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Designing an Immersive Experience Using Georgia O'Keeffe's Works and Effects

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Georgia O'Keeffe Museum

Designing an Immersive Experience Using Georgia O'Keeffe's Works and Effects

An Interactive Qualifying Project submitted to the Faculty of
WORCESTER POLYTECHNIC INSTITUTE
in partial fulfillment of the requirements for the
Degree of Bachelor of Science

by
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The Georgia O'Keeffe Museum

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ABSTRACT

This project aimed to design an immersive experience for the Georgia O’Keeffe Museum, to improve visitorship and to showcase more museum holdings and collections unable to be displayed due to space limitations. Our team sought to do this by extending the museum experience to the landscapes in Northern New Mexico that Georgia O’Keeffe made famous in her paintings. We did extensive research in the O’Keeffe library and archives, documented sites around Northern New Mexico where she painted, and designed an app prototype as an immersive experience that incorporated our findings in a user-friendly format.

EXECUTIVE SUMMARY

Georgia O’Keeffe is well known for her landscape paintings that depict now iconic locations in Northern New Mexico where she visited yearly throughout her life. The O’Keeffe Museum, located in downtown Santa Fe owns the largest collection of her works. The museum hopes to expand its visitors’ experiences beyond the walls of the museum through the implementation of an immersive technological experience that will connect Georgia O’Keeffe’s landscape paintings with the surrounding landscapes and museum holdings from her life. The O’Keeffe Museum also owns two properties that she made famous in her paintings, photos and sketches. After O’Keeffe spent several summers on Ghost Ranch in New Mexico, she purchased a piece of property there and later bought an additional home in Abiquiu where she would spend the winter months. At these locations and in several nearby locations in New Mexico, the subjects of her works can be found and documented.

While the museum has recently seen an increase in visitorship from outside New Mexico, there has been a trend of decreasing local visitorship (See Figure 1). To increase local visitors and bring back visitors from outside NM, the museum is currently exploring more innovative ways to bring in visitors besides changing exhibits and new collections. The museum envisions that it can become a hub for travel around northern New Mexico using O’Keeffe’s landscape paintings. By connecting museum owned artifacts, content from the research center and the New Mexican landscapes, visitors can potentially immerse themselves in Georgia O’Keeffe’s life and New Mexican culture more so than before and gain a new perspective of their area of residence.

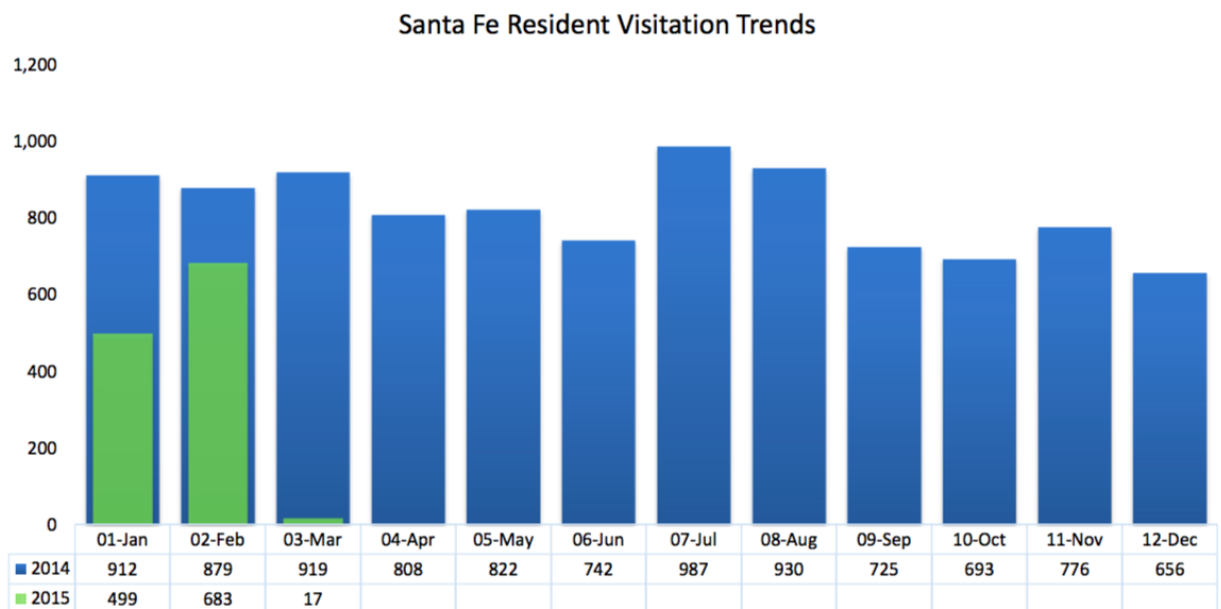


Figure 1: Santa Fe Resident Visitation Trends of the Georgia O’Keeffe Museum

(Last Updated 3/01/2015)¹

An immersive experience in which a visitor can view connections between works and landscapes could be accessible through an exhibit, mobile device, or website. Visitors from in or out of state could easily learn more about O’Keeffe before and after their visit. This may invoke curiosity which will lead to an increase in visitorship. This is especially important to the museum because of their desire to reach out to new audiences and increase in out of state visitors (See Figure 2), thus potentially bringing in new return visitors.

