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Museum Collections
IQP Team

DIGITAL INTEGRATION IN HÖNNUNARSAFN ÍSLANDS

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Abstract

The Interactive Qualifying Project (IQP) Worcester Polytechnic Institute provides a unique experience where we get to work on a team to complete a social science project with real world impact. For our IQP project we worked with Hönnunarsafn Íslands, the Icelandic Museum of Design and Applied Arts. Overall, the museum is rather small and has a limited staff, which makes planning new exhibits and managing the collections quite difficult. The museum was looking for a way to digitally represent more items from their collection in storage for their upcoming exhibit about home. Having better access to the storage through technology would allow the museum to optimize their space, minimize the amount of manual labor for the staff, and it would allow patrons to explore the full scope of Icelandic design the museum has to offer. While working with the museum, we conducted research concerning the integration of technology in the museum and the best ways to engage an audience with their collections. Our methods to conduct our research and to gather data were mainly field observations and interviews. Our observations showed that all of the museums visited had some sort of digital component. Each component served a purpose, either for engaging the audience or to better utilize the available space. This data helped guide our decisions regarding the recommendations for our deliverables. The interviews provided information on how other museum experts have dealt with the same issues that our museum was facing, more details on the specific pieces that were going to be displayed, and overall personal opinions based on experience. This data provided further context that could be used for our deliverable, a few recommendations for the museum to expand their collection using technology. We provided the museum with prototypes for two holographic displays, as well as near field communication tags (NFC tags). We also recommended the utilization of VR equipment and provided contacts for achieving this.

Images from the current exhibit inside Hönnunarsafn Íslands

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Introduction

Hönnunarsafn Íslands, located in Garðabær, Iceland, is the Icelandic Museum of Design and Applied Art.

Founded in 1998, this museum collects, preserves, researches, and exhibits Icelandic design and art from the last century.

The museum hosts temporary exhibits showcasing various forms of Icelandic design and art along with a multitude of guided tours and discussions with Icelandic designers. School field trips are also a regular occurrence to promote education about modern and historical design.

Even though Hönnunarsafn Íslands started its collection in 1998, the museum only opened in 2010, so it is still relatively new and small. The museum building itself is not large enough to exhibit their growing collection. Just like many museums all around the world, Hönnunarsafn Íslands wants to pivot to digital sources to display their pieces in order to make their collection more accessible. The main focus of our Interactive Qualifying Project is creating digital engagement with the special collections of the Icelandic Museum of Design and Applied Art.

In this booklet, we cover a number of topics that provide context for the project, walk through the data collection process, discuss the results from data, and showcase our proposal to increase digital integration.

Front of Museum of Design and Applied Art

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Importance of Museums

Museums are one of the most important pieces of infrastructure we have today for preserving culture. They provide places for people of all backgrounds to witness the great works of many people about nearly every topic. Museums "enable access to cultural forms in order to enlighten or educate" as well as to "[support] platforms where people are culturally active on their own terms" (Mctavish et. al. 2017). This provides a space for people to appreciate the history of their culture and learn, which is important in keeping the traditions of a country alive. It also provides a space for artists and community members to expand upon their culture; to take what they have learned and leave their own mark on history, which is equally as important as learning about the history and culture of your home country.

Display in Hönnunarsafn Íslands

In general, Icelandic people have a very rich and deep rooted culture. In addition to having its own language, the ancient history of Iceland dating back to medieval times and the rich arts it carries provides Iceland with a deep rooted nationalism and pride for their country (Ingolfssón, 2019). Their unique culture and heritage separates their history from the rest of the world, which is why preserving it in museums is so deeply important. The Icelandic Museum of Design

aims to preserve part of this Icelandic culture and history, focusing on design elements from the 20th century to present day. This museum gives tourists and Icelanders alike the ability to learn about and deeply appreciate the rich design history of Iceland, while also providing a place for modern Icelandic artists to show their new works inspired by the rich history of Icelandic design.

Importance of Design

Design is all around us. Every product, building, or experience we interact with has been designed. The field of design encompasses many different disciplines including, but not limited to, urbanism, architecture, interior design, fashion design, furniture design, product design, graphic design. All of these disciplines unite beauty and function to frame social communication (Schumacher 2011). Often, design gets categorized by the general public as a way to beautify normal things and stereotyping it as 'just style'. Though it does consider aesthetics, it goes beyond just making a product look pretty (Mathers 2015). Design influences the way people think, feel, make decisions, and interact with not only the object, but other human beings by providing "hints" pointing the audience in a certain direction. Every minute design decision will create a different appearance and impact of a product (Schneller 2015). If it is well done, design becomes invisible and reduces the need to think, since all of the thinking is already done due to the communicative design. It links creativity and innovation to shape ideas to become practical and attractive propositions for users and consumers (Mathers 2015).

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hrough the years, design has become an important subject matter due to its power to solve complex and challenging problems. A majority of the design process concerns itself with user needs, prioritizing functional solutions for all users. Good design can be used to innovate and re-engineer not just objects, but entire systems with a focus on how people operate to improve the quality of life (Mathers 2015). Just as good design exists, the opposite also exists. Bad design can make a user's life harder by making menial tasks frustrating and time consuming. Additionally, poor design decisions can lead to excluding certain groups of people. For example, bad design can exclude people with physical or mental health issues preventing them from utilizing certain products. An instance of this could be keeping the needs of dyslexic users in mind. Creating bold, simple, and large-font interfaces would help them interact with the product easier and simply work better for everyone (Mathers 2015). Overall, understanding and implementing good design practices has overwhelming benefits to individuals and society as a whole.
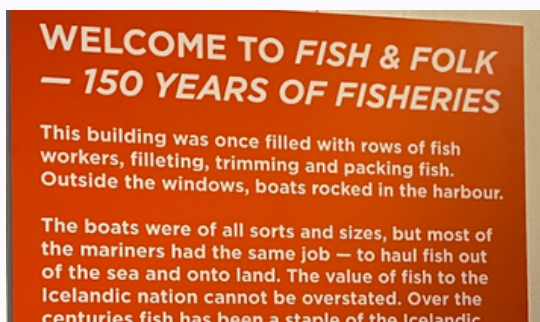
Example of Good Design at the Maritime Museum (Easy to Read)

As design continuously shapes society's present and future, looking back and preserving the past serves an important role for society as a whole.

History contributes to an understanding of current design through the lens of past design practices. Knowledge of early practices, due to their transparency and simplicity, helps better inform modern situations where complexity makes interpretation much more difficult (Meikle 1995). Building on the knowledge of the past will also help create a better future because designers do not need to reinvent designs or design processes that already exist. Instead, better knowledge of design history can help lead to innovative solutions for modern societal problems. Additionally, preserving design is a part of preserving culture. Preserved design can tell a lot about a culture's values, priorities, way of living, and preferred aesthetics. Maintaining museums of design or design exhibitions is a vital way to keep design history alive. They showcase objects that were created and the design process behind it. This can help spread design awareness and highlight the importance of design.

Accessibility in Museums

Increasing accessibility in museums is extremely important. For many obvious reasons, the main goal as a museum should be to teach as many individuals as possible about the collections contained within, so providing different forms of accessibility is highly important. Using online resources can also help museums even make certain exhibits more accessible to a wider audience . For example, the Metropolitan Museum of Art has an interactive kids program (The Metropolitan Museum of Art). This program not only caters to kids but also helps maintain children's interest in the museum. It takes an experience that children might have considered boring and makes it more

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MetKids Advertisement (The Met, 2022)

exciting and accessible for kids. This not only broadens the museum demographic, but also helps make the museum more accessible to this audience. Overall, there are many ways to make a museum more accessible to many individuals by integrating technology within the exhibits. It is important that museums consider this type of accessibility as it is important to not only increase the museum's overall popularity, but also allow more individuals to experience and learn from their museums.

Resources Museums Currently Utilize

As the world continues to advance through the digital era, museums need to adapt by utilizing technology to create more immersive and engaging experiences for their audience. There are numerous technology resources that museums use to increase exhibit engagement and to create more opportunities to showcase more pieces. Some resources help spread awareness to the museum or help foster interest in a certain demographic. All of these are important considerations for what kind of tool you choose to use to create a more immersive experience with the museum collections. For example, there are many types of resources museums use to increase engagement and interest with exhibitions, including screen displays, VR/AR experiences, interactive media, and immersive soundscapes.

