'd like to test your screen sharing capabilities. Would you please screenshare a blank browser window or a webpage of your choice?

That all seems to be working. Please keep the screenshare on. We also have live transcription on for today, if you can see that? Just to let you know, I'm going to be following a script today to ensure I'm providing the same information as my team members in each of our tests. Any questions before we begin recording?

[Once confirmed, start recording]

Introduction

Okay the recording has begun. The recording itself will only be used internally, and the results will be anonymised for the final report, which will be presented to the Client and Pratt Institute.

This is a user test of the New York Philharmonic Digital Archives on [Date]. My name is [primary], I'm a graduate student at the Pratt Institute School of Information, and I'll be conducting today's interview. We're also joined by my fellow student [secondary] who will be taking notes and helping out as needed. [participant], could you please introduce yourself with your name, occupation, and any previous experience you have with the New York Philharmonic? (If any)

[Participant Introduction]

Brief

Perfect, thank you so much for joining us today. Have you ever done any user testing before? (Y: This should all sound pretty familiar to you then. N: Don't worry, we'll walk you through it).

The way this is going to work is we're going to go to the New York Philharmonic Digital Archives website, and you'll be asked to complete a series of five tasks in increasing difficulty, each of which will have a couple of smaller steps. For each step, we'll paste the prompt into the chat as well for your reference. As you're working towards each task, we would appreciate it if you can think aloud as much as possible. So say whatever thoughts come into your head so we can get an idea of what you're thinking.

There's no pressure to complete these tasks in a certain amount of time or clicks; we're more interested in the way you'd go about this naturally. We're here to test the site and not you. If you need to take a break at any time, just let us know. The same goes If you do not want to complete a task, let us know and we'll move on to the next task. You may also end the session and leave at any time.

We may ask you some clarifying questions as you're completing each task, but we will mostly be observing. After each task, there will be some follow-up questions, and there will also be a brief survey for you to complete after the final task. In total, this shouldn't take us more than 45 minutes, so we'll be done by [time]. Any questions?

Tasks

Shall we get started then? I'm going to send you a link to the Digital Archives in the chat. For now just follow the link and, without clicking anything, have a look around the page. Tell us any first impressions, thoughts, or anything else that comes to mind.

Let's get started with our first task then.

Task 1

- **Task 1a:** Find a program that includes William Lincer, a member of the New York Philharmonic orchestra in the mid 1900s. Think aloud as you go so we can follow along.
- **Task 1b:** Find an image of William Lincer that is not included in this program.
- Post task questions:
 - How difficult was this task to complete?
 - How successful do you feel you were in completing this task?
- On to our second task. If you could please navigate back to the homepage.

Task 2

- **Task 2a:** Find the music for Tchaikovsky's Nutcracker Ballet.
- **Task 2b:** Find the sheet music for clarinet for The Nutcracker. [send in chat]
- Post task questions:
 - How difficult was this task to complete?
 - How successful do you feel you were in completing this task?
- On to our third task. If you could please navigate back to the homepage.

Task 3

- **Task 3a:** For our third task, we'd like you to visit the Archives' digital exhibition about its first female musician.

- **Task 3b:** Now that you've found the exhibition, can you tell me where this musician was born?
- Post task questions:
 - How difficult was this task to complete?
 - How successful do you feel you were in completing this task?
- On to our fourth task. If you could please navigate back to the homepage.

Task 4

- **Task 4a:** Next, without leaving the homepage, find the Digital Archives' newly digitized set of press clipping scrapbooks.
- **Task 4b:** Once you have found the set, locate a press clipping scrapbook that documents one of the New York Philharmonic's parks concert series.
- Post task questions:
 - How difficult was this task to complete?
 - How successful do you feel you were in completing this task?
- On to our fifth and final task. If you could please navigate back to the homepage.

Task 5

- **Task 5a:** Now, imagine you're researching how orchestras like the New York Philharmonic reached audiences during the COVID-19 pandemic, which began around March of 2020. Find a recording of one of the virtual performances offered by the Philharmonic in the first few months of the pandemic.
- **Task 5b:** Find out which soloist performed the most times during the first few months of the pandemic.
- Post task questions:
 - How difficult was this task to complete?
 - How successful do you feel you were in completing this task?

Debrief

Thank you for completing these tasks. If you could stop sharing your screen at this point. The last thing I'm going to ask you to do is complete a short questionnaire to record your impressions of the website and this test. I will send you the link to the questionnaire in the chat. I'll mute myself while you finish, and please let me know when you've completed it. Please also take all the time you need to do so.

[Participant completes questionnaire]

I believe that wraps up everything we have for you. Thank you for your time today. You'll receive an email follow-up in the next 24 hours confirming your participation and a form to receive your \$10 Amazon gift card, which you should receive in 7-14 business days via

email. You can reach us any time by email if you have any issues. If you're interested in having a copy of the report, please let us know. All this information will be in the follow-up email. Did you have any questions for us before we part ways?

