

Improving the City of Seward, Alaska's Cemetery Map through End-User Participation

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Introduction

A prototype web mapping application was released in early 2023 to the public and city staff for the City of Seward, Alaska's five cemeteries located within city limits. The main purposes of the prototype were to improve burial record management and ameliorate the workflow for the three city departments involved with the burial permitting process. Another intent of the prototype application was to provide a cemetery map that the public could use to search for their buried loved ones and/or find available burial plots. The prototype was created with the end-user in mind but did not include any end-user participation within the design process. Since the prototype's release, minimal feedback has been given about the application from end-users. However, this could be a consequence of not providing a platform for the public and city staff to give their feedback. For this capstone project, end-user participation was promoted for the final cemetery mapping application design by conducting remote usability surveys for city staff and the public to share their experiences with the current prototype. Utilizing the city's geographic information systems (GIS) software, Esri, usability surveys navigated end-users through the prototype's interface and capabilities through a series of tasks that needed to be completed. Participants were then given the opportunity to provide their feedback about the application which was then incorporated into the final design of the application. Encouraging end-user participation in the design process led to the creation of a final application that met the needs of the end-users and provided better efficiency for burial record management and burial permitting for City of Seward staff and Seward residents.

Literature Review

Developing a final cemetery mapping application for the City of Seward entailed understanding how GIS has become more involved with cemetery management and acknowledging that end-user participation and usability testing should be incorporated into the final design. This literature review

discusses how GIS can improve cemetery management through online web maps but also discusses the lack of usability testing within cemetery mapping application designs that could be improved if end-user participation were to be included in the design process.

A few studies have demonstrated that GIS can be used to design record keeping databases for cemetery management since GIS is a “more dynamic approach” because it can always be edited (Titus, 2008, p. 23). Titus (2008) explained that “GIS provides a way to record, monitor and analyze the information stored within it interactively and be responsive to new data and forms of representation” (p. 23). A case study at the Woodland Hills Memorial Park Cemetery in Minnesota used GIS to conduct a field survey to inventory gravesites into a geodatabase, also known as a spatial database, to help cemetery administrators manage their cemetery more efficiently (Schmidt et al., 2020). Previously, the Woodland Hills Memorial Park Cemetery had been using a handwritten ledger with paper records which Schmidt (2018) was able to convert into a Microsoft Excel spreadsheet, joining this data with the surveyed gravesites. By creating a geodatabase for the cemetery, administrators were able to query buried individuals and their attributes with improved speed and efficiency (Schmidt, 2018).

The historic St. Michael's Cemetery in Pensacola, Florida also utilized GIS in mapping and inventorying the cemetery to create a geodatabase similar to the case study conducted at Woodland Hills Memorial Park Cemetery (Liebens, 2003). After the geodatabase for the St. Michael's Cemetery was completed, a website was published containing a web map of the cemetery for cemetery administrators and the public to use. The mapping application was fully interactive and supported different types of queries on all attributes. However, Liebens (2003) stated that informal feedback was received from the public, who thought it had too many advanced features. A new web page was designed that contained a simpler map for the public to navigate. Further detail was not provided for the feedback given by the public, as it may not have been part of the scope of the project.

In Chance, Maryland, Hartge (2017) mapped and inventoried the gravesites of the cemetery of the local church, Rock Creek United Methodist Church, creating a geodatabase. Hartge (2017) was able to publish a web map application through ArcGIS Online with the assistance of Salisbury State University. However, without access to the university's resources, the locations of new burials have been hard to update. Other parts of the website can be edited by the public, such as adding obituaries, photographs, and/or stories associated with buried individuals. Hartge (2017) did not receive formal feedback on the web map by the public, which could improve the application if any issues are discovered by public users in the future.

End-user feedback can be essential in creating an application whose design and usability performance meets the needs of future end-users. An example of this is an application that was designed for a nonprofit group, Friends of Oberlin Village (FOV), who maintain the Oberlin Cemetery in Raleigh, North Carolina. Bravo (2019), a student of the University of North Carolina, conducted usability testing for FOV to determine what design characteristics could be implemented in their cemetery application. Bravo (2019) had nine FOV volunteers who tested three existing cemetery websites, such as findagrave.com, to understand what features worked for the end-users and which ones did not. After the usability testing, Bravo (2019) determined which features to include in the new web database design based on participants' feedback (e.g. incorporating pictures for graves and making the database editable by the public).

As to how many participants should be used in usability tests, Bravo (2019) was able to find nine volunteers from FOV, but none from the general public. Seven of the nine volunteers were also aged 50 years or older, which may or may not accurately represent the public users' demographics. Previous usability research conducted by Jakob Nielsen in the 1990s determined that five participants are efficient for usability testing. Nielsen (1993) demonstrated that the first three to five participants are able to discover 80 percent of usability problems in a product or system. Yet, other case studies have revealed

that depending on the user group, only 35 percent of the usability problems were discovered (Faulkner, 2003). Furthermore, Faulkner (2003) showed having more than five participants in a usability testing group, such as 15 or 20 participants, “increased the minimum percentage of problems identified” to 95 percent whereas groups of five participants varied from 55 to 100 percent depending on the user group (p. 381). Selecting appropriate membership for usability testing groups can be complex in that members can vary upon experience levels with the product or system being tested. However, Faulkner (2003) goes on to explain that “the only clear answer to valid usability testing is that the test users must be representative of the target population” (p. 382). Thus, in cases where it is hard to find participants or funding is limited, it is best to find users that represent the end-user of the product or system.

Therefore, when Bravo (2019) used the FOV participants in his usability testing, his user group represented a majority of the end-users for his application, as the FOV volunteers are the future users of the application. However, for the usability testing that was conducted for the cemetery application development for the City of Seward’s cemeteries, a survey was sent out to both city staff and to the public to attempt to engage both entities of the end-user population with an aim of 10 to 15 participants to ensure more usability problems could be identified.

