MICHIGAN STATE UNIVERSITY | Usability/Accessibility Research and Consulting

To: Robert Van Rennes, Big Ten Academic Alliance
From: Grey L. Pierce, MSU Usability/Accessibility Research and Consulting
Subject: HathiTrust High-Level Accessibility Evaluation for the Library Accessibility Alliance
Date: June 17, 2020

MSU Usability/Accessibility Research and Consulting (MSU UARC) conducted a high-level accessibility evaluation of the HathiTrust platform to evaluate its conformance with WCAG 2.1 AA Criteria. This evaluation did not include all functionality or content of the site or all WCAG 2.1 AA Success Criteria.

During this evaluation, a number of issues were found that will make some site content impossible to use for some individuals with disabilities and will make the site difficult to use for many others.

Critically, some content cannot be used when assistive technologies are enabled. Users that rely on assistive technologies such as screen readers, including individuals with visual and reading impairments, must be able to reach and use all content when those technologies are enabled.

Keyboard users, including screen reader users and users with dexterity impairments, will find it impossible to access or use some site content. Some content cannot be reached or operated via keyboard when a screen reader is active, making it impossible to access for users that employ those technologies. Focus order is incorrect in some places, increasing the difficulty of using the site with a keyboard, and many interactive elements lack a sufficiently visible focus indicator, making it difficult for many keyboard-only users to effectively use them, as they cannot determine when they have reached the correct element. Modifying some inputs also causes page content to unexpectedly change.

Individuals with visual impairments, including those that rely on screen readers, will also have problems using the site. Some content is not read out correctly and structural information (e.g., headings) is not appropriately conveyed to users, making it difficult or impossible to understand content and organization in places. Many form inputs are not appropriately labeled, making those inputs difficult or impossible to use for those that rely on screen readers. Custom elements do not correctly announce themselves to screen readers, making them difficult to understand and use. Many images have inappropriate or missing alternative text, significantly impacting users with visual impairments (most notably, OCRed text from scanned book pages is inaccurate).

Other issues were found that will make it difficult for users with a variety of disabilities to effectively use the system, including insufficient color contrast for text and meaningful visual elements, use of color alone to convey information, inability to appropriately dismiss hover content, content being removed when the viewport or text size is changed, insufficient link context, and problems bypassing repeated navigation.

To improve access for users with disabilities, MSU UARC recommends a full WCAG 2.1 AA evaluation and that the problems discovered be remediated.

Note: Results for "William Shakespeare" were used as an example of a Search Results page and "A midsummer night's dream illustrated by Helen Stratton; with songs set to music by T. Maskell Hardy" was used as an example of a Book page.

For reference, screenshots of the Home page (wide, medium, and narrow viewport widths) at the time this evaluation was completed has been included at the end of this memo.

High-Level Findings

Conformance

- Contents of the "About" dropdown (or "About" section of the Menu dropdown, depending on viewport width/text size) in the main navigation cannot be reached via keyboard when a screen reader is in use. [WCAG 2.1 CR 4, WCAG 2.1 SC 2.1.1]
- On the Book page, arrow keys cannot be used to control screen readers when focus is on page navigation buttons. [WCAG 2.1 CR 4]

Document Structure

- Headings are not appropriately structured throughout the site. [WCAG 2.1 SC 1.3.1]
    - An invisible h1 is present at the start of all pages
    - On the Home page, "HATHI TRUST Digital Library" graphic should be tagged as a heading (h1)
    - On the Home page, an invisible "News and Projects" h2 is present before "About HathiTrust"
    - On the Home page, "About HathiTrust" and "Latest Tweet from @hathitrust" should be tagged as h2s, not h3s
    - On the Book page, invisible "Catalog Record Details" and "Search in this volume" headings are present
    - On the Book page [medium and narrow viewport], "Options" should be tagged as an h2, not an h3, and its subheadings (e.g., "About this Book") should be tagged as h3s
    - On the Book page [medium and narrow viewport], an invisible "View Options" heading is present after the "Options" heading
    - On the Advanced Search page, "Advanced Full-text Search" should be tagged as an h1, not an h2
    - On the Advanced Search page, "Additional search options" should be tagged as an h2, not an h3
    - On the Advanced Search page, "View Options", "Date of Publications", "Language", and "Original Format" should be tagged as h3s, not h4s
    - On the Advanced Search page, an invisible "Search by field" heading is present
- On the Book page, content that is not on screen is read out. For example, on the Flip Page Scans variant, if the user moves to the next page and then goes back a page, the next page's contents are read out after the current one, and in the View Thumbnails variant, loading messages for pages that are not onscreen (e.g., "31 button load page") are read out. [WCAG 2.1 SC 1.3.2]
- On the Search Results page, invisible "Choose a collection" text is read by screen readers before the "Select Collection" dropdown. [WCAG 2.1 SC 1.3.2]
- On the Scroll Page Scans and View Thumbnails variants of the Book page, arrow keys are disabled on page navigation buttons when using a screen reader, requiring the tab key to be used to shift focus to the element, but that resets focus to first page of document, making it functionally impossible to use page navigation buttons. [WCAG 2.1 SC 1.3.2, WCAG 2.1 CR 4]