Alright, again thank you so much for your participation, you've provided some valuable insights. Have a great rest of your day.

Appendix C: Rainbow Chart

Problem	Location	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
User has difficulty navigating through a large set of search filters; there is no way to search them or change their order from alphabetical	Search Results										
Confusion about who is who in image; unclear the order that names are listed in and how to associate them with individuals in the photo	Resource Page										
User experienced issues finding the clickable squares that allow a user to navigate through the carousel	Homepage										
Discovery of Stephanie Goldner exhibition is spontaneous - user only found the exhibition because the carousel happened to automatically move to the correct slide while looking for it.	Homepage										
Attempted to search for Stephanie Goldner exhibition in search bar by using "first female musician" or another variation which led to 0 results; user believes everything, including exhibitions, should be searchable through the search bar	Search Results										
User wants search recommendations when typing search terms; thought this would help her when receiving 0 results for "nutcracker ballet" or "Tchaikovsky's nutcracker ballet"	Search Results										
Orchestra or Group label is unclear: user doesn't understand differences between NY Philharmonic Ensembles, New York Philharmonic, Stadium-NY Philharmonic	Performance History										
User looks to navigation at the top of page to find information about exhibitions and special collections and can't find what they're looking for; Features label does not signify to the user that exhibitions can be found here	Homepage										

User attempted to click on Digital Archives in nav multiple times; when on the homepage, this is not clickable.	Homepage										
for a virtual performance, user doesn't feel like the program is necessary; says it should be smaller; User does not understand what the program for virtual performances is and how to interact with it; user expects a program similar to in-person performances; user clicks arrow icons to try move forward and receives nothing.	Resource Page										
User assumes they can filter by virtual performances in the location option, but this is not available to them.	Performance History										
Difficulty closing out of a detailed program view; user was looking for an X button where there was none	Resource Page										
Dislikes how much space the navigation bar takes up.	Homepage										
Difficulty searching for resources by terms included in program; search for "nutcracker ballet" returns no resources even though this is in the transcribed program metadata	Search Results										
Resource type filter terminology is a little confusing; not sure what program, business document mean; thinks score means only what a conductor sees, not the separate parts, too	Search Results										
User missed that navigating to the scrapbooks search linked on the homepage leads to "business documents" results, and is not able to find the resources she had previously viewed when attempting a new search from the homepage because she is redirected to "programs"	Search Results										
User believes breadcrumbs would be helpful	All										

Virtual performances are tagged inconsistently in event type; this is some, but not all virtual performances.	Performance History												
Image result loading is slow and results in user confusion as they try and understand how many results are actually available to them.	Search Results												
Thinks photos are of "Ancient times"	Homepage												
Tab filters are hidden in dropdown on mobile view	Search Results												
User doesn't like having to enter dates in homepage search. Would rather see dates presented as filters	Homepage												
User thinks carousel turns too slowly	Homepage												
User doesn't like how much they have to scroll on the website, and feels it's caused by the big navigation bar	Homepage												
User doesn't like how far down on a resource page a recording is listed; it feels like a central piece of the resource page for her, and she'd prefer it higher up	Resource Page												
User thinks using dates is required in searching from homepage	Search Results												
User having trouble distinguishing between search results; thumbnails and metadata all look very similar to them; which they had date to help distinguish them	Search Results												
User wants to see date of each resource in search results; this is important information for her; she's particular about the year of the nutcracker performance	Search Results												
User dislikes how a user must exit out of the search filter; she wants to click an option again to close it	Search Results												
User doesn't see resource type filter and doesn't realize that it restricts her search; verbally says she's trying to find a score, but she doesn't see the score option	Search Results												

Hard to find on program where OCR result is	Search Results										
Event types unclear, like "bandwagon"	Performance History										
Number by first soloist field is confusing; does this note the amount of soloists?	Performance History										
User wants to sort by all columns, but can only do so by first 9; which columns the user can sort by is not clear to the user until they hover	Performance History										
User believes the filters needed to be used in a certain order to find information, and that she's receiving different results for the same query; this stems from confusing labels that seem similar but are different	Performance History										
Wants to be able to narrow search by name of a score; not finding an option to do so	Search Results										
User doesn't feel that scrapbooks fit into the business documents category; that label is not clear to them	Search Results										
Confusion in search filter terminology; difference between conductor and composer	Search Results										
Search filters for conductor show more results than are relevant to the search; is slightly confusing	Search Results										
User doesn't like that the filters open as a popup	Search Results										
When attempting to narrow a large set of results by a subject area, like events that are part of the parks series, user first looks to search filters to narrow it, but does not find options to do so; labels for search filters for business documents are confusing. Some are also described as redundant, like "press clippings"	Search Results										
User clicked on and visited "Features" page. (Was looking for major news features; wanted to see a search box	Features										

on this page to help find the press clippings.)											
Searched for “press clippings, new” in main search bar on homepage and got no results			Search Results								
Searched for "William Lincer photo" and got no results		Search Results									
If user window is small enough, carousel navigation overlaps with "Learn More" button			Homepage								
User does not understand what the program for virtual performances is and how to interact with it; user expects a program similar to in-person performances; user clicks arrow icons to try move forward and receives nothing.			Resource Page								