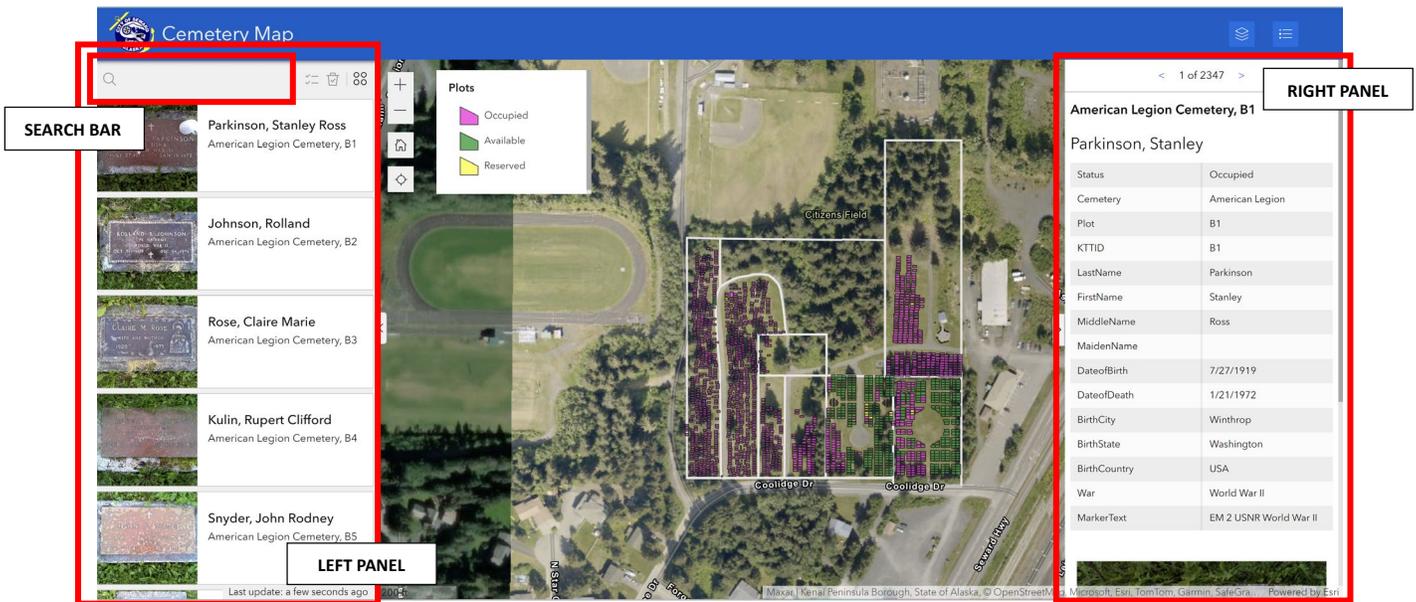
Methodology

The City of Seward has faced challenges in managing their cemeteries, specifically with locating buried individuals and finding available burial plots for future interments. In order to improve the workflow of the city departments involved with locating buried individuals, a prototype mapping application was created and was released to the public in early 2023 on the city’s website (City of Seward, 2024). The prototype application displayed a list on the left-hand side panel of those buried in the Seward cemeteries (Figure 1). The list contained a search function in the upper left corner of the left panel so that end-users could search for buried individuals by first and last name. The search results

would be shown within the list and end-users could then select an individual from the list, which would then have the map zoom to that gravesite. Information about the buried individual was displayed in the right-hand side panel and included a picture of their headstone and/or a link to their obituary in PDF format if there was one associated with the individual (Figure 1).

Figure 1

Cemetery Map Application



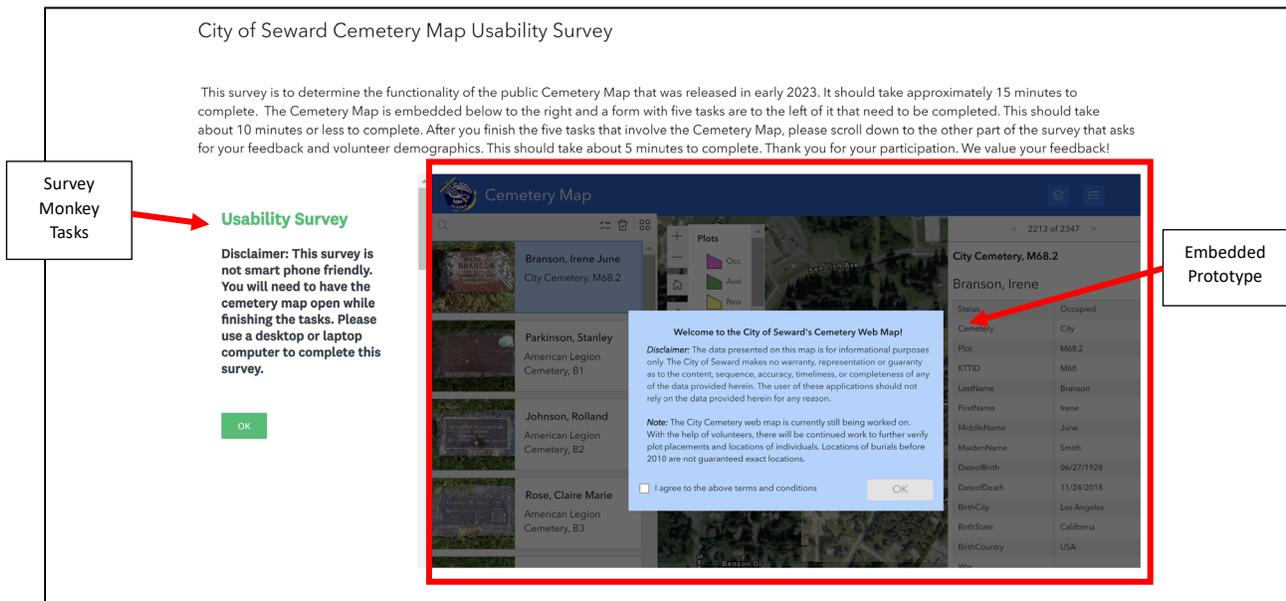
Note. Screenshot of the prototype cemetery mapping application for the City of Seward, Alaska.

The hardware and software that were used for creating the remote usability survey to test the prototype application was a personal laptop, Esri online software, and Survey Monkey. The hardware that participants used may have varied as it depended on how they decided to complete the survey. Since smart phones were discouraged due to webpages not fitting the phone screen correctly, participants could have used personal desktops, personal laptops, or public computers, such as at a library.

The software used to deploy the usability survey were Esri's ArcGIS Experience Builder and ArcGIS Survey123 as well as Survey Monkey. ArcGIS Experience Builder hosted the survey and an embedded version of the prototype on a single webpage so that participants had all the tools they needed to complete the survey within one webpage (Figure 2). The usability survey itself was split into two sections using both ArcGIS Survey123 and Survey Monkey and took approximately 15 minutes to finish.