Within each of these, there are many sub-categories that further help a museum appeal to its demographic, for instance many museums, including the San Francisco Museum of Modern Art (SFMOMA), uses interactive kiosks with screen displays to show video clips and other forms of media. Another example is the Louvre Museum's first virtual reality experience called "Mona Lisa Beyond the Glass" . This exhibit allows viewers a chance to step into the iconic painting to experience the portrait in an

Mona Lisa Beyond the Glass (Britt 2020)

entirely new way (Louvre Museum). An example of interactive media includes the Isabella Stewart Gardner Museum's "Hacking the Heist" which utilizes AR to let the audience see digital versions of pieces from the collection that were stolen almost 30 years ago (Isabella Stewart Gardner Museum). Additionally, there are interactive experiences like the National Museum of Singapore's "Story of the Forest" exhibit which is an immersive installation that takes 69 drawings from William Farquhar Collection of Natural History Drawings transforming them into three dimensional animations for viewers to enjoy. Altogether it is extremely important to choose a resource that properly represents your museum and its audience. The proper usage of these two properties can help create a meaningful, refreshing experience for museum goers to immerse themselves into.

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Throughout this project, the main goal and purpose was to create a digital interface that would help promote a higher level of engagement in the museum's new exhibit about home. Hönnunarsafn Íslands is a great museum, but it is rather small, so many of their art pieces end up in storage for long periods of time. Displaying more of their collection to more people would be a great tool for learning more about Iceland's art and design pieces. Our guiding research questions are: How does technology play a role in engaging the Museum of Design and Applied Art's target audience? What are the barriers preventing people from getting access to the Museum of Design and Applied Art and what are the supports already in place? And what are the most effective ways to engage an audience, especially in a museum setting?

In the process of working with the Museum of Design and Applied Art, we used tools such as interviews, surveys, and field observations as our main sources of data and information collection. These methods aided in guiding our research as well as the overall progression of our project, which was to create a feasible digital platform that the museum would be able to use to create better access to their collections. Interviews allowed us to gather individual and detailed perspectives on the museum and our ideas. Surveys helped us get general opinions from a broad range of people. Field observations helped us see how the museum operates day-to-day and what the most popular areas within the museum are. Each of these methods is explained in more detail below.

Interviews

Interviews were one of the main methods for gathering data to guide our project. We sat down in person or over Zoom with museum staff, a few artists and designers, and a few museum experts experienced in managing museum collections to discuss many different aspects of our project. We selected these individuals because they were the ones most closely linked to the museum. The staff know how the museum runs, as well as what their vision for our project deliverable is. The artists are the ones providing pieces of art for the museum to showcase, and thus they will be invested in how their work is represented. The museum experts provided insight into how they have solved similar problems to the ones we face. As a group, we wanted to interview these individuals to guide our project and gain invaluable insight into the museum.

We interviewed the museum workers on an array of topics. These topics included what the expectations were for a deliverable, how the artwork in the museum should be best represented, and why the museum matters to them. We wanted to hear about the full scope of their experiences with the museum so that we could understand their

Team Meeting with Sponsor

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perspective. This helped us realize the museum workers' vision for the digitization of this project, since the museum is the sponsor for this project . We also used these interviews to gain more insight into why this project matters to the greater community from firsthand accounts. We asked the artists these questions as well, but the artist interviews were mainly centered around how they want their artwork represented digitally and any background information the artists may want included in the exhibit along with their work.
 We also interviewed museum experts in order to get an outside perspective on museum management in general. The questions we asked were centered around their experiences in running a museum and how they have handled the challenges involved with new collections and community engagement. We also asked these professionals for their advice on working with a smaller staff, small museum space, and large storage, since these are some of the challenges our museum is facing. These interviews helped us to inform our strategy for presenting our recommendations and deliverables to the museum. They also allowed us to gain an important perspective on how museums in general function, which was incredibly helpful.

The data management for these interviews is crucial for our project, as well as the working relationships we have with our interviewees. Because of this, we conducted interviews with the museum employees and artists using premeditated questions- as seen in the appendix- and recorded their responses through an audio or video platform, as well as with written notes. Of course, we had to consider how comfortable our interviewees are with being recorded, so we asked our interviewees at the beginning of each meeting if they are comfortable with being recorded. Another method we used, in order to benefit the people we interviewed, was sending each of them the questions asked in advance via email so that they had the opportunity to prepare answers in advance. The data we collected in our interviews was then used to guide what we created for our deliverable prototype, as well as how we presented the importance of our work. Taking the time to re-listen to recordings and re-read notes from the interviews gave our group the clearest understanding of how to proceed in making our deliverable.

Fields Observations

One of the specific methods used is field observations. Through this process, we gathered data about what specific aspects of exhibits are popular, or what makes a museum exhibit more engaging to patrons. So the main source of data came from our observations in watching people navigate the museum. Members of our group recorded the field observations over the course of a few days. During these observations, significant observations were noted on a data collection

Experiencing the Maritime Museum in the field

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template that can be seen in the Appendix. Another goal of field observations was to visit other museums in Iceland to observe how they operate. Especially if they had an engaging set-up that keeps people coming back.

We chose this method because it provides a way of seeing the museum and its patrons in action. Seeing what is popular and how the museum operates on a normal business day could provide insight into how we go about the project. It may not provide a lot of data, but at the beginning of the project, it helped us observe the nature of the museum and provide insight.

Mostly, we wished to uncover day-to-day information regarding the museum. Observing other museums on a normal day provided clues on how we might do our project. Data was recorded in notes detailing information about what was engaging in the exhibits, how accessible the information was, how they utilized the space they were given, and a variety of other items. These notes were then analyzed to see if there were any trends or commonalities. In addition, we used the "How To: Field Observation guide" by Sarah Jane Harknett which guides people on how to observe patrons in a museum in a conscientious and ethical way.

Surveys

Another method we planned to utilize was surveys. We intended to send out surveys to three main groups of people to gather data about general opinions about the Museum of Design and Applied Art. The three groups of people include: Artists, Museum Patrons, and Icelandic citizen Surveys. Through the surveys, our main goal was to gather information on people's likes, dislikes, awareness, and feedback on the museum. We would have utilized an online platform and a physical survey to maximize the number of responses we collected. There were multiple ways we planned to distribute the surveys, including creating QR codes to hang on walls, emailing the surveys to certain people, or printing out physical copies. We planned to reach out to the artists and museum patrons through the museum by gaining access to email lists that include both groups in order to reach our target audience of patrons who care about the museum, and care enough about it enough to provide additional feedback. Additionally, we planned to survey Icelandic citizens visiting the museum through physical copies.

Image of our Survey

We also had a survey that was sent out to our interviewees. This specific survey was sent to anyone we collected data from in order to explicitly communicate our intentions with their information and allow them to indicate what kind of data collection and sharing they are comfortable with.

We chose surveys as one of our methods for multiple reasons. They are easy to distribute to a large number of people which makes it easier to get a large amount of quantitative data.

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They are also flexible. People can take surveys when it is most convenient for them, and they can take as long as they need to complete them. This allows people to form their answers in an intentional and thought-out way. It also gives people a space to express their opinions and honestly communicate their concerns and suggestions. Lastly, online surveys make it easy to organize data and see it in a visual way. Overall, surveys allowed us to gather a large amount of data in a short amount of time.

Limitations

Though we planned to survey three groups of people, there were unforeseen circumstances that arose. Initially, we intended to survey museum patrons, however, once we arrived at the museum we quickly realized there were not enough people that come to the museum daily. Waiting for people to come to the museum to survey them was also not an efficient way to spend our time, so we decided against it. Despite the issue, the museum does host events that bring a larger audience to the museum. These events allowed our team to pivot and survey these attendees, however, the event we were going to attend was canceled due to COVID-19. The museum did not host another event that we could attend to survey the museum audience in time. These limitations pushed us to completely forgo the survey aspect of our methodology. In respect to surveying the museum staff and artists, we interviewed them instead of utilizing a survey which gave us the data we needed. For future IQP teams working on this project, we highly suggest surveying museum patrons. Their opinions would give a lot of insightful data.

Prototyping

Since our project is considerably focused on producing a deliverable for our sponsors, prototyping was a very important method for us to consider. This process included brainstorming ideas for a deliverable before meeting with our sponsor, conducting our other methods, interviews and field observations, before meeting back together to workshop our ideas and possibly brainstorm new ones. Throughout this process, we took into consideration our available resources, the desires of our sponsor, and the information we gathered through our data collection tools. This allowed us to make informed decisions to produce the most useful and realistic deliverables possible, ensuring our final prototype was usable and attainable both for ourselves and the museum.