Appendix D: System Usability Scale (SUS) & Calculations

System Usability Scale Questions

Responses fall on a five-point scale from Strongly Agree to Strongly Disagree for each of these questions, according to Usability.gov (2022):

1. I think that I would like to use this system frequently.
2. I found the system unnecessarily complex.
3. I thought the system was easy to use.
4. I think that I would need the support of a technical person to be able to use this system.
5. I found the various functions in this system were well integrated.
6. I thought there was too much inconsistency in this system.
7. I would imagine that most people would learn to use this system very quickly.
8. I found the system very cumbersome to use.
9. I felt very confident using the system.
10. I needed to learn a lot of things before I could get going with this system.

System Usability Scale Calculations and Results

Contents																																																																																																																																														
SUS Scoring Sheet & Reliability Test																																																																																																																																														
Paste raw SUS data (scored from 1 to 5) in the columns labeled Q1-Q10 for upto 1000 responses.																																																																																																																																														
<table><tr><td>Mean SUS Score</td><td>60.3</td><td>StDev</td><td>21.4</td><td># Non-Blank</td><td>10</td><td>Coding Check:</td><td colspan="4" rowspan="3">Values appear to be coded correctly from 1 to 5</td></tr><tr><td>Cronbach Alpha</td><td>0.866</td><td colspan="9" rowspan="2">Internal Reliability: Good</td></tr></table>											Mean SUS Score	60.3	StDev	21.4	# Non-Blank	10	Coding Check:	Values appear to be coded correctly from 1 to 5				Cronbach Alpha	0.866	Internal Reliability: Good																																																																																																																						
Mean SUS Score	60.3	StDev	21.4	# Non-Blank	10	Coding Check:	Values appear to be coded correctly from 1 to 5																																																																																																																																							
Cronbach Alpha	0.866	Internal Reliability: Good																																																																																																																																												
<table><thead><tr><th>Q1</th><th>Q2</th><th>Q3</th><th>Q4</th><th>Q5</th><th>Q6</th><th>Q7</th><th>Q8</th><th>Q9</th><th>Q10</th><th>Scales</th></tr><tr><th>I think th: I found this s: I thought</th><th>I think th: I found the</th><th>I thought</th><th>I would in I found th</th><th>I felt very</th><th>I needed</th><th></th><th></th><th></th><th></th><th>SUS</th></tr></thead><tbody><tr><td>4</td><td>2</td><td>1</td><td>3</td><td>4</td><td>2</td><td>2</td><td>2</td><td>4</td><td>2</td><td>60.3</td></tr><tr><td>4</td><td>2</td><td>4</td><td>1</td><td>5</td><td>1</td><td>3</td><td>1</td><td>4</td><td>2</td><td>57.8</td></tr><tr><td>5</td><td>3</td><td>2</td><td>2</td><td>3</td><td>4</td><td>4</td><td>2</td><td>5</td><td>1</td><td>62.5</td></tr><tr><td>3</td><td>4</td><td>2</td><td>1</td><td>2</td><td>4</td><td>3</td><td>4</td><td>3</td><td>3</td><td>34.4</td></tr><tr><td>4</td><td>4</td><td>3</td><td>5</td><td>3</td><td>4</td><td>1</td><td>4</td><td>1</td><td>4</td><td>27.5</td></tr><tr><td>4</td><td>1</td><td>4</td><td>1</td><td>3</td><td>2</td><td>4</td><td>2</td><td>5</td><td>1</td><td>82.5</td></tr><tr><td>5</td><td>5</td><td>1</td><td>3</td><td>2</td><td>4</td><td>1</td><td>4</td><td>2</td><td>2</td><td>78.1</td></tr><tr><td>5</td><td>3</td><td>5</td><td>3</td><td>5</td><td>5</td><td>1</td><td>3</td><td>5</td><td>5</td><td>62.5</td></tr><tr><td>4</td><td>2</td><td>4</td><td>1</td><td>4</td><td>1</td><td>5</td><td>1</td><td>5</td><td>1</td><td>55.0</td></tr><tr><td>4</td><td>2</td><td>3</td><td>1</td><td>4</td><td>4</td><td>3</td><td>3</td><td>3</td><td>2</td><td>90.0</td></tr></tbody></table>											Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Scales	I think th: I found this s: I thought	I think th: I found the	I thought	I would in I found th	I felt very	I needed					SUS	4	2	1	3	4	2	2	2	4	2	60.3	4	2	4	1	5	1	3	1	4	2	57.8	5	3	2	2	3	4	4	2	5	1	62.5	3	4	2	1	2	4	3	4	3	3	34.4	4	4	3	5	3	4	1	4	1	4	27.5	4	1	4	1	3	2	4	2	5	1	82.5	5	5	1	3	2	4	1	4	2	2	78.1	5	3	5	3	5	5	1	3	5	5	62.5	4	2	4	1	4	1	5	1	5	1	55.0	4	2	3	1	4	4	3	3	3	2	90.0
Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Scales																																																																																																																																				
I think th: I found this s: I thought	I think th: I found the	I thought	I would in I found th	I felt very	I needed					SUS																																																																																																																																				
4	2	1	3	4	2	2	2	4	2	60.3																																																																																																																																				
4	2	4	1	5	1	3	1	4	2	57.8																																																																																																																																				
5	3	2	2	3	4	4	2	5	1	62.5																																																																																																																																				
3	4	2	1	2	4	3	4	3	3	34.4																																																																																																																																				
4	4	3	5	3	4	1	4	1	4	27.5																																																																																																																																				
4	1	4	1	3	2	4	2	5	1	82.5																																																																																																																																				
5	5	1	3	2	4	1	4	2	2	78.1																																																																																																																																				
5	3	5	3	5	5	1	3	5	5	62.5																																																																																																																																				
4	2	4	1	4	1	5	1	5	1	55.0																																																																																																																																				
4	2	3	1	4	4	3	3	3	2	90.0																																																																																																																																				
<table><thead><tr><th></th><th>Usability</th><th>Learnability</th></tr></thead><tbody><tr><td>1</td><td>60.0</td><td>59.4</td></tr><tr><td>1</td><td>82.5</td><td>81.3</td></tr><tr><td>1</td><td>67.5</td><td>62.5</td></tr><tr><td>1</td><td>42.5</td><td>34.4</td></tr><tr><td>1</td><td>27.5</td><td>31.3</td></tr><tr><td>1</td><td>82.5</td><td>100.0</td></tr><tr><td>1</td><td>32.5</td><td>25.0</td></tr><tr><td>1</td><td>55.0</td><td>62.5</td></tr><tr><td>1</td><td>90.0</td><td>100.0</td></tr><tr><td>1</td><td>62.5</td><td>87.5</td></tr></tbody></table>												Usability	Learnability	1	60.0	59.4	1	82.5	81.3	1	67.5	62.5	1	42.5	34.4	1	27.5	31.3	1	82.5	100.0	1	32.5	25.0	1	55.0	62.5	1	90.0	100.0	1	62.5	87.5																																																																																																			
	Usability	Learnability																																																																																																																																												
1	60.0	59.4																																																																																																																																												
1	82.5	81.3																																																																																																																																												
1	67.5	62.5																																																																																																																																												
1	42.5	34.4																																																																																																																																												
1	27.5	31.3																																																																																																																																												
1	82.5	100.0																																																																																																																																												
1	32.5	25.0																																																																																																																																												
1	55.0	62.5																																																																																																																																												
1	90.0	100.0																																																																																																																																												
1	62.5	87.5																																																																																																																																												