Figure 2

Usability Survey Webpage



Note. Screenshot of the ArcGIS Experience Builder webpage that hosted the usability survey and embedded prototype.

The first section of the survey was displayed next to the embedded prototype and consisted of six tasks that needed the prototype to complete the tasks, which should have taken approximately 10 minutes. This section was created with Survey Monkey, as this software allows for one question to be displayed at a time, which would help participants from having to scroll back and forth between survey

questions and the prototype (Figure 2). The tasks navigated the participants through the different tools of the prototype application, and the participants were able to rate their experience with the prototype's functionality and interface. Tasks 1 through 6 were rated using a Likert scale based on the ease or difficulty of the task completed (e.g. "Very easy", "Easy", "Neither easy nor difficult", "Difficult", "Very difficult") (Figure 3).

Survey Monkey also had the capability to record the overall time spent on the survey by participants. Being able to analyze the time it took for participants to complete all of the tasks could provide more insights on the functionality and interface of the prototype. However, the basic version of Survey Monkey did have limitations that restricted survey questions to a maximum of 10, and none of the questions could have long, open-ended answers. Therefore, a survey created by ArcGIS Survey123 was implemented below the Survey Monkey section of the usability survey. The ArcGIS Survey123 form focused more on detailed feedback from participants (Figure 4). A volunteer demographics section was also part of the survey to understand the different types of end-users that would use this application in the future (Figure 5). Time spent on this part of the survey would not be collected with ArcGIS Survey123, as this software did not provide this capability.

When the usability survey was ready to be viewed by participants, an email created from Microsoft Outlook was sent to selected city staff, such as the City Planner and Assistant City Manager, to test for accessibility and any errors encountered. Once this was completed, a link to the survey was sent out on the City Clerk's emailing list and shared on the City of Seward's *GIS / Mapping* webpage and their *Cemetery Maps* webpage to acquire participants from the general public and other city staff. A Facebook post was also created by the City of Seward's Communications Executive and shared on the City of Seward's Facebook page.

Figure 3*Survey Monkey Tasks*

Usability Survey

📄 PAGE TITLE

Disclaimer: This survey is not smart phone friendly. You will need to have the cemetery map open while finishing the tasks. Please use a desktop or laptop computer to complete this survey.

1. Task 1: Please search for the buried individual, "Irene Branson". Once you have found "Irene Branson" in the search list, select it so the map zooms to the gravesite. How easy or difficult was it to finish this task? 🗨️ 0

Very easy
 Difficult
 Easy
 Very difficult
 Neither easy nor difficult

2. Task 2: On the right hand-side of the screen, click on Irene Branson's obituary below the image of her headstone. If your screen takes you to another tab, come back to this tab to resume the survey. How easy or difficult was it to finish this task? 🗨️ 0

Very easy
 Difficult
 Easy
 Very difficult
 Neither easy nor difficult

3. Task 3: Click the image of the headstone to enlarge it. If your screen takes you to another tab, come back to this tab to resume the survey. How easy or difficult was it to finish this task? 🗨️ 0

Very easy
 Difficult
 Easy
 Very difficult
 Neither easy nor difficult

4. Task 4: On the left-side panel, clear the search results so that the map shows all the burial plots. How easy or difficult was it to finish this task? 🗨️ 0

Very easy
 Difficult
 Easy
 Very difficult
 Neither easy nor difficult

5. Task 5: In the top right corner of the screen, click the Layers icon to add the layer, "2022 GPR results", to the map. These are the results from the ground penetrating radar (GPR) survey done on the cemetery in 2022. How easy or difficult was it to finish this task? 🗨️ 0

Very easy
 Difficult
 Easy
 Very difficult
 Neither easy nor difficult

6. Task 6: Find the legend on the map. How easy is it to understand the symbols and colors used on the map to represent the burial plots? 🗨️ 0

Very easy
 Difficult
 Easy
 Very difficult
 Neither easy nor difficult

After hitting the "Done" button, please continue this survey below the Cemetery Map application to provide detailed feedback on the tasks you recently completed. 🗨️ 0

Note. Draft layout of the tasks to complete with the prototype using Survey Monkey.

Figure 4

ArcGIS Survey123 Feedback Section

Please provide your feedback on the Cemetery Map. This should take approximately 5 minutes to complete.

Please describe your overall experience with the City of Seward's Cemetery Map and provide any suggestions that you have for the map.

If you have used the Cemetery Map before and had any issues, please describe below.

What are the main reasons you would use the Master Cemetery Map for in the future?

- Searching for an individual
- Finding an available burial plot
- Looking at GPR results
- Other

If "Other", please provide your main reason here:

Would you participate in more usability surveys in the future for other City of Seward mapping applications?

- Yes
- No
- Maybe

Note. ArcGIS Survey123 section of the survey provided participants a space for detailed feedback.

Figure 5

Volunteer Demographics Section

Are you a City of Seward employee?

Yes

No

Do you currently live in Seward, Alaska?

Yes

No

If "No", please type in the city and state of where you currently live:

What is your age group?

18 to 24 years old

25 to 34 years old

35 to 44 years old

45 to 54 years old

55 to 64 years old

65 years old or over

How would you rate your overall computer skills?

Basic

Intermediate

Advanced

Note. Volunteer demographics section of the ArcGIS Survey123 survey.