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Ethical Considerations and IRB

Many of our methods involved discussing the work and life experiences of our interviewees. It is important to ensure the privacy of everyone we interviewed was maintained, especially when considering that many of the replies we received were closely linked to their professional identities. While we did not need to file any paperwork for IRB, we did send out a survey to all of our interviewees. This survey described how we would be using the information from each survey, and asked for the consent to include identifying information, quoted material, and general descriptions of the information shared during our interviews. Any interviewee who did not consent nor respond was kept anonymous and not quoted in this booklet, while interviewees who consented to having more sensitive information utilized in our paper were able to be quoted and referenced more freely.

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Results

Field Observations

The first form of data collection we utilized is field observations. The group visited seven museums to collect data on their exhibitions. To perform our observations we used a field observation sheet to maintain consistency throughout our process. On the observation sheet we have questions regarding the museum's accessibility, engagement, storytelling, and use of technology.
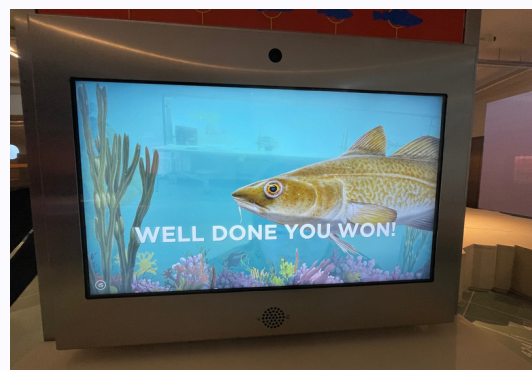
The first museum we visited was The Phallological Museum. This museum showcased various preserved phalli of animals. All the preserved phalli were set on tables with text on the wall describing information about the animals and their mating habits. The set up was easy to follow and all the text was clear and concise making it accessible. Also, all the spaces were well lit allowing the piece to be in the

Wall Display at the Phallological Museum

spotlight properly. However, the only language available was English, so if the viewer was not adequate at speaking English it would be very difficult for them to enjoy the museum. Additionally, some objects in the museum were not labeled, which made it confusing for the viewer.

The information was very engaging to the viewers due to its niche theme, and they also included fun facts that the museum labeled as "oddities". There were a couple different sections in the museum organized by type of animal including a mythological section. Even though the space was small, the museum was still able to display many objects and give a lot of information on all their pieces. The layout of the museum flowed well and it was easy to follow. Due to the nature of the pieces being displayed, the museum doesn't need a lot of space to display their entire collection. They utilized shelf and wall space well. Lastly, there were limited digital displays with only a couple videos playing. There was one TV with a video playing and there was one projector with headphones playing another video. A lot of their information did not require digital displays, so the lack of technology use made sense.

We also visited the Maritime Museum. This museum took visitors through the history of the Icelandic Fishing industry, showcasing old fishing methods, equipment, and cultural impact. Each artifact had a correlating explanation in both English and Icelandic, and some parts of the exhibition had audio as well. One of the main observations we gathered from this museum was their use of interactive exhibits. These included informational games, puzzles, and a photobooth with fishing gear to try on. These

Game Display at the Maritime Museum

exhibits were geared towards a wide age range. One game was a multiplayer fish game, where each player raced to eat the most fish and become the biggest ocean animal in the ecosystem. This game is geared towards smaller children, but it still presents information to

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the visitors. Another part of the museum showed all of the fish species that are caught and sold by Iceland, as well as information on the history of the fishing of those species over time. You could select any of them on a screen to get more information about that specific species. These digital displays caught our attention, since they were not only interactive, but also efficiently used technology and museum space in order to enhance the museum and provide more information to the patrons.

We visited the Saga museum as well. The Saga museum displayed its exhibits in a very different way than many of the previously stated museums. This museum utilized a fairly small building where they could display a multitude of wax figures that depicted different events and stories in the Icelandic Sagas. The museum used audio recordings that were played on a device as you walked through the space. The audio recordings gave information about every display

Display at the Saga Museum

which was the number corresponding to the matching audio recording. The topic for this museum is engaging in itself, but the mock scenes and audio tour added another level of engagement to the museum. This museum, like the Maritime Museum, also included ambient noises that helped engage and immerse the viewers.

Library at the Museum of Photography

Another museum we visited was the Museum of Photography. This small museum was located on the top floor of a library building, and it consisted of a main exhibit and a small library section with Icelandic photography books dating back to the early days of photography. The exhibition on display had many photographs on the walls along with a small amount of written text explaining the exhibit theme. There was also a small alcove which showed a series of interview clips from Icelandic citizens talking about how tourism has impacted their lives, their communities, and the country as a whole. This part of the exhibition was particularly interesting because of the way it used personal stories to expand upon the themes of the photographs. The photography books were another very interesting aspect of the museum, since they were essentially an extension of the library and can be considered 'storage' for the Museum of Photography. People are able to access this part of the museum without paying admission, and with that they can explore Iceland's history of photography easily. They were able to create a space for museum visitors to explore the storage easily, which was very interesting in terms of our own project.

We also visited the Reykjavik Art Museum showcasing the Icelandic artist Erro. This museum was quite large, and showcased Erro's artwork throughout his entire career as an artist. Despite the large size of this museum, we were still able to observe some useful strategies for how a museum should flow and be organized. His works were organized by

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age or style, with all pieces in the same room sharing a common theme or style. There were also walls placed in the middle of the museum that had artworks hung on them. The extra walls provided more space for pieces to be placed, and helped to use the space more efficiently. We also got to see how all of the descriptions were listed or painted in multiple languages (English and Icelandic), and how the museum used ipad displays to help provide additional information throughout the museum.

Utilization of space at Reykjavik Art Museum

Statue at Einar Jonnson Museum

We visited the Einarr Jonnson museum, this museum was relatively small but utilized their available space the best out of many of the museums we visited. The space itself was also designed by Einar Jonnson, so it fits much of his work really nicely. This museum also had the most translations for the names of each piece. There were at least five different translations on each piece; Icelandic, English, Dutch, French, and German. Unfortunately this museum didn't display much information about each piece past its name.

Other than a lack of information on the individual pieces this museum is easy for many tourists that speak different languages to go to.

The final museum we visited was the Punk Museum. This museum was the smallest that we visited, and was built in an old public restroom. The museum made great use of the wall space, taking patrons through the history of Icelandic punk music by using the old bathroom stall structures to provide lots of wall space for posted text and images. The text was shown in English and Icelandic, and it was easy to read, although the narrative was hard to follow as the displays were somewhat chaotic. This museum also made use of TV monitors and headphones hung from the ceiling to show off concert videos from old punk concerts, and to play punk song excerpts.
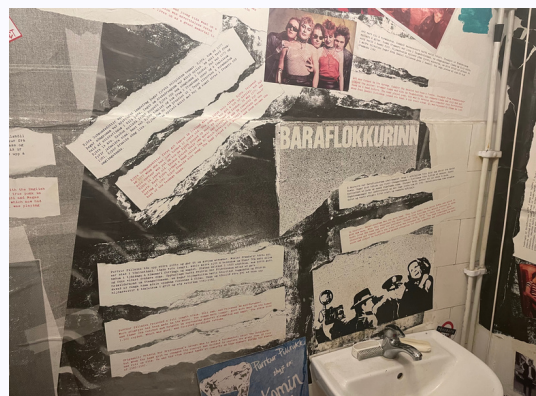
Wall Space at the Punk Museum

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Interviews

In our interviews with the artists whose work is being considered for the upcoming exhibit, we learned a lot of information about the artwork being displayed and the inspirations behind each piece. Our main takeaway from the interview was that each piece of art has the ability to communicate a deeper meaning to the museum patrons. The exhibit about home is using this life and character provided by each piece to create an atmosphere of a living space, and to tell a story about how people may live there. Each piece takes on a life of its own, adding depth to the narrative of the exhibit. Every artist we interviewed had specific inspirations behind their pieces, but every artist believed that their piece belonged in a home setting and would fit perfectly in the upcoming exhibit.

Our interviews with museum experts were focused on gaining insight into what makes a museum exhibit successful, and what strategies can be used to work with some of the limited resources our museum has. One of the most important themes emphasized by both of the experts we talked to was community involvement at every step of the curation process. This involves community outreach when planning a new exhibit, getting and utilizing feedback properly, and continuing community involvement through programming and outreach programs while the exhibit is running. We consulted both experts on how to tackle the challenges of working with some of our museum's limitations; having a small staff, working in a small space, and having a static exhibition for multiple years. They recommended above all else continuing to run programs in order to expand upon the static exhibit and explore the related themes. They also recommended strategies for working with a smaller staff and space, such as emphasizing the importance of strategy and planning when tackling a new concept, using outreach to businesses and schools to display more objects out of house, and using digital aspects like QR codes to provide more information online instead of physically in the museum. Another important takeaway was to ensure that accessibility concerns are addressed when designing a new exhibit, such as taking into consideration any language barriers, or ensuring there are accommodations in place for any museum patrons who have disabilities. Lastly, we gathered some of the most important considerations to take when designing an exhibit. These include making the information timely and relevant, ensuring that the exhibit is consistent with the museum's mission, amplifying community involvement and contributions, and making sure that there is a takeaway or message that can be used by patrons.