Keyboard Support

- Content of the "About" dropdown (or "About" section of the Menu dropdown, depending on viewport width/text size) in the main navigation) cannot be reached via keyboard when a screen reader is in use. [WCAG 2.1 SC 2.1.1, WCAG 2.1 CR 4]
- On the Scroll Page Scans and View Thumbnails variants of the Book page, arrow keys cannot be used to control screen readers when focus is on page navigation buttons, requiring the tab key to be used to shift focus to the element, but that resets focus to first page of document, making it functionally impossible to use page navigation buttons. [WCAG 2.1 SC 2.1.1, WCAG 2.1 CR 4]
- Closing and reopening the "About" dropdown [wide viewport] or "Menu" dropdown [medium and narrow viewport] does not reset focus to the start of the dropdown list (e.g., if the dropdown is opened, focus is moved to the third item, the dropdown is closed and later reopened, the down arrow places focus on the fourth item, not the first). [WCAG 2.1 SC 2.4.3]
- On the Home page [narrow viewport], an invisible "HathiTrust" button is reached before the "LOG IN" button. [WCAG 2.1 SC 2.4.3]
- On the Book page, activating keyboard shortcuts for page navigation moves focus to the associated buttons, instead of activating the function and allowing the user to continue from their present location. [WCAG 2.1 SC 2.4.3]
- On the View Thumbnails variant of the Book page, focus should reach display options before page thumbnails (to switch to a different view, the user has to tab through 84 pages). [WCAG 2.1 SC 2.4.3]
- Focus is not sufficiently visible for a variety of interactive content. [WCAG 2.1 SC 2.4.7]
  - "LOG IN" button
  - "HathiTrust Response to COVID-19" on the Home page
  - "BROWSE COLLECTIONS" and "READ BOOKS ONLINE" boxes on the Home page
  - Text links, image links, radio buttons, and checkboxes on the Home page (with the exception of links in the page header and footer)
  - Social media icons on the Home page (focus indicator is not restricted to individual icons)
  - Text links in the search and search results areas (e.g., "Full-text", "Full view only", "Advanced full-text search", "Catalog Record", "Full View") on the Search Results page
  - Text links in the sidebar and in the Jump to Section lightbox on the Book page
  - Page thumbnails in the View Thumbnails variant of the Book page
  - Text links, radio buttons, and checkboxes on the Advanced Search page (with the exception of links in the page header and footer)

Navigation

- On all pages, incorrect h1 placement (invisible h1 at the start of the page) interferes with the ability to bypass repeated content. [WCAG 2.1 SC 2.4.1]
- On the Book page [narrow viewport], the magnifying glass icon in the "Search HathiTrust" button lacks alternative text, and therefore provides no indication to screen reader users that it is a search button. [WCAG 2.1 SC 2.4.4, WCAG 2.1 SC 1.1.1]