Data

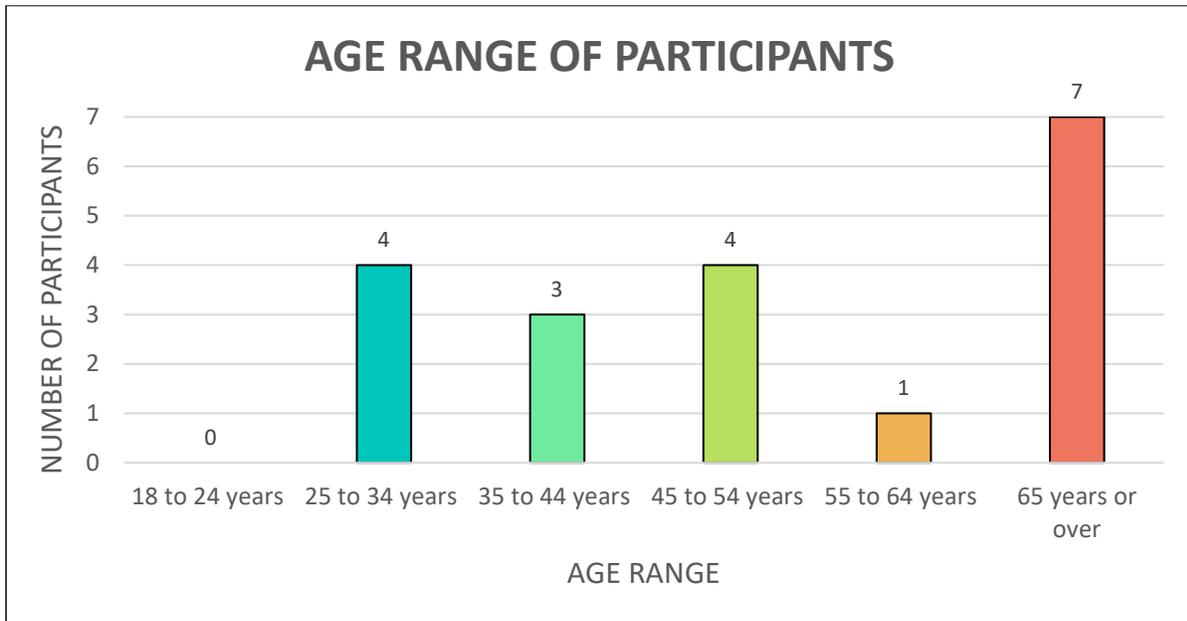
The results that were submitted through Survey Monkey and ArcGIS Survey123 were the data used for this capstone project. The geographic extent of the data could be varied, as respondents of the survey could have been from the Seward area or from out of state. Survey responses were collected from March 6th to March 29th, 2024, with the aim of 10 to 15 volunteers that accurately represented the end-users for the final mapping application. The software used to collect the data both organized responses submitted. Depending on the results from the tasks section in Survey Monkey, if a task received responses such as “Very easy” or “Easy,” it was likely that the tool in the prototype functioned efficiently and/or the interface was intuitive. However, if a task received responses such as “Very difficult” or “Difficult,” it may have been that the tool did not operate appropriately and/or that the interface was not user-friendly. The tasks that received lower ratings, along with the individual feedback from the ArcGIS Survey 123 section, were examined more closely to improve these functionality or interface issues so that these were resolved before the deployment of the final application.

Results

The usability survey had a total of 20 participants of which 13 were from the general public and seven were city staff. All participants live in the Seward area. Of the 20 participants, four participants were in the range of 25 to 34 years old, three were in the 35 to 44 years age range, four were in the 45 to 54 years age range, one was in the 55 to 64 years age range, and seven were 65 years old or older (Figure 6). One participant chose not to share their age range in the survey. As for overall computer skills of the participants, 13 participants considered themselves as “Intermediate,” six participants as “Advanced,” and one participant as “Basic” with a computer (Figure 7).

Figure 6

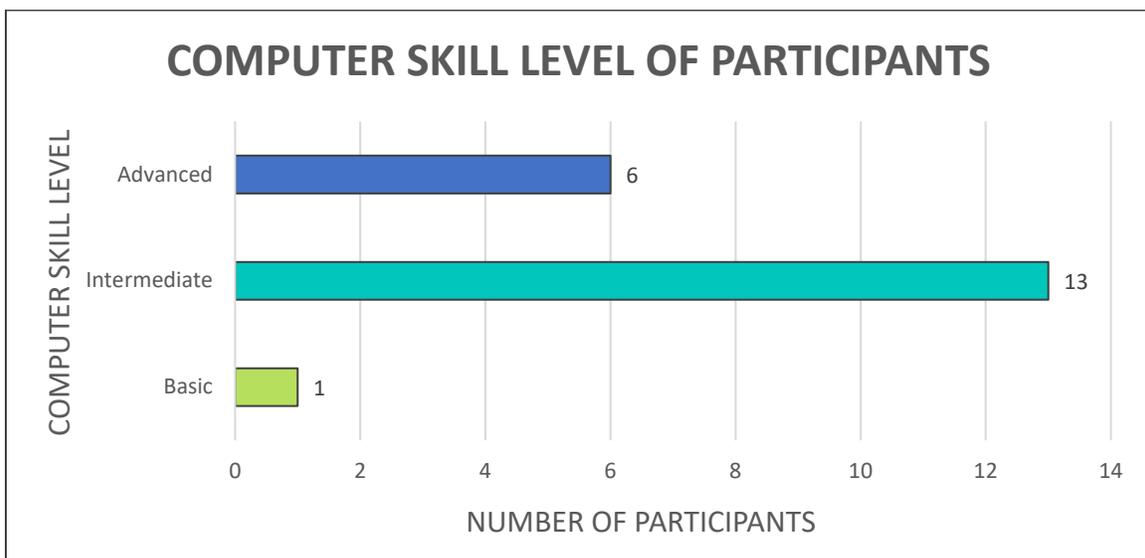
Age Range of Participants



Note. One participant did not disclose their age.

