

## **Bridging the Digital and Physical: Increasing Engagement with the Grateful Dead Archive at UC Santa Cruz**

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The UC Santa Cruz University Library supports the creation of digital projects which aid student scholarship, enhance on-site exhibit experiences, engage broader communities through online exhibitions, and promote our unique collections. This case study explores the use of a digital tool, ThingLink, to create a virtual 360° tour of a library exhibit space which features material from the Grateful Dead Archive. Librarians and students created this virtual tour (<https://guides.library.ucsc.edu/loveonhaight360>) in order to promote the library's collections, engage students in creating new forms of scholarly work, preserve a record of a physical exhibit after deinstallation, and increase use of library resources.

Keywords: exhibits; outreach; annotated 360° images; special collections; archives; digital humanities

### **Introduction**

Digital exhibits are often created to engage audiences with the collections that cultural heritage institutions steward. These exhibits primarily act to either enhance the collections in the space where they are held or expand the public's ability to interact with and learn about the collection from farther away. Various levels of complexity can be incorporated; simple slideshows within the space, accompanying images and videos that allow for in-depth discovery,<sup>1</sup> interactive apps,<sup>2</sup> websites that preserve the content of physical exhibits after deinstallation, virtual tours of historic landscapes,<sup>3</sup> and in-

depth online archives of the larger holdings of the institution<sup>4</sup> are just a few examples of what might constitute a digital exhibit. Increasingly, 360° images, Augmented Reality (AR), and Virtual Reality (VR) technologies are making their way into the toolkit available to the professionals who create these experiences for their constituents.<sup>5</sup> Increasing access and ability to use these tools allows innovation in the way cultural materials are presented, but can also bring new technical barriers. At the UC Santa Cruz University Library, collaborations among departments such as the David Kirk Digital Scholarship Commons (DSC) and Special Collections & Archives have been emerging to make the most of these tools in order to promote access to unique collections, such as the Grateful Dead Archive, and to engage student learning and success.

In 2018, Kristina Golubiewski-Davis (Director, Digital Scholarship Commons), Ann Hubble (Digital Initiatives Librarian), Alix Norton (Archivist), and Reed Scriven (Digital Scholarship Commons Student Assistant) collaborated to create an immersive digital tour of one of the library's most visited physical exhibit spaces, with the shared goal of exploring ways to increase access to and engagement with the library's unique collections. After attending an interactive workshop for the image-interaction tool ThingLink, we decided that it would allow us to create a 360° virtual tour of a physical exhibit space, and had a low technical barrier. We imagined that this virtual tour would not only showcase the library's unique collections on display in the library's exhibit spaces, but also promote the use of digital tools for teaching and research to the students and faculty with whom we collaborate in the library. These goals were supported not only by the flexibility of the tool, but also by our ability to learn and deploy ThingLink without the need for significant customization or in-depth technical skills.

Each member on the project team brought different perspectives and individual goals for the project, coming from three library departments: Digital Scholarship

Commons, Digital Initiatives, and Special Collections & Archives. This project presented a specific way for us to collaborate across library departments to create an exhibit that would serve the library's communities in multiple ways.

As Director of the library's Digital Scholarship Commons (DSC), Golubiewski-Davis focused primarily on project management and the potential for creating future projects with this tool. Golubiewski-Davis works with faculty to create digital assignments for students and assists faculty in digital humanities research projects. In particular, she was interested in using this project to experiment with new tools and ways of engaging with 360° imaging and VR that did not rely on highly customized code. This 360° virtual tour project acted as a test case to determine what was possible with the ThingLink tool. Specifically, would the tool provide a way for the DSC to support other projects of this nature by students and faculty in the future?

Hubble, Digital Initiatives Librarian, has worked on digitizing primary source materials from Special Collections & Archives and collaborated on innovative research projects with campus constituents in the Digital Scholarship Commons. Her primary perspective and interest in this case study arose from developing projects that use images, text, and maps to tell stories, and using archival materials in these projects in order to bring greater visibility and usage to lesser known library resources.

Norton, Archivist for the Center for Archival Research and Training (CART),<sup>6</sup> came to the project with a primary focus of describing, preserving, and providing access to the library's unique collections, and making them discoverable in new ways. Exhibit curation is a key method of increasing visibility of collections, both in the library's physical space and online. Norton brought a perspective of supervising the work of graduate students in CART, where PhD students are trained in archival processing and the curation of physical and digital exhibits. Norton's goals thus included skill

development in archival research, digital exhibit curation, writing for a public audience, and the use of digital tools in research and teaching for UCSC graduate students.

Scriven worked on technical, graphic, and web design and focused on creating a polished and cohesive project. His primary focus was user experience and clarity through icons, layouts, and the overall website surrounding the virtual tour.

In addition to increasing access to and engagement with library collections, supporting student success with library services and resources was a main shared project goal. We all work closely with students on various projects, including archival processing, exhibit curation, developing training modules for the use of equipment and digital tools, and creating digital projects using library resources. All of these projects involve a high amount of collaboration among undergraduate and graduate students and library staff. We saw this particular project as a perfect opportunity not only to collaborate with each other as full-time staff across library departments, but also to involve paid student employees and graduate fellows in the development of an interactive tour of our exhibit space, and determine if the ThingLink tool could be utilized in future digital projects in the library.

Another central goal for this project was to provide online users access to the archival materials on display in an exhibit space by connecting them to additional resources that describe and highlight the library's archival collections. The idea of an immersive virtual tour of a curated exhibit using 3D or VR technologies presented a new opportunity for researchers to not only interact with materials in a virtual representation of the library's physical exhibit space, but also to find additional information about materials in our digital collections and finding aids by following links within the virtual tour.

### *Experiencing Collections and Exhibits through Digital Tools*

Over the last several years, cultural heritage organizations have been developing innovative ways for remote visitors to view and use collection materials and exhibits via the Internet. The Virtual Reading Room at UC Irvine's Special Collections and Archives is an example of an archives providing access to born-digital materials in a controlled environment that mimics the registration process in a physical reading room, thereby increasing access virtually while maintaining the security of records due to donor-stipulated or copyright restrictions.<sup>7</sup> Numerous institutions have digitized selections of their archival collections and made them available online via their own local digital collections, with larger consortial entities such as the Digital Public Library of America (DPLA)<sup>8</sup> and Europeana<sup>9</sup> harvesting those assets into their platforms for broader distribution and educational purposes. This access to born-digital or digitized collection materials enhances and expands the public's interaction with an institution's holdings. In addition to making digitized materials available online via virtual reading rooms and digital collections platforms, institutions can also make content available using digital exhibits, which often provide more contextual information to the material being shown, or a virtual preview into the experience of visiting the physical space.

