BROADENING THE REACH OF THE MUSEO DE SAN JUAN THROUGH MULTIMEDIA STORYTELLING AND WEBSITE DESIGN

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Exhibition: A City in Time: Five Centuries of Artistic Representation of San Juan (2021)

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ABSTRACT

The Museo de San Juan was founded in 1979 to showcase the history and culture of Puerto Rico's capital city through art. The Museo is looking to expand its digital presence through a website as well as to catalog and manage its collection. It wants a broader audience to discover and learn about San Juan's history and culture. We conducted key informant interviews and engaged in user testing with Museo staff to incorporate their perspectives in our website designs and in selecting a potential collection management system (CMS). The team recommended that the Museo adopt Omeka S as its CMS, as well as to continue web design utilizing the website platform Webflow, and to adapt examples of multimedia elements on our prototype to tell future stories the Museo curates.

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Introduction

The Museo de San Juan is an art and history museum that opened in 1979 in Old San Juan, Puerto Rico. Run by the Municipality of San Juan, the Museo currently lacks a website and a collection management system that supports discovery of its collection and assists in telling its stories. This fact has hindered the ability of the Museo de San Juan to share its history with its community, as well as the transnational audience it strives to reach beyond Puerto Rico.

Goal & Objectives

The goal of this project was to explore digital storytelling possibilities with the Museo de San Juan by creating a website prototype. Our team established three main objectives to complete this goal:

1. Explore methods of digital storytelling
2. Assess the Museo's current archival system
3. Develop a website prototype

The online representation of the Museo de San Juan and its collection contributes to the presentation and support of the Museo's purpose in society. DEMSJ prioritized engaging elements about the Museo's history on the website prototype. Furthermore, the Museo's history is an integral part of its identity as well as the building itself being representative of the history of San Juan.

The team created storytelling elements using audio and visuals, in a total of 8 different website designs, to explore how these elements contributed to user experience over 3 elicitation and feedback sessions. We gauged user experience using Kabassi (2016) and Lopatovska's (2015) frameworks for evaluating websites based on usability and visual aesthetics and conducting elicitation sessions of our designs with the Departamento Educación Museo de San Juan (DEMSJ). Our finalized prototype implements a total of seven unique storytelling techniques that described the Museo's collection and history.

We held a total of three elicitation sessions, in addition to having numerous informal conversations with DESMJ regarding our website design and storytelling methods. The feedback we received aligned with criteria and conclusions from the literature as well as educate and engage the community through our storytelling elements and design of the website prototype. From our interviews and elicitation sessions, we received feedback on our website designs and storytelling methods and learned that their view of the Museo influenced what they felt should be displayed on the museum website. From our interviews and elicitation sessions, we received feedback on our website designs and storytelling methods and learned that their view of the Museo influenced what they felt should be displayed on the museum website.

Our teams' methods involved two key informant interviews with Irmarie Reyes Pérez, the Museo's archivist, as well as three elicitation sessions with the Departamento Educación Museo de San Juan (DEMSJ) and Luis Moises Perez Torres, the Director of the Museo de San Juan. DEMSJ is a group of museum educators comprised of Raysa Rodríguez Garcia, Kelvin J. Rodríguez Soto, and Frances G. Pagan de la Rosa, who provided feedback on our storytelling methods and website design. Ms. Pérez provided us with information related to the Museo's current content management system, as well as any feedback related to our team's CMS.

We also needed to explore and assess the Museo's current content management system in order to ensure how future website content would be supported, updated and maintained. We conducted an interview with the Museo's archivist, Irmarie Pérez, who informed us of the system. She shared the physical and digital scale of their current system, explaining the Museo's methods of documentation, searching, and maintenance of their collections. We discovered the people and processes for curating exhibits which relate to methods of finding and collecting content for a future website.

Findings

Prompted by dialogues about future digital presence and online media content overarched by general access to archives, we found that many things impact the overall perception of identity for the Museo by its stakeholders. We discovered that an absence of a vast working knowledge of the depth of the Museo's collection greatly contributed to the differences in opinions when it comes to the purpose of the Museo, as well as what should be presented on the website. This prompted questions about its archival systems and curation processes, in addition to collection management software. A list of criteria for CMS software was compiled and used to evaluate different platforms available. The top criteria included bilingual functionality, simplified interface, searchable, simple data entry, cost, and confidentiality options of fields. Five options were evaluated, and two platforms were prototyped with the museum's collection: Omeka S. These platforms were

selected after learning that a local implementation would be something they could begin working with on its current technology, regardless of municipal funding constraints due to the open-source nature of the systems of these systems.

Building up a presence online required a platform with several considerations, cost, learnability, ability to embed, modern design, etc. Through an evaluation of three website hosting platforms, we chose Webflow to host our finalized prototype.

Limitations

We mainly focused on creating the website designs, capturing numerous forms of multimedia content, and implementing that content. This limited potential conversations and dialogues with the Museo or other external sources about how such media can influence the perception of the Museo on a website. Many paintings and artifacts from its exhibitions were copyrighted, which reduced the potential for collected media. Our team therefore focused primarily on telling the history of the Museo's building which influenced storytelling methods explored. Future iterations could expand upon other methods that explore community engagement and responses, for example.

An analysis of the Museo's archival system transitioned part of our focus to the maintainability of a website, leading to exploration of content management system applications. Although an important aspect for the future website, this took away from further research about the effectiveness of storytelling methods. Additionally, we needed to consider the Museo's role as a Municipal Museum and how our work fits into that role. This relationship, as well as the logistics of implementing an official website in the future, could be explored and solidified with more time, resources, and discussions.

Recommendations

An online presence would support the reputation and image of the Museo de San Juan.Through our team's process of prototyping, we found that Webflow allowed us to fine tune and design every facet in addition to supporting multimedia content. Thus, for future iterations, it is recommended that the Museo use this platform to continue the work started by this team.

Identifying and implementing Omeka S as a viable collection management system allows more staff members to gain a deeper understanding of the collection the museum holds. For implementation, the team has identified that starting with a locally hosted instance of the CMS would fill the short-term needs of the Museo. When migrating to this new system, it is imperative that new protocol for data entry and media creation be developed using the international standard (the Dublin Core), which would be supported by the Omeka S system, to ensure a higher quality of metadata and discoverability that would bring them onto the same level as many other institutions using the same standard.

Museo de San Juan, Interior (2021)

Museo de San Juan: Municipality Seal (2021)

INTRODUCTION

The role of history museums, until recently, has been to collect, preserve, and identify objects of historical importance and present these items to the public; items are then showcased in exhibitions, which help museums educate people about local culture and history (Yasmin, Hanan, Zizo 2017). With the increased popularity of interactive websites, museums have begun digitizing their content (Garcia-Madariaga, 2019). As a result, many museums are finding new ways to leverage online platforms to enhance their ability to exhibit history and to expand their audience base, encouraging the community to take a more active role in the curation of said exhibits. With new platforms comes the opportunity to experiment with new forms of design and storytelling, and a better way to engage with the community on different levels.

The Museo de San Juan was founded in 1979 to preserve the vast history of San Juan and further educate the local community on this history through art. As the first museum of the municipality, its collection contains every art piece the city has purchased or received over the past five hundred years. The Museo currently has an online presence limited to Instagram, Facebook and Twitter. Through the implementation of a website, the museum hopes to make its collection, and therefore the culture, history, and artwork of Puerto Rico, more accessible to a larger audience.

Museums have approached creating their own websites through many different means. We needed to consider which host to use to create a website prototype and possibly one that the Municipality of San Juan would want us to use. We also needed to consider the importance of the audience that the website would appeal to, which first includes the people of

Puerto Rico and secondly an international audience. The museum also needs to assess the stories they wish to tell as well as what audience they are trying to reach with them, since that will affect the content produced and presented on the website. These factors affect the engagement of the user and the success of the website.

A museum website opens opportunities for presenting archival information, displaying museum content to non-local audiences, and creating an accessible digital experience for a wide audience (Cerquetti & Ferrara, 2018). Within the context of a website, a collection management system (CMS) plays a critical role in showcasing the vast amount of content that a museum can offer to the public. Internally, a CMS assists in the facilitation and organization of museum collections which simplifies access to a museum's archives. Externally, a CMS can give the public and other museums access to the complete collection of art and artifacts a museum holds, allowing them to explore and participate in their own curation efforts.

Our goal was to explore how storytelling techniques for the Museo's prototype website could help the Museo identify possibilities to convey history online in ways that could engage viewers. Our team worked closely with the museum staff to determine the function and design options of the website and how it can engage online visitors. We assessed the museum's current archival content and assisted in the collection of photos and videos for the website. This was utilized in different storytelling techniques as a way explore how the Museo could tell the stories of San Juan on a website platform. We assessed the needs of the Museo for a collection management system and, after completing an analysis, determined and recommended a system that would best assist in its archival and curation process.

Jorge A. Santini Padilla Alcade, Catalino

Museo de San Juan: Front Gate (2021)

BACKGROUND

Local History Museums

Defining a Local History Museum

Matelic (2011) states that many "small history museums", have become more prevalent in society due to the possibilities of community building tools, such as educational programs and other museum events that can be used to bring the community together. Small and local museums have consistently faced the same set of challenges. A 1995 report by Paul Katz, which studied the needs of America's museums through questionnaires, concluded that a main issue surrounding small historical museums is a general lack of funding and municipal support (Katz, 1995). According to the research completed by Matelic, the issues of funding and municipal reports are still relevant, almost two decades later (Matelic, 2011). Funding constraints create new challenges for museums trying to develop an online presence, which is becoming more important to maintaining relevance in society today. Matelic stresses that museums should focus on community engagement to keep a sustainable and relevant place in society, as well as to create more meaningful connections within the community, becoming "social entrepreneurs" (Matelic, 2011).

The Museo de San Juan

The Museo de San Juan is a local municipal history museum located in Old San Juan, Puerto Rico, dedicated to preserving the local history and artwork of San Juan. The building was constructed in the late 1800's and started off as an open-air market for the people of San Juan to trade their goods (Museo de San Juan: History, n.d.). It was famous for the variety of merchandise that could be found there, as well as for the cafés where the

intellectuals of the time held gatherings. During the 19th century, the population of Puerto Rico increased four times over and a strong merchant class developed. The market served as a place for the people to gather and sell their goods as well as gather as a community (Museo de San Juan: History, n.d.)

During WW2, the United States built up their military defenses in the Caribbean, establishing an air presence as well as places to store supplies (United States Bureau of Yards and Docks, 1947). The San Juan contract was drafted then later revised when the need for storage facilities for supplies grew. The building that is now the Museo de San Juan became a warehouse itself, to store supplies for the war (Museo de San Juan: History, n.d.). After the war was over, the building of the Museo de San Juan hosted another market, PRACO, a local supermarket (Museo de San Juan: History, n.d.). Again, the building has become a place for people to purchase their goods and shop for their necessities, all with the members of the community.

The Museo de San Juan once served as a headquarters for Puerto Rico's Department of Education's Community Education Division (AKA DIVEDCO) (Museo de San Juan: History, n.d.). The members of DIVEDCO used the Museo as a place to create their educational movies as well as posters (Thompson, 2005). Thompson further delves into the history of DIVEDCO, with being originally created as the Division of Cinema and Graphics, in the commission of Parks and Public Recreation. In 1949, the governor of Puerto Rico transferred this division into the Department of Public Instruction and was rebranded as the Division of Community Education. DIVEDCO used films, posters, and pamphlets in order to inform the general rural public by creating "community consciousness". Within their films, DIVEDCO explored many different themes, ranging from informing people about social and economic programs to warnings against contaminated water to even inspiring people to come together as a community. The last films created by DIVEDCO were released in the early 1970s, and the program itself was disbanded in 1991.