Figure 7

Computer Skill Levels of Participants



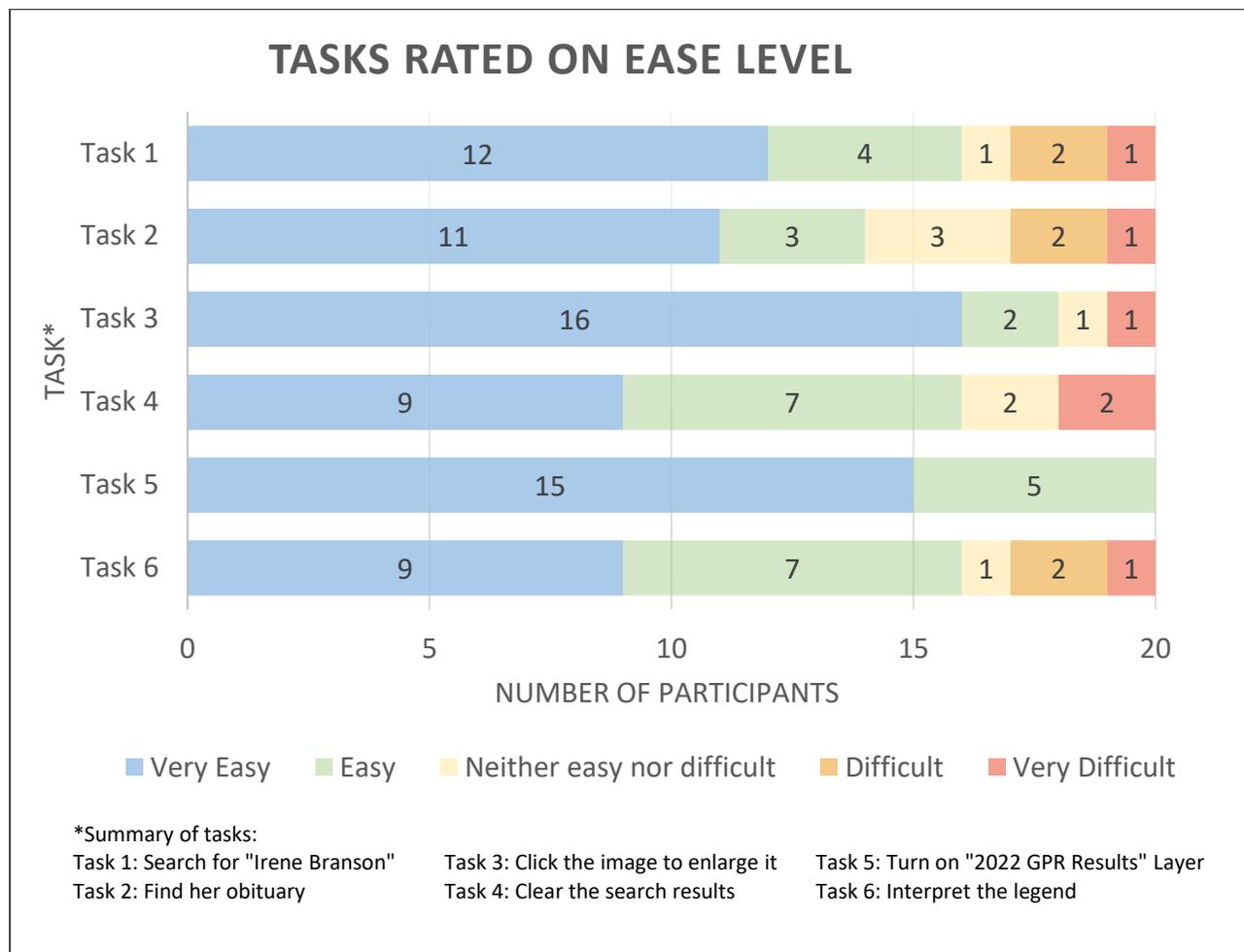
When reviewing how the tasks were rated, the Survey Monkey results exhibited that it took approximately 9 minutes and 35 seconds for participants to finish the tasks with the cemetery mapping application. The completion rate was 100 percent as each task was rated by the participants on the ease of the task from a Likert scale of "Very easy" to "Very difficult". Task 5, making the "2022 GPR Results" layer visible on the cemetery map, was rated as the easiest task with all participants claiming it was either "Very easy" (15 participants) or "Easy" (5 participants) to complete (Figure 8). The second easiest task to complete was Task 3, which was clicking on the headstone image in the feature information widget to enlarge it. Out of the 20 participants, 16 participants rated it as "Very easy" and two rated it as "Easy." The third and fourth easiest tasks were Task 1 and Task 2 where participants were asked to search for "Irene Branson" and then find her obituary in the right hand-side panel. Both tasks had a majority rating the task as "Very easy" and a few participants rating it as "Easy." However, there were a couple of responses that rated these tasks as "Difficult" or "Very difficult." Tasks 4 and 6, which asked the participant to clear the search results and to interpret the legend, also had mixed results with a majority rating the tasks as "Very easy" (9 participants) or "Easy" (7 participants), but a few rated the tasks as either "Very difficult" or "Difficult." Whereas the other tasks had a majority rating the tasks as "Very easy," Tasks 4 and 6 are more split between "Very easy" and "Easy" (Figure 8).

While evaluating the feedback from the ArcGIS Survey123 results, a majority of collected responses iterated that the cemetery mapping application was simple and easy to use. However, there were a few responses that commented on some difficulties encountered while using the application. For example, one participant was not able to locate "Irene Branson" using the search bar. Another participant had trouble clearing the search results as the select tool in ArcGIS Experience Builder is not intuitive to users without explaining how to use it. Other participants mentioned that the obituaries should be clearly labeled with the word, "Obituary," after the name of the individual as well as GPR should be spelled out to "Ground Penetrating Radar" for the "2022 GPR Results" layer. A few participants

provided detailed feedback on how to improve the cemetery mapping application. A full list of their suggestions can be found in Table 1. Although only a few participants provided detailed suggestions for improvement, all 20 participants answered, "Yes," to participating in future usability surveys for City of Seward mapping applications.

Figure 8

Tasks Rated on Ease Level



Note. Usability survey results from the SurveyMonkey portion where participants were asked to rank the six tasks used to navigate the embedded cemetery mapping application prototype.

Table 1

Participants’ Suggestions

TOOL/FUNCTION	SUGGESTIONS FROM PARTICIPANTS
Map	<ul style="list-style-type: none"> • Keep the default plots visible when an individual is selected instead of solely showing the selected individual • A tutorial on how to navigate the map
Search Bar	<ul style="list-style-type: none"> • Change the color of the search bar as it blends into the background and is hard to see • Add a “Help” button next to the search function that explains how to unselect the individual in the list and then clear the search results
Legend/Layer Buttons	<ul style="list-style-type: none"> • Label the buttons with words as well as icons • Spell out GPR in the “2022 GPR Results” layer and add an explanation of GPR
Attachments	<ul style="list-style-type: none"> • Add the word, “Obituary” to the PDFs • Add a “Help” button or a hover function over the image that states, “Click to enlarge”
Overall Application	<ul style="list-style-type: none"> • Add a tutorial button or have a small tutorial that opens when a user first visits the application walking users through the functions and tools of the application

Note. A compilation of suggestions from participants from the ArcGIS Survey123 section of the usability survey.

In an examination of the Survey Monkey tasks’ ratings and the ArcGIS Survey123 results for any cross-tabulation between task ratings, age, and computer skills, there were no distinct trends found. Those who considered themselves as “Advanced” with computer skills did rate most of the tasks as “Easy” or “Very easy.” However, there was one “Advanced” individual who rated the first three tasks as

either “Difficult” or “Neither easy nor difficult,” but expressed not having the knowledge of navigating an online mapping application. Those with “Intermediate” computer skills had mixed results on the easiness of the tasks. There were no trends found with the participants’ ages and skillsets as both seemed dispersed amongst the different age ranges and categories of computer skills. The results appeared to have varied simply by individual responses as participants may have different background experiences working with computers and online mapping applications. The cemetery mapping application is one of the first mapping applications that is more interactive for end-users published by the City of Seward which could mean a slight learning curve is required to navigate it better if some individuals have minimal experience working with online mapping applications.

