

Stare Into The Void

Final Report

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Introduction

Stare Into The Void is a web application designed to allow users to browse, edit, and export images from NASA's image APIs. Interviews with both casual and professional users of NASA's existing image browsing tools found that users were generally dissatisfied with the current state of those tools. Users were frustrated with the abundance of unwanted articles which they found intrusive and kept them from browsing effectively. Stare Into The Void gives users a sleeker alternative that focuses on helping users find what images they need and only showing users the most relevant information. Advantages the app has over standard NASA websites include the ability to access images from multiple different NASA image libraries. Another major advantage is the inclusion of editing tools, preventing the user from needing multiple software tools to find and prepare images for use.

Stare Into The Void is made for educators, students, and anyone with an interest in learning about astronomy, as well as artists looking for authentic, high-resolution NASA photos to use for reference for their work. As such, one of the website's core goals is ease-of-use, which is achieved through dynamically updating searches, simple page navigation, and quickly loading content. Included in the system is the ability to search by multiple different criteria, such as dates, keywords, and source libraries to find the exact images that they need. Stare Into the Void's editing tools allow users to crop, edit, mirror, rotate images. Users can also draw on and add text to images, as well as add color filters and layer images on top of each other. The website also provides quick and easy one-click downloads for images. Users can also view a list of images they have recently viewed, eliminating the need for unnecessary searching to keep track of images that they need.

Final Product Design

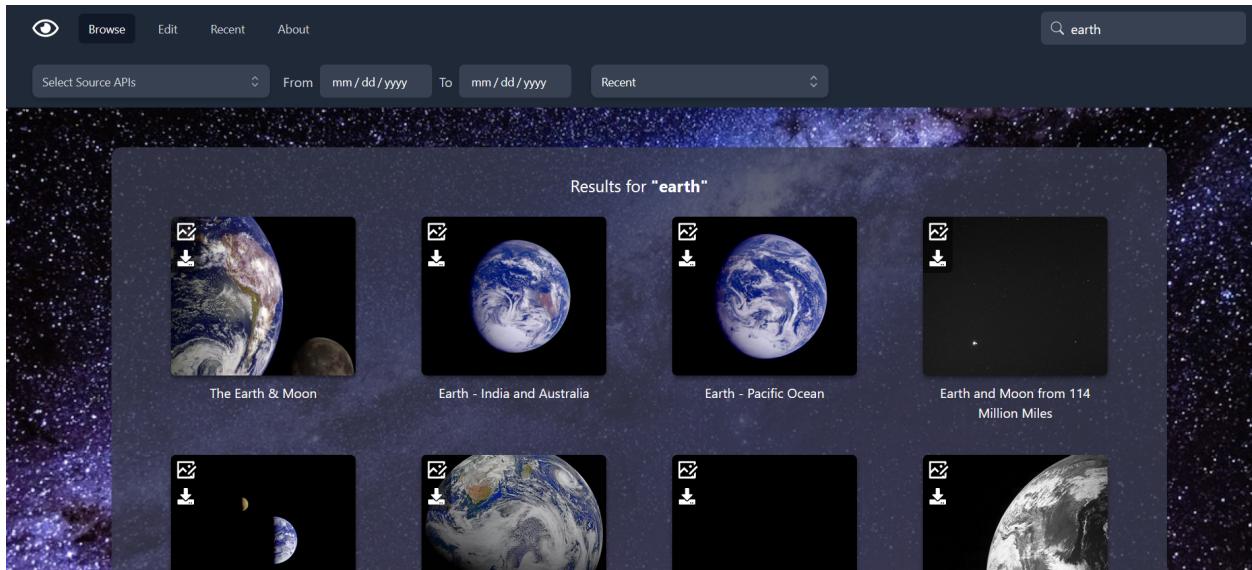
Stare Into the Void uses the conceptual model of a set of pages accessed using a single navbar locked at the top of the page. This allows each feature to be compartmentalized on its own page, with navigation between different pages only requiring a single click. This contributes to one of Stare Into the Void's primary usability goals, ease-of-use. Likewise, the navbar (shown below) also allows users to search images (the website's primary function) from anywhere in the website.



The Stare Into the Void navbar

Clicking the eye on the left, the Stare Into The Void icon, will bring the user to the home page. Feedback from the high fidelity prototype stage of development revealed that the navbar appeared small for large displays, making navigation difficult. As a result, better breakpoints for scaling the navbar and other components have been added. This allows more casual users to more easily use the website on mobile devices, and more professional users to use the website on large displays. The website uses a simple, limited color scheme of darker shades of gray and indigo to allow text and images to clearly stand out. This also allows for the use of a galaxy background, to fit the astronomy theme without obscuring any of the page content.