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Discussion
...Based on Field Observations

In terms of accessibility, one of the main things we noticed was the languages included amongst the displays and technology options. Every museum we visited had at least Icelandic and English options included. The exception being the Einar Jonsson museum that had 5 languages in some areas of the museum on display (including Icelandic, English, French, German, and Danish). In many cases the technological displays also had the option to switch between languages. For example, the Maritime museum had audio components and the choice of preferred language was available. In terms of language, every museum's information and displays were easily accessible. Another form of accessibility we noted was the physical aspect. Most of the museums were accessible but there were some issues we encountered. The Saga Museum had some narrow areas to walk in and the Einar Jonsson museum had no elevator to access the top portion of the museum. Overall though, most areas of the museums we toured had easily accessible exhibits that all could enjoy.

Another item we took note of was the audience engagement aspect of the museums. We wanted to see what exactly was keeping the audience engaged and an active part of the museums' exhibits. All of the museums had an interesting theme or topic which already engaged the audience. But many included something extra to further draw the viewer in. The saga museum used a lot of audio components to engage the viewer. (The trip through the museum was all an audio tour and also had some ambient sounds to further immerse the viewer.) This helped tell a story that any visitor could follow and enjoy. The Maritime museum, the Reykjavik Art Museum, and the Phallological Museum also tried to tell a story in their exhibits. Many also included some form of interactive display. In the case of the Maritime Museum there were games and touch displays and in the case of the Reykjavik Art museum there were iPads containing extra information that the viewer could access at their will.

5 Languages at the Einar JonnsonMuseum

Upper level of Einar Jonnson Museum that can only be accessed by stairs


Cooking Game at the Maritime Museum

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Discussion
...Based on Field Observations

Additionally, space efficiency was something we focused on especially since it is an issue our own museum faces with limited space. A common theme amongst all of the museums was the utilization of wall space. All the museums tried to use as much of the wall space as possible since some of them were rather small in terms of floor space. The Punk Museum actually used the ceiling as well for a place to put information. The Phallological museum also put up additional walls, not only to create pockets of space, but also to have access to more walls for displaying images and information. Drawers were also a method of saving space in the case of the Einarr Jónsson which had items available to be pulled out. Probably the most common theme in terms of saving space was the use of technology. Having, for example, an iPad display allows for multiple pieces of information to be displayed all in one area of the exhibit. Or having a series of images cycling through on a projector, again, saves space.

Finally, in terms of technological integration, every museum visited had some form of technology included. Some used only one or two pieces, like the Punk museum which had TVs and music playing through headphones, while others used quite a few more like the Maritime museum which had everything from ambient sound to projectors. Technology was used both to keep people engaged as well as a way to display more information then they normally would be able to. Having screens with changing information and images allowed for the greatest maximization of the space given and also allowed for the museum goers to stay engaged as they had to watch the screens for the shifting information. Overall, technology was a great tool to best solve problems that the museum might face as well as enhance the viewers experience while observing the exhibits.
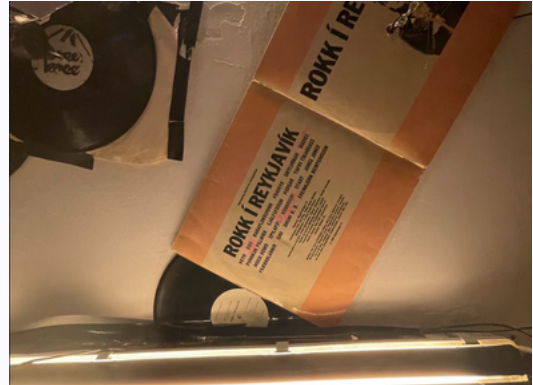
Ceiling of the Punk Museum
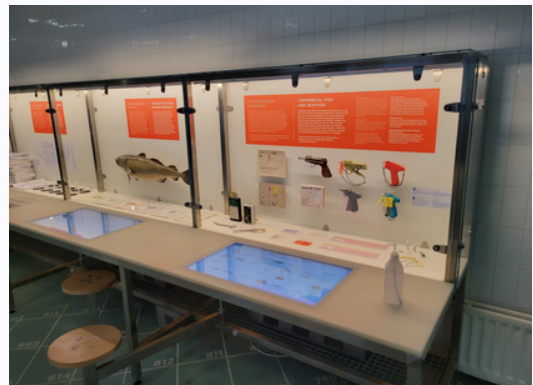
Screens at the Maritime Museum

Screens at the Reykjavik Art Museum

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Discussion
...Based on Interviews

We were able to use the artist interviews to make informed decisions about integrating technology into the museum. A home setting is very different from a standard museum, and none of the artwork is going to be displayed as a standalone piece. Each piece is going to be set up together to set a mood and tell a larger story. Therefore, when integrating technology into the new exhibit, it is important to try to blend it into the atmosphere the museum is aiming to create. Each aspect we chose to pursue should either be easily concealed or used as part of the story being told by the exhibit. Our sponsor indicated that they would like to include more information about the artists in the upcoming exhibit. We can use the information obtained in our interviews with the artists combined with technology to share the backstories behind each artist and piece with museum patrons. This can also be used in order to show off more works from each of the artists that are in storage.

When speaking with museum experts, we were able to gather important information regarding strategies to take for our deliverable, and for the recommendations we can make to our sponsors. Since the museum has a very small staff, the technology we recommend them to use should be easily usable and updateable. Another accommodation for the museum's small staff should be a step by step guide on how to use each piece of technology so that there is minimal strain put on the staff members when it comes time to assemble the new exhibit. It is also important for us to pass along the recommendations made by the museum experts to our sponsors regarding continuing programming, addressing accessibility concerns, and seeking community feedback. These will be important for providing the best audience experience, and making sure the museum can include the broadest audience possible for their new exhibit. Since their focus is on making the items in storage more accessible, it could be interesting to recommend they allow local businesses and schools to showcase some of the items they have in storage, since this would give the museum more exposure as well as showcasing more items for the community.

Each Team Member when in the process of an interview via Zoom

06
Proposal

After taking our results and discussion into consideration, we came up with a few technology recommendations for the museum.

Our first recommendation is using NFC tags to give patrons access to additional content through smartphones, including video, audio, images, and written information. Originally, we planned to suggest QR codes, but we found that NFC tags to be a smoother experience to the users. We chose to use NFC NTAG216 tags. These NFC tags have the largest amount of onboard rewritable memory with 888 bytes which gives the museum the most flexibility in whatever they choose to do with the tags in the future. NTAG216 tags are also one of the most accessible types of tags because the tag architecture works with both android and apple devices. NFC tags would allow the museum to create a personal tour experience accessible. Museum viewers can use the NFC tags to open links to audio or video ques for different exhibits. This type of platform can be highly engaging as it provides a fun way to interact with the museum. Another perk of NFC tags over QR codes is that NFC tags only require the user to get their phone within the proximity of the tag for it to work. QR codes require the user to open their camera and properly orient the phone to scan. These extra steps can distract a viewer from the exhibit and possibly decrease a viewer's engagement. NFC tags are fairly easy to set up too. We have found a multitude of NFC tools and apps online. We first considered using an app called NFC Tour Guide for Museums which felt a little more formal than simply opening up youtube links directly, but our sponsor made a great comment that changed our mind. Sigridur, director of Honnunarsafn Islands, said that having to download an app might be asking too much of guests. That then led us to look into how to open youtube or video links directly. The best that we have found is NFC Tools Pro by wakedev. This app makes it very simple to write multiple programs to the NFC tags. There's a lot of pre-setup common tasks on the app, which is mostly what we envision that museum using. A step-by-step manual on how to implement the NFC tags with NFC Tool Pro is listed in the appendix. Lastly, NFC tags are much more aesthetically flexible.
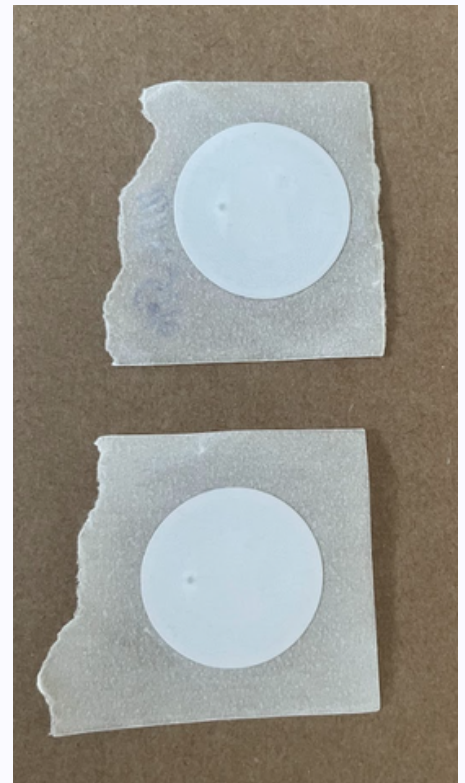
The NFC tags we delivered to our sponsor

06
Proposal

Museums, especially Honnunarsafn Islands, need to consider the way technology integrates into the exhibit. The NFC tag's simple, circular design makes it easy to work with and can be placed anywhere while still looking good.