The integration of digital tools into cultural institutions provides several benefits for the institutions that employ them, including:

- Access to digital collections online can reach a wider range of the interested public.
- Audio tours can be created in multiple languages.
- 3D scans of objects allow people to interact with specific artifacts, rotating them and interacting with them in ways that were previously restricted.<sup>10</sup>

- 3D prints expand this interaction to allow people to touch the objects, expanding the audience that can interact with the object to those who are hard of sight.<sup>11</sup>
- Online exhibits familiarize patrons with the material ahead of time, and increases their interest and engagement with exhibits.<sup>12</sup>
- Digital exhibits can expand interaction and input by underrepresented groups by increasing access and allowing for additional interpretation.<sup>13</sup>

As new technologies are introduced into mainstream consumption, institutions of cultural knowledge often work to incorporate these technologies into their digital toolkit in sustainable ways. VR, AR, and 360° images are technologies that have recently reached a point of being more widely accessible. Early examples of digital exhibits provide a new level of interaction and exploration of physical space beyond what was previously possible with text, images, and video. Museums such as the International Spy Museum,<sup>14</sup> The Met,<sup>15</sup> and the Smithsonian National Museum of Natural History<sup>16</sup> have created virtual 360° tours of their physical spaces to provide prospective visitors a preview of what they could experience in person. The Virtual Smithsonian exhibit has been available for several years and appears to be largely unchanged, illustrating the challenge of ongoing maintenance with these types of displays. On a more complex level, the Virtual Bethel project re-created the historic Bethel AME Church in VR.<sup>17</sup> To our knowledge, each of these projects required custom coding and creation to support their initial creation and, possibly, the long term maintenance of the project. The Virtual Bethel project, in particular, required a team of faculty, technology staff, and students to create the exhibit.<sup>18</sup> These types of custom exhibits provide a wealth of learning, teaching, and development opportunities that enhance specific aspects and goals of the individual projects.

A common barrier to creating custom virtual tours is access to financial resources and staff with sufficient time and technical knowledge to create these types of exhibits. Exhibits that are custom coded for an institution provide the ability to call out the specific needs of a particular exhibit, but also require staff with the skillset not only to create the initial exhibit but also to maintain the exhibit as updates in technology and content are needed.

## **Project History**

### *Grateful Dead Archive, Dead Central, and the Summer of Love*



Figure 1: Dead Central exhibit space on the main floor of the UC Santa Cruz McHenry Library.

One of the most popular collections at the UC Santa Cruz University Library is the

Grateful Dead Archive, which the library acquired in 2008. This collection of nearly 1000 linear feet is a key component of the unique collections in our stewardship, and includes business records, show files, concert posters, audio tapes, vinyl LPs, t-shirts, merchandise, fan correspondence, artwork, and photographs. On the main floor of McHenry Library is a 1500 square-foot exhibition space known as Dead Central (shown in Figure 1), which is dedicated to the display of material from the Grateful Dead Archive. A new exhibit is installed in Dead Central every 18 months, and the space welcomes thousands of visitors every year. Visitors are also invited to consult additional materials from the Grateful Dead Archive in the Special Collections & Archives reading room. Between these two modes of physical access, the Archive gets a lot of use -- fans make pilgrimages to Santa Cruz just to visit pieces of the Archive; scholars travel here to conduct research using the collection materials; faculty members utilize the Grateful Dead Archive in classes on business, music, and American popular culture; and students and the general public learn about the Dead phenomenon in Dead Central.

In 2017, Special Collections & Archives staff members curated the exhibit, *Love on Haight: The Grateful Dead and San Francisco in 1967*, in commemoration of the 50th anniversary of the Summer of Love. This was an opportunity to showcase materials from the Grateful Dead Archive, but also to situate the Grateful Dead in a broader context of activity in and around the Haight-Ashbury district during the 1960s, and to contextualize the Grateful Dead Archive in the library's other unique collections. The exhibit featured selections from the library's newly-acquired collection of photographs by Ruth-Marion Baruch and Pirkle Jones, which had recently been made available via the library's Digital Collections site.<sup>19</sup> The exhibit curators wanted to create a space that felt like an immersion in Haight-Ashbury in 1967, with newspapers and printed ephemera one might have encountered at the time: posters for Grateful Dead

concerts, popular LP records, film footage of San Francisco, and Baruch's street photography that captured everyday life of the Haight in 1967.

This physical exhibit, like every exhibit installed in the Dead Central space, was a unique experience that was only viewable in person. This was an issue that the authors considered when creating this project; we wanted a way to experience this particular physical exhibit online, in the same way that the archival collections can be experienced through resources like the library's Digital Collections site and the Grateful Dead Archive Online (GDAO), an Omeka-based site that provides online access to over 45,000 items from the Grateful Dead Archive as well as digital content submitted by fans.<sup>20</sup> Given ThingLink's 360° display and annotation functionality, we saw it as a solution to providing an online experience of the physical exhibit space.

We imagined visitors being able to virtually tour the Dead Central exhibit online, explore more information about certain items, and have another way to "immerse" oneself in the world of the exhibit. As the exhibits are rotated out on a regular basis, we also envisioned using this tool as a way to preserve the experience of visiting a previous exhibit in the Dead Central space. We saw many benefits to this project if it worked: reaching out to the community of visitors to the Grateful Dead Archive, including students in creating new forms of scholarship based on our collections, and capturing the exhibit experience after it has been deinstalled.

### ***Using ThingLink for a 360° virtual exhibit tour***

In March of 2018, three members of our team attended a one-day training workshop for ThingLink, a digital tool that can be used to create multimedia annotations on images, 360° images, and videos.<sup>21</sup> This tool is used for both corporate and educational purposes, with the educational branch of the tool usually marketed towards K-12 educators teaching their students to create interactive digital projects. As academic

librarians, we work with undergraduate and graduate students in a number of ways and are always interested in finding new digital tools that can lead to the production and dissemination of new forms of knowledge. After the workshop we decided that ThingLink had the potential to be a low-cost, low-effort tool for what we wanted to do, and we wanted to try utilizing the tool in a university setting.

We were all especially drawn to the 360° image annotation feature of ThingLink, and how it could easily ingest, display, and annotate 360° images with various types of media. We immediately thought of the library's Dead Central exhibit space as a good application for using this 360° image technology, and utilizing the media annotations for promoting the use of the library's collection materials. In addition, the library's Digital Scholarship Commons had recently purchased Samsung Gear 360 cameras for its equipment checkout program, so we knew we could utilize and promote these new library resources by creating this project.

Unlike the custom-made virtual tours mentioned previously, making a virtual 360° tour using ThingLink is relatively low-cost, has an easy-to-use web interface, and has many features that we wanted for this project, such as the ability to attach various kinds of media to the annotations (e.g. videos, music, text, photos) and the ability to “tour” between different areas of the physical space. We had support from library administration to create this virtual tour as a pilot to determine whether ThingLink would be a useful, sustainable, and engaging tool for the library to support for campus use going forward.