Raw Data*		Stats	Results																																	
60.0 82.5 67.5 42.5 27.5 82.5 32.5 55.0 90.0 62.5		* Confidence Level: 95%																																		
		Descriptive Stats	Confidence Interval	Low High																																
		Mean 60.3		44.95 75.55																																
		Standard Deviation 21.4	Margin of Error 15.30																																	
		n 10																																		
How to Report																																				
We can be	95.0%	confident the population SUS Score is between	44.95	and 75.55																																
We can be	97.5%	confident the population mean SUS Score is above	44.95																																	
Calculations <table border="1"> <tr><td>alpha</td><td>5%</td></tr> <tr><td>Test Value</td><td></td></tr> <tr><td>SD</td><td>21.39087292</td></tr> <tr><td>Mean</td><td>60.3</td></tr> <tr><td>Using Difference</td><td>60.250</td></tr> <tr><td>SEM</td><td>6.764387958</td></tr> <tr><td>t-critical value</td><td>2.262157163</td></tr> <tr><td>Margin</td><td>15.30210867</td></tr> <tr><td>Low</td><td>44.9</td></tr> <tr><td>High</td><td>75.6</td></tr> <tr><td>Additional Descriptives</td><td></td></tr> <tr><td>Median</td><td>61.3</td></tr> <tr><td>Mean</td><td>60.3</td></tr> <tr><td>Min</td><td>28</td></tr> <tr><td>Max</td><td>90</td></tr> <tr><td>CV</td><td>0.35504</td></tr> </table>					alpha	5%	Test Value		SD	21.39087292	Mean	60.3	Using Difference	60.250	SEM	6.764387958	t-critical value	2.262157163	Margin	15.30210867	Low	44.9	High	75.6	Additional Descriptives		Median	61.3	Mean	60.3	Min	28	Max	90	CV	0.35504
alpha	5%																																			
Test Value																																				
SD	21.39087292																																			
Mean	60.3																																			
Using Difference	60.250																																			
SEM	6.764387958																																			
t-critical value	2.262157163																																			
Margin	15.30210867																																			
Low	44.9																																			
High	75.6																																			
Additional Descriptives																																				
Median	61.3																																			
Mean	60.3																																			
Min	28																																			
Max	90																																			
CV	0.35504																																			