Next, we recommend expanding the usage of VR in the museum. VR is an inherently engaging and immersive experience due to its novelty. VR allows the user to experience situations up close and personal without actually being there. We planned to use the VR to give a tour of the museum's storage. This would allow individuals a new way to experience the museum as well as represent the items in the storage. The museum already has an Oculus Go that could be used for the tour, so there's no extra expenses in terms of getting equipment. One main problem is that VR can be tricky to update or change, especially with a smaller staff. At least once it's made it doesn't have to be changed and is fairly manageable from there.

Unfortunately we were not able to find a large amount of data for VR. We planned on talking to an expert in the field, but multiple scheduling conflicts did not allow for us to meet. We would recommend trying to find more ways to utilize the existing VR technology at the museum, but unfortunately this part of the project would take a much longer amount of time than we have to finish the project. This could perhaps be a topic of further discussion or research for another IQP group.

Our last recommendation is to create a smaller Pepper's ghost effect hologram. We created a prototype hologram using a piece of glass and an ipad. The Pepper's ghost effect is most notably used in the Disney Haunted Mansion ride. In the ride, Imagineers use the effect to create the illusion that there's a plethora of ghosts dancing in the hall below the guest. The effect is fairly simple and just requires a light source and a piece of glass to reflect the rays of light from the projected object. This effect is very engaging. It allows viewers to see objects in what feels like a 3D space. The hardest part of the hologram is initially setting it up and getting video of whatever object the museum would like to present with it. The video also needs to have a completely black screen around the object so it can create the illusion. This requires a little bit of video edit knowledge, luckily this is a common technique, so most video editing softwares make this an easy process. We used LightWorks which is a free application for video editing to make a few videos of our own for the prototype version. The other downside of the hologram is it requires a fairly dark room to work properly.

VR Model (Weezy VR, 2022)

06
Proposal

Luckily, we have come up with some solutions for this problem. If the hologram is placed within a cabinet or a closed object, like a box, then a dark enough environment could be created. The museum could also have a separate station for the hologram as well, where a dark enough environment could be created. The benefit to the display being within something in the exhibit is that it may fit the theme of "Home" better. Lastly, the last downside to the hologram is that if the museum wanted to create a fairly large hologram, then it would cost a lot of money since glass is quite expensive. Although, if combined with pre-existing pieces in the exhibit, this could be a very interesting display medium. It would also mesh with the theming of the upcoming exhibit. In addition to a display in the museum, we also decided to provide the Museum of Design and Applied Art with the instructions for making a small scale 3D hologram to be used with a phone as an interactive activity for kid's educational workshops. This allows the museum to have an activity that is relevant to the exhibit while engaging with a wider audience.

When discussing the design of our prototype hologram display, our sponsor compared our final product with one of the programs they had been running at the museum. Taking into account the recommendations of continued programming for audience engagement, we recommended that the museum tie in the holographic display design with programming. There is a simple craft project that can be used to make a small hologram model, and when combined with a youtube video played on a mobile phone it creates a hologram effect. Using a thin, clear, sturdy plastic, you would need to cut out four equal trapezoid shapes following the dimensions on a template. These four pieces are then bonded together with clear tape to form a pyramid shape. When the pyramid is placed upside down on a phone playing a 3D hologram video, which can be found on youtube, it produces a small scale holographic image. This craft is simple enough for a wide audience to achieve, and it would provide a great opportunity for museum patrons to engage not only with the museum themes, but with the technology behind the museum's displays. A step-by-step manual on how to create the mini phone holograms is located in the appendices.

The box that hosts our hologram inside

The hologram inside the box

07
Conclusion

Overall, our project aimed to provide the Museum of Design and Applied art with digital resources and interfaces to use in their new exhibition. When creating a new exhibit, whether it is a virtual tour or some type of virtual display, the use of interviews, surveys, and field observations are all very important. Each provided us with vital information needed to create a digital display that not only allowed a wider range of audience to see the pieces in the museum's collection but also displayed pieces that the museum cannot showcase all the time. Interviews provided us with a closer look and personal take on the museum. Surveys gave us the ability to gather information quickly. Lastly, field observations gave us specific data on how different museums utilize space and pieces efficiently to provide an engaging experience for museum patrons. . Through all of these methods, we were able to provide the museum with several options they can utilize, including NFC tags, holographic displays, and a VR tour of the storage facilities.

Though we prepared a plan utilizing these methods, we still had many potential obstacles such as scheduling issues and potential lack of data due to limited interest. Our data collection methods were a key part of creating and choosing a good deliverable. Through our methodology, we were able to create a project the team and sponsor were satisfied with.

08

Appendices

Appendix A

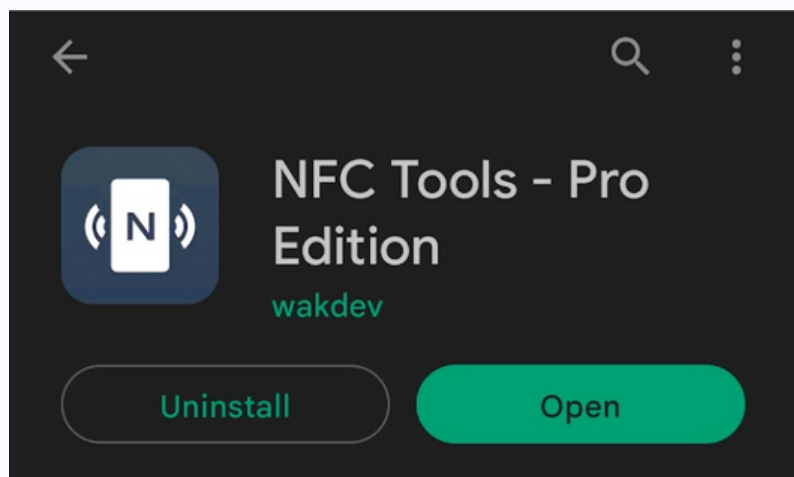**Step-by-step "How to use NFC Tags with Pictures"**

01 Buy NFC Tags
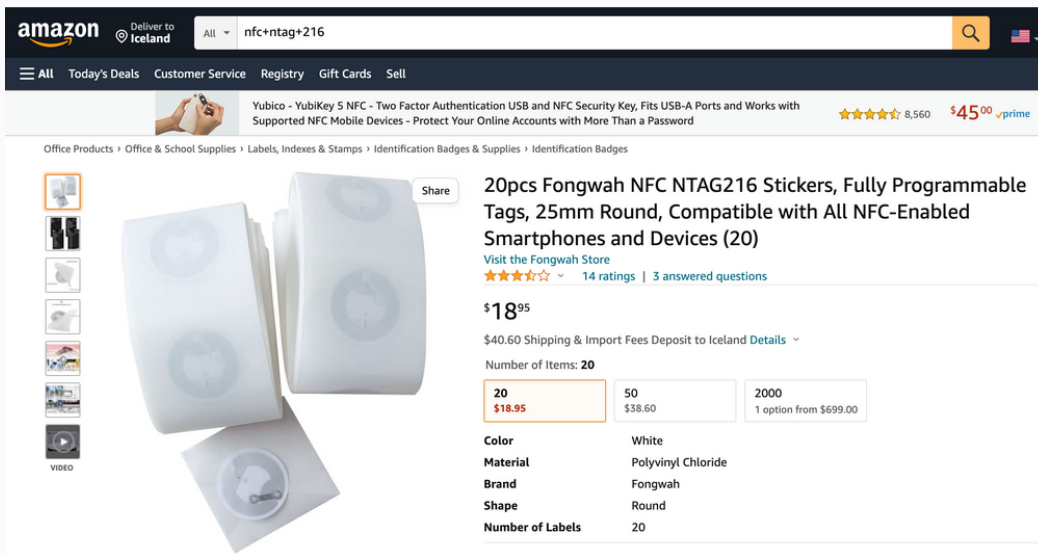
To implement NFC tags as part of the museum the first thing you would want to do is get the proper kind of tags. We chose the NTAG216 by Fongwah, and purchased them off of Amazon. We choose the NTAG216 tags as they have the most flexibility in what you can do with them. The tags have the most available memory and work with most devices.