Discussion

From both the Survey Monkey tasks section and the detailed feedback ArcGIS Survey123 section results of the usability survey, participants were able to discover functionality problems with the cemetery mapping application that could be improved upon. For instance, one of the first participants, who identified as having “Advanced” computer skills and was in the age range between 25 to 34 years old, had to notify me via email that Task 4, clearing the search results, was quite complicated as the end-user had to unselect the individual in the list before clicking the “X” in the search bar to clear the results. A call to Esri Support explained that this is a limitation of the select tool in the List widget, which is the widget on the left hand-side panel of the cemetery mapping application. Esri Support clarified that a feature must be unselected in the List widget for the results to be cleared. Otherwise, the default features will not be restored on the map or in the list. Due to this limitation, Task 4 was reworded to include the phrase, “click on ‘Irene Branson’ to unselect it, then clear the search results”, before the link to the survey was sent out to the public through the City Clerk’s emailing list. This limitation of the select

tool may also be the reason why this task received more of a split between “Very easy” and “Easy” among participants, whereas some of the other tasks were rated “Very easy” as the majority.

Task 6, interpreting the legend for burial plot availability, was another task that had mixed results similar to Task 4 due to a functionality issue of the embedded prototype in the hosted webpage. The legend format may have been hindered by the way the hosted webpage embedded the prototype, shrinking it so that it was not fully expanded. One participant, a 35 to 44 year old with intermediate computer skills, expressed this exact problem with the usability survey format where they were not able to expand the legend in the embedded prototype. Another participant, 65 years or older who has intermediate skills with computers, conveyed having issues finding the legend on the map. On the other hand, one individual who is also 65 years or older with intermediate computer skills, stated they “liked the simplicity of the plot color scheme.” With these comments, it can be deduced that participants may have these mixed responses due to varied screen sizes while taking the usability survey. The embedded prototypes for future usability surveys may need to format the legends to allow them to expand by the participants rather than placed in a locked size and format on the mapping application.

While further reviewing participants’ feedback on the cemetery mapping application, one individual shared that the map was difficult to navigate unless one had previous experience with navigating online maps. This participant was in the age range of 65 years or older and had “Advanced” computer skills. Yet, the sole participant that rated themselves with “Basic” computer skills and an age range of 45 to 54 years old, did not provide any feedback on the mapping application, but rated most tasks as “Easy” or “Very easy.” Regardless of an individual’s computer skills, a participant not understanding how to navigate the map section as described above is valuable feedback so as to incorporate a tutorial on how to use the map section itself so that users are more confident in utilizing the application (i.e. explain to users to hold their mouse down to drag the map around or use their scroll on their mouse to zoom in and out).

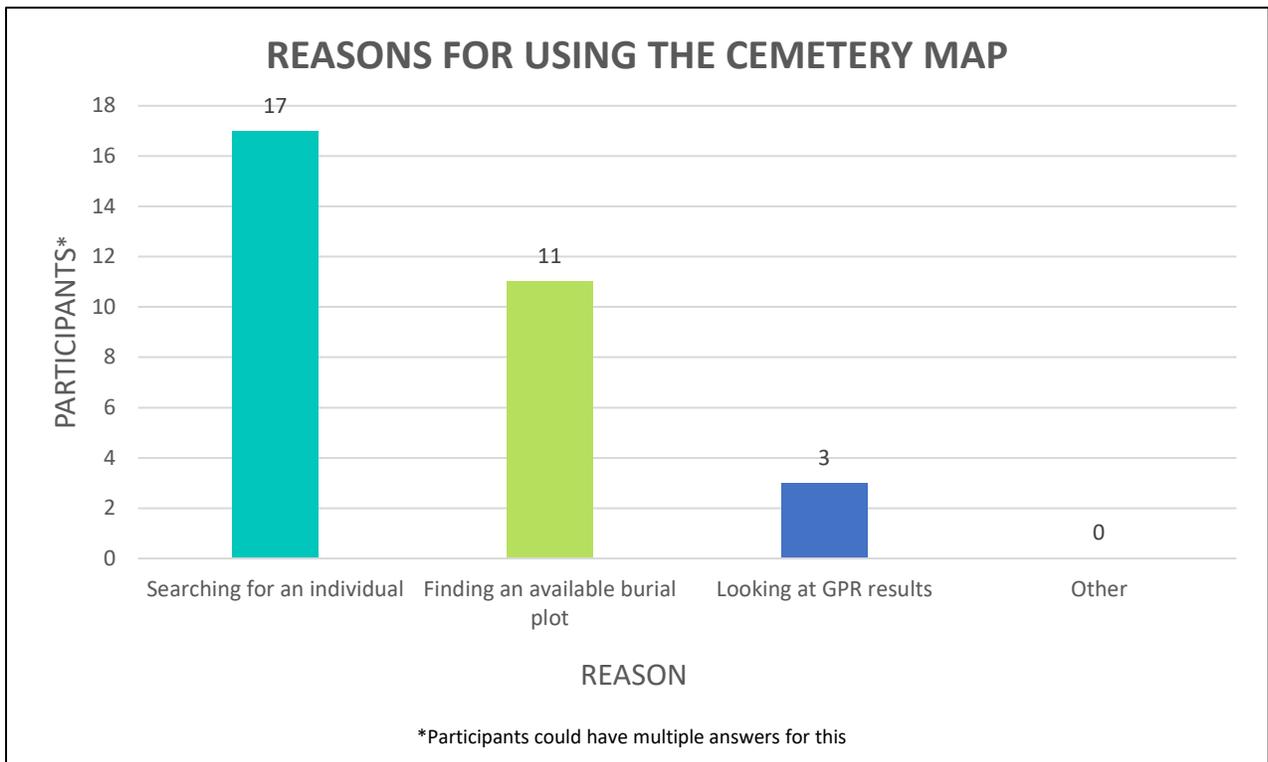
The search function in Task 1 also revealed functionality and display issues that were addressed and incorporated into a tutorial for end-users to fully understand the tool. For example, one participant had trouble finding the search bar as it blended into the background, which led this individual to rate the task as "Difficult." Another participant attempted to search for "Irene Branson" in the search bar, but was never able to get a result back. Subsequently, this led to the individual rating Tasks 1 through 4 as "Very difficult." A third individual also expressed that it was hard to discern which section was active on the mapping application (i.e. right or left-hand side panels), which also led to the individual rating Tasks 1 and 2 as "Difficult." This relates to the issue of navigating the map that was discussed previously. When a tool or function did not have a "Help" button or was not addressed in some sort of tutorial before using the application, end-users were halted from further use of the application as they could not understand how to operate the main functions of the map, which are using the search bar and navigating the map to a burial plot. For example, the individual that rated Tasks 1 through 4 as "Very difficult" was originally having difficulty with Task 1, which consequently led the participant to not be able to find the obituary or gravestone image of "Irene Branson."