Contents

Comparing a SUS Score to a Benchmark (1-Sample t-test)
 Paste the Raw Data in the 1st Column—Remove Non Numeric Values
 * Required Fields

Raw Data*		Input		Results	
60.0		* Benchmark	<input type="text" value="68"/>	Difference (Mean SUS Score - Benchmark)	-7.8
82.5				p-values	
67.5				Population Mean < Test Mean	0.85927
42.5				Population Mean = Test Mean	0.28147
27.5	Confidence Level: 95%				
82.5					
32.5					
55.0					
90.0					
		Descriptive Stats		Confidence Interval	
62.5	Mean	60.3		Low	44.95
	Standard Deviation	21.4		High	75.55
	n	10	Margin of Error	15.30	
			Power	0.18953	
How to Report					
There is a	14.0733% chance the population SUS mean is above			68.00	
We can be	97.5% confident the population mean is above			44.95	
We can be	95.0% confident the population mean is between			44.95	and
We can be	95.0% confident the difference between population and test mean is			-7.55	23.05

Calculations			
alpha	5%	Test statistic	-1.145706019
Test Value	68	2 Sided p-value	0.2814666332
SD	21.39087292	1-p	0.7185333668
Mean	60.3	1 Sided p-value	0.1407333
Using Difference	-7.750	1-p	0.8592667
SEM	6.764387958	Probability Above Test Value	0.1407333
t-critical value	2.262157163	Probability Below Test Value	0.8592667
Margin	15.30210867		
Low	44.9		
High	75.6		
Additional Descriptives		Effect Size & Power	
Median	61.3	Cohen's D	0.51238
Mean	60.3	Tails	2.00000 1
Min	28	Standard Deviate	1.95996 1.6448t
Max	90	Power	0.18953 0.2937t
CV	0.35504	Beta	0.81047
		Population Mean > Test Me	0.1407333

Copyright © 2004-2011 Measuring Usability LLC

Converting a Raw SUS Score to a Percentile Rank

* Required Fields

Input	Results
Raw SUS Score*	60.3 Percentile Rank 29.3%
SUS Benchmark	Adjective : OK Grade (Bangor): D Grade (Sauro & Lewis): D Acceptability: Marginal
Reporting	
A raw SUS score of	60.3 has a higher SUS score than 29.29% of All Products
Calculations	
Actual Benchmark	68.000
Reflected Score	39.8
Reflected Benchmark	32
Ln Reflected Score	3.68
Ln Reflected Benhmark	3.466
Population SD	12.500
Ln SD	0.3980666
z	0.545
Reflected %	0.707
%	0.293

Copyright © 2004-2011 Measuring Usability LLC

Appendix E: Consent and Pre-test Forms

New York Philharmonic Archives Usability Study:

The purpose of these usability tests is to evaluate the desktop/laptop experience for the New York Philharmonic's Shelby White & Leon Levy Archives website (archives.nyphil.org). We are interested in determining if people can accomplish desired tasks and easily find information housed on the site. The session is not a test of your ability to complete the tasks; it is meant to gather insights on areas of improvement for the Archives website. Please be advised that there are no risks associated with participation in this session.

Procedure: During this session, the following will occur:

- I will log on to Zoom to join the session with two researchers at our scheduled time.
- I will share my video and my screen.
- I will be given tasks using the Archive's website. While completing these tasks, I will be asked to "think aloud" to verbalize my thought process.
- Members of the Pratt Center for Digital Experiences will observe and take notes via Zoom. My actions on a computer will be captured via screen recording. Audio, photos, and/or video may be recorded from the session for future review.
- I will complete a brief online post-test questionnaire after the test is complete.
- The session will last no longer than 45 minutes (including time for pre and post-test activities).

If for any reason you are uncomfortable during the session and do not want to complete a task, you may say so and we will move on to the next task. You may take a break at any time. You may also end the session and leave at any time.

Confidentiality: Approximately 8 people will participate in this study. Results from all sessions will be included in a usability report and presentation for the Archives' representatives and a Usability graduate-level class at Pratt Institute. Your name will not be included in the report, nor will your name be associated with any session data collected unless disclosure is required by law.

Contact: If you wish to speak with someone about your participation in this study, or if you feel you were not treated as described above, please contact [team emails].

Statement of Consent: I have read and fully understand the extent of the study and any risks involved. All of my questions, if any, have been answered to my satisfaction. My signature below acknowledges my understanding of the information provided in this form and indicates my willingness to participate in this user testing session.

Signature of participant & date: _____

Pre-test questionnaire:

Please type your signature: _____

Date: _____

What internet browser do you typically use?

- Google Chrome
- Firefox
- Internet Explorer
- Safari
- Opera & Brave

What operating system do you typically use?