## Project Walkthrough

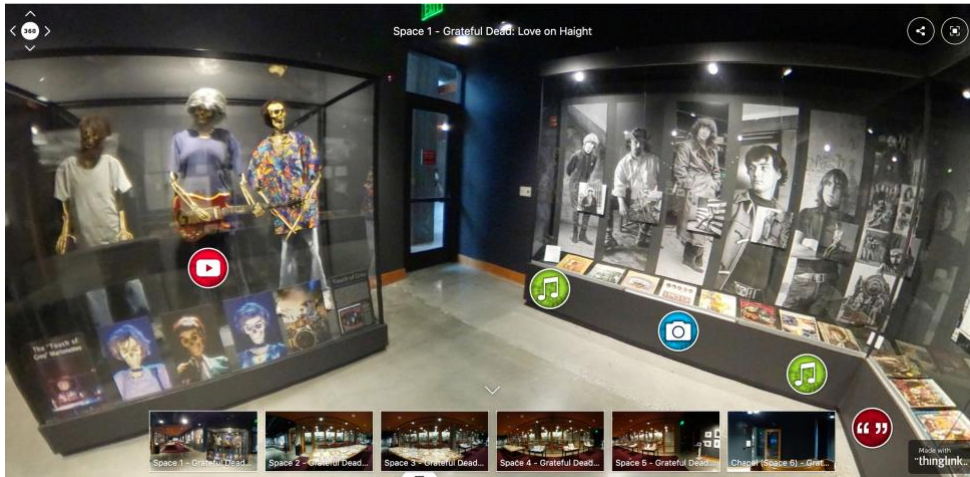


Figure 2: Screenshot of Space 1 in ThingLink virtual tour.

ThingLink provides the ability to import a 360° image (captured with the library's Samsung Gear 360 camera), and then add annotation tags to specific parts of that image that can show multimedia resources, such as images, text, audio, and video. Using the Tour feature of ThingLink allows 360° images to be added next to each other in a string, which is especially helpful when multiple images have been taken in a large physical space. The space of Dead Central is a long room that required multiple 360° images to adequately capture the content. One way for a viewer to move between sections of Dead Central is to click on the six spaces across the bottom of the ThingLink viewer. Figure 2 shows a screenshot of a 360° view of one space in the virtual tour, as seen on the ThingLink website.

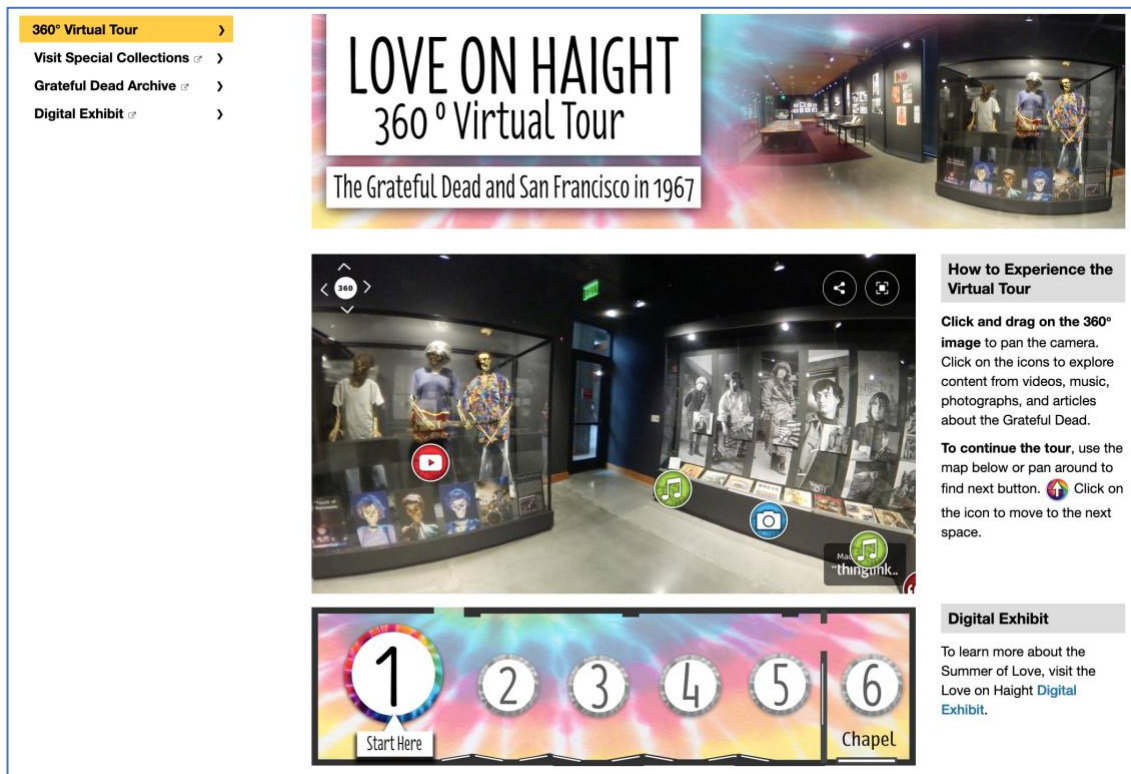


Figure 3: Screenshot of LibGuide page with embedded virtual tour and contextual information.

One feature we felt we could improve upon was adding context to the tour itself: who created it, what the context of the exhibit was, how to use the virtual tour, and how to find additional resources. To address this perceived gap, we created a LibGuide as a central website to introduce viewers to the ThingLink virtual tour (see Figure 3).<sup>22</sup> A separate map of the physical exhibit space below the ThingLink window was added after receiving initial feedback during the first of two feedback periods. This updated map shows the orientation of the six individual 360° spaces in the room, and gives the viewer another way to navigate through the spaces, either by starting from Space 1, or clicking on another number to view that space.

Video 1 (see supplementary information) shows a demonstration of how a user could navigate through the full virtual space, starting on the main LibGuide page,

moving through the different 360° spaces, and clicking on the annotation tags to view details about the objects on display.

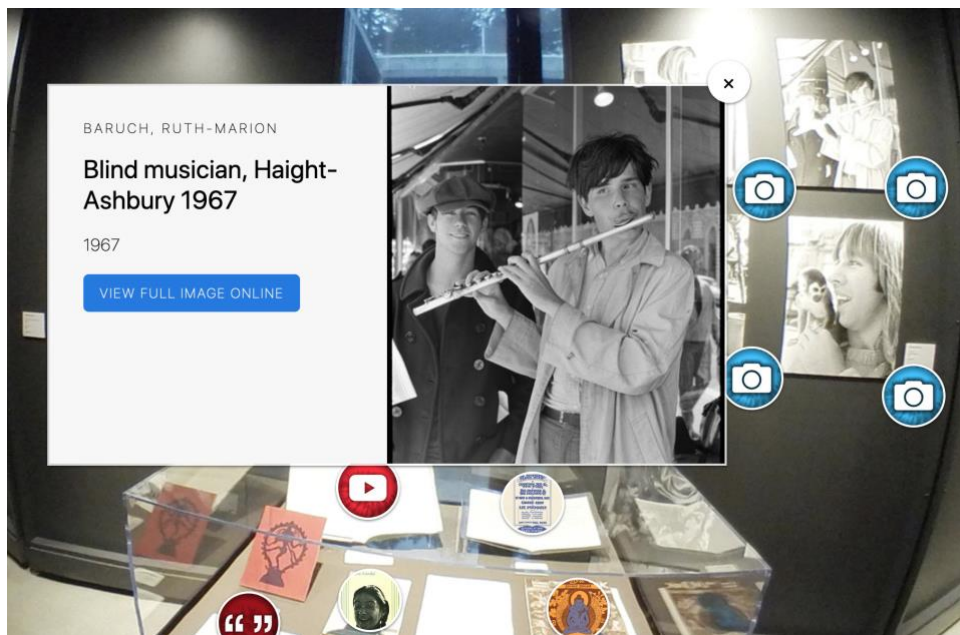


Figure 4: Screenshot of expanded tag annotation, with link to View Full Image Online via Calisphere.