Calle del Mercado, San Juan P.R. 1899. Image provided by the Museo de San Juan

DIVEDCO in the process of filming. Image provided by the Museo de San Juan

The Museo de San Juan, formerly known as the Museo de Arte e Historia, opened its doors on October 31, 1979, as Puerto Rico's first municipal museum (Museo de San Juan: History, n.d.). The Museo also currently has rooms outside the walls where they coordinate exhibitions in spaces located in municipal facilities, such as the San Juan Bautista Gallery and the Mayors Gallery in the Mayor's House, the Paoli Room, and History of the Tapia Theater in the Tapia Theater (permanent exhibition) and the Ashford House in Condado. Today, the municipality leads museum processes including hiring staff, approving exhibitions, and assisting the museum with maintenance and funding (Museo de San Juan: History, n.d.). The Museo de San Juan is funded by the Municipality and is directed by Luis Moisés Pérez Torres. The Museo has a growing team of curators and administrative employees, including the Educational Department. This team consists of three educators for the Museo, Raysa Rodriguez Garcia, Kelvin Rodriguez Soto, and Frances Pagan de la Rosa.

The Museo recently suffered due to Hurricane Maria. In the hurricane, the Museo had major losses to its digital archives, including the loss of a hard drive, and major structural damage done to the building itself. The only records of pieces that survived were physical documents and papers that are now kept in a filing system as the sole records of the museum's collection. The Museo itself was closed for approximately a year and a half for repairing the galleries and is still in need of repairs to some of the offices on the second floor.

The Museo was also affected by the COVID-19 pandemic, causing it to shut down in March 2020. In August 2020, the Museo was re-opened to the museum staff to begin working again but remained closed to the public. The staff took advantage of this time and began the preparations for two new exhibitions to show to the public for when the museum reopened in September 2021. While closed, the Museo's first initiative was creating content featuring various paintings from its collections for its social media platforms. DEMSJ also started

a weekly post on its social media pages dedicated to showing historical locations in Old San Juan and explaining the history behind them. This was a way for the Museo to still share the 500-year history of Old San Juan and fulfil its purpose as a museum to the public.

In September 2021, they were able to reopen again for the public, with a mask policy in place for all guests and employees and the official opening of its two exhibitions: A City in Time: Five Centuries of Artistic Representation of San Juan and Art, Image, and Devotion: San Juan 500 years (Museo de San Juan, 2021). The first exhibit focuses on the founding of San Juan, starting in 1521. A timeline of the art pieces is on the wall and guests are invited to explore the timeline in person, walking through the three rooms, moving from era to era of Puerto Rican history. The exhibition Art, Image, and Devotion: San Juan 500 Years (Museo de San Juan, 2021), focuses on the connection San Juan shares with the Catholic church. This exhibition features a collection of silver pieces that were contributed by a private collector. As guests move to the second part of the collection, the artist Arnold "Marcolino" Maas is featured with a modern take on imagery presented by the church (Museo de San Juan, 2021).

The collection of the Museo de San Juan is not limited to its two current exhibitions but includes a vast archive as well as a collection of statues around San Juan. The collection of over 850 art pieces and artifacts contain all pieces given to and purchased by the city of San Juan. These archives include Taino artifacts from the 12th century, making its collection especially unique. The statue collection, currently of unknown size, includes statues in Old San Juan, Miramar, and Santurce.

Digital Presence for a Local History Museum

Comparing Physical and Digital Museums

It is important to acknowledge the relation between physical museums with digital museums. Physical museum exhibitions are seen as a "show" where visitors are excited to go and experience of being in the presence of different artworks in hopes to gain inspiration and interact with thought provoking pieces (Giannini, 2019). A standard practice for a museum curator in a physical museum is to thematically display different art pieces around themes such as time periods, artists/creators, the content of the piece (Szczepanowska, 2013).

Image of "Mirando Pa' Lejos" by Jorge A. Santini Padilla Alcade, taken by our team

More museums are digitizing their exhibitions to provide more engagement to the visitor by making the museum experience involve more user interaction (Giannini, 2019). One major difference between physical and digital museums revolves around the role of curators. For digital museums, the role of the curator is more complex than that of a physical museum considering that they would need more technical expertise in being able to change lighting in photos and videos as well as curating artworks for exhibitions (Giannini, 2019). Digital museums allow for a larger number of art pieces to be showcased in comparison to a physical space, by allowing the digital archives of past exhibits to be viewed by visitors to the website (Marty, 2011). As newer technologies are improving the digital museum experience, it allows the viewer to become more immersed in the museum experience than that of a physical museum would have to offer (Garcia-Madariaga, 2019; Giannini, 2019).

The Benefits of a Digital Museum

There are many benefits that come with digitizing a museum, such as utilizing different methods to present art pieces. In the area of media usage which includes the use of photos, videos, and audio elements, digital museums are superior in showing this kind of information to a museum viewer. Museums are taking steps to improve their relationship with their audience by appealing to the values and culture of their audience (Giannini, 2019). To accomplish this task, museums have been looking into different ways to include contemporary ideas which allow museums to get more involved with the cultural needs of the "digital world" (Giannini, 2019). Another benefit of having a digital museum is being able to appeal to a wider audience with the introduction of virtual tours. Virtual tours are digitized versions of the exhibitions found in a physical museum but with additional usage of multimedia like photos, videos, and audio. Some challenges that pose for a digital museum is the execution of the digital museum given its additional complexity, and whether the current museum staff is experienced enough to be able to effectively convert their physical exhibitions to a digital space (Giannini, 2019). Finding new technologies that can be used in the digital museum, as a means of keeping their audience engaged, is another challenge museums face. As a result, the proper utilization of a digital space can provide an institution with greater accessibility opportunities than with a physical space (Marty, 2011).

Online Engagement

The active participation of museum visitors can directly show how an exhibition appeals to the audience and as a result, museums can tailor the digital museum experience. A study conducted by Fernández (2015) and Jancovich (2015) concluded that the constant input of the museum audience served as an important resource which gave museums an advantage in online engagement over competing museums that did not ask for user information (Fernandez-Hernandez, 2020).

Basic digital learning techniques can help boost online engagement by utilizing multimedia resources (Chong & Smith, 2017). Museum staff would use multimedia resources like photos, videos, and audio recordings to supplement information written in text to aid in learning information. More advanced digital learning techniques can increase the online engagement for visitors of the website even further. Museums have been experimenting the use of online activities making the visitors participate in "real-time" or even through the use of games (Chong & Smith, 2017).

Museums have a wide selection of resources including historical photographs, charts, and diagrams which can be used to convey information to the visitor easier than text alone (Crow & Din, 2015). Another technique that can help increase online engagement is offering information in a "condensed" form, which helps the visitor avoid reading large chunks of text to get their information (Chong & Smith, 2017). Also, showing information in small "chunks" helps the user to be able to process new information due to the "limiting

working memory of the brain" (Chong & Smith, 2017). This concept can be applied to website navigability. Looking into website navigability is important for the museum to consider because users typically feel overwhelmed if a website is too complex or difficult to navigate through and as a result, they will not continue to use the website (Crow & Din, 2015; Kraybill, 2015). Establishing strong online engagement with the museum audience is especially relevant when considering recent historical events like the COVID-19 pandemic.

The Impact of COVID-19 on Physical Museums

When the COVID-19 pandemic began in early March 2020, more than 90% of museums and galleries around the world were closed over health concerns (King et al., 2020). A study conducted in 2020 involving 88 different museum exhibitions in the UK researched the impact that the beginning of the pandemic had on these institutions as well as how these museums responded to the pandemic. The immediate lockdown cost the museums to lose upwards of 80% of their income (King et al., 2020). Of these 88 exhibitions, 21 moved their exhibitions online. King et al. (2020) recommended creating content that had a more human aspect, such as podcasts as well as videos and photos that featured curators and historians, in order to provide a human connection during a time where contact with other people was limited (King et al., 2020).

According to King et al. (2020), "the pandemic was discussed in a slightly optimistic tone, with museums recognizing their role in communities of providing hope and escapism in a time of uncertainty" (p. 6).

Some museums offered resources for varying ages. For example, the Children's Museum of Houston offered daily virtual learning centers, with content that changed each day (Institute of Museum and Library Services, n.d.). Another approach explored by museums during the pandemic includes virtual engagement possibilities such as virtual gallery tours, videos, and using social media to engage with the community and create a dialogue surrounding art (Institute of Museum and Library Services, n.d.).

Website Aesthetics

Website Features & Design

Website designers are challenged with the task of providing resources that cater to diverse audiences. The intent of a user when visiting a museum's website directly influences how that user interacts with available resources (Lopatovska, 2015). Irene Lopatovska from the Pratt Institute School of Information and Library Science conducted a study of ten museum website users that examined some core features of websites: browsing, image manipulation, interactivity, website aesthetics, and overall

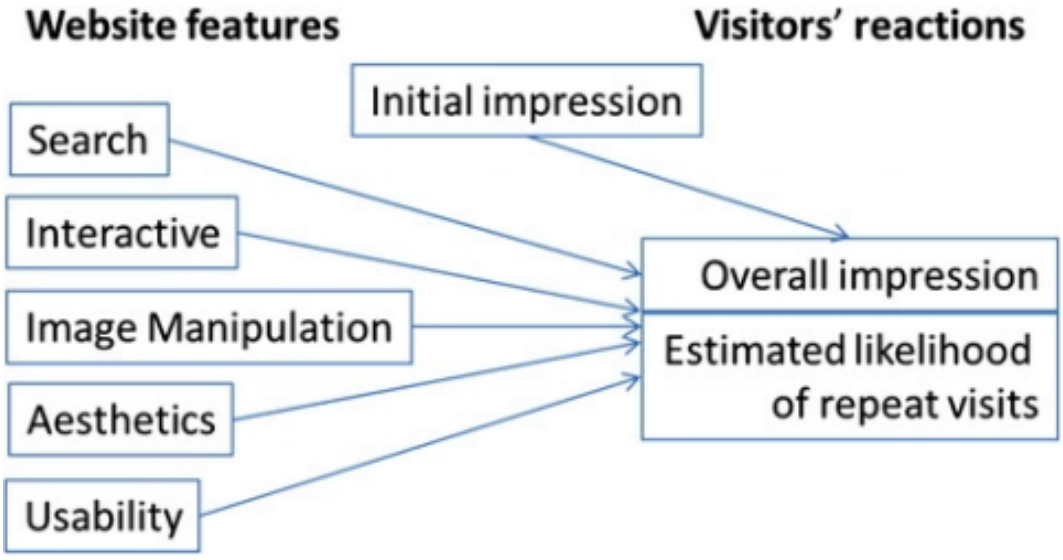

Figure 1: Lopatovska's chart relating website features to visitor reactions (Lopatovska, 2015)

usability. The users were told to give ratings and comments to different museum websites based off the application of these website features. The common theme surrounding most of the comments applied to website aesthetics and navigation, which led to some museums scoring much lower than other museums in the same study. Lopatovska concluded that the most desirable features among museum website users are the visual aesthetics and navigation of the websites (Lopatovska, 2015).

Other scholars highlighted other, equally important, aspects of website design. Lepowska-White and Imboden proposed that art museum websites are organized coherently, but are lacking in terms of complexity, mystery, and legibility (Lepkowska-White & Imboden, 2013). These scholars analyzed 80 different art museums' websites and created a table of design criteria sorted by category. Each criterion was scaled ranging from containing "none" of the elements to "almost all" of the pages containing this element (Lepkowska-White & Imboden, 2013). The study concluded that art museum websites are coherently organized, but are simple, not unique, and missing elements that would encourage exploration of the site by excluding interactive media and linked content, resulting in a boring art museum website experience. According to Lepkowska-White & Imboden, aesthetics, design, content organization, and search functions for museum websites create an enjoyable museum website experience (Lepkowska-White & Imboden, 2013). Figure summarizes elements from Lepkowska-White & Imboden's criteria that we deemed important for our website design, and the full table is in Appendix E.