- Mac OS
- Windows
- Linux

What device do you typically use to browse websites?

- Laptop or Desktop
- Mobile
- Tablet

Which of the following describes your highest completed level of education?

- High School graduate
- Undergraduate
- Graduate
- PhD

Which age group do you belong to?

- 18-24
- 25-39
- 40-59
- 60-74
- 75+

What gender do you identify as?

- Female
- Male
- Prefer not to say
- Self-identify

If you selected "Self-identify" above, please feel free to enter more below:

Appendix F: Inspirations

This screenshot shows a pop-up filter modal titled "Subject". It displays a list of search results with columns for "Name" and "Hit Count". The results are as follows:

Name	Hit Count
research paper	152,070
research-article	151,994
tomography, x-ray computed	122,801
review-article	78,386
general review	78,369
computed tomography	78,051
cats	74,339
engineering	70,172
cat-engg	69,819

At the bottom of the modal are two buttons: "Update" and "Cancel".

Figure F1 (top): Example of a pop-up filter modal from the [Pratt Library](#). Demonstrates multiple filter selects, scrolling (non-paginated) results, and ordering filters by result count.

Figure F2 (right): Example of a drop down filter menu from the [Pratt Library](#). Demonstrates date slider, collapsable filter categories, ordering filters by result count, and limiting total filters immediately viewable, with an option to show full list (Figure F1).

This screenshot shows a drop-down filter menu titled "Subject". It includes a date range selector ("From: 1581" and "To: 2023") and a "Show More" button. Below these are sections for "Source Types" and "Subject".

Source Types

- All Results
- Academic Journals (1,277,830)
- Conference Materials (257,536)
- Magazines (167,908)
- News (142,172)
- Reviews (47,110)

Show More

Subject

- research paper (152,070)
- research-article (151,994)
- tomography, x-ray computed (122,801)
- review-article (78,386)
- general review (78,369)
- computed tomography (78,051)