The website's browse page was designed to be minimal in its design, only showing the user essential details: their search query, images, and their titles. Image previews on this page are scaled dynamically to show enough images at one time for easy browsing, but not so many that the image previews become difficult to see. Likewise, image previews are truncated to a standard size for easy display.



Stare Into the Void browsing page, with a search query

The page allows the user to filter their search with a set of dropdowns and datepickers for different purposes, like specifying the source API and a date range. These controls are labeled with placeholder text to clearly express each control's purpose and give indications about its use, like the year format specified on the datepicker as shown above. The browser page encourages exploration, with multiple test participants through the design stages pointing out the enjoyment they got out of searching for different subjects.

The website's original designs did not feature direct controls for downloading and editing controls on the image preview on the browse page itself, but in order to eliminate unnecessary navigation and clarify mappings, edit and download buttons have been attached to each image preview. Users can also view each image's description, as shown in the popup below:

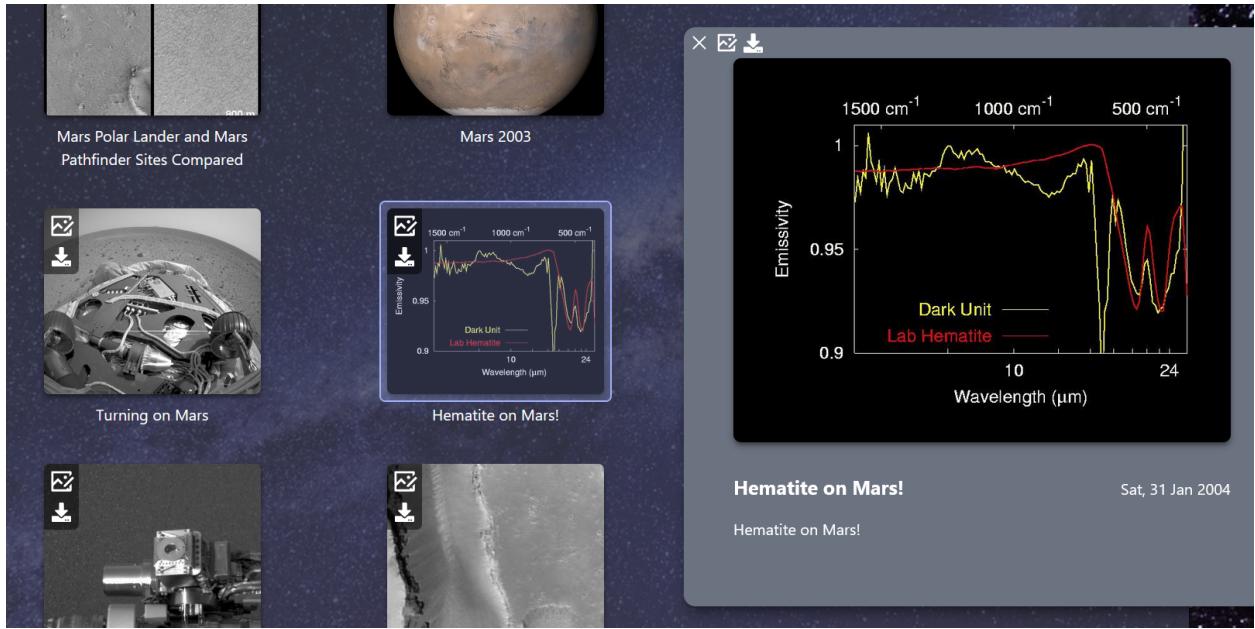


Image description, with the image highlighted in the search pane

The same edit and download buttons are displayed, as well as a larger image preview, title, description, and date. To properly indicate to the user what image in the browsing list is shown in the expanded preview, the corresponding image is highlighted with a blue border. This panel is shown to the side to allow the user to view other images in the search results while still viewing an image's information

Another one of the system's usability goals is to have clearly mapped and discoverable controls for key interactions with the system. Stare into the void makes use of common iconography used in photo editing applications to clearly and concisely label controls. For example, the image shown to the right from the app's "Browse" page makes use of two common signifiers for the previously discussed image controls: a pen drawing an image signifying an edit, and an arrow pointing to a hard drive to indicate a download button. Using these icons occupies less space on the display and reduces the amount of time users spend reading text to identify controls. Another example is the controls in the tray at the bottom of the editor pane, shown below:

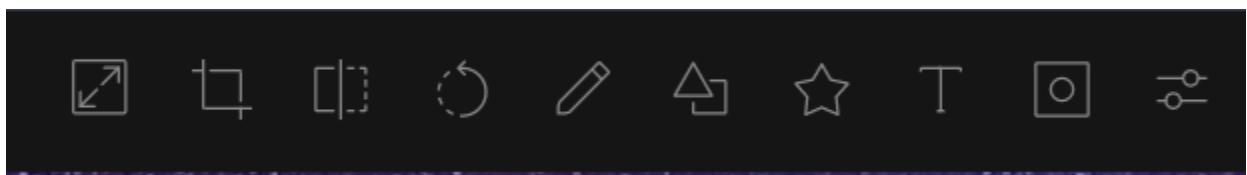
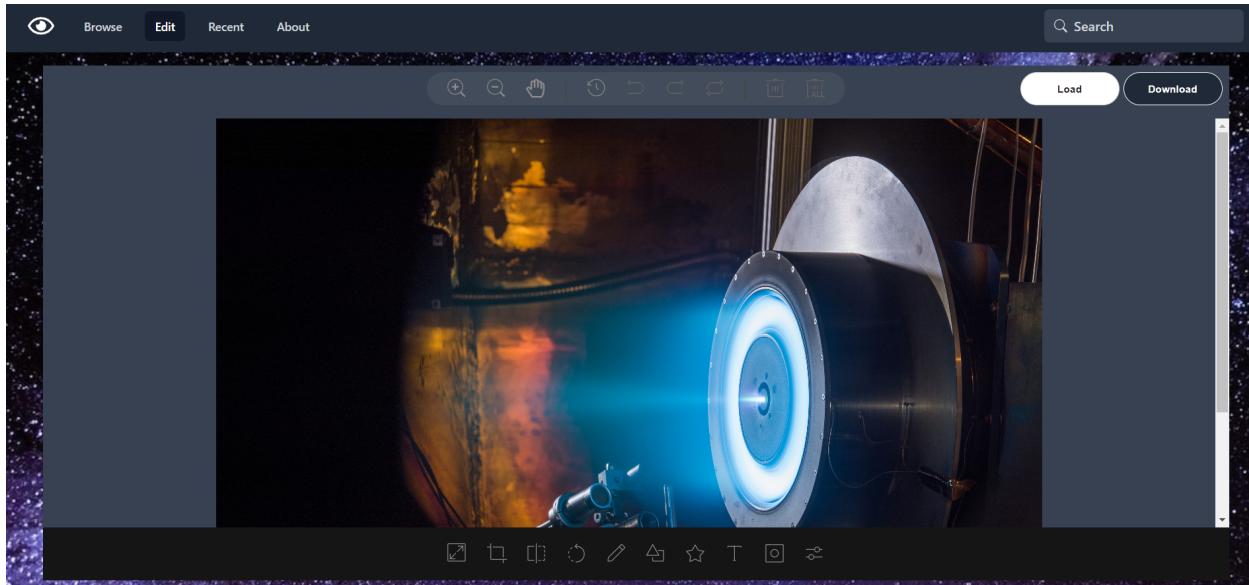


Image editing toolbar

Instead of obfuscating controls behind dropdowns or context menus as is done in apps like GIMP and Photoshop, editing controls are presented directly to users with clear iconography. As such, users who participated in high fidelity prototype testing were able to nearly instantly identify these controls when prompted by test administrators.

The original low fidelity prototypes for the website included two different designs for an editing menu, one as a popup and one as a dedicated page. User testing revealed that a separate editing page was preferable, as controls were larger and easier to manipulate. The editing page also shows the image in a larger display, making drawing tools easier to use.



Stare Into the Void editing page

As part of our goals of efficiency, the system was designed to respond as quickly as possible. Pages were designed to minimize the amount of page content and scripts required to load, resulting in quick navigation. Through the usage of smaller thumbnail images provided by the source APIs, displaying search results on the browse page takes less than a second. This also eliminates the problem of widely variable image load times, as the thumbnail images are all of a similar size.