An experiment done by Pallud and Straub (2014) also supports that an aesthetically pleasing website correlates with an enjoyable experience. These researchers discovered that there is a relationship between intentions to return to a museum website and intentions to visit the museum (Pallud & Straub, 2014). In other words, museum website visitors who have a good experience on a museum website and who intend to revisit the museum website also develop a greater interest in the museum's collection; Thus, viewers that had a pleasant experience using a museum website are more likely to visit the museum in person (Pallud & Straub, 2014). Johnson performed a study where American museum websites were analyzed for their use of photos, videos, audio, and animations. Out of the 224 museums websites, 95% of the websites had photos, 13.8% of the websites implemented videos, 1.8% of websites used audio, and 0.4% of the websites used animations (Johnson, 2020). Johnson highlighted the importance of dynamism, which refers to the interactivity element of a website. There is visual dynamism, which describes using photos, photo slideshows, and/or moving images, and multimedia dynamism, which describes using of sound, videos, and/or livestreaming (Johnson, 2020). Johnson highlighted the importance of balancing usability with visual dynamism in order to ensure that these interactive elements do not impede navigation of the website (Johnson, 2020). He concluded that designers should focus on visual and multimodal dynamism, adding that the use of any of these elements would lead to the user having greater interest on a museum website (Johnson, 2020).

According to a fact published by the American Alliance of Museums, "Museums receive millions of online visits to their websites each year," which presents opportunities for website designers to carefully plan and execute engaging museum websites (American Alliance of Museums, n.d., People Love Museums section; Kabassi, 2016). Katerina Kabassi identifies different methods of evaluating website designs (Kabassi, 2016). Her research explores inspection and empirical evaluation methods. Inspection methods are conducted by experts, and these methods are when the expert users spot errors or test different user scenarios based on their own predefined guidelines (Kabassi, 2016). On the other hand, empirical methods are user driven, with user feedback and behavior being collected as they explore the website (Kabassi, 2016). Among these methods, empirical evaluation is the most

Criteria
Coherence
Consistency
Variety in images
Legibility
Colors that stand out
Content that stands out
Interactive elements

Figure 2: Lepkowska-White & Imboden website evaluation criteria summarized from 24 distinct criteria (Lepkowska-White & Imboden, 2013)

Criteria
Usability
Navigation/orientation
Accessibility
Structure
Interactivity and Feedback
Simplicity
Multilingualism

Figure 3: Kabassi's inspection method website evaluation criteria summarized from 30 elements (Kabassi, 2016)

common and effective in gauging positive user experience (Kabassi, 2016). The following figure is a table of criteria, summarized from Kabassi's research, and the full table can be found in Appendix E.

Storytelling

Portraying History

An issue that museums face is displaying cultural artifacts or artworks in a manner that allows the visitor to enjoy an informational yet historically accurate experience. This issue was explored in a study regarding the display of West African religious artifacts within British museums (Catalani, 2007). The author determined there were three distinct types of exhibits in which West African religious objects were displayed: artistic, ethnographic, and religious. The author concluded that these museums often misrepresent artifacts' cultural heritage by displaying them in manner which leads to viewing the artifacts through a Western lens that strips away the important cultural heritage and history of such artifacts. Wyman (et. al. 2011) notes that museums have not taken the approach to be entirely on a digital platform, but rather, they use technology as an expansion to physical experience. He goes on further to highlight how traditional art and artifacts have been consumed in a physical space for most of recent history, whether it be a framed painting or installation piece.

As audiences evolve, museums have had to take on a new level of accountability, social responsibility, and inclusiveness (Stylianou-Lambert, 2010). Museum visitors are "envisioned as active interpreters", meaning that they "selectively construct meaning based on their personal experiences, associations, biases, and sense of identity", therefore museums are responsible for the messages they present as institutions which are regarded as trustworthy sources of historical data and context

(Stylianou-Lambert, 2010; Sandell, 2007). Similarly, Coffee (2008) argues that the role of museums is to "collect, preserve and educate" while serving diverse and sometime conflicting audiences. Therefore, he postulates that museums should avoid engaging in "specific advocacy" for particular audiences (Coffee, 2008). The discussion surrounding inclusivity and exclusivity are widely discussed in the world of museology, so it is critically important for museums to carefully consider their "narrative practices" (Coffee, 2008).

Digital Storytelling for Museums

The exponential development of technology over the past 20 years has greatly affected the museum landscape, allowing a multitude of storytelling possibilities through means such as audio guides, videos, and much more (Wyman et al., 2011; Carlsson, 2020). These forms of storytelling in museums have transformed the in-person experience from merely telling history through stories, to a multidimensional and interactive experience which engages the audience and invites conversation (Wyman et al., 2011). Storytelling can also be used in the digital space; museums can use technology on their websites as "a powerful storytelling tool," allowing museums to "[create] new worlds" and allows them to "[show] new perspectives with a single click of a button" (Carlsson, 2020, para. 1). Storytelling can be used by museums to "foster emotional engagement," which would allow visitors to connect with artifacts on a more personal and deeper level than just a plaque on the wall (Roussou et al., 2015).

According to Sylaiou & Dafiotis (2010), digital storytelling is "a combination of the art of telling stories and digital multimedia". Therefore, we have used digital storytelling and multimedia storytelling interchangeably within this report. For digital storytelling, the technology used to tell stories should enhance the story, rather than have the technology be the central focus (Carlsson, 2020). Wyman et al. (2011) suggests that museums need to have a vision for what digital story they want to tell or what experience they want their website visitor to have (Wyman et al., 2011). Other suggestions include looking for inspiration outside of museum websites, being prepared to iterate on your storytelling ideas, and to be creative and to not limit yourself to basic ideas (Wyman et al., 2011).

Image of "La Rogativa" by Linsday Daen, taken by our team

Digital storytelling for museums is extremely important. This form of storytelling, as well as traditional storytelling, are important because they "trigger the visitors' imagination[s]", thus creating "unforgettable memories" in addition to aiding visitors in linking the past to the present (Sylaiou & Dafiotis, 2020). Not only does digital storytelling create a unique and memorable experience for visitors, but it also allows museum website visitors to "construct their own understandings" regarding a specific exhibition, artwork, or artifact (Sylaiou & Dafiotis, 2020). This is especially important because this results in the creation of a dialogue revolving around that work, and results in new revelations or ideas surrounding a work or exhibition. Furthermore, digital storytelling promotes the democratization of knowledge, meaning it makes a museum's collections more accessible, in addition to allowing museums to reach new audiences as well as informing visitors about their own heritage and cultural diversity (Sylaiou & Dafiotis, 2020). This is especially relevant in the case of the Museo de San Juan, who wants to get its history and culture out to the Puerto Rican people and the world

The effectiveness of digital storytelling can be evaluated and quantified through user experience testing. The Digital Storytelling chapter of Visual Computing for Cultural Heritage refers to the quality of user experience with interactive digital storytelling (IDS) being measured through "edutainment" value, which means the content is both entertaining and educational (Rizvic et al., 2020). Rizvic et al. performed multiple cases studies with different IDS applications and measured edutainment value using numerical sub-scales paired with questions (Rizvic et al., 2020). Furthermore, they noted that although evaluating user experience is different from project to project, the main goal of user testing with IDS applications or features is to provide informative and qualitative feedback to designers regarding their edutainment value and level of immersion (Rizvic et al., 2020).

Managing Museum Archives

Museum catalogs provide a centralized listing of a museum's collection and archival information which is useful in curating an exhibit. The earliest recordkeeping of collections was simply the memory of registrars and curators of collections which were not well documented (Carpinone, 2017). A survey conducted by Canadian Public Opinion Research (POR) in 2016 found that 34% of respondents used basic spreadsheet tools like Microsoft Excel or Filemaker to catalog their collection (Canadian Heritage Information Network, 2017a). These tools lay a good foundation, but present issues for the later utilization of the collected and cataloged content, such as when curating an exhibit or handling complex relationships between items. These preliminary systems also present complications when it comes to accessing collection information (Horava, T. 2010). To help rectify and minimize these complications, collection management systems have been developed. Originally these systems were created centered around assisting with the digital curation and storage of media, as well as allowing community access to collections (Razak et al,. 2018). These systems are now being considered as prerequisite and overall, a base foundation for institutions' core function as academic research and educational mediums (Hsu & Yang, 2006).

Cataloging all forms of media while maintaining consistency within records is critical to maintaining a collection's completeness of data. The Dublin Core metadata standard was developed by a consortium of libraries and museums with the goal of compiling a list of metadata fields that would achieve a relative completeness in data for a range of objects and media types (Weibel, 2005). The standard names and provides descriptions for fifteen metadata features and descriptions, listed in Figure 4 (Maron, & Feinberg, M. 2018). Following the standard has been recognized is an indicator to that quality of the information is valid and reliable (Maron, & Feinberg, M. 2018). Additional benefits include improved

Metadata field name	Description of the field
Creator	the person or organization responsible for the content
Subject	the topic covered
Description	a textual outline of the content,
Publisher	those responsible for making the resource available,
Contributor	those who added to the content,
Date	when the resource was made available,
Type	a category for the content,
Format	how the resource is presented
Identifier	numerical identifier for the content such as a URL,
Source	where the content originally derived from,
Language	in what language the content is written,
Relation	how the content relates to other resources, for instance, if it is a chapter in a book,
Coverage	Where the resource is physically located, and rights a link to a copyright notice

Figure 4: Field name and description of the simple Dublin Core meta data standard (Filippini, 2006)

trackability, searchability, and cross-referencing of collection pieces between institutions that use the same standards (Weibel, 2005). There have been tweaks to the standard over time with more fields introduced. Keeping these standards becomes necessary in the case of content creation and within a growing database of images, transcription, and records.

Choosing the system that accommodates all an intuition's criteria can be an "overwhelming task" as every institution has a different set of needs (Carpinone, 2017). There are many collection management software systems on the market that have been developed to handle all types of collections. In 2007, the National Information Standards Organization (NISO) published a framework for building good digital collections. In this framework, they outline nine core principles that a "good" – meaning consistent, reliable, and sustainable – system should be built on (National Information Standards Organization, NISO). Upon the same core principals, a UK organization, Collection Trust, created the Spectrum standard defining processing and workflow protocol that standardizes the way information is captured (Collections Trust, n.d.). With these fundamental frameworks, the Canadian Heritage Information Network (CHIN) developed a checklist to identify critical features to help museums evaluate their options. The Collections Management System Criteria Checklist (CMSCC) includes 800 criteria, for museums with smaller collections they have abridged the list to 300 features to take into consideration. This set of criteria is further broken into ten distinct categories. These include core functionality (Spectrum compliant), other core features (not specified by Spectrum), extended functionality, information management functions, user interface, query, reports, technical requirements, support and training, and system administration (Canadian Heritage Information Network, 2017b). Further, they provide questions to help intuitions rationalize and understand how a collection management system might suit specific processes and their motivations for implementing such (Canadian Heritage Information Network, 2017a).

Collection management system address the question “What is a collection?” and its meaning in a digital context has been widely debated among scholars, where the debates have surfaced around the new ability to group and categorize image in a digital space fueled the adoptions of CMS’s (Hackney & Pickard, 2018). Departing from methods of curation comprised of location proximity with modern systems this is no longer a limiting factor in the realm of digital curations where items can be grouped based upon different attributes of each object not bound by physical limits. They also can benefit the access to collections by allowing multiple users to view and manipulate the collection simultaneously (Razak et al,. 2018). In addition to the standardization of cataloging and handling terminology and classifications. Witch becomes a necessity a result as lots become more complex allowing a larger number of people to engage in the curation and data entry processes (Hackney & Pickard, 2018).

Collection Principles
A good digital collection is created according to an explicit collection development policy.
Collections should be described so that a user can discover characteristics of the collection, including scope, format, restrictions on access, ownership, and any information significant for determining the collection’s authenticity, integrity, and interpretation
A good collection is curated, which is to say, its resources are actively managed during their entire lifecycle.
A good collection is broadly available and avoids unnecessary impediments to use. Collections should be accessible to persons with disabilities, and usable effectively in conjunction with adaptive technologies
A good collection respects intellectual property right.
A good collection has mechanisms to supply usage data and other data that allows standardized measures of usefulness to be recorded.
A good collection is interoperable.
A good collection integrates into the users own workflow.
A good collection is sustainable over time.