Due to the types of issues that were encountered during the usability survey, improvements were made to the mapping application for a future release. For example, even though Task 5 was rated the easiest out of the six tasks, three participants suggested spelling out "GPR" in the "2022 GPR Results" layer, as they might not have known what that stood for without the instructions, and one participant suggested adding an explanation section for the layer. Three participants also answered that they would use the map for looking at the ground penetrating radar (GPR) results (Figure 9). Two of these three participants were not the same participants that suggested spelling out "GPR." The suggestions of spelling out "GPR" and providing an explanation section were implemented as well as labelling the buttons in the top-right corner of the application (Figure 10). With these improvements,

more future end-users may be more comfortable using the map for viewing GPR results which is the purpose of sharing this layer with the public on the cemetery mapping application.

Figure 9

Participants' Reasons for Using the Cemetery Map



Another suggestion that was taken into consideration for the future release of the cemetery mapping application was in relation to Task 3, enlarging the headstone image. This was the second easiest task. However, one participant, with the age range of 25 to 34 years old and intermediate with computer skills, suggested adding a tooltip where an end-user could hover over the image and it would show the text, "Click to enlarge." ArcGIS Experience Builder does have a tooltip for attached media that displays the attachment's file name, but it does not allow for an option to change it. Thus, this

suggestion was not added to the list of improvements for the mapping application in that format, but an explanation was added within a tutorial for the application.

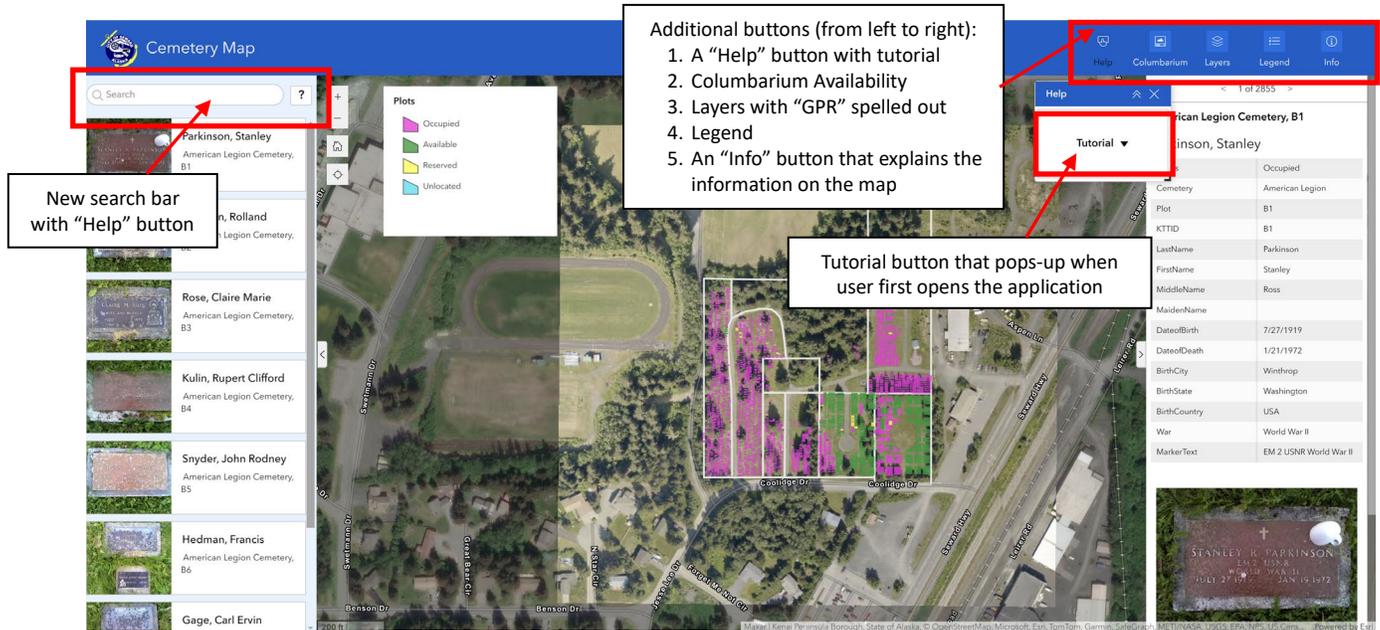
Other than the tooltip for the attachments, all other suggestions from Table 1 have been included in the future release of the mapping application. The default plots are now kept visible when an end-user selects an individual, a new search bar with a different color has been added with a help button to the right of it, the word, "Obituary," has been added to the PDF attachments, and a tutorial was created that pop-ups when a user first opens the application (Figure 10). The layout of the cemetery mapping application remains the same with both a right and left-hand side panel. However, the top-right corner has new buttons that have been added that include the tutorial if an end-user needs to revisit it, an explanation text widget that discusses the map's layers, and the availability of the columbarium that the City of Seward recently installed in the fall of 2023 (Figures 11 through 13).

The challenges encountered during the implementation of the participants' suggestions were minimal, but time extensive. For example, adding the word, "Obituary," to the title of the files involved detaching the attachments and reattaching them with their new names on ArcGIS Online where the burial plots layer is hosted. Other suggestions required research in understanding the limitations of the widgets in ArcGIS Experience Builder. For instance, the search and select functions in the list widget were difficult for participants to use so a new search bar was added with a "Help" button with the intention of clarifying to future users how to clear the search results. Another time-consuming task was learning how to create a pop-up tutorial in ArcGIS Experience Builder. ArcGIS Experience Builder allows for small video clips in GIF format that can be used to display tools and functions of a mapping application in a short tutorial (Coughlin, 2023). There are multiple applications that can save screen recordings in GIF format. In this instance, PowerPoint's screen recording capability was utilized to create small video clips of how to use the tools in the cemetery mapping application saved as GIFs which were then uploaded to ArcGIS Experience Builder through the image widget. Although this task was not extremely challenging, it did

provide a new toolset that will be included for future City of Seward mapping applications as it is quite helpful for end-users learning how to navigate mapping applications.