Show More

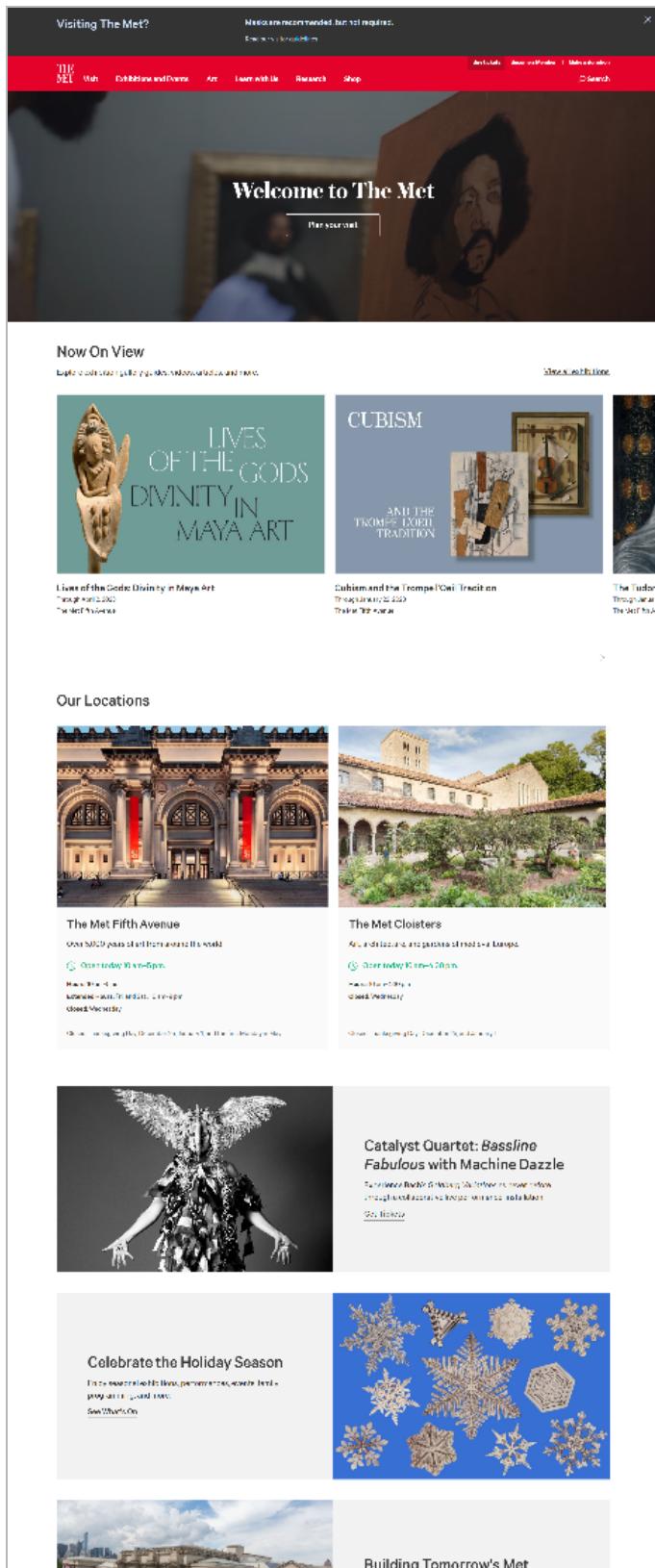


Figure F3: Screenshot of [The Metropolitan Museum](#) home page taken on December 13, 2022. Here, instead of a carousel, the Met provides a few different pieces of content: a scrolling list of modules that display current exhibitions, location information, and a list of modules that feature current special items like exhibitions, events, and more. A scrolling list of modules like this may work well for the Digital Archives to feature information that is currently hidden in the carousel. Moving this information into a scrolling list may also help the Digital Archives more prominently highlight its main feature: search.

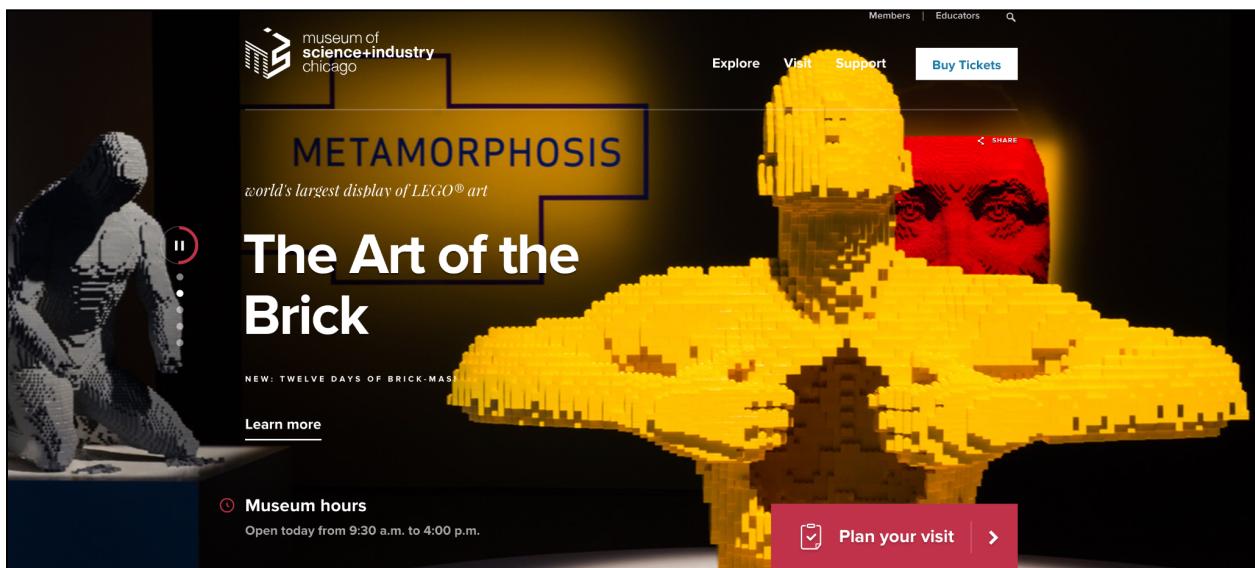
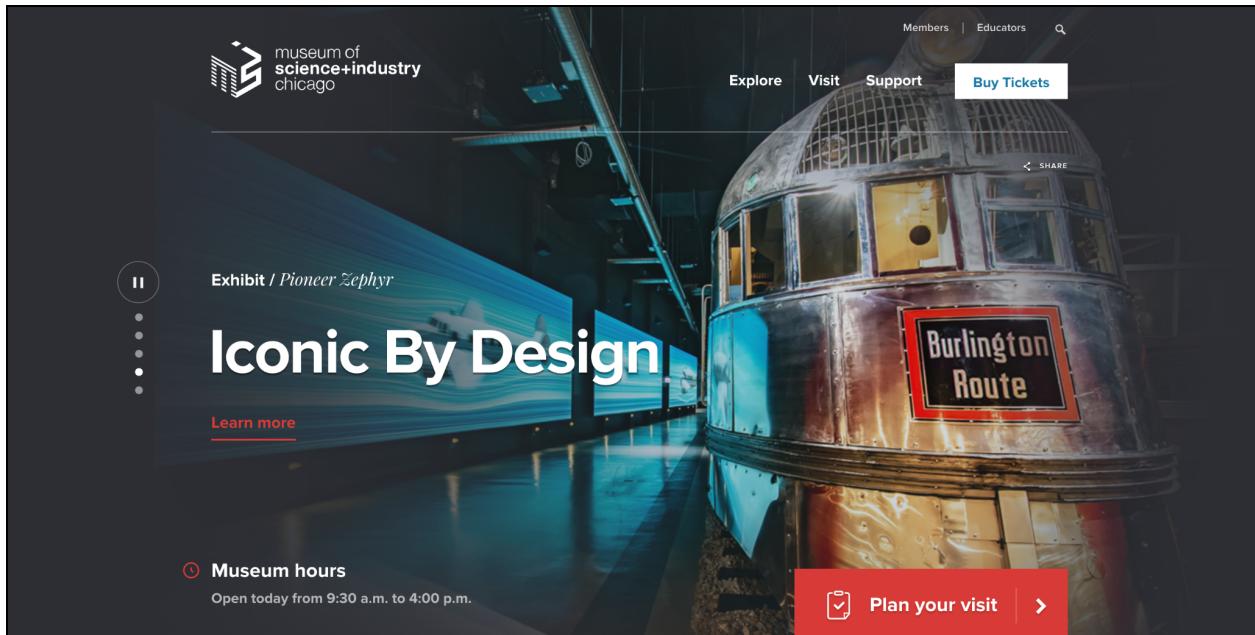