Forms and Data Submission

- On the Search Results page, the name of an input ("Item Viewability") does not match the input's visual label ("Filter your search"). [WCAG 2.1 SC 2.5.3]
- On the Search Results page, the name of an input ("Choose a collection") does not match the input's visual label ("Select Collection"). [WCAG 2.1 SC 2.5.3]
- On the Book page, the name of an input ("Add to your collection") does not match the input's visual label ("Select Collection"). [WCAG 2.1 SC 2.5.3]
- On the Advanced Search page, the name of an input ("Select the type of date range to search on") does not match the input's visual label ("Date of Publication"). [WCAG 2.1 SC 2.5.3]
- On the Search Results page, radio buttons are not programmatically associated with the appropriate grouping label ("Filter your search"). [WCAG 2.1 SC 3.3.2]
- On the Book page, the "Search in this text" label is not read out by screen readers. [WCAG 2.1 SC 3.3.2]
- On the Book page, "Location:" is not a sufficiently descriptive label for the page selection slider. [WCAG 2.1 SC 3.3.2]
- On the Book page, "1.1904761904761905% • Location 1 of undefined" is not an appropriate programmatic label for the page selection slider, and the visible page label (e.g., "1/84") should be read out for the page number, not a percentage of slider progress (e.g., "1.1904761904761905%"). [WCAG 2.1 SC 3.3.2]
- On the Advanced Search page, "Filter" inputs are not programmatically associated with grouping labels ("Language" and "Original Format"). [WCAG 2.1 SC 3.3.2]
- On the Advanced Search page, checkbox lists are not programmatically labeled (e.g., the list of languages under "Languages"). [WCAG 2.1 SC 3.3.2]
- On the Home and Search Results pages, selecting the "Catalog" radio button for the search input causes a new input to appear prior to the current input. [WCAG 2.1 SC 3.2.2]

Images

- On the Book page [narrow viewport], the magnifying glass icon in the "Search HathiTrust" button lacks alternative text. [WCAG 2.1 SC 1.1.1]
- On the Scroll Page Scans and Flip Page Scans variants of the Book page, alternative text is not provided for images on pages. [WCAG 2.1 SC 1.1.1]
- On the View Thumbnails variants of the Book page, book pages lack appropriate alternative text. [WCAG 2.1 SC 1.1.1]
- On the Scroll Page Scans and Flip Page Scans variants of the Book page, alternative text for images (i.e., OCRed text) is inaccurate. The issue is also present as inaccurate text on the View Plain Text variant, which is itself a text alternative for the page scan views. [WCAG 2.1 SC 1.1.1]
  - Examples include:
    - Incorrect text from images: Harvard seal includes the text "SICILLVUM ACADEMIAE HARVARDIANNAE IN NOV ANG" "CHRISTO ET ECCLESIAE" "VE" "RI" "TAS" but is OCRed as "HARVARD" "EMIAE ." "ACADE" "RDIANA" "IVE" "EC" "BIS TO" "VM" "IN NC" "247715IS" "ON ." (page 2)
    - Added spaces around non-alphabetic characters (which breaks screen reader ability to read text accurately): "LAMB'S" OCRed as "LAMB ' S" (page 5)

- Character substitution: "HEAD" OCRed as "HEA)" (page 6)
- Character addition: "A MIDSUMMER) NIGHT ' S DREAM" OCRed as "A MIDSUMMER) NIGHT ' S DREAM" (page 1)

Color and Visual Characteristics

- On the Book page, color alone is used to differentiate active buttons, inactive buttons, and selected buttons (e.g., "Jump to section", "Jump to selected page", and "View Plain Text" buttons). [WCAG 2.1 SC 1.4.1]
- On the Scroll Page Scans and Flip Page Scans variants of the Book page, color alone is used to highlight search results in the text. [WCAG 2.1 SC 1.4.1]
- Light grey text on white background (e.g., placeholder text in search input on Home and Advanced Search pages) has insufficient contrast. [WCAG 2.1 SC 1.4.3]
- On the Home page, light blue Twitter icon on light grey background has insufficient contrast. [WCAG 2.1 SC 1.4.11]

Custom Elements and Dynamic Content

- On the Home page, the "Want to get the most out of HathiTrust?" section disappears at some viewport widths and text sizes. [WCAG 2.1 SC 1.4.4]
- On the Book page, tooltips are not dismissable without losing focus on buttons (e.g., Share buttons in sidebar, "Jump to section", "View Plain Text", "Scroll Page Scans"). [WCAG 2.1 SC 1.4.13]
- On the Search Results page, screen readers are not notified when the "Show all...Filters" links or "Show fewer...Filters" links are activated, or when the "Select all on page" checkbox is selected or deselected. [WCAG 2.1 SC 4.1.2]
- On the Advanced Search page, screen readers are not notified when the "Show only selected options" and "Show all options" links or the "Add another group of search fields" button is activated. [WCAG 2.1 SC 4.1.2]

Home Page Screenshots

Large Viewport

Medium Viewport

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