The annotation tags in each space feature more detailed images of elements in the room, contextualizing text, high-resolution photographs, videos, music, and links to additional resources. These resources include library catalog records and finding aids for archival materials on display, as well as links to digitized content and related metadata shared on Calisphere, where viewers can view additional digital content from UC Santa Cruz's collections in context with those from other University of California campuses.<sup>23</sup> Figure 4 shows the ThingLink interface after clicking on an annotation tag, and before clicking through to Calisphere to see the full-sized version of the photograph *Blind Musician, Haight-Ashbury 1967*.

ThingLink offers pre-set icons for these annotation tags, as well as the ability to create custom icons. DSC student employee Reed Scriven created custom icons that either featured imagery from the source material the tag was identifying, or symbolic icons that identified types of content with a consistent look and feel. Using Adobe Photoshop, Scriven made a set of .jpeg files that have consistent coloring and a tie-dye theme, which aligned well with the Grateful Dead aesthetic and can be re-used for future ThingLink projects. Figure 4 shows examples of the blue photo tags and a red video tag. Scriven also created the Love on Haight banner, the interactive map of the Dead Central room, and utilized his skills in HTML to structure and stylize the main LibGuide landing page, which are all shown in Figure 3. These elements of the site have been saved as templates that can be used in future virtual tours of the physical exhibits in the Dead Central space.

### **Project Management**

Our project team consisted of four individuals: librarians Alix Norton, Ann Hubble, and Kristina Golubiewski-Davis; and Reed Scriven, who joined the team in June 2018.

Throughout the project, we communicated about the roles and expectations each individual would take. Golubiewski-Davis took on the Project Manager role and kept track of the project progress. For the purposes of transparency, we decided to adopt the CASRAI CRediT system after the project concluded to describe the roles that each member fulfilled.<sup>24</sup> The roles of each team member can be found in Appendix 1. In some cases, multiple team members shared a role, such as Visualization which constituted the majority of the work done on the project.

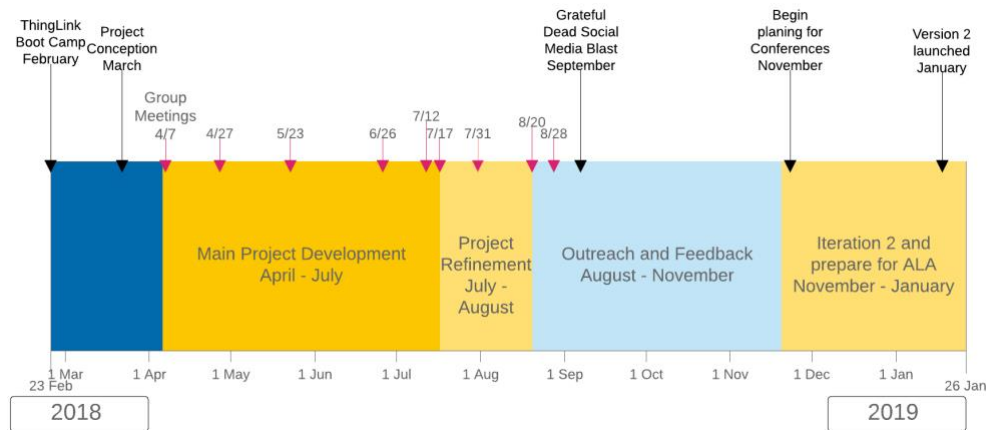


Figure 5: Project Timeline. The shaded blocks indicate different phases of the project and the dated arrows indicate group meetings.

The project was conceived shortly after our ThingLink training in February 2018. Norton, Hubble, and Golubiewski-Davis met throughout April and May to test different ways to implement the ThingLink tool using the *Love on Haight* exhibit in Dead Central specifically. During this time, we captured and edited the initial images, and we outlined the expectations that each group member would annotate a few different types of media in each of the six spaces of the Dead Central room. After several iterations of annotating, we developed and agreed upon best practices that stated the format of each type of media annotation. The factors we took into consideration included the appropriate archival resource to feature, when to manipulate image previews to preserve fidelity to the original image, and what initial metadata we would provide in the annotation tags. Once this was completed, Scriven joined the team to provide graphical direction and internal consistency based on the project plan. Figure 5 displays the timeline of the project.

The period of testing and concept refinement took place during April and May, and June and July were largely focused on populating the annotations and working with Scriven to create custom icons that invoked the aesthetic of the Grateful Dead. While

ThingLink provides a wide variety of icons available for use, it also allows for customization of the graphics by uploading pre-created images. The relative ease of using the annotation tools allowed us to spend this time on visual customization instead of code, which ultimately provided us more flexibility in our ability and confidence in future maintenance of the project.

With the exception of Scriven, our time commitment to the project was one 1-hour meeting approximately every other week and between two to four hours of work on the project itself each week. Scriven spent between six and ten hours a week during June and July on the project as part of his position. His input and work were key to the iterative design process of the collaborative project.

The 360° images were captured with the Samsung Gear 360 cameras that the University Library has available for patron checkout. As mentioned earlier, it was important to us to use equipment and software that we could make available through the library if a student or faculty member wanted to create their own project. To obscure the tripod that was visible at the bottom of the 360° image, we added a custom watermark using Photoshop that appeared as a floor medallion. This watermark ended up acting as an anchor for links to some of the resources that we wanted to feature, as well as the main landing page for the virtual tour.

Scriven took the lead for graphic design as the rest of the team began populating the annotations with assets identified by Norton. For this process, we adopted an iterative process of design and team feedback. Scriven would then take our feedback, incorporate it, and push the design to better represent the aesthetic we discussed. Our process included approximately four distinct iterations of the icons including multiple minor changes in each iteration. Once this process was completed and all annotations were added, Scriven unified all of the files and made sure that all annotations aligned

with our best practices. He also identified and incorporated a tool called Zoom In, which allowed us to share more detailed photos of the exhibit cases within the ThingLink environment.<sup>25</sup>

Once the design work, consistency checking, and annotations were complete, the virtual tour went through two feedback stages. The first feedback stage was internal, where we promoted the tour to library staff and asked our colleagues to respond to a short 6-question survey (see Appendix 2). Our questions were focused primarily on ease of use for the tool with an opportunity to provide open feedback. The feedback we received indicated that people understood how to move through the space and interact with the annotations. We did have one member of the library specifically ask about accessibility. ThingLink is not fully accessible as per Section 508 and WCAG 2.0 A standards, but the ThingLink team has begun to implement accessibility standards and continue to add additional benchmarks to their roadmap.<sup>26</sup> We felt that for this pilot project, we could tolerate this limitation, but we will monitor ThingLink's progress in this area and may revisit this need if we work with faculty on creating assignments in the future. When judging the cost/benefit of creating a custom tool compared to using a proprietary tool, this is one of the factors that should be taken into consideration.