02 Download NFC Tag app

Next, you want to set up the tag for their individual tasks. We used the application NFC Tools PRO by wakedev. This tool allows us to program the tags using a phone's built-in NFC capabilities.

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Appendices

Appendix A

Step-by-step "How to use NFC Tags with Pictures

03 Scan NFC tag and write onto tag
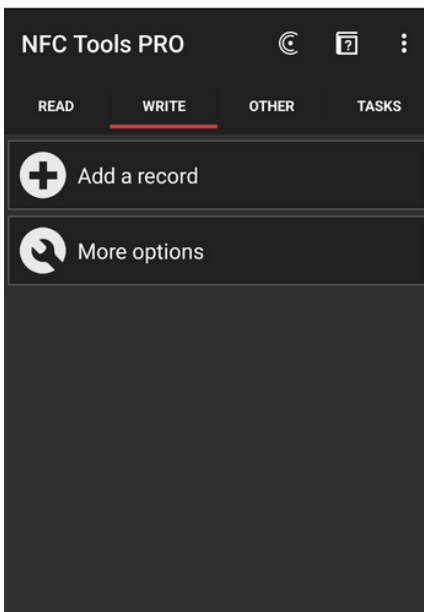
When opening the NFC Tools Pro app you want to navigate to the write tab to write a program to the tag. Tap add a record, once there you can select a multitude of different forms of media to write to the tag.

04 Select one of the pre-made tasks

This app is a useful tool because it has all these tasks pre-made for you on the app. You simply need to enter the empty data fields for the selected media.

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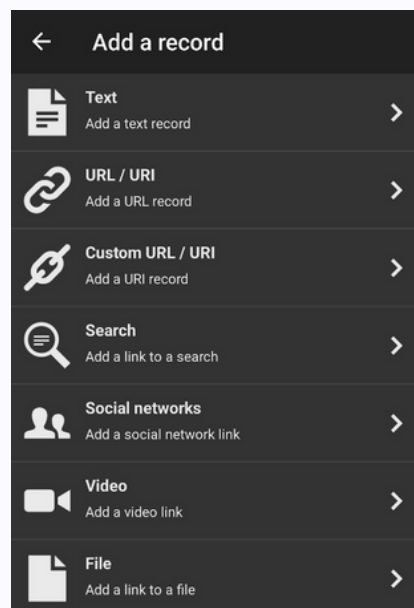
Appendices

Appendix A

Step-by-step "How to use NFC Tags with Pictures

05 Complete details in pre-made task
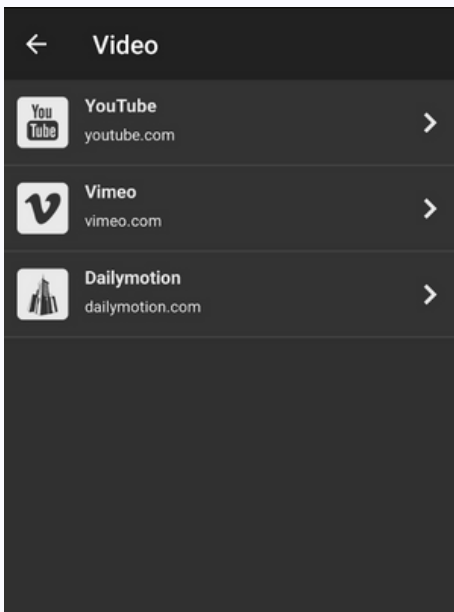
In our prototype we uploaded different youtube video links to the tags in order to replicate a museum tour. To do this you would select the video option under write.

06 Add in media

Then it will ask you for the video source, we chose youtube. Finally you want to enter the youtube link of your video. You don't need to enter anything before https://youtu.be/. Everything after the last forward slash you will need to enter so you have the complete link in the data box. Once you are editing the link, click ok to return to the write menu.

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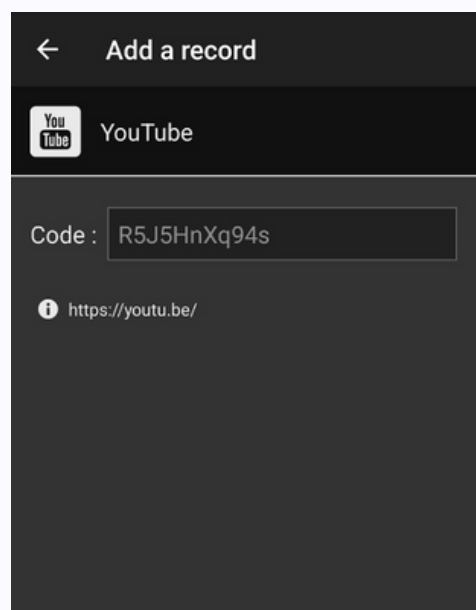
Appendices

Step-by-step "How to use NFC Tags with Pictures

07 Finish writing task onto NFC tag
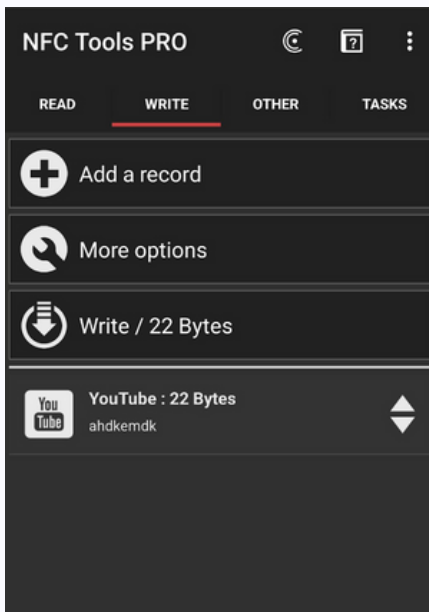
In our prototype we uploaded different youtube video links to the tags in ordeYou will see the task you created directly below the write button. If you now click the write button right above the task the application will write to whatever NFC tag you approach. Once the tag has been written to, you can then approach the tag with your device to see the results. Once you are done testing the tag it can then be placed, where you would like guests to be able to scan the tag and watch the connected videor to replicate a museum tour. To do this you would select the video option under write.

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Appendix B
Step-by-step "How to use NFC Tags with Pictures

01 Making the Box and the Set-up

1.) Tape up the box so that no light gets through the cracks (need to be able to control how much light you let in)
2.) Once the box is taped up we cut a hole in the front. This provides a spot for the viewer to look into the box so that way they can actually see the holographic display inside.
3.) We then taped the IPad to the top of the box using tape.
4.) Then place the glass inside the box and tape the bottom so it won't move with ease.
5.) We then moved the glass around a little bit changing the angle until we found a spot that created the best version of the effect. Below you can see the path of the image's reflection from the IPad.