Safety is another core usability goal, especially with respect to the editing tools. Stare Into the Void's editor provides a set of tools to prevent users from losing progress and allow them to easily correct their mistakes. Featured prominently at the top of the editing window are options for undoing, redoing, resetting, and viewing an audit of the user's progress. These controls are shown below:



Safety-related controls for image editing

Deletion controls are displayed separately from these controls, preventing users from misclicking and clearing their progress or deleting image elements accidentally. Likewise, all of the editing controls are set in a separate tray from the safety controls to prevent accidental actions. The “Recent” page functionality also provides a level of safety; users do not have to re-search queries to find images they might use later. Links on the navbar are sufficiently spaced to prevent misclicks when navigating, as is the navbar from the rest of the page content. Minimal navigation also contributes to safety, as it only takes users 1-2 clicks to return to a page or other component they might have accidentally clicked off of.

Evaluation Methodology

Stare Into the Void’s design was evaluated using a controlled experiment in which participants performed a given set of tasks using Stare Into the Void, with Google Images and Microsoft Paint as a control group. Participants were first briefed on the procedure. They were informed that the test consisted of a set of tasks to be performed using Stare Into the Void, Google Images, and Microsoft paint, and that they would be interviewed about their experiences afterward. Participants were informed that they would remain anonymous and that the only data collected about themselves and their participation would be the demographic information, quantitative, and qualitative data listed in this section. The set of tasks performed, the operating system of the device they used for the test (Windows 10), and the browser used (Google Chrome) were kept constant across all tests. Tasks performed using Google Images for image searching and Microsoft Paint for image editing served as the control group for the experiment. The independent variable of the experiment was the software used to complete the tasks.

Participants were prompted to answer the following demographic questions prior to starting the tasks:

- For what purposes do you browse/use space-related media, as a student, professional, or a hobbyist?
- What is your level of interest in space/NASA related topics (on a scale of one to ten, one being least interested and ten being the most interested)?
- What is your proficiency with technology (on a scale of one to ten, one being least proficient and ten being the most proficient)?
- What is your proficiency with photo editing (on a scale of one to ten, one being least proficient and ten being the most proficient)?

For both Google Images/Paint and Stare Into the Void, participants were prompted by test administrators to complete the following set of tasks in the order given below:

- Browsing
 - Search for an image with a keyword of user choice.
 - View an image description from search results.
 - Download an image.

- Reopen a recently opened image.
- Editing
 - Resize the image
 - Draw on the image
 - Crop the image
 - Add text to the image
 - Undo the most recent action
 - Reset the image
 - Add a filter to the image
 - Download the edited image

The following dependent variables were collected for both test runs using Google Images/Paint and Stare Into the Void. Quantitative data was collected as the participants performed tasks.

Qualitative data was collected by interviewing participants after each test.

- Quantitative Data
 - Percent of tasks completed without help 100%
 - Number of times the participant asked for help
 - Time taken to complete editing sequence
- Qualitative Data
 - How would you describe your experience?
 - What tasks did you have trouble with?
 - Were there any parts of the design that you found confusing? If so, what were they?
 - Were there any parts of the design that behaved in an unexpected way? If so, what were they?

Participants were also asked to answer the following questions comparing their experiences

- How would you compare Stare Into the Void to Google Images/Paint?
- Would you use Stare Into the Void over Google Images/Paint?

Results

Demographic Data:

Participant	Purpose	Interest in space/NASA	Technical Proficiency	Image Editing Proficiency
A	Hobbyist	6	8	5
B	Student	7	9	4
C	Hobbyist	4	8	7
D	Student/Hobbyist	7.5	8.5	7.5
E	Student/Hobbyist	10	7	4

The demographic data collected serves to verify that participants are part of the target audience for Stare Into the Void, hobbyists and students with some technical proficiency with varying degrees of proficiency with image editing. The image editing proficiency score also assisted in evaluating the ease-of-use of the design. Specifically, it helped determine if signifiers and mappings for the editing controls relied on specialized language/symbology known to proficient editors, but not to the less experienced.

Quantitative Data:

	Participants									
	A		B		C		D		E	
	Google Images / Paint	SItV	Google Images /Paint	SItV						
Tasks completed without help	9/12	11/12	11/12	12/12	11/12	12/12	11/12	12/12	10/12	12/12
Number of times asked for help	4	1	0	0	0	0	0	0	3	0
Time taken to complete sequence	3:15	1:59	5:47	3:58	3:45	1:42	6:12	4:08	3:50	2:43

Most Difficult Tasks For Each Participant:

	Participants				
	A		B		E
Tasks	Resize image Undo action Reset image	Download image Search image	Undo action View description	View Description	Reset image Undo action

With Stare Into the Void, participants generally required very little assistance to complete tasks successfully. With Microsoft Paint however, participants required more assistance from test administrators to accomplish tasks, particularly adding filters and scaling the image. Editing tasks consistently took less time to complete using Stare Into the Void than the control softwares. This can be attributed to a more streamlined set of controls with more distinct labels and fewer layers of menus. This is corroborated by participant A's observation that the floating tooltips on

the editing controls from Stare Into the Void were easier to understand than Paint's toolbars. Likewise, participants who reported lower proficiency with editing tools averaged a similar number of tests completed without help and similar total editing times to participants that reported more proficiency. This indicates that the editor has achieved its usability goals of discoverability and ease-of-use.