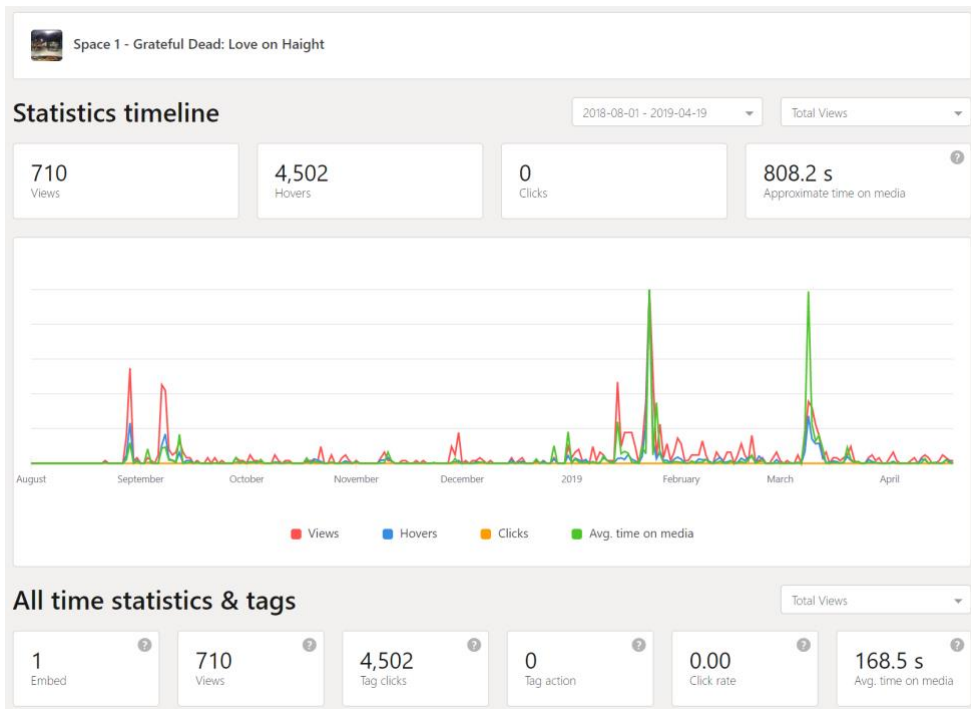


Figure 6: Statistics for the past year of Space 1 of the virtual tour.

Our second feedback stage considered the statistical output that ThingLink provides instead of direct feedback from our colleagues. Once we were confident that we had incorporated feedback from stage one, we began promoting the site outside of the library, particularly to the community of Grateful Dead fans. We kept track of the dates that we pushed the content to social media and announced the site in our library newsletters. This allowed us to track how media pushes affected site views. The in-depth statistics that ThingLink provided also allowed us to see how people interacted with the site itself. Figure 6 shows the statistics for Space 1, the first 360° image at the entrance of the physical exhibit space. The spikes of activity in September 2018 correspond to the original launch date of the site.

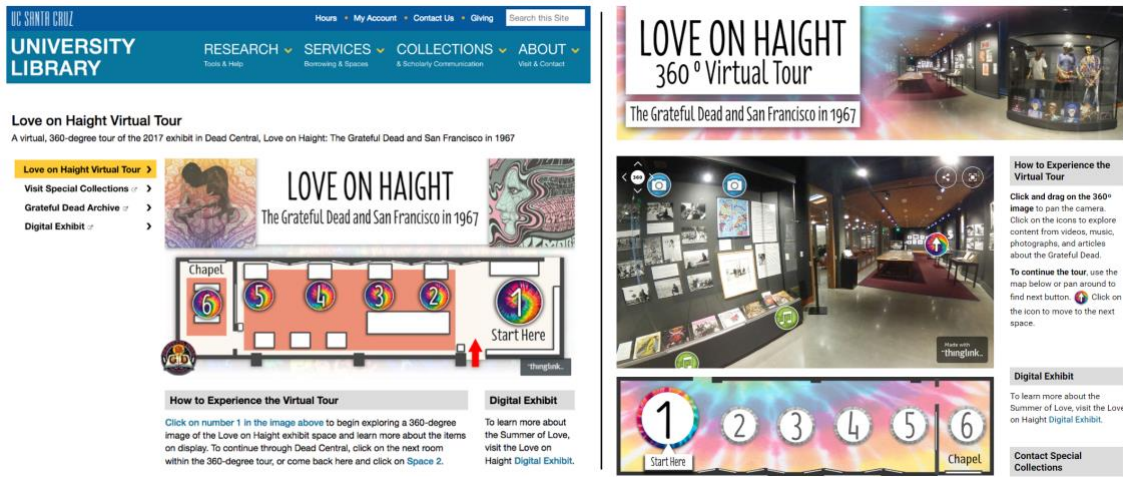


Figure 7: Screenshots of the original virtual tour site (left) and the updated site (right).

One surprising outcome we observed was that not many users were clicking past the original map on the landing page. We realized that while the map provided context about the physical space, it put a barrier between the user and the 360° content. We could determine this by the number of click-throughs – visitors were looking at the site but it did not appear to be clear that they could click on one of the numbers to see the 360° space. We also realized that our preconceived notions about the physicality of the space (entering from the right and walking left) did not translate well without the context of actually visiting the space. This is embodied in the directionality of the numbers and the white boxes denoting exhibit case placement on the original site. Figure 7 displays the original LibGuide site on the left and the revised version on the right. The second, and current, iteration of the site simplified the map, switched the direction of the numbers to align left to right, removed the old map and replaced it with the 360° view of Space 1 to immediately immerse the viewer into the virtual tour, and replaced the banner to match the updated styling. Scriven worked to develop an HTML and CSS solution to replace the original ThingLink map so that we could keep the interactive aspect of the map without using the ThingLink version as a barrier to the first 360° space. In Figure 6, the larger spikes of activity in February and March in

addition to the higher traffic numbers in general correlate to the time period after we made these changes to the site.

In terms of resources, the bulk of the project was completed using roughly 100 hours of staff time and 60 hours of student time over a 3-month period. The equipment we used, which the library already owned, originally cost approximately \$250 for both the Samsung Gear 360 and the tripod we used. Software subscriptions included a subscription for Adobe Photoshop and the premium ThingLink accounts that were included with the training session (\$500 training cost for the 3 librarians, which came out of the DSC department funding to cover the cost as professional development). The project could be replicated on a smaller budget without the custom design work and without the training workshop.

## **Discussion**

### ***Project Sustainability***

We saw this virtual tour project using ThingLink as an endpoint: a deliverable with specific goals of widely promoting the Grateful Dead Archive and other collections to the broader community. In addition, we also saw this project as a way to promote the use of the tool to students and faculty for their research and teaching projects. After the successful completion of this second iteration of the virtual tour, we decided we could add ThingLink as an option to our growing suite of digital tools that members of the campus community can use to present their research or teach new concepts.

It is important to note that we evaluated concepts of both sustainability and archivability when thinking about using this tool in the future. For our purposes, we defined sustainability as the ability to re-create the project using a different set of archival materials, such as those displayed in a future exhibit. Aspects of sustainability

can include reuse of assets, ability for library staff to learn the digital tool, time commitment required, a reproducible project workflow, and continued access to both the necessary hardware (such as the Samsung Gear 360 camera) and digital tools used in the project. In the context of this project, we defined archivability as the ability to preserve and maintain the project in its intended form for long term re-use.