Figure 5: A table of (NISO) collection principals from (National Information Standards Organization, NISO)

Museo de San Juan: Plaque (2021)

METHODS

The goal of this project was to explore how storytelling techniques on a website could help the Museo identify possibilities to convey history online that could engage viewers. Our team's objectives were therefore to:

1. Explore methods of digital storytelling to allow the Museo to display its content in ways that garners the interest of museum visitors.
2. Assess the Museo's current archival system to discover possible limitations that may arise when the website prototype website is made.
3. Develop a website prototype to showcase storytelling methods to a broader audience in an engaging manor.

Exploring Methods of Storytelling

Crafting Ideas for Design and Storytelling Elements

We explored design possibilities for our prototype by first investigating multiple museum websites to explore existing implementations of design and digital narratives. The full listing of explored websites can be found in Appendix D which ranges from large, well-funded museums like the Smithsonian, to small, lesser-known museums like the Worcester Historical Museum. The website examples were useful in visualizing website design criteria outlined by Kabassi (2016) and Lopatovska (2015)

Marty (2011) stated the use of dynamic multimedia contributes to an appealing and engaging website. Therefore, we incorporated aesthetic design into dynamic elements

including video, audio, and animation. On the final version of the website prototype, we integrated and a total of eight storytelling elements :

- Image sliders
- 360-degree virtual tour of one exhibit
- Narration video of one exhibit
- Responsive timeline
- Interactive visual of the Museo
- Audio narration
- Focus and explanation of the story of a single artwork
- Journal-style article of an event hosted by the Museo

Collecting and Editing Multimedia Content

We compiled photos of the Museo's collection and information about the history of the Museo's building in order to have content to put on the prototype. We asked for information about the history of the building from DEMSJ and for names of artifacts and locations of statues in Old San Juan from the Museo's archivist, Irmarie Reyes Pérez. We captured most of the multimedia content used on the prototype, as the Museo had a limited collection of historic photos of the building and a few pictures of statues and artifacts.

We utilized cameras and a GoPro to take pictures and 360-degree images of the Museo's building, statues, exhibits, and some pieces on display. Ms. Pérez informed us of some works being copyrighted, limiting which pieces we were allowed to capture and post on the website. Our project team assessed these images based on clarity, framing, and usability. We defined "usability" as the purpose the image would have on the website, possibly as a background image, header banner, or to focus on a specific artifact. We edited the saved photos using Procreate and Microsoft's image editor if they needed adjustments pertaining to color, cropping, or removing unwanted objects in frame. We also had the opportunity to assist taking pictures of the Museo's Taíno artifact collection

Image of "Gato Girafo" by Jorge Zeno, taken by our team

with Kelvin Rodríguez Soto, a member of DEMSJ, using his camera. These pictures were taken as archival photos, utilizing a white backdrop and lightboxes to capture front, side, three-quarter, and downward angles of each piece that minimized shadows. Mr. Rodríguez Soto helped us by editing these photos so they could be used on the website prototype.

Using the 360-degree images, we created a virtual tour of A City in Time: Five Centuries of Artistic Representation of San Juan (Museo de San Juan, 2021), one of the current exhibitions, on a platform called Klapty which could embed it as HTML, a format compatible with the website platforms we used. We added text from the placards which allowed the viewer to read the text on the walls, as well as "hotspots", which allowed for travel between rooms of the exhibit. For the Museo's second exhibit, Art, Image, and Devotion: San Juan 500 years (Museo de San Juan, 2021) we captured video and audio with Luis M. Pérez, the Museo's director, explaining the exhibit's historical prevalence. We took short videos focusing on certain pieces in that exhibition and edited them together in Adobe Premiere to create an informative video of that exhibit.

In addition to the pictures, video, and virtual tour, we captured an audio recording of the history of the Museo's building spoken by Mr. Rodriguez Soto. We used an audio recorder with omni-directional microphones and edited the recording using Reaper. We then uploaded the recording to Elfsight so it could be placed into an audio widget, and subsequently, embedded as HTML to be put on our prototype.

Assessing the Museo's Current Archival System

Interviewing the Museo's Archivist

We spoke with the Museo's archivist, Irmarie Reyes Pérez, to learn about the museum's current strategies for managing

Our team helping Kelvin Rodriguez (pictured left) take pictures of the Museo's artifacts

Taino artifacts from the Museo de San Juan. Photo courtesy of Kelvin Rodriguez

Artifact from the Museo de San Juan. Photo courtesy of Kelvin Rodriguez

archival information exploring the Museo's media sharing capacity . This interview took place at the Museo with Kelvin Rodríguez Soto, a member of DEMSJ, to help answer additional questions we had. We took written notes of the conversation which was led with questions about Ms. Pérez's role, the current archival system, and difficulties she had with that system.

We wanted to understand the ways in which artifact cataloging and documentation was currently managed, as it would be important to understand the current system and the extent of the content it holds . Ms. Pérez showed us where specific documentation was located, showing the scale of the physical documentation, and explained how she searched for information while curating exhibitions. For security purposes, Ms. Pérez did not share sensitive information like the value of the artifacts.

Ms. Pérez was also asked specifically about the functionality of the current archival system and how usable it is. She described how she searches and updates information for each piece and the importance of those and more functions for when pieces are being moved in or out of the Museo for curating an exhibition. We noted any issues with the current system and were able to identify key features of a future strategy that would best support museum processes. These responses were coded into the framework outlined below.

Identifying a Potentially Improved Collection Management Strategy

We created a listing of criteria to evaluate key features of a CMS based on discussions with Ms. Pérez, the Museo's archivist, about how to best support the Museo archival system. Additional research was performed on CMS platforms and guided by four questions adapted from National Information Standards Organization (NISO) and their core guiding principles (NISO, 2007).

- Is the system sustainable and supported?
- Would the system suit the collection of the Museo?
- What stage is the software at in its lifecycle?
- Would the Museo be able to the implement system?

Six different CMS platforms were then selected to be evaluated on the Museo criteria found from the previous methods interview with Ms. Pérez. Included systems were: Collective Access, The Museum System (TMS), Omeka S, CatalogIt, PastPerfect, and Artwork Archive. The criteria were evaluated based on the information found on each respective system's website. This evaluation was used to narrow down the options to a single system that was then used in user testing within the next method.

Evaluating the Implementation of a CMS

One platform was chosen to be prototyped and compared through user testing. The application was installed locally on our team-shared laptop as it was open-source. This was done using a program named Xampp, an open-source software to assist with the operation of an Apache webserver, and a mySQL maria database server running for both CMS systems. This allowed the web applications to run and allowed the system to be accessible to computers on the network displaying the capability of each system to be multiuser.

After the system was operational , an elicitation session was done with Mr. Rodriguez Soto, a member of DEMSJ , and Ms. Pérez, the Museo's archivist.

(From left to right) Raysa Rodriguez, Frances Pagan, Kelvin Rodriguez, and Mark Delia during a website elicitation session

We conducted a walkthrough of the system asking for critiques and feedback. We also asked for feedback regarding a comparison to the current archival system. We took written notes and categorized her responses based on pros over the current system and her opinions on the system's utility and applications to her work as an archivist.

Creating and Refining the Website Prototype

Choosing a Website Platform to Host the Prototype

We researched different website hosts to determine where our prototype designs would be best developed . It was also important to ensure the platform chosen would support a smooth transition from our project team to the next group, person, or organization who would be responsible for completing, editing, and/or maintaining our website prototype . We chose to assess three platforms as our team was not familiar with web design and needed to gain a better understanding of the website design process. Wix, WordPress, and Webflow were well-known platforms and, based on our research , included similar core features for a mobile editor, animations , custom code, and more. We conducted a usability assessment of each based on our team's experiences throughout designing our prototypes on the three different platforms. We sought to evaluate intuitiveness, learnability, ease of use, responsiveness, customization, navigation, and website management criteria which would be important for a group or person new to website design. Based on these criteria, we determined one platform to host our finalized prototype.

Design & Feedback Cycle

We implemented various methods of storytelling using our collected information and content into a series of designs which were finalized into a single prototype. We conducted a three-stage design process that consisted of five, two , and then one website design. The sample design s we created were unpublished or password protected to ensure the designs were not publicly searchable or viewable. The process began with five initial designs created by each member of the team, then two

designs using feedback from the initial designs, and finally one design incorporating overall feedback. At each stage, we explored website elements that were visually appealing and engaging to the user to improve each iteration of the design. Descriptions and feedback from each stage are detailed in the Findings section.

The designs were evaluated by DEMSJ in a total of three elicitation sessions, each lasting for approximately an hour. These sessions consisted of an explanation of the implemented elements, combined with the user's self-guided exploration of the prototypes. The DESMJ provided us with feedback as they scrolled through , which was followed by an open-ended discussion to identify specific visual elements or information that need to be added, removed, or moved on the website. The team also received feedback from Luis M. Pérez, the Director of the Museo, during one of our website elicitation sessions with DEMSJ. Mr. Pérez gave us additional feedback as he navigated through the website, on what he believed should be changed for future elicitation sessions.

We incorporated the feedback into iterative designs of the website, as well as retroactively coded the feedback using summarized versions of Kabassi's and Lepkowska-White & Imboden's criteria. Kabassi's original criteria included 30 elements, which were narrowed down to seven criteria: usability, navigation/ orientation, accessibility, structure, interactivity and feedback, simplicity, and multilingualism (Kabassi, 2016). Lepkowska -White & Imboden's website criteria were also narrowed down; originally containing 24 distinct criteria, we condensed it into seven criteria: coherence, consistency, variety in images, legibility, colors that stand out, content that stands out, and interactive elements (Lepkowska -White & Imboden, 2013).

After the feedback was coded using these

Our team's first day at the Museo with (left to right) Kelvin Rodriguez and Frances Pagan

criteria, we used Lopatovska's five criteria elements: search/browse features, image manipulation features, interactive features, website aesthetics, and usability in order to further organize our feedback (Lopatovska, 2015). The overarching criteria from Lopatovska with their corresponding sub criteria can be seen in FIGURE 6. The criteria which would fall under search features would be navigation/orientation (Kabassi, 2016; Lopatovska, 2015). None of the adapted criteria fell under image manipulation features. Interactivity and feedback and interactive elements would be sub criteria for interactive features (Kabassi, 2016; Lepkowska-White & Imboden, 2013; Lopatovska, 2015). Consistency, simplicity, colors that stand out, structure, and variety in images fall under aesthetics (Kabassi, 2016; Lepkowska-White & Imboden, 2013; Lopatovska, 2015). Accessibility, legibility, multilingualism, coherence, and usability all fall under the usability category (Kabassi, 2016; Lepkowska-White & Imboden, 2013; Lopatovska, 2015).

Lopatovska (2015) Website Features	Kabassi (2016) and Lepkowska-White & Imboden (2013) sub criteria
Search	Navigation/Orientation
Interactivity	Interactivity and feedback, interactive elements
Image Manipulation	N/A
Aesthetics	Consistency, simplicity, colors that stand out, structure, variety in images
Usability	Accessibility, legibility, multilingualism, coherence, usability

Figure 6: Our evaluation framework created using Lopatovska's (2015) website features as overarching categories for adapted criteria from Kabassi (2016) and Lepkowska-White & Imboden (2013).

Website elicitation session led by Calista Carrignan (pictured in red)

Four Season Statues: Winter

FINDINGS

Our project focused on creating an engaging website prototype by exploring different storytelling possibilities. In order to do this, we investigated multimedia storytelling possibilities , evaluated website hosting platforms that would allow us to present these stories in an engaging manner , and addressed the Museo's current archival and documentation system. Addressing the current archival system was important for identifying how content and information on the future website would be presented. We created a prototype website design that explored ways of telling the Museo de San Juan's history and portraying its collection. These options gave the staff of the Museo de San Juan various examples for representing its collections in the future.