Figure F4: Screenshots of the interactive carousel from the [Museum of Science and Industry in Chicago's website](https://www.msichicago.org/) (<https://www.msichicago.org/>), taken on December 13, 2022. Note the “pause” button surrounded by a circle above the buttons. This layout, with the clearly shown vertical buttons and timer directly above them, is an example of an accessibility feature that gives users immediate temporal feedback and context for the changing carousel slides, as well as an option to pause their movement.

References

Bangor, A., Kortum, P., & Miller, J. (2009). Determining What Individual SUS Scores Mean: Adding an Adjective Rating Scale. *Journal of Usability Studies*, 4(3), 114-123.
<https://uxpajournal.org/determining-what-individual-sus-scores-mean-adding-an-adjective-rating-scale/>

Bierlein, I. (2022) INFO644-03 Week 09: Meet with Clients & Testing Prep Part 2. Pratt Institute, delivered November 1, 2022.

Bierlein, I. (2022) INFO644-03 Week 10: Testing Prep Part 3. Pratt Institute, delivered November 8, 2022.

Cabrera-Mieles, Z. (2019). The Rainbow Sheet: A Visual Method for Research Analysis. UX Collective. Retrieved from:
<https://uxdesign.cc/the-rainbow-sheet-a-visual-method-for-research-analysis-a7e7d2011058>

New York Philharmonic Digital Archives (n.d.). <http://archives.nyphil.org>

Nielsen, J. (2012). *How Many Test Users in a Usability Study?* NN Group.
<https://www.nngroup.com/articles/how-many-test-users/>

Optimal Workshop. (n.d.). *Tree Testing 101*.
<https://www.optimalworkshop.com/learn/101s/tree-testing/>

Rubin, J., & Chisnell, D. (2008). Handbook of Usability Testing, Second Edition. Indianapolis, IN: Wiley Publishing. Retrieved from:
<https://www.dropbox.com/s/t1d53lh22w2l3yj/Rubin%20%26%20Chisnell%20-%20Ch.%208%20-%20Prepare%20Test%20Materials.pdf?dl=0>

Shade, Amy. (2017, April 9). Write Better Qualitative Usability Tasks: Top 10 Mistakes to Avoid. <https://www.nngroup.com/articles/better-usability-tasks/>

Spencer, D. (2014, July 4). *How to Test an Information Architecture*. UX Mastery.
<https://uxmastery.com/testing-information-architecture/>

Spencer, D. & Warfel, T. (2004, April 7). *Card Sorting: A Definitive Guide*. Boxes and Arrows.
<https://boxesandarrows.com/card-sorting-a-definitive-guide/>

Steffy Goldner online exhibition banner. (n.d.). New York Philharmonic Shelby White & Leon Levy Digital Archives. <https://archives.nyphil.org/>

The Complete Guide to User Testing Websites, Apps, and Prototypes. (2016). Mountain View, CA: UserTesting. Retrieved from:

<https://www.dropbox.com/s/wkppzhfdmqp1i34/Complete%20Guide%20to%20User%20Testing%20%28UserTesting%29.pdf?dl=0>

Usability.gov. (2022). System Usability Scale (SUS). Retrieved from:

<https://www.usability.gov/how-to-and-tools/methods/system-usability-scale.html>

WebAIM (2019, October 24). *Links and Hypertext - Link Text and Appearance*.

https://webaim.org/techniques/hypertext/link_text

W3C. (2016a). *Contrast (Minimum) | Understanding Success Criterion 1.4.3*.

<https://www.w3.org/WAI/WCAG21/Understanding/contrast-minimum.html>

W3C. (2016a). *Identify Purpose | Understanding Success Criterion 1.3.6*.

<https://www.w3.org/WAI/WCAG21/Understanding/identify-purpose.html>

W3C. (2016b). *Location | Understanding Success Criterion 2.4.8*.

<https://www.w3.org/TR/UNDERSTANDING-WCAG20/navigation-mechanisms-location.html>

W3C. (2016c). *Use of Color | Understanding Success Criterion 1.4.1*.

<https://www.w3.org/TR/UNDERSTANDING-WCAG20/visual-audio-contrast-without-color.html>