Project sustainability measures were considered from the very beginning. As we consider future projects, we can refer back to our initial project plan and best practices for consistency. We can also reuse the image files and layered Photoshop files that Scriven created in future virtual tours of Dead Central as new exhibits are installed in the space. These files create a consistency between exhibits and represent reusable assets. They will facilitate our ability to focus more on the choice of physical items to annotate and streamline the work of creating the tour. We have already captured 360° images of the current exhibit in Dead Central, and in the future we plan to start conversations with the exhibit curators early in the exhibit planning process to identify and digitize any additional related material.

At this point, attempting to preserve the ThingLink virtual tour itself as a digital asset is out of the scope of this project. ThingLink is a proprietary, web-based software that requires a subscription to maintain editing privileges on the projects created within it, and there is no way to download or save a project for use offline. One of our goals for this project was to preserve the experience of visiting a physical exhibit in Dead Central after it is deinstalled, which is achievable with this exhibit for as long as the ThingLink tool is maintained. Even though the interaction component of the tour may one day cease to function, we are addressing issues of long term preservation of the experience by crawling the main LibGuide page for the library's ongoing web archives, and planning to create screencast videos of the tour that can be preserved as digital assets.

Although the preservation of the full interactive experience of the virtual tour would be ideal, lack of archivability is a widespread issue that affects many digital humanities projects based on web browsers and other client-side technology. In our case, the short term benefit and our ability to capture content via screencast videos and web crawling technologies outweighs the potential inability to meaningfully preserve the project over the long term.

### ***Measuring Engagement***

Prior to the creation of the virtual tour, engagement with the Grateful Dead Archive was primarily focused on materials within the collection itself and inviting people to visit Dead Central in person. Primary mechanisms of learning about and using the Grateful Dead Archive included:

- Visiting the physical spaces of Dead Central (an average of 1,324 visitors per month) and the Special Collections & Archives Reading Room
- Visiting the Grateful Dead Archive Online (GDAO) website, which had 16,698 unique pageviews between August 2018 and May 2019
- Visiting the UCSC Library Special Collections & Archives website about the Grateful Dead Archive,<sup>27</sup> which had 6,832 unique pageviews between August 2018 and May 2019
- Visiting the Grateful Dead Archive Facebook page, which has 157,389 followers as of May 2019
- Consulting finding aids on the Online Archive of California<sup>28</sup>
- Viewing digital exhibits that provide additional contextualizing information for the material displayed in Dead Central, such as the digital companion exhibit to *Love on Haight: The Grateful Dead and San Francisco in 1967*<sup>29</sup>

Through these existing online platforms, visitors can get more information about the Archive, view selections of content, interact with other fans on the Facebook page, and plan a visit to the UCSC Library. The ThingLink virtual tour adds another way of engaging with the Grateful Dead Archive: the ability to see the Dead Central space and the collection materials without having to visit in person.

Statistics collected through Google Analytics and ThingLink can be used to examine what this user engagement looks like, and provides some information about the audiences we are reaching with the virtual tour. Google Analytics statistics are recorded on all of our library web pages, and for the purposes of this analysis were examined for the LibGuide we created as the landing page for the ThingLink virtual tour.

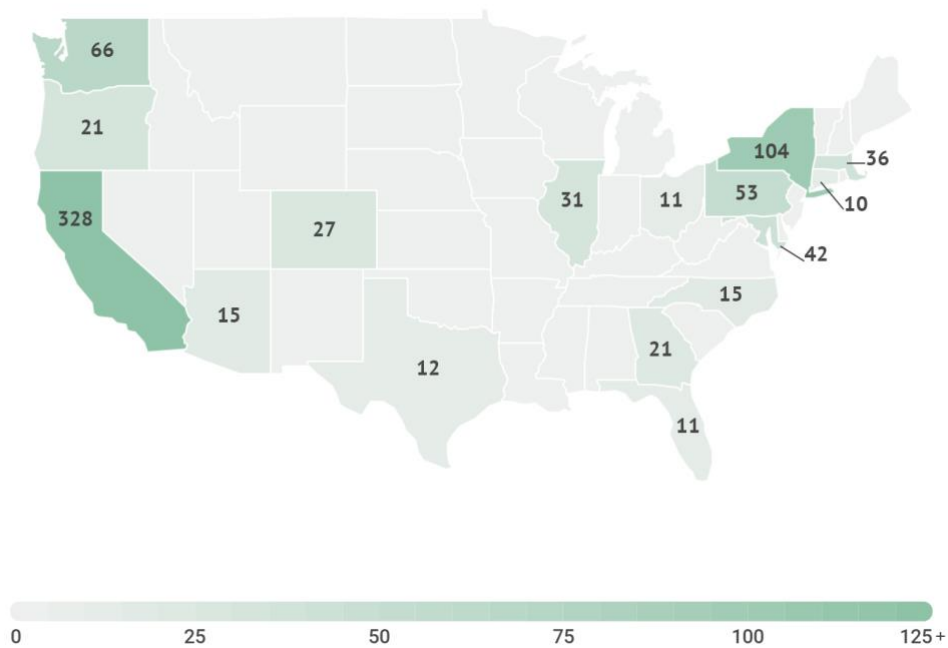


Figure 8: Unique pageviews within the United States, September 2018 - May 2019.

Statistics from Google Analytics show a total of 1222 unique pageviews since the landing page LibGuide was made public. Almost all site views (1132) originated from users within the United States, with other pageviews primarily coming from

Canada, the United Kingdom, Japan, Germany, and Italy. Unique pageviews listed by country and city can be found in Appendix 3, and a map of unique pageviews within the United States is shown in Figure 8. These statistics help illustrate that the virtual tour is achieving its intended purpose of providing an interactive experience to users not just in our local community, but worldwide.

Statistics provided by ThingLink allow us to measure the engagement with the virtual tour itself and confirm that users are interacting with the virtual tour and not just viewing the first 360° image on the main LibGuide page before exiting. Thinglink provides data on unique interactions, total hover time, and movement through the individual spaces in the ThingLink tour, which we can use to get a fuller understanding of user behavior.