Figure 10

Cemetery Mapping Application New Interface



Note. Improvements added to the cemetery mapping application recommended from participants' feedback from the usability survey.

The cemetery mapping application with improvements was published on the City of Seward's website on April 9, 2024. A formal email will be sent out to the public via the City Clerk's emailing list thanking those who participated in the usability survey and listing the improvements that were made on the application. Overall, conducting the usability survey has been a success in terms of end-user participation where participants were able to discover functionality and formatting issues that have now been fixed in the improved cemetery mapping application.

Figure 11

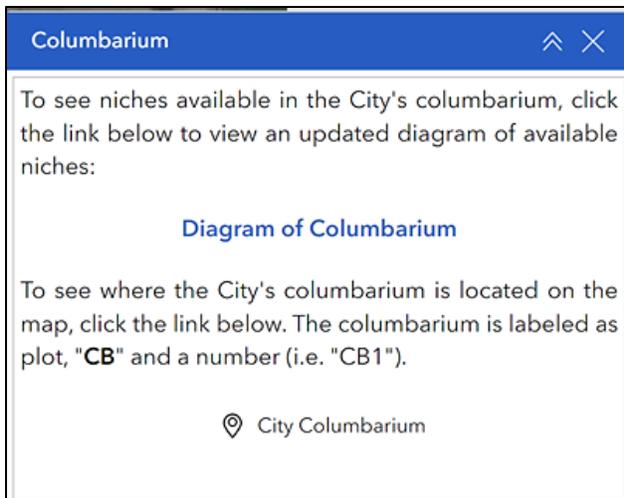
Tutorial View



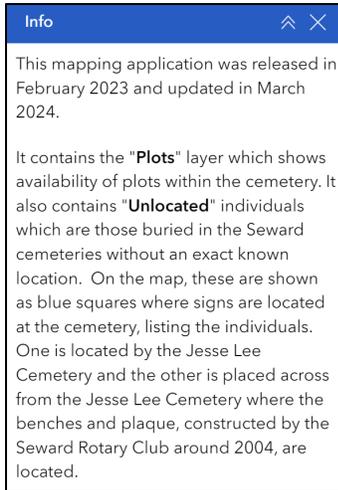
Note. Step 1 of the new tutorial created to walk users through the cemetery mapping application. The image within the tutorial is a small video clip in the format of a GIF.

Figure 12

Columbarium Button Widget



Note. View of the Columbarium button when it is clicked. It contains a link to a diagram of niches available and a bookmark to zoom to the columbarium's location on the map.

Figure 13*Info Widget*

Note. View of the Info button when it is clicked. More information regarding the ground penetrating radar results can be viewed in the cemetery mapping application by scrolling down.

Conclusion

This was the first time a remote usability survey has been sent out to the City of Seward staff and the public to provide feedback on a mapping application for the City of Seward. No other platform has been presented to end-users that allows them to express their experiences navigating City of Seward's interactive, online maps. The results and feedback from the remote usability survey helped in improving the overall functionality and user interface of the final cemetery mapping application. Receiving 20 responses both from city staff and the public has shown that end-user participation can and should be incorporated into future City of Seward mapping applications. Although all the participants from the public were from the Seward area, it still demonstrates that there is interest among Seward residents to improve mapping applications and learn more about the tools and functions of online maps. The cooperation shown by participants in the remote usability survey also illustrates that this methodology was an acceptable platform for end-users to use to express their needs and feedback on

the design of the cemetery mapping application. Due to this success, future mapping applications for the City of Seward will implement more usability surveys to promote end-user participation.

References

Bravo, C. D. (2019). The design and development of a new web database for Oberlin Cemetery, Raleigh, North Carolina. *University of North Carolina: Carolina Digital Repository*.

https://cdr.lib.unc.edu/concern/masters_papers/s7526h41f

City of Seward. (n.d.) *Cemetery Map*. Retrieved February 5, 2024, from

<https://experience.arcgis.com/experience/0b3cb1084c2e4384953f9619d065e7dd>

Coughlin, T. (2023). Make an in-app tutorial in ArcGIS Experience Builder. ArcGIS Blog. Retrieved April 11, 2024, from <https://www.esri.com/arcgis-blog/products/experience-builder/mapping/exb-make-an-in-app-tutorial/>

Faulkner, L. (2003). Beyond the five-user assumption: Benefits of increased sample sizes in usability testing. *Behavior Research Methods, Instruments, & Computers*, 35(3), 379-383. <https://doi-org.ezaccess.libraries.psu.edu/10.3758/BF03195514>

Hartge, S. (2017). Heritage conversations: Engaging with a coastal community through a cemetery mapping project. *Society of Applied Anthropology*, 39(3), 35-38.

<https://www.jstor.org/stable/10.2307/26539867>

Liebens, J. (2003). Map and Database Construction for an Historic Cemetery: Methods and Applications. *Historical Archaeology*, 37(4), 56-68. <https://www.jstor.org/stable/25617095>

Neilsen, J. (1993). *Usability Engineering*. Academic Press. Retrieved January 20, 2024, from <https://books.google.com/books?hl=en&lr=&id=95As2OF67f0C&oi=fnd&pg=PR9&ots=3dyDwnat-o&sig=UL0g3rgq9x8gTzzlYcyZ2DxPK10#v=onepage&q&f=false>

Schmidt, M. L. (2018). Cemetery management in a GIS framework: A case study of Woodland Hills Memorial Park. *Cornerstone: A Collection of Scholarly and Creative Works for Minnesota State University, Mankato*. Retrieved January 20, 2024, from <https://cornerstone.lib.mnsu.edu/etds/1254/>

Schmidt, M. L., Yuan, F., & Jang, W. (2020). Cemetery Mapping and Digital Data Analysis: A Case Study in Minnesota, USA. *Journal of Geography and Geology*, 12(2), 40-57. <http://dx.doi.org/10.5539/jgg.v12n2p40>

Titus, C. A. (2008). Preserving Our Past for the Future: Designing a Geographic Information System for Archiving Historical Cemetery Information. *West Virginia University ProQuest Dissertations Publishing*. Retrieved January 20, 2024, from <https://www.proquest.com/docview/304446922?pq-origsite=gscholar&fromopenview=true&sourcetype=Dissertations%20&%20Theses>