Analysis of Prototype Iterations by Criteria

At each stage of the development of the website, the members of DEMSJ were our test users. The DESMJ members were asked for open-ended feedback, which we later coded using an adaptation of Kabassi's (2016) and Lepkowska-White & Imboden's (2013) framework for inspection evaluation criteria and organized these into larger categories using Lopatovska's (2015) five criteria. We found our method of user-focused website elicitation, with the users providing open-ended feedback, to be like the empirical methods described by Kabassi (2016). Kabassi's (2016) empirical methods focus on users interacting with websites, to identify problems that can be addressed by designers.

In our first elicitation session, the DEMSJ staff outlined their perceptions of content criteria for design aesthetics , which were informed by other institutions' webpages that the research team elicited. These criteria included an easily navigable site, large font size as well as interactive elements. The team also gained design suggestions as well. For example, DEMSJ recommended the use of the colors of the Museo building, which is a bold yellow color, which aligns with Lepkowska-White & Imboden's "colors that stand out" criteria, a subset of the website aesthetics criteria (Lepkowska-White & Imboden, 2013; Lopatovska , 2015).

The first stage consisted of five website homepage designs, each made by an individual member of the project team using either Wix or WordPress. Each website had a fully designed homepage and used photographs of the museum building, exhibitions, and statues. Each team member created a design guided by other museum website examples, while keeping the Kabassi and Lepkowska-White & Imboden design criteria in mind . The initial designs can be found in Appendix D. The most common feedback received during this session was related to simple navigation, which falls under navigation/orientation from Kabassi's (2016) criteria, which is a sub-criterion of Lopatovska's (2015) search/browse features. The use of a navigation bar with names of the pages was preferred, as it was clear what information was on the website and how to get to it (DEMSJ , Personal Communication, November 2021). DEMSJ wanted the navigation to be simple , meaning reducing the number of actions to find or get to each piece of information on the website (DEMSJ , Personal Communication, November 2021).

The second design stage added interactive and responsive elements combined with feedback from stage one into two website designs which were edited using Webflow for the platform. One design incorporated a vertical scrolling timeline (Figure 7) while the

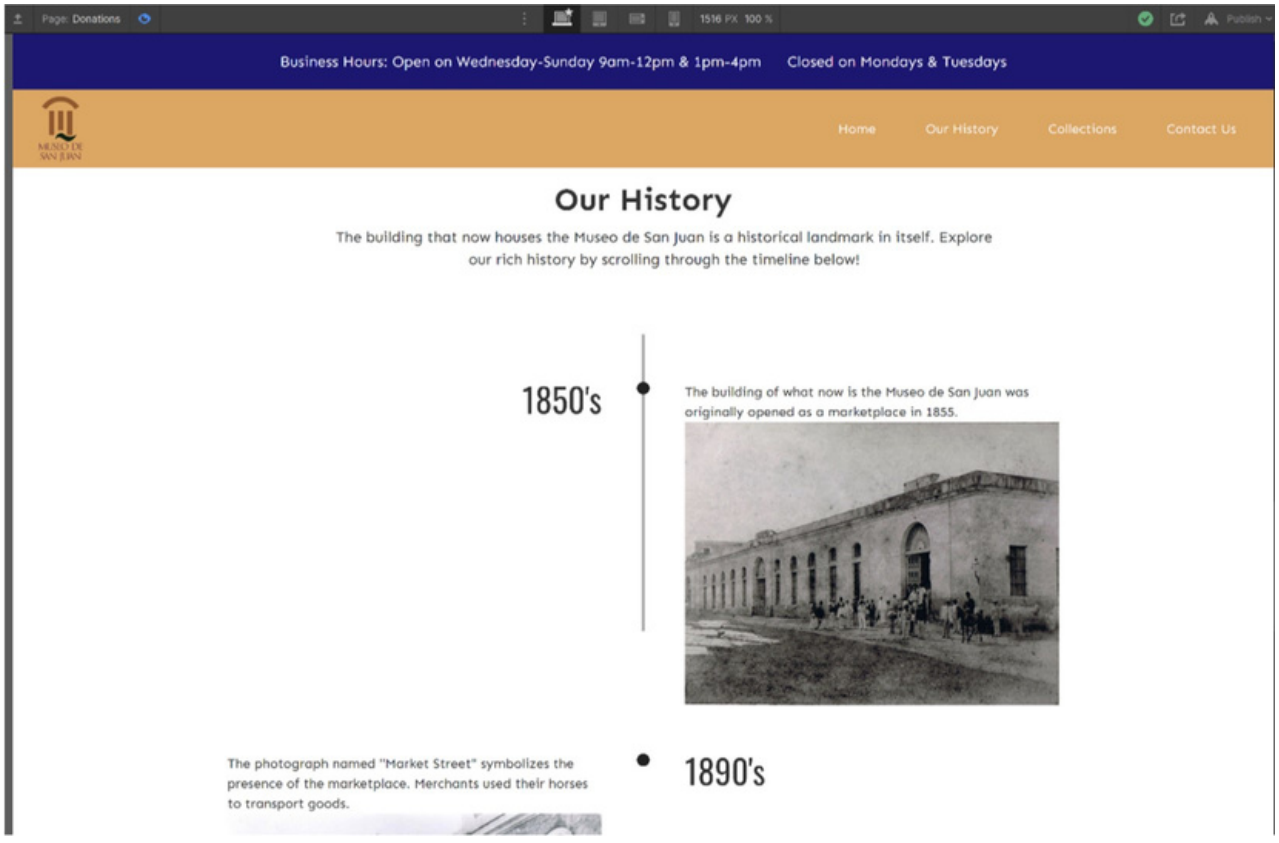

Figure 7: Initial design for a timeline of the Museo's history

other had a visual of the Museo with interactive buttons for different periods of time (Figure 8). We also showcased the Museo's collection through pictures taken of the Museo's exhibits and statues, a 360-degree virtual tour (in English and Spanish) of the exhibit A City in Time: Five Centuries of Artistic Representation of San Juan (Museo de San Juan, 2021) in Figure 9, and photos of the Museo's archive of Taíno artifacts. The coded feedback for the second session mostly revolved around interactive elements, which is a subset of criteria for interactive features (Lepkowska-White & Imboden, 2013; Lopatovska, 2015).

Figure 8: Screenshot of initial design for the interactive visual of the Museo with one pop-up

Figure 9: Screenshot of initial design of a virtual tour for the exhibit A City in Time: Five Centuries of Artistic Representation of San Juan (Museo de San Juan, 2021)

The final design stage consisted of a single website design which combined the different storytelling elements we have been exploring into a set of pages on the prototype. We created a landing page containing navigation to pages that portrayed the history of the Museo in Figure 10. Each page contained different implementations of multimedia storytelling design elements including text, pictures, a 360-degree virtual tour (Figure 11), audio (Figure 12), a timeline (Figures 13-14), a page exploring a painting of Gobernador Don Ramón de Castro (Figure 15), and interactive visuals (Figures 16-17). We also included a Spanish narration of the Museo's his tory done by Kelvin Rodriguez Soto. In this final design session, we received a lot of feedback surrounding consistency, which is a sub criteria of website aesthetics, in addition to interactive elements, which fell under interactive features (Lepkowska-White & Imboden, 2013; Lopatovska, 2015). Overall, the most common criteria we found after coding all our feedback related to the overarching website aesthetics criteria from Lopatovska (2015). Website aesthetics feedback was the most common type of feedback, which reinforces Lopatovska's (2015) conclusion that website aesthetics have the "strongest effect on overall impression" of a museum website.

Figure 10: Landing page containing different methods of storytelling

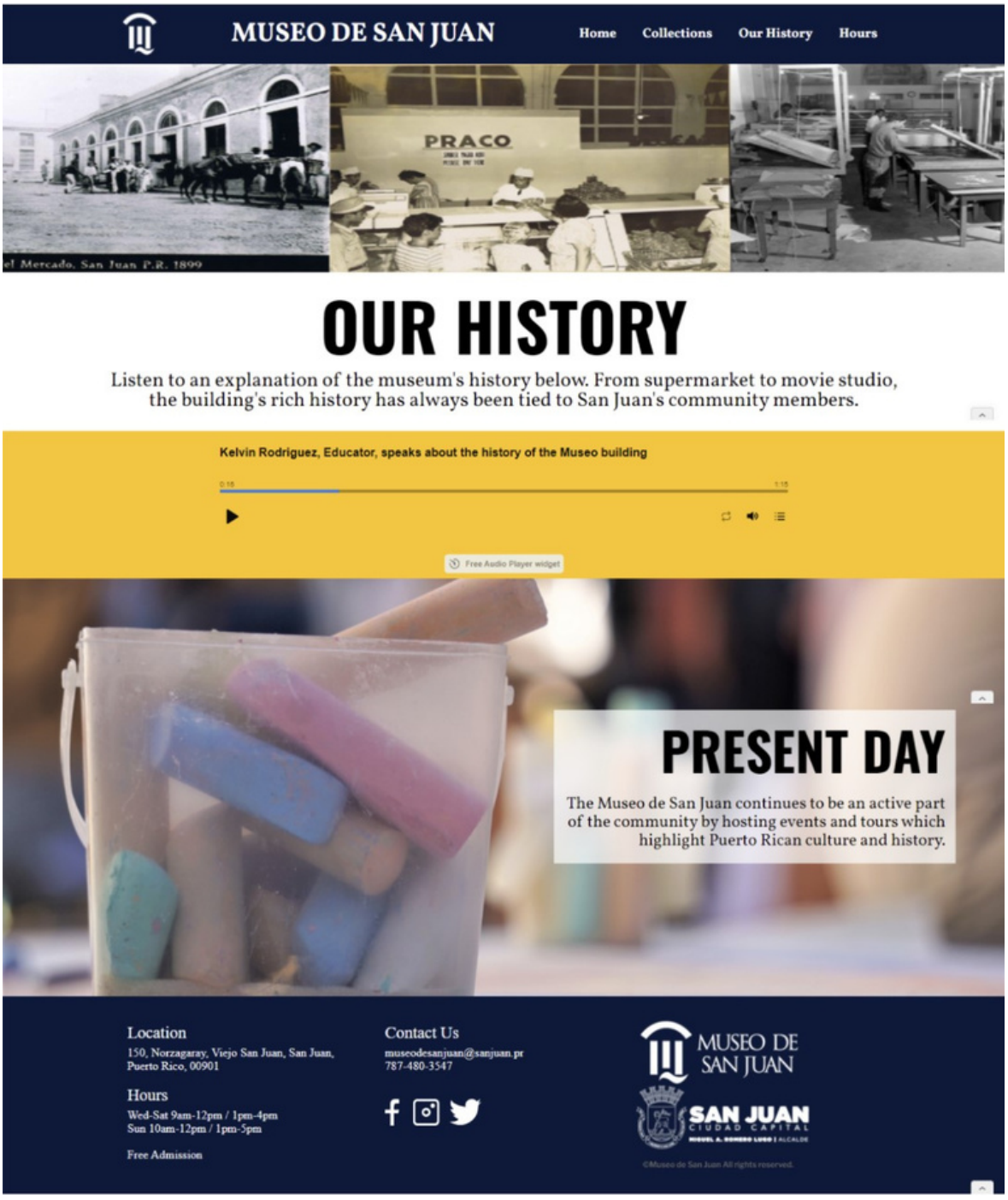

Figure 11: Page including audio narration of the Museo's history

Figure 12: Screenshot of timeline of the Museo's history in its initial state

Figure 13: Screenshot of timeline of the Museo's history while scrolling down the page