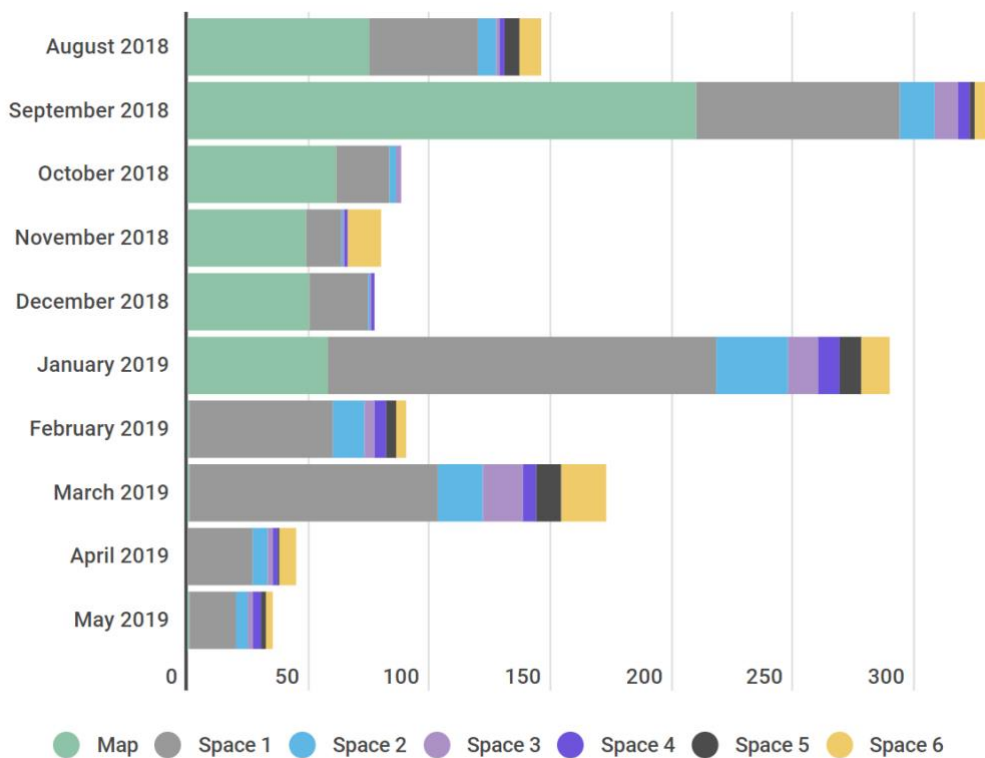


Figure 9: Unique pageviews per space by month, August 2018 - May 2019.

Examining the pageviews on individual spaces shows two main ways in which visitors are moving through the virtual space, shown in Figure 9. The majority of users view only the first and second spaces that they encounter and then exit the site. However, there appear to be a few users who consistently move through the entire space. This is evidenced by a stabilization of drop off in unique views between Spaces 3-6 in comparison to Spaces 1 and 2. Users were also more likely to move through the entire virtual tour after the main introduction space was changed from the map to the Space 1 (see Figure 7) in mid-January 2019, which increased engagement with the first 360° image.

The authors plan to continue to measure the impact of and engagement with this virtual tour, and future virtual tours of exhibits in the Dead Central space, through both qualitative and quantitative means. As discussed previously, digital exhibits like these have the potential to reach a wider range of the public interested in these collections, and impact broader communities through providing new ways of interacting with archival materials. We will continue to monitor viewer statistics through ThingLink's internal tools, interactions through social media sites like the Grateful Dead Archive Facebook page, and utilize Google Analytics to measure the number of unique viewers, which geographical regions are represented, and what paths users take to get to the virtual tour site. These quantitative means of acquiring data on engagement will be complemented with anecdotal feedback as well as information we receive from more structured feedback forms (see Appendix 2). Additionally, we understand virtual tours like these may offer opportunities for users to engage with collections that they might otherwise not visit in person, due to lack of ease, ability, or comfort visiting institutions like academic libraries. We hope to reach these users, increase this kind of meaningful engagement, and collect meaningful data that we can use to improve the virtual tour

while maintaining privacy of users and being mindful of ethical concerns in collecting this kind of data.

### ***Impact on Library Services and Communities***

This project has illuminated ways in which tools like ThingLink can impact our work in the library, and help us serve the research needs of our communities, including students, faculty, and the broader public. Our main shared goals were to:

- (1) Collaborate to increase access to the library's unique collections, and
- (2) Find ways to involve students, both graduate and undergraduate, in digital projects and promote their success in research and digital scholarship.

Norton, due to her work with graduate fellows in the Center for Archival Research and Training (CART), focused on ways to promote student success in archival research skills, curating digital exhibits, writing for a public audience, and using digital tools in research and teaching. The creation of digital exhibits has always been a significant component of the CART fellowship, with graduate students being trained in the use of tools like Omeka<sup>30</sup> and Scalar<sup>31</sup> to showcase the archival collections they have processed and provide a digital complement to their physical exhibit. Now ThingLink can be used as another tool to create these digital exhibits in the CART program. Using simple digital tools like ThingLink gives the graduate fellows a low-barrier introduction into what digital humanities work may look like, how these kinds of projects can augment their research and teaching, and how using tools like these can be beneficial in their future careers.

This project has also illuminated the ways in which undergraduate students can benefit from working with digital tools. This virtual tour would not have been created

without the work of Reed Scriven, who created structural and stylistic elements and handled much of the technical work. Scriven used his staff time in the DSC to dive into this project, utilizing and expanding his expertise in the Adobe software suite and web design, learning about the library's archives and special collections materials, and developing skills using the ThingLink tool in order to train other campus constituents who want to use it in their research and teaching projects. Now that the DSC staff members are trained in the use of ThingLink, among other digital tools, undergraduates on campus can utilize ThingLink in their class projects and receive the technical support they need from the library.

Golubiewski-Davis has also begun using this tool in the DSC with faculty and instructors for classwork. In Fall of 2018, she worked with an instructor to support a small project where students added 4-5 annotations to an image of their choosing that represented a topic chosen by the instructor. Initial feedback has been positive and we hope to work with more faculty in this way. We have also put ThingLink to use on the DSC's LibGuide page, using it to give students a preview of the various physical spaces available within our location on campus.<sup>32</sup>

The biggest potential impact outside of the main campus community is on the community of Grateful Dead fans, also known as Deadheads. They interact with the Grateful Dead Archive every day on sites like the Grateful Dead Archive Online (GDAO.org) and the Archive's Facebook page, which has over 150,000 followers.<sup>33</sup> The Facebook page is an avenue to promote this virtual tour since it has such high engagement with the Deadhead community, and the virtual tour allows fans to interact with the physical exhibit if they're not able to visit in person, or if they've missed visiting a previous exhibit. One post created in January 2019 promoting the updated version of the virtual tour received 163 likes, 6 comments, and 24 shares through

Facebook. We will continue promoting the current and future exhibit virtual tours on the Grateful Dead Archive Facebook page, and monitor engagement through the site.

This project is also being leveraged as an opportunity for library development to raise funds for student success initiatives and ongoing collection stewardship. The virtual online tour is a new way for the library to showcase the Grateful Dead Archive to a wider audience, draw in new kinds of visitors, and promote our other collections to the library's existing donors. Showcasing available collections and promoting the student work that goes into making these projects are concrete examples of how donor funds can allow the library to help students succeed through the use of tools like ThingLink to create new kinds of digital scholarship.

We have also seen impacts of this work on other scholars and library workers outside of UCSC. As part of her dissertation work, a PhD student at UCLA reached out to learn more about how we are using 360°, VR, and AR technologies in the UC Santa Cruz Library, and its benefits and drawbacks. We have presented about this work at professional meetings, where librarians from other institutions have expressed interest in creating similar projects.

## **Conclusion**

We found the experience of creating the 360° virtual tour to be a productive and valuable experience. We have committed to creating an additional virtual tour using ThingLink for the exhibit that is currently on display in Dead Central. The feedback we have received from library staff, students, and community members has been overwhelmingly positive. Since there are many applications for this virtual tour including opportunities to fundraise for student success initiatives, because the cost can be managed by the library through the foreseeable future, and because undergraduate staff members can be paid to help us build these virtual tours, we have the support to

continue this project for future exhibits that are installed in the Dead Central space. We plan to explore using this existing virtual tour in current and future technologies in the UC Santa Cruz Library, such as the DSC's visualization wall. We recognize that cost models and library support may change, so we will monitor our ability to maintain these projects over time and align the goals of the projects with the overarching library mission and goals. One benefit of using ThingLink is that in the event we choose not to renew our premium-level subscription, which allows us to edit the annotated 360° image and incorporate custom icons, the existing virtual tours will remain available to visitors of the site.