Box Setup-The only source of light should be from the hole in which people look into the box.
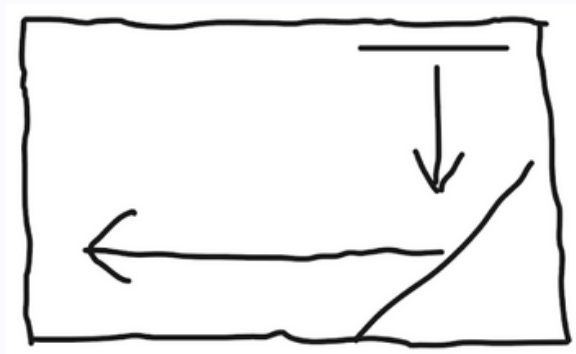
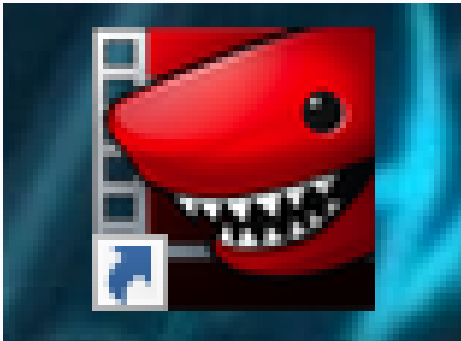The angle of the glass inside the box

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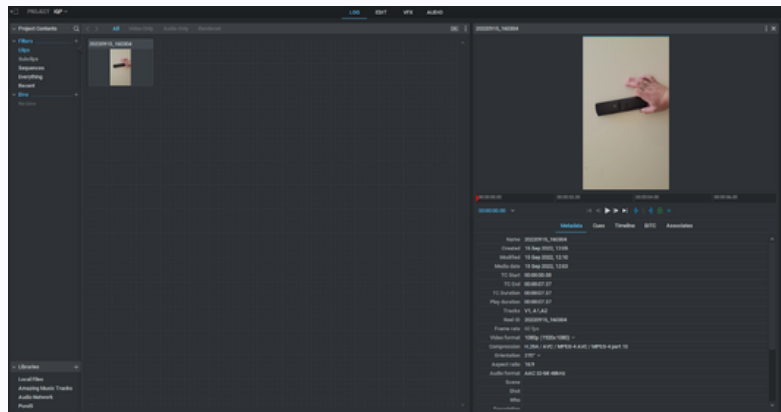**Step-by-step "How to use NFC Tags with Pictures**
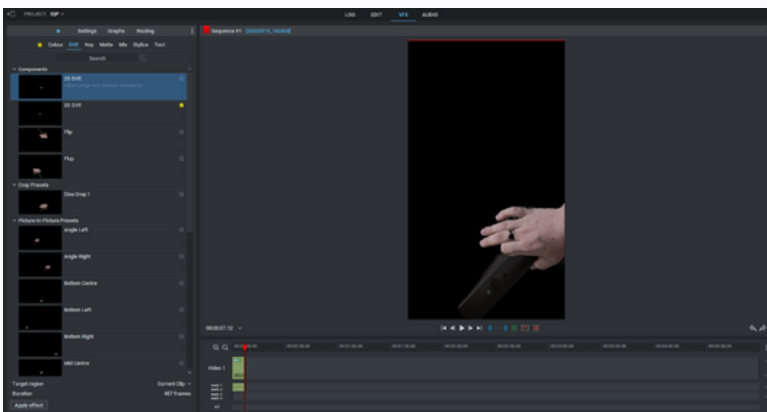
02 Lightworks

Now that the box has been made, its time to create the video component to go with it. To do this, you need a video with an all black background. Lightworks is one such video editor that can help accomplish this.

03 New Project

Create a new project in Lightworks and simply drag and drop your video into the grid area.

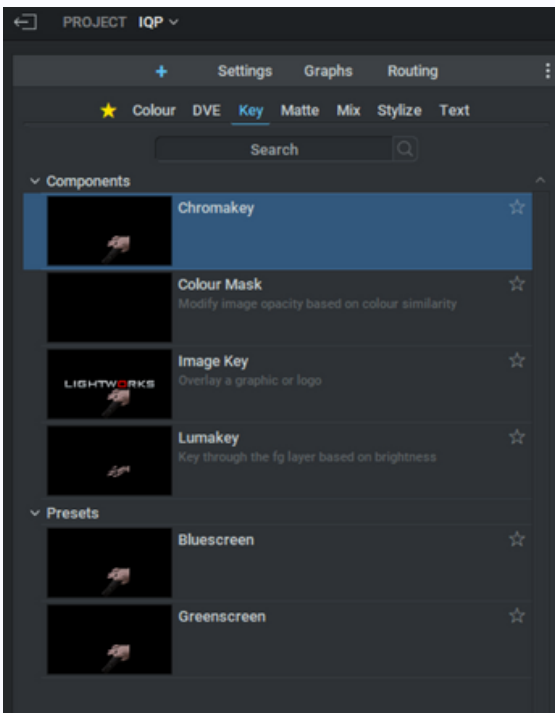### 04 VFX Tab

Go to the VFX tab and tap add an effect.

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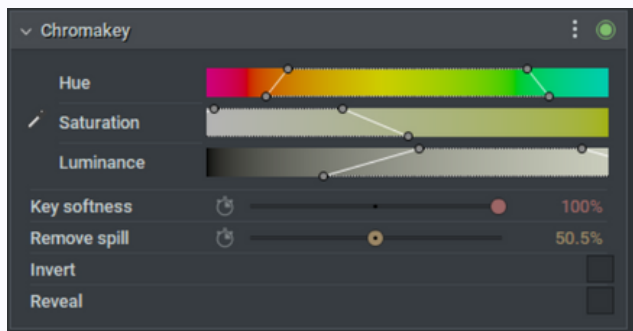**Step-by-step "How to use NFC Tags with Pictures**

05 Chromakey

Now select the Chromakey effect and add it.

06 Hue Selection

Use the hue selection tool to select the background in the video. This will make it so that anything that is the color of the background is turned black in the next step.
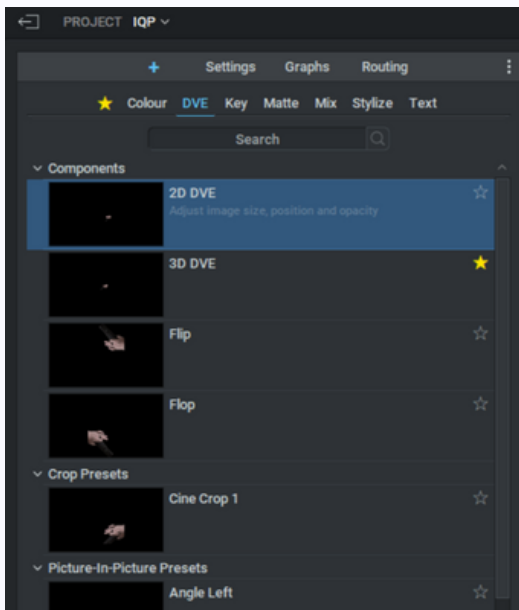
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Appendix B

**Step-by-step "How to use NFC Tags with Pictures**

07   2D DVE Effect

Finally we want to add a 2D DVE effect. Once this effect is added you should be able to play the video and admire your work. You may notice that the background doesn't completely disappear on the spot. Don't fret, you can edit the settings in the Chormakey effect to mitigate this issue.

08 Display Video

Once you have finally found the appropriate settings to make as much as the background disappear you can go and download your video. Then simply display the video on the iPad.
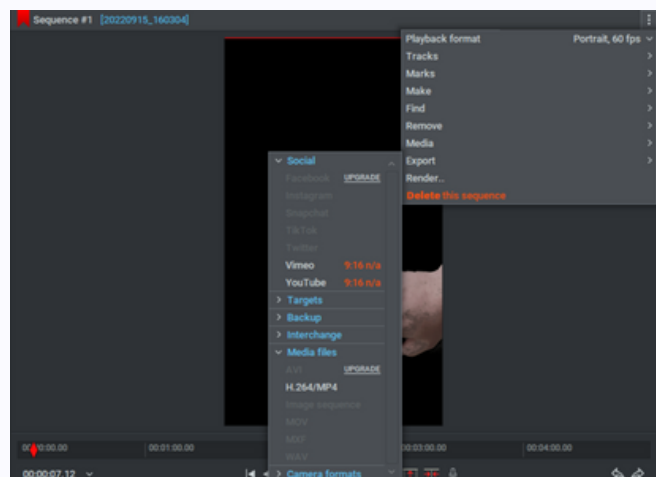
08

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Appendix C

Step-by-step: How to make a hologram (Pepper's ghost effect Mobile Phone)

There is a simple craft project that can be used to make a small hologram model, and when combined with a youtube video played on a mobile phone it creates a hologram effect. Using a thin, clear, sturdy plastic, you would need to cut out four equal trapezoid shapes following the dimensions on a template. These four pieces are then bonded together with clear tape to form a pyramid shape. When the pyramid is placed upside down on a phone playing a 3D hologram video, which can be found on youtube, it produces a small scale holographic image. This craft is simple enough for a wide audience to achieve, and it would provide a great opportunity for museum patrons to engage not only with the museum themes, but with the technology behind the museum's displays.