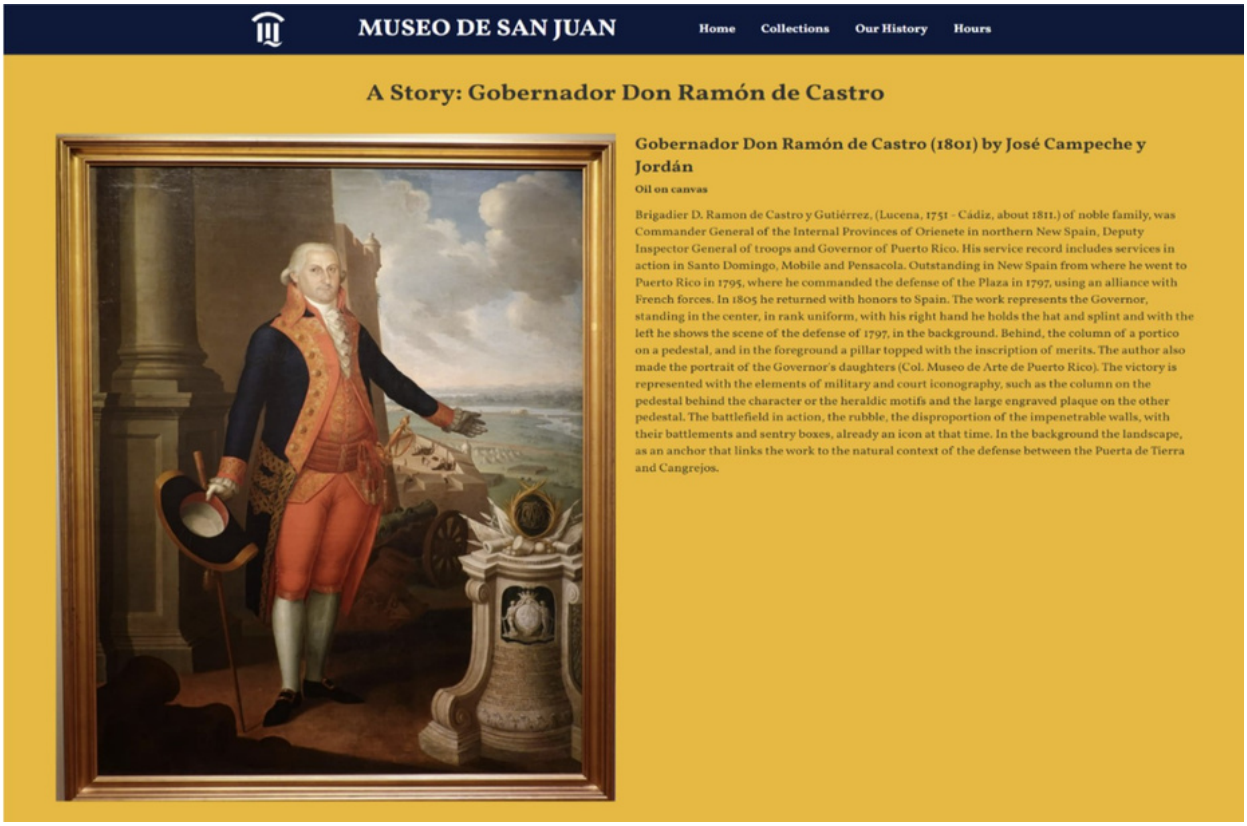

Figure 14: Screenshot of page exploring the story of the painting of Gobernador Don Ramón de Castro

Figure 15: Screenshot of interactive Museo visual

Figure 16: Screenshot of interactive Museo visual with pop-up from one button. Other pop-up were designed in the same style

Analysis of Website Platforms Pursued

We used a combination of Wix, WordPress, and Webflow during our website design process. We evaluated these platforms based on usability and learnability (see Figure 18) in addition to taking notes on the pros and cons of developing a design on each platform. We found WordPress counterintuitive to use, where basic features, such as moving an image, required finding a tutorial. Its layout was difficult to navigate and linking pages on a menu was challenging. There was also not a lot of freedom in the aspect of customization as well. The main benefit of using WordPress is that there are a lot of instructional videos and tutorials to be found online because of its widespread use. WordPress also allows users to define sizing, offset spacing, and hierarchy of elements. Because it was so difficult and counterintuitive to use, we do not recommend it for first-time web developers based on the WPI team's experiences and compared to the other website platforms we explored.

Wix is an entry-level, beginner-friendly design tool which allows users to click and drag elements with ease. Wix has simplified the website building process, but the element hierarchy is not customizable, and it is difficult to define element sizing and offsets. This gives Wix less customizability than WordPress and Webflow. Some benefits to using Wix include the wide selection of ready-to-use templates and the dedicated mobile editor that edits the website to properly fit a smartphone screen. Wix's downsides were noticeable for our team considering our technical background and expertise as STEM students. This platform would be useful to first-time or inexperienced web designers.

Webflow meets the middle-ground in usability and was chosen to host our finalized prototype. The interface is catered to web developers similar to WordPress which allows users to define sizing and spacing across multiple elements simultaneously. This gives Webflow greater customization than Wix though it is more intuitive to use than WordPress. For a team with familiarity in computer science and graphic design, Webflow's editor

	WordPress	Wix	Webflow
Intuitive		X	
Easy to learn		X	X
Easy to use		X	X
Easy management of sites	X	X	X
Responsive	X	X	X
Easy navigation	X	X	X
Customizable elements and hierarchy	X		X

Figure 17: Table of usability criteria by web development platform

design was less intuitive than Wix , but easier to learn than WordPress. The trade-off of intuitive design for customization power would be more beneficial in the future, as Webflow would only require more time to learn. Many tutorials exist online which eases this learning curve. This platform's combination of usability and design potential made it a good fit for the final prototype design.

Analysis of a Potential Collection Management System (CMS)

During an initial conversation with DEMSJ about the Museo's collection, the staff said that they did not possess a full working knowledge of the artifacts in its collection. Frances Pagan de la Rosa, a member of DEMSJ, noted that, "We didn't even know that the statues were a part of the Museo's collection until a few weeks ago when I took a look in the file" (F. Pagan de la Rosa, personal communication, October,2021). She also mentioned that there were probably more items in the collection that she did not know about. This (instead of saying "This" tell us what it is precisely that helped you to frame the interview with Inmarie) framed the key informant interview with the Museo's archivist, Irmarie Reyes Pérez, about the current process they use to create a new curation for the physical museum this was and the current collection management system she uses. Out of this we were able to leverage the Spectrum 5.0 standard to evaluate different aspects of its collection keeping process. These extracted processes are outlined in Figure 19.

This conversation revealed that the Museo's current archival system relies on a single, localized Microsoft Excel spreadsheet with basic archival information for each piece, such as title and year, in tandem with a cabinet of physical files. DEMSJ and Ms. Pérez explained that the Museo's archives were damaged due to hurricane Maria in 2017. A key finding was the Museo's desire for a system that would minimize the loss of information in the future and would support an improved curation process. DEMSJ favored the item discovery aspect of a collection management system (CMS), whereas Ms. Pérez favored how the Museo's collection would become more searchable and editable internally.

Criteria was then identified from these conversations a potential collection management system. The cost consideration was evaluated with more weight due to the fluctuation in the Museo's funding for technical resources. Using these synthesized criteria, the team researched and evaluated different 6 different CMS options based on the

Process of Managing collection by Spectrum 5.0	Understanding of Museo de San Juan Process
Object entry	Done between physical documents, and entering object into Microsoft Excel spreadsheet
Acquisition and accessioning	Physical documents with no digital versions mentioned.
Location and Movement control	Physical notebook and memory of the archivist.
Inventory	No processed outlined
Cataloguing	Microsoft Excel considers 4 metadata fields - title, list of authors, medium and identifier.
Object exit	No processes outlined
Loans in/out	Archivist and director handel the solicitation and connections with other institutions
Documentation planning	No future plan identified

Figure 18: Spectrum 5.0 analysis of current collection management processes

	TMS	Collective Access	Omeka S	Past Perfect	CatalogIt	Artwork Archive
Open source		x	x			
Offline Data Entry		x	x	x		
Supports objects	x	x	x	x	x	x
Object Fields	x	x	x	x	x	x
Object Location	x	x	x		x	
Online Exhibitions	x	x	x			x
Search Features	x	x	x	x	x	
Multimedia content	x	x	x	x	x	x
Print metadata				x		
Metadata import	x	x	x	x	x	x
Language compatibility	x	x	x			
Authority control	x		x		x	x
Cost	High	Low	Low	Medium	High	High

Figure 19: Evaluation of CMS platforms

information available on the platform's websites.

Based on our evaluation of criteria, Omeka S was the only platform that satisfied 13 out of the 14 criteria. In a conducted elicitation with session of Omeka S revealed that both DEMSJ and Ms. Pérez agreed that the system would provide wider access of the collection within the Museo and improve the curation process. However, while it was agreed that the system had the potential to develop areas of the criteria concerns over overall technical operation of running an open-source system could present challenges of running and maintaining local hardware into the future. Another concerned raised pertained to access to the collection and information shared about the items. As the archivist expressed that the system would not be in a stage to share with the public until the full collection can be validated and more complete in metadata. This led to investigations into the ability to upgrade to externally hosting its CMS. She agreed that a local system initially would allow the Museo to implement the system with little overhead cost at the expense of time and technical resources needed to troubleshoot a new installation. Future upgrades to an Omeka S system in terms of support and external hosting were explored. A webhosting platform by the name of "Kualo" website was explored and found to have "Omeka S experts" to assist with migration and hosting of existing system. Using such a service would address the concern for technical resources at the expense of cost and potential security of the collection.

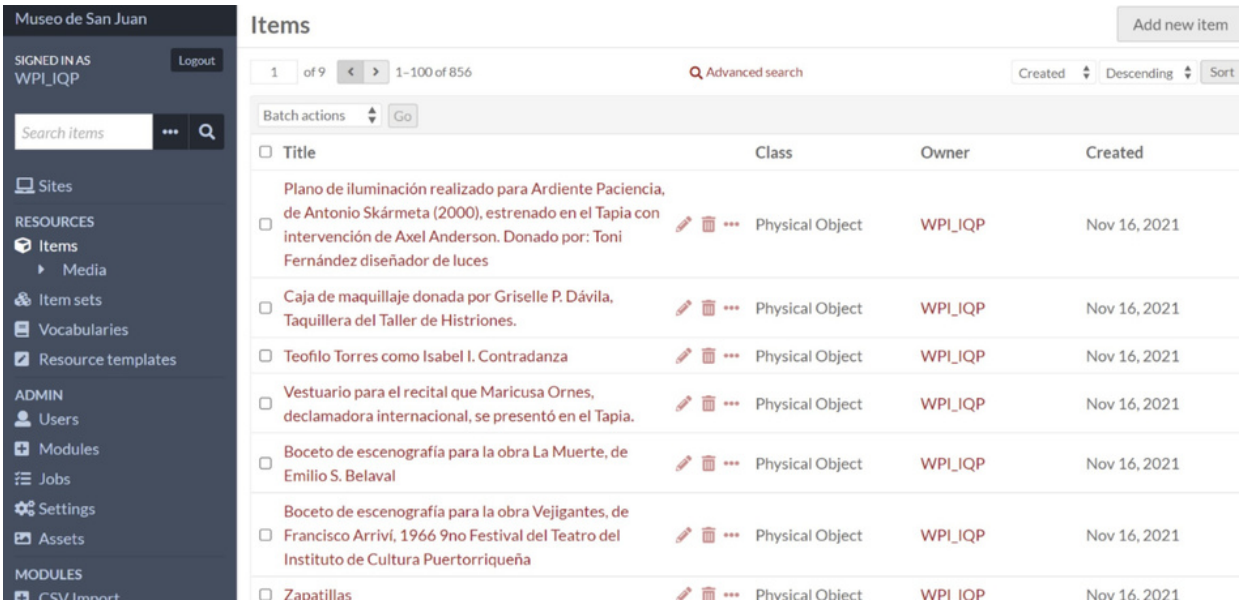

Figure 20: Sample data entry interface in Omeka S

Museo de San Juan: Liliana Foucault Exiting the Museo

CONCLUSION & RECOMMENDATIONS

Conclusion

In the pursuit of an online presence for the Museo, it was critical to develop a base understanding outlining website building platform, digital archives keeping methods and different storytelling strategies using multifaceted media content influences the image to the public. The team prototyped said elements using different features and strategies to elicit different reactions from the user .Evaluating these methods utilizing one of the core aspects of the Museum's image, the Museo building, various video, audio, 360 photographs and historical photos were collected to be arranged in different ways. Our team then explored virtual tours, audio explanations, videos and interactive maps as multimedia storytelling techniques and found that certain types of media, like the interactive timeline and video, aligned more with the stories the Museo wished to share.