Participants reported an overall positive experience in the post-test interview. For example, one participant described their experience as "very easy", with another saying that "editing the images and finding the images was very simple". When asked about what elements were confusing, three of the four participants had issues with the image descriptions. Participant A expressed disappointment in the lack of details like filename, format, and resolution in the description popup, a feature that Google Images provides. Participant C was confused by the lack of a description for certain images, and participant D said "descriptions were cut off and [they] had to zoom out to see the rest of the descriptions". Participants A and D disliked the lack of functionality in the recent images page. When asked about any unexpected behaviors in the system, participants A and C reported difficulty finding the correct control on the editor's top toolbar to undo and clear their edit history. Participant E found the edit history, undo, reset, and delete controls redundant as well as difficult to find. Participant B found the behavior for downloads from the browse page intrusive; the preview that appears in a separate tab is unnecessary. Multiple participants also found the multiple search bars redundant.

When asked to compare Google Images/Paint to Stare Into the Void, three of the five participants remarked on the value of having an editor built into browsing software. Participant A found Paint's tools particularly difficult to use in comparison to Stare Into the Void. Participant A found that Paint's interface obscured cropping and scaling tools in favor of the drawing controls, and that Stare Into the Void's approach of displaying those controls together was preferable. Participants A and E found many of the results for their searches in Stare Into the Void to be irrelevant in comparison to the results from Google Images.

Discussion

Overall, Stare Into the Void was successful in meeting the user requirements. However, the system's browsing capabilities lack in satisfying some usability goals, especially in comparison to the editing capabilities. The editing tools success lies chiefly in its layout. A simple set of two toolbars showing all editing options consistently allowed users to find exactly what tools they needed. Simple iconography and tooltip labels help ensure users can find controls quickly even if their purposes are not immediately evident to users. The editing interface can be refined more, however. Increasing the size of the editing pane and preventing options menus for specific editing controls from blocking the image would give users a better view of their progress. The design of the undo/deletion controls needs to be re-evaluated, as they were the only part of the editors design that participants had significant difficulties with. One possible solution would be to brighten the colors of the icons in the upper toolbar, giving the controls better visibility against the dark background, making them easier to find. Improved tooltips to

better differentiate the undo/rest buttons from the delete/delete all buttons would further reduce ambiguity.

While the test participant's successes in completing the tasks shows that the requirements have been fulfilled, the browsing tools need more improvements to better facilitate accomplishing the tasks. The description popup's layout and content did not adequately provide necessary information to users and did not cleanly display what information it contained. To address these issues, the panel should provide more relevant information about the image itself (at least file names, formats, and resolutions), provide placeholder descriptions for images that do not have one, and better condense long descriptions to remove the need for scrolling. The browser's searching capabilities should also be refined to allow for better filtering of less relevant results. Smaller improvements also include moving the search bar to the browse page and providing the same one-click download functionality that the editor provides from the browse screen. A full implementation of the recently viewed images page is another step for the website.

The issues with the description popup and deletion controls were unexpected, as similar participants in tests for the low fidelity and high fidelity prototypes did not report any issues with these features. More tasks related to browsing and safety controls in previous tests would likely have helped identify these issues earlier. Also unexpected was how many users preferred Stare Into the Void over Google Images for finding space-related images. Users found the domain-specific features like descriptions as well as the editing to be a strong advantage over the more generalized functionality of Google Images.

Designers creating a similar application should focus on evaluating what information about an image is most useful to display for browsing, and what capabilities are the most common and necessary for editing. Designers should also evaluate their systems to remove any redundancies in navigation and the controls of their system. The value of having browsing, searching, and editing capabilities integrated together in the same system cannot be overstated, as multiple test users noted the value of an all-in-one-tool over existing systems. Designers should also consider what other tools could be integrated into the system to provide convenience for casual and hobbyist users.