01 Print out the template shown below on a sheet of A4-size paper
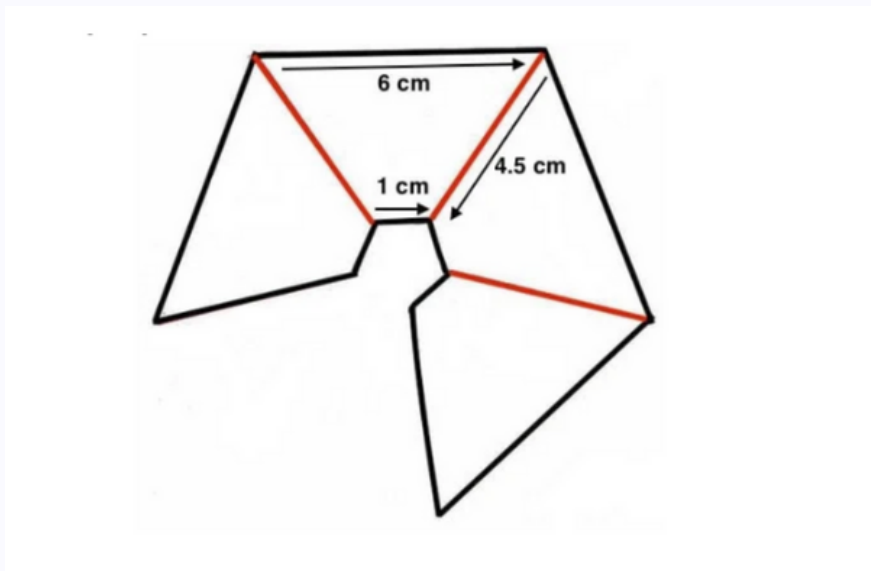
Note: If you don't have access to a printer you can also make a template on your own using the measurement guidelines above. Draw a basic trapezoid on a piece of paper using these dimensions. Parallel sides = 1cm, 6cm, and two others dies = 4.5cm each. You can always double or triple the dimensions in proportion to use on a larger display.

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Appendix C

Step-by-step: How to make a hologram (Pepper's ghost effect Mobile Phone)

02 Trace template and cut

Trace out the shape on the plastic sheet using a ruler and pen. For the trapezoid template, trace out four similar outlines on the plastic sheet. Now carefully cut out the outlines with a cutting blade and ruler. Try to make your cuts as precise as possible for a perfect pyramid.

03 Assemble Pyramid

If you used the printout template: score the red edges very lightly using a cutting blade. This will allow you to fold the edges better and form a pyramid shape. Stick the open edges of the sheet together using clear sellotape.

If you used the trapezoid template: Join the four edges to form a pyramid shape. Stick them together.

Using either method will give you a pyramid shape like the one shown below.
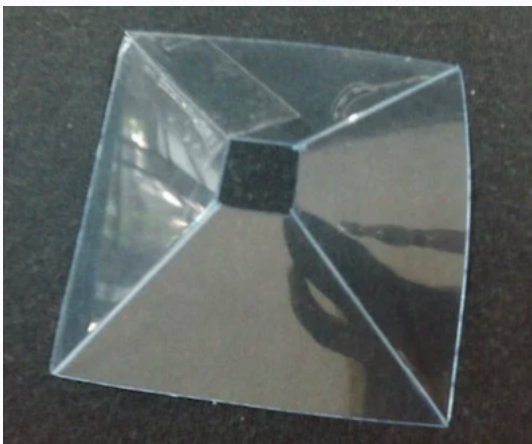
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Appendices

Step-by-step: How to make a hologram (Pepper's ghost effect Mobile Phone)

04 Finish hologram pyramid and use!

The hologram pyramid is finished. Now, all you have to do is play a hologram video on your phone. Place the hologram pyramid in the middle of your screen, and enjoy the show. This works best in low light conditions.

You can find many hologram videos on Youtube. Here are a few example videos:
https://www.youtube.com/watch?v=Y60mfBvXCj8
https://www.youtube.com/watch?v=8VQhRoo75j8

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Appendices

Appendix D

Interview Questions

Here we have the questions we asked during our interviews with museum experts, museum staff, and artists.

Artist Interview Questions

1. Can we record this meeting?
2. Tell us about yourself
3. What information might you want museum patrons to know specifically about the piece being displayed?
4. What made you design this piece? Was there something specific that inspired it?Is there a story you try to tell with your pieces?
5. Looking back at this piece is there anything you would have changed?
6. The museum theme is going to be centered around home, how does your piece fit into this?
7. Is there anything additional you would like us to know about these piece and your design work?
8. We are helping Honnunarsafn Islands integrate technology into their upcoming exhibit. Are there any digital aspects to a museum you would suggest or like to see?

Museum Staff Interview Questions

1. Can we record this meeting?
2. What is your name and what is your role in the museum?
3. What is your professional background? (schooling, prior places of employment, etc.)
   a. What led to you working with Honnunarsafn Islands?
   b. What do you love about the museum?
4. How many years have you worked here?
5. What is expected of you on an average day?
6. What type of technology might you want to see in the upcoming exhibit?
   a. We were thinking of creating QR codes, a VR tour of the storage area, audio ambiance, and a hologram...What do you think of these options?
      i. Do you think these options are manageable for the small staff?
   b. Is there something else you would want to see?
7. What would you like to see from the museum in the future?

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Appendix D

Museum Experts

Dr. William B. Crow Interview Questions

1. Are you okay if we record this zoom meeting?
2. In your experience as the director of the Lehigh University Art Galleries, what have you found to be the best way to engage your audience? What is your approach?
   a. Did you use technology, "games", brochures, etc...
3. How have you outreached to the community to see the galleries?
   a. What is the best way to reach out to the community to hear their thoughts and opinions?
4. How have you used technology, specifically, to engage your audience?
5. Have you encountered certain barriers in people getting access to your Galleries? (In regards to distance, language, etc.) If so, how have you combatted this?
6. As we understand it, you work with a small staff. How have you and your team utilized/maximized your resources to be as efficient as possible?
7. When designing a museum exhibit, what are the three most important things to consider?
8. Our museum is creating an exhibit that will be displayed for the next few years. How can we keep people coming back even when they have already visited?
9. Are there any applications or programs you would recommend for digital interfacing?

Lisa Harms Interview Questions

1. Are you okay if we record this zoom meeting?
2. In your experience at Thomas J. Watson Library at The Metropolitan Museum of Art in New York working with collections and accessibility, and at the National Museum of Industrial History in Bethlehem as Collections Manager and Education Coordinator, what have you found to be the best way to engage your audience? What is your approach?
   a. What were some of your strategies for increasing collection viewership and keeping the exhibits fresh/showing off maximum storage items?
   b. What have you found to be effective for engaging your audience?
   c. How do you best use the available space to represent as many items in the collections as possible?
   d. What strategies did you use or find most effective for engaging your audience? Did you use technology, interactive exhibits, brochures, etc.?

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Appendix D

Lisa Harms Interview Questions Cont.

1. How have you used technology, specifically, to engage your audience?
2. Have you encountered certain barriers in people getting access to your Galleries? (In regards to distance, language, etc.) If so, how have you combatted this?
3. When designing a museum exhibit, what are the three most important things to consider?
4. Our museum is creating an exhibit that will be displayed for the next few years. How can we keep people coming back even when they have already visited?

Lena Whitehead Interview Questions

While we did not get to ask her these questions, these are the questions we would have asked her if we did not have scheduling conflicts.

1. May we record this meeting?
    a. explain a little about who we are and our project
    b. explain about storage space and VR equipment we're working with
2. Please tell us a little bit about yourself and your work!
3. So VR tech, what programs do you recommend (in regards to oculus) and what do you usually do?
4. How easy/hard would it be for a small staff to manage the VR? Like updating it as the surroundings change?
5. How much information can you include in a VR experience?
6. What is a good starting space? They are looking for a prototype, do you think we could make something in two weeks?
7. Would you say, after hearing about our ideas and intended project, that VR would be a good way to display the storage?
8. What are some thoughts and recommendations for our project?

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Appendix E

Survey Questions

Though we did not get to utilize our survey, if we could we would have asked these questions.

Demographics

1. What is your name?
2. Age?
   a. 0-18 yrs old
   b. 19-30 yrs old
   c. 31-45 yrs old
   d. 46-60 yrs old
   e. 60+ yrs old
3. Where are you from? (city, country)
4. What is the primary language you speak?

Museum Questions

1. Why did you decide to get an annual pass for the Icelandic Museum of Design and Applied Art (Hönnunarsafn Íslands)?
2. How often do you go to Hönnunarsafn Íslands?
3. If you've gone 2 or less times in the past year, what keeps you from coming back?
4. If you've gone 2 or more times in the past year, what keeps you coming back?
5. If you are interested in providing additional feedback, please leave your email/contact information here so we can reach out! :)

09
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