These storytelling techniques were determined to be effective for the local and transnational audiences the Museo wishes to reach.

Creating an online presence required a platform that considered cost, modern design, the ability to embed multimedia content, and was easy to learn. We evaluated six different platforms against our established criteria and selected Webflow as our website building platform to develop our prototype. This choice was made based upon the fact that it was free to use as well as allowing the designer to have a free reign over all elements of website design.

The team was able to narrow down a collection management system based on informed criteria. Resources such as CHIN and Collection Trust which outline different implementation strategies and feature criteria that is associated with digital CMS, were used in the selection of Omeka S.

This columnated in the deployment of an Omeka S installation onto the archivist computer to enable the transitions to such system. Future work needs to be done to redefine new curation, data entry, and implications for a digital CMS in order to leverage the system to its fullest potential.

Limitations

We spent more time than previously intended focused on creating the website prototype(s) and the multimedia content. This resulted in limited conversation and dialogues with the museum staff outlining how such media influenced their perceptions. Additionally, new stakeholders with different perceptions of our research goals were introduced . This revealed that designing a website for the Museo was a more complex endeavor than we initially imagined by introducing varied perspectives on the overall scope of the media content and the completeness of the prototype.

Museo de San Juan: Campechada Chalk Event (2021)

This influenced the team's perception of the work into light of implementation rather than that of researching how the created prototype was contributing to larger research goals and questions. In addition, the time constraints of the Museo's staff, as well as other institutions, led to longer than expected times to conduct meaningful conversations with outside perspectives from other historical institutions. Even when the Museo's staff was available to be interviewed, we felt that the information that we received was not adequate for us to accurately discuss the exact purpose and identity of the Museo. We were unable to meet with any staff members from any other museums in Puerto Rico, leading to only being able to gain the perspective of museums' online presences from our own computers.

Our storytelling endeavors were initially constrained by the fact that many paintings and artifacts from the exhibitions were copyrighted, which heavily reduced the number of art pieces that the team could create content from. We were able to create sample content by mainly focusing on telling the history of the Museo building and utilizing the pieces the Museo had copyrights to.

We also discovered that we needed to choose a web platform and CMS that met the technical capacity of the Museo's team rather than our own level of expertise as STEM students, computer scientists, game designers and graphic designers. We sought to design systems that Museo staff found usable and would be able to maintain. Documentation left behind to support such a system had to be created as well, both for the use of the Museo and for the possibility of receiving assistance from the communication department of the municipality.

Recommendations

Identifying and implementing Omeka S as a viable content management system supports the Museum's future development by allowing staff members to gain a deeper understanding of the complete collection the museum holds. For implementation, the team identified that starting with a locally hosted instance of the CMS would fulfil the short-term needs of the Museo. When migrating to this new system, it is imperative that a new protocol for data entry and media creation be implemented using the international standard, the Dublin Core, which would be supported by the Omeka S system. This would ensure a higher quality of metadata and discoverability that would bring them to the same level as many other institutions using the same standard.

A local installation of the collection management system is recommended, as it will allow the museum to use the CMS platform without having to worry about financial or technical constraints on the system. Implementing a system in this way would also allow a future transition to an externally hosted system to be at a much higher level than that discovered by our team once the Museum's data is uploaded. This level of documentation is also a critical first step to moving toward more developed platforms such as Google Art and Culture or E-Museum platforms.

The prototype web site developed sets up interesting areas of research into the social and technological issues surrounding the implementation and use of a website for the Museo de San Juan. Our work can serve as a basis for future research for the Museo, in terms of implementation techniques of storytelling elements and their effectiveness in reaching local and transnational audiences. This research focused on storytelling should be conducted using the prototype developed by our team as a starting point. Additionally, the team found that the Webflow platform allowed fine control of website features, thus we recommend it to develop and conduct future user research on effective storytelling methods. Another area of future research that the team identified is the future continuation of using user testing sessions with criteria derived from frameworks we utilized. This would be a continuation looking into areas where the prototype could be improved and why such a change might be warranted. The final area of future study that the team identified is the need for more research into the comprehensive image of the museum and how this should be portrayed on a website. An effort to create a greater understanding of the Museo's internal and external perception would assist in portraying this image in a digital depiction.

Museo de San Juan: External Wall

Museo de San Juan: Front Entrance

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APPENDIX A: CONSENT AGREEMENT

Participant Consent Agreement

Introduction
Hello! We are a group of students from Worcester Polytechnic Institute in the U.S. doing a research project on how to effectively portray cultural and historical elements on a website. Our team is working with the Museo de San Juan, and their liaison Raysa Rodriguez, to create a website prototype for the museum. We would like to interview you regarding (determined interview topic) and plan to take no more than an hour of your time. Do you mind if we ask you a few questions? Before we begin, we would like to inform you of potential drawbacks and confirm your participation in this discussion. Please feel free to stop us at any point in our explanation for clarifications.

Record Keeping and Confidentiality
Records of your participation in this study will be held confidential so far as permitted by law. However, the study investigators, the sponsor or it's designee and, under certain circumstances, the Worcester Polytechnic Institute Institutional Review Board (WPI IRB) will be able to inspect and have access to confidential data that identify you by name. Any publication or presentation of the data will not identify you. You do not need to feel any obligation in agreeing to share this information.

COVID-19 Protocol
Any and all equipment used during this session will be sanitized before and after contact with the participant, if at all. Our team will follow instructions based on local or national protocols and expect the participant to also follow these protocols. If additional concerns or measures are recommended by the participant, our team can accommodate. Use of equipment is voluntary and may be refused by the participant for any reason.

Confirmations of Consent
You are not required to answer yes to any of the following questions. We would like to confirm our methods of documenting this discussion. Do we have your permission to record the audio of our discussion for our records? Do we have permission to record a video of our discussion? If not, we can use just take notes during the meeting instead. Would we be allowed to use your name as reference in any published documents following this discussion? Would you be with handling the equipment involved in your participation?
Please note that your participation is completely voluntary and at any point you may decide to not continue or not answer a particular question. We can conclude at any point per the participant's request and, if desired, any information collected during your participation will not be included in our records. Otherwise, notes taken can be sent back to you if you would like to review and redact information you do not wish to be shared publicly.
Do you have any questions for us before we start?

APPENDIX B: INTERVIEW QUESTIONS

The listing of questions provides a range of topics we wanted to cover with the Museo staff, depending on who we spoke with.

About the Museo de San Juan

- In your own words, can you explain what you think the message of the museum is?
- Why should visitors come to the museum?
- What can they learn or take away by visiting?
- How have you seen the museum actively affect the community?
- Based on your experiences, how has working at the museum affected your view and knowledge of history and culture?

Curation Process

- Who is involved in crafting the ideas for an exhibit here?
- Is there a learning objective for this exhibit?
- How do you commonly address controversial topics, people, events?
- How are works to be included in an exhibit determined?
- Who is involved in choosing said pieces?
- How is information gathered for each piece?
- How are these artifacts organized?
- Is there an intended way or chronological order to view these pieces?
- Why were these pieces chosen over other works present in the museum's archives?
- Who decides which pieces belong?
- In what ways has displaying the pieces limited what information you can share about it?

Archival & Conservation Process

- What is the current system in place for maintaining information on archived pieces?
- Are pieces in an exhibit grouped together, or only listed by registry number?
- Where is archival information stored?
- Where are archived pieces maintained?
- How are pieces moved in and out of the museum's collection?
- Where do pieces come from?
- How do you collect background info about an artifact?

Expectations from the Museum

- Where do you see the state of the website being at by the end of our project?
- How can we assist with documentation and improving the current archival system?
- Do you have an idea of what you want the prototype to look like?
- If not, we have prepared some other museum website examples and ideas. Do any features catch your eye?
- Does the museum have a subscription for software we could use for the website? Or for an archival system?
- If known, who will be responsible for this website after our team?
- What documentation would be necessary for the website to continue being developed?
- What information from our experiences would be useful in handing off the website?

Website Elicitation Guiding Questions

- What is your initial impression of the website?
- If you had to use one word to describe this web page, what would you choose?
- Can you describe some of the features of this website that you find helpful?
- What specific design features do you think need to be added, changed, or removed?
- Examples: colors, text & text styles, imagery used, navigation design & placement, type or topic of info included, or elements such as maps, timelines, animation, etc.

Museum Website Examples

WAmerican Museum of Natural History	https://www.amnh.org/
Frans Hals Museum	https://www.franshalsmuseum.nl/en/
Museo de Arte de Puerto Rico (MAPR)	https://www.mapr.org/en
Museo del Prado	Explore the collection - Museo Nacional del Prado
Museum of Connecticut History	https://museumofcthistory.org/education-services/
Museum of Food & Drink (MOFAD)	https://www.mofad.org/
Museum of Modern Art (MOMA)	https://www.moma.org/
Natural History Museum	https://naturalhistory.si.edu/
ND Heritage and History Museum	https://statemuseum.nd.gov/
Portland Art Museum	http://www.portlandartmuseum.us/mwebcgi/mweb.exe?request=record;id=6052;type=101
Rijks Museum	Rijksstudio - Rijksmuseum
RISD Museum	https://risdmuseum.org/art-design/projects-publications
Smithsonian	https://www.si.edu/
The British History Museum	Museum of the World (britishmuseum.withgoogle.com)
The Sixth Floor Museum	https://www.jfk.org/
The Van Gogh Museum	Vincent van Gogh - Van Gogh Museum
Worcester Art Museum (WAM)	https://www.worcesterart.org/
Worcester History Museum (WHM)	https://www.worcesterhistory.org/

APPENDIX C: CRITERIA

Website Evaluation Criteria (Kabassi, 2016)