We recommend that project creators that are looking to develop their own virtual tours consider the following questions:

- What resources are available?
  - What time can staff spend on the project?
  - What perspectives / expertise do different members of the potential team offer?
  - What cost can the institution sustain for software and hardware?
  - Is hiring student assistants an option?
- What benefits would a custom solution provide?
- What limitations would be encountered when using proprietary software?
- What are the goals of the project?

We were able to create a team of four members who each brought unique skills and perspectives. Each member was individually motivated to learn the technology involved, and the technical barriers were low enough to allow for all the team members to feel comfortable using ThingLink and co-editing the project. We used existing

equipment for the project and combined professional development with the cost of the software. When considering a custom solution compared to a proprietary tool, we determined that we did not have the resources to develop a custom tool and we encountered few limitations using ThingLink for this project. Our goals focused on providing broad access and evaluating the tool for future use, so using ThingLink for this pilot was a good solution.

We see great value in continuing to build and use these virtual tours, especially in the ways that they can promote student engagement, provide an opportunity for the library to experiment with new technologies, and increase access to the library's unique collections. The ThingLink tool has fit the needs of this particular project, it has provided a low technological bar for people at different levels of technical ability, and currently it is sustainable in terms of cost and administrative support. The creation of this project has aligned with our library's strategic directions of access and discovery, research and scholarship, student success, and preservation. We look forward to continuing to use the ThingLink tool, continuing to gather data about how projects like these are helping achieve goals of expanding access and engagement, and continuing to explore new tools that will help us provide meaningful research experiences to our library's numerous constituents.

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## Notes on Contributors

Alix Norton has been an Archivist at UC Santa Cruz since 2015, where she oversees the Elisabeth Remak-Honnef Center for Archival Research and Training (CART), a fellowship program that trains PhD students from various disciplines in archival processing and exhibit curation. She holds degrees from the University of Michigan School of Information and the University of Washington.

Kristina Golubiewski-Davis, PhD, has worked in the Digital Scholarship Commons (DSC) at UC Santa Cruz since 2017. In her position first as Digital Humanities Librarian and currently as Director of the DSC, she helps to manage the DSC Lab and VizLab, focusing on incorporating media capture, 3D modeling, and virtual reality support into the library. The DSC provides software, hardware, and support for students and faculty interested in incorporating digital tools into their research and pedagogy. Prior to UCSC, Kristina held a post-doc at Middlebury College and completed her dissertation work in Anthropology at the University of Minnesota, Twin Cities, where she integrated 3D scanning and morphological analysis to examine prehistoric networks of craft knowledge by examining Bronze Age swords.

Ann Hubble is a Librarian in the Digital Initiatives department at UC Santa Cruz. She investigates new technologies and processes for the UCSC Library and provides support in the development and management of the Library's website. Ann consults with faculty & students on digital exhibit building tools such as CONTENTdm, Omeka, and Story Maps.

Reed Scriven is a UCSC alumnus who worked as a DSC Student Assistant in the Digital Scholarship Commons since 2017. Through his education spanning Computer Science game design and Anthropology, he is able to work on the technical side of a project while still understanding the large scale message that the project is working to convey. By working on multiple Virtual Reality projects, website redesigns, graphic design, and photogrammetry, Reed adds valuable insights into every team that he is on and helps to improve quality across the board.

## Appendix 1

Team member roles and project labor allocation, adapted from CASRAI CRediT

<b>Role</b>	<b>Team Member</b>	<b>Role Description</b>
Conceptualization	Alix, Ann, Kristina	Ideas; formulation or evolution of overarching research goals and aims.
Project administration	Kristina	Management and coordination responsibility for the research activity planning and execution.
Resources	Alix, Reed	Gathering collections materials (Alix), creating digital assets for the project (Reed).
Software	Reed	Creating custom HTML and CSS for the project, exploring the extent of customization within ThingLink, and finding additional visualization tools
Supervision	Kristina	Oversight and leadership responsibility for the planning and execution, including mentorship external to the core team.
Visualization	Alix, Ann, Kristina, Reed	Preparation, creation and/or presentation of the published work, specifically visualization/data presentation.
Writing – original draft	Alix, Kristina	Preparation, creation and/or presentation of the published work, specifically writing the initial draft (including substantive translation).
Writing – review & editing	Alix, Ann, Kristina, Reed	Preparation, creation and/or presentation of the published work by those from the original research group, specifically critical review, commentary or revision – including pre- or post-publication stages.

## Appendix 2

### Love on Haight Virtual Tour Feedback Form

Please provide any feedback you have after interacting with this site:

<https://guides.library.ucsc.edu/loveonhaight360>.

Thank you!

(1) Did you find the movement from space to space understandable? If not, what was confusing?

(2) What did you think of the number of objects that are annotated in each 360-degree image?

Too Few			Too Many	
1	2	3	4	5

(3) Did you open up any of the links to view the source material in Calisphere or elsewhere? (Yes / No)

(4) Do you find this to be a useful tool to view the exhibit that was previously in the Dead Central space?

(5) If you found a broken link, please tell us which room it is in and what the title of the button is below. (e.g. Space 2, Man with large black hat)

(6) Do you have any other comments?

### Appendix 3

Google Analytics Summary of Unique Pageviews by Country,  
September 2018 - May 2019

<https://guides.library.ucsc.edu/loveonhaight360>

Country	Sum of Unique Pageviews
United States	1132
Canada	24
United Kingdom	16
Japan	12
Germany	8
Italy	6
Australia	5
Ecuador	3
Argentina	2
Austria	2
Brazil	2
Finland	2
France	1
India	1
Ireland	1
Mexico	1
Netherlands	1
Seychelles	1
Sweden	1
Taiwan	1
<b>Grand Total</b>	<b>1222</b>

Google Analytics Summary of Unique Pageviews by U.S. City,  
September 2018 - May 2019

<b>City (Metro) area in United States</b>	<b>Sum of Unique Pageviews (10 or more views per area)</b>
Monterey-Salinas CA	131
New York NY	94
San Francisco-Oakland-San Jose CA	84
(not set)	74
Seattle-Tacoma WA	66
Los Angeles CA	64
Washington DC (Hagerstown MD)	42
Boston MA-Manchester NH	36
Philadelphia PA	34
Chicago IL	31
Eureka CA	28
Denver CO	27
Portland OR	21
Sacramento-Stockton-Modesto CA	21
Atlanta GA	21
San Diego CA	19
Harrisburg-Lancaster-Lebanon-York PA	19
Greenville-New Bern-Washington NC	15
Phoenix AZ	15
Dallas-Ft. Worth TX	12
Orlando-Daytona Beach-Melbourne FL	11
Cleveland-Akron (Canton) OH	11
Burlington VT-Plattsburgh NY	10
Hartford & New Haven CT	10