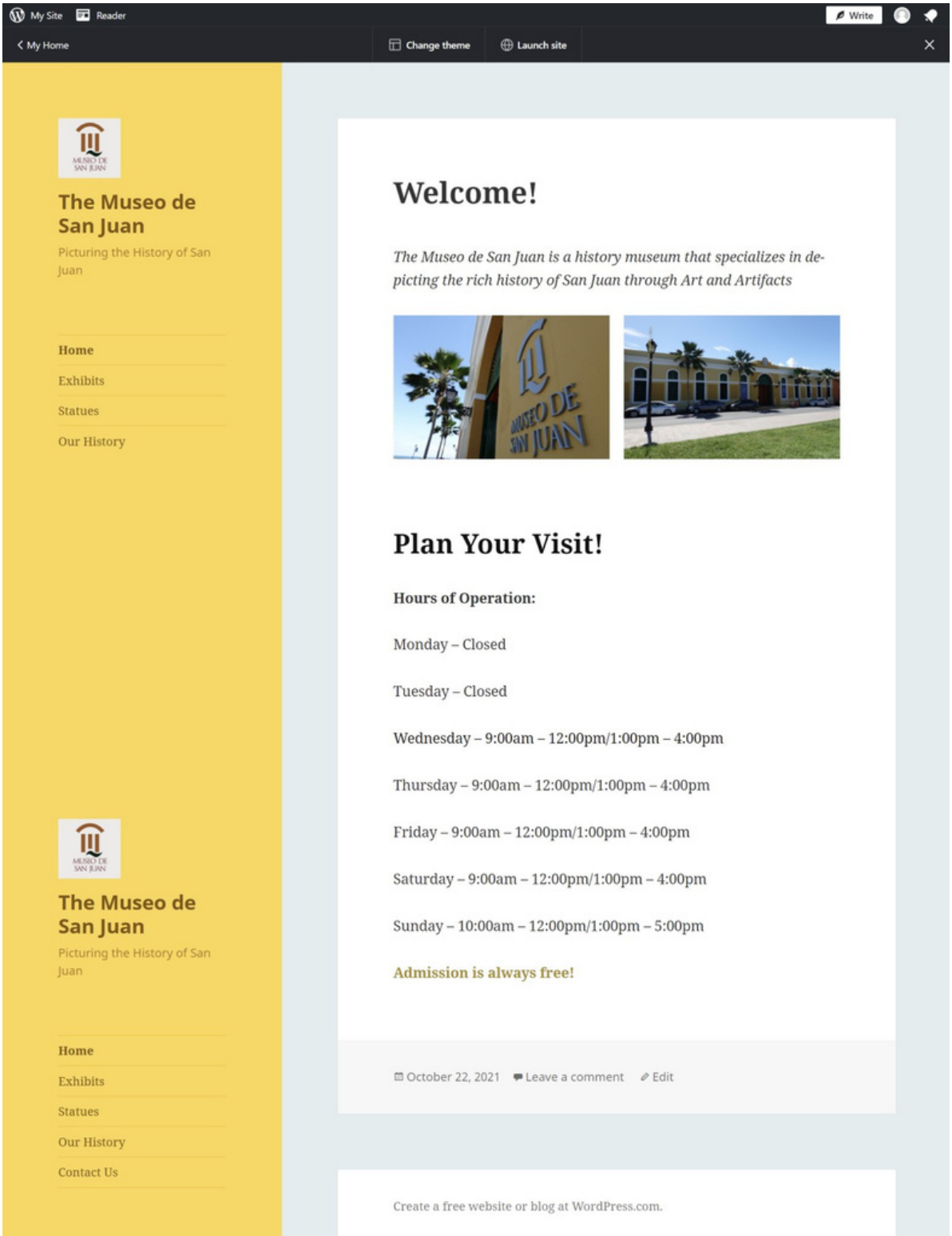
Criterion
Usability
Currency/Clarity
Consistency
Accessibility
Completeness/Richness
Quality Content
User interface and metaphors
Structure
Navigation/Orientation
Interactivity & Feedback
Multimedia Usability
Learnability
Easy to use/simplicity
Efficiency
Role Playing
Text Comprehension
Overall presentation- Design
Functionality
Multilinga-lism
Multimedia features
Educational Services
Services mechanisms
Support of cultural tourism, Research
Web communities
Privacy, standards, regulations
Maintainability – compliance - reliability
Other
Adaptivity/adaptability
Technical
Partnership

Website Evaluation Criteria as defined by Lepkowska-White & Imboden (Lepkowska-White & Imboden 2013).

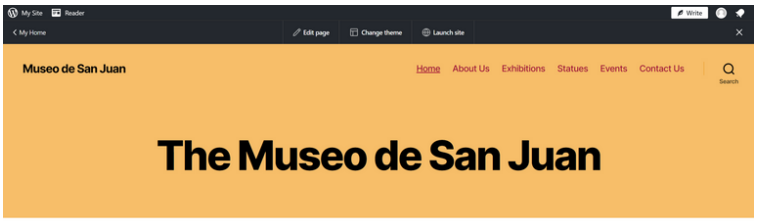
Coherence: Orderly and clear, easy to make sense of
Consistency in page layout throughout site
Consistency in subtitle and secondary links placement
Consistency in image placement between pages
Information grouping of similar content
Categories present in navigation
Appropriate and accurate category titles
Working links
Easy-to-read header/subheader in terms of font style and contrast with background color
Complexity: Rich in elements, intricate with different visual components
All sublinks visible at once rather than under a category
Variety in types of images
Proportionality: Image vs. text balance
Variety of colors across website
Variety of font styles across website
Complex language
Legibility: Differentiated, memorable components help with online orientation; distinctiveness that helps with "way finding"
Design that stands out (distinct layout and features)
Content that stands out
Colors that stand out
Memorable icons and images
Distinctive logo typography
Link colors change when interacted with
Mystery: Promoting exploration, pushing to seek new information; enticing to see more
Pages linked by content
Iconic images used for category titles
Hyperlinks in body text
Attention-grabbing buttons and links
Interactive elements

APPENDIX D: WEBSITE ITERATIONS

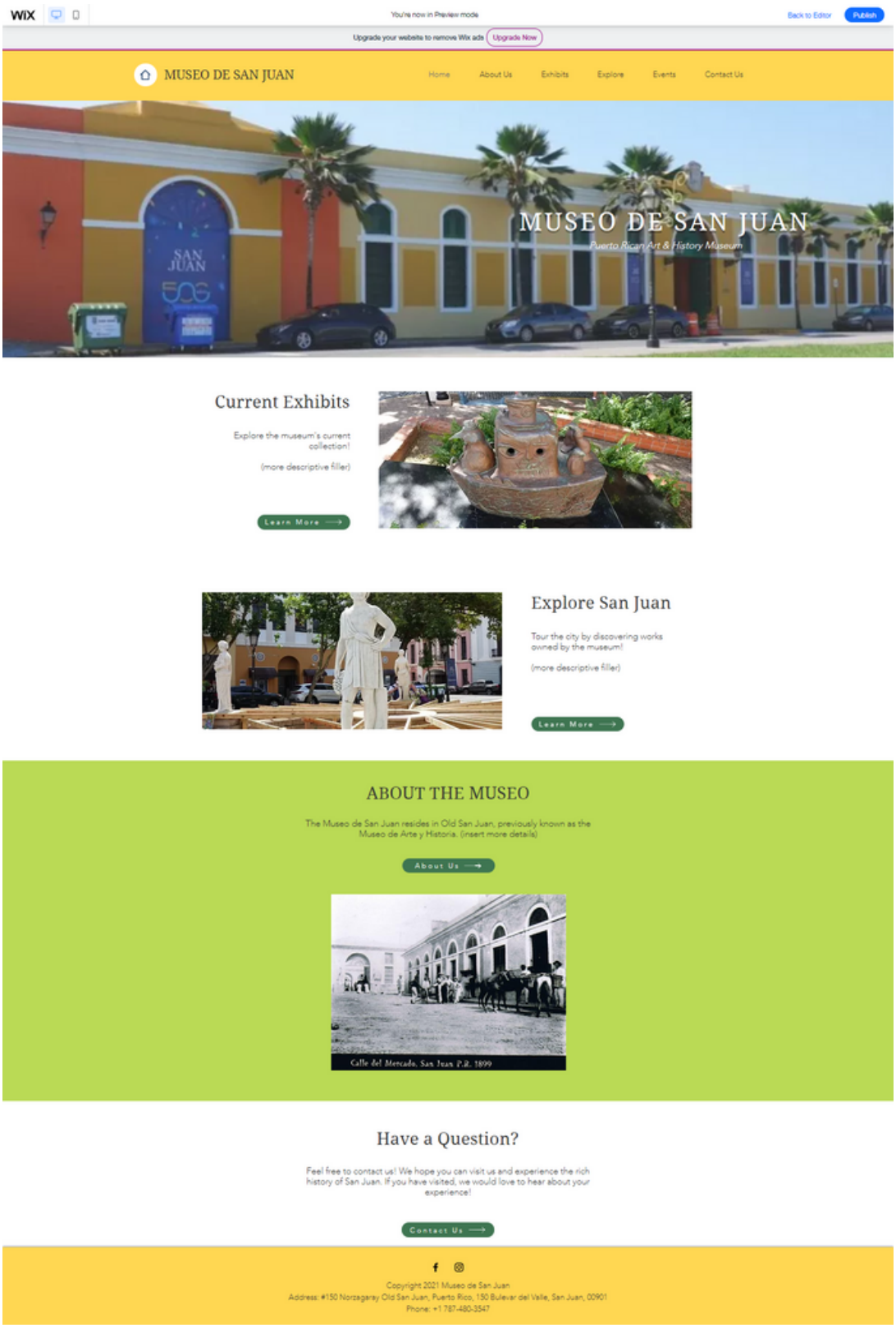
Calista Carrignan's initial homepage design



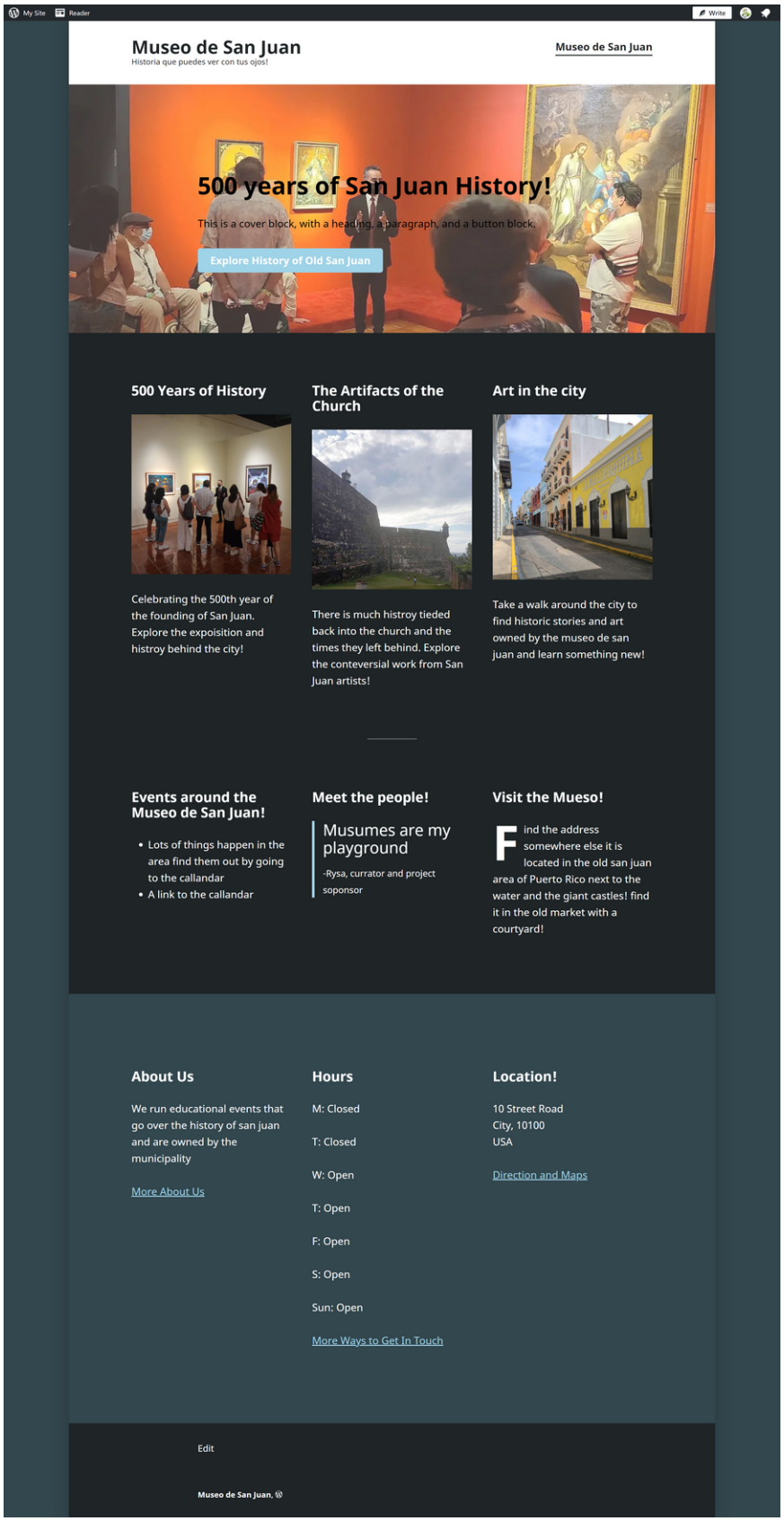
Mark Delia's initial homepage design



Liliana Foucault's initial homepage design



Troy Mullenberg's initial homepage design



Alan Roush's initial homepage design