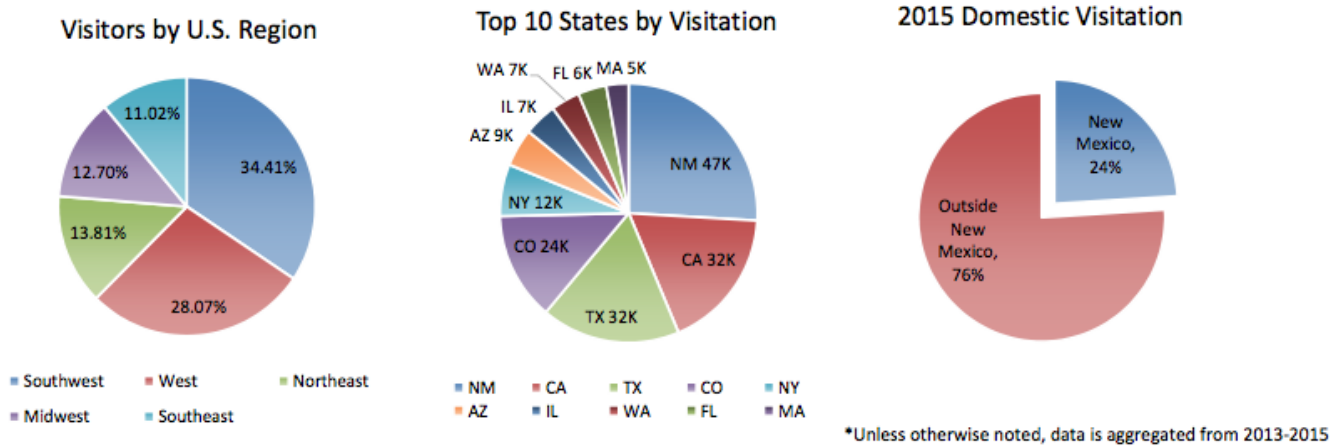


Figure 2: Georgia O’Keeffe Museum visitor distribution (Last Updated 3/01/2015)²

Implementing immersive experiences has generated great success in museums such as the Cleveland Museum of Art. Our project outlined what is needed for an immersive experience to be implemented as well as design a prototype that could be used as a platform to work off of in the future.

The first major objective of our project was to connect paintings to surrounding landscapes. To do this, we first needed to find the actual locations of the painted subjects and vantage points. Working with the museum employees, we created a list of paintings that depicted actual landscapes and compiled notes of roughly where they were done from within Ghost Ranch. Once we completed the list, we created a field guide containing pictures of each of the paintings organized by location. We focused on Ghost Ranch due to its proximity to large number of vantage points (See Figure 3).

On site, we dropped pins on the viewpoint and painting subject locations using Google MyMaps and collected all the logistical information including: permissions required to access land, parking, cell reception by provider, necessary supplies to bring, and nearby facilities.

¹ The Georgia O’Keeffe Museum, “Feb2015 Gallery Visitation Report”, 2015

² The Georgia O’Keeffe Museum, “Feb2015 Gallery Visitation Report”, 2015

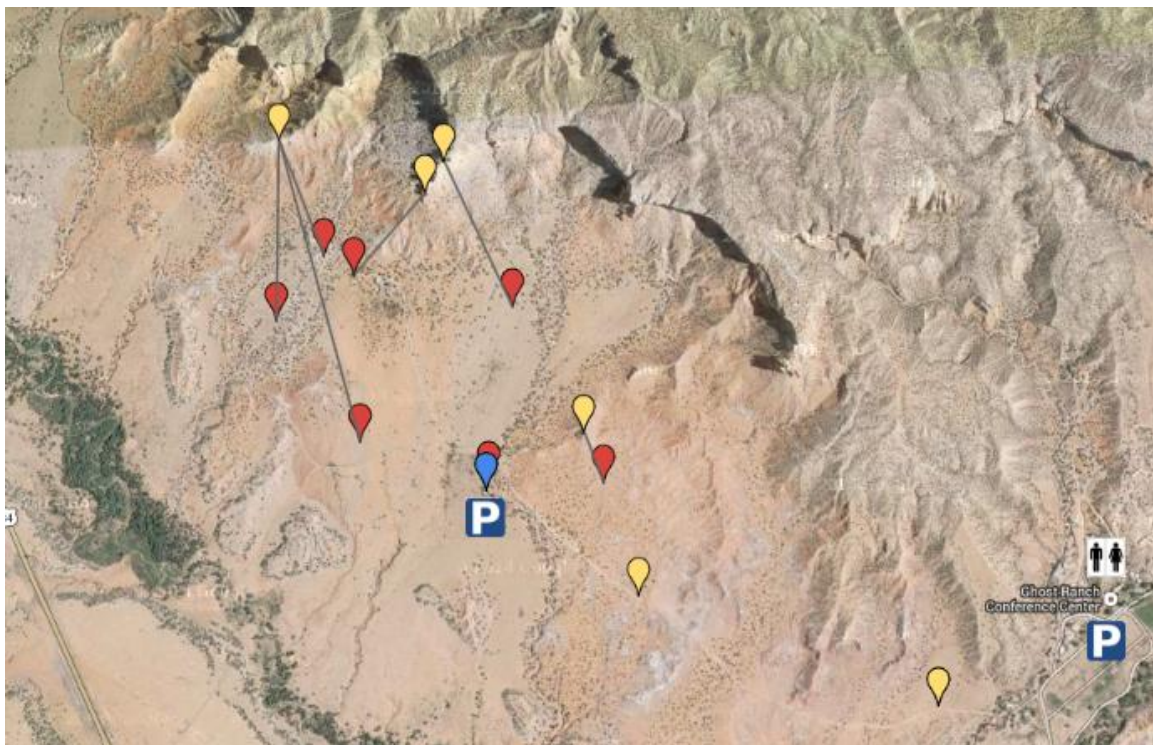


Figure 3: Ghost Ranch Area with Dropped Pins and Facilities

However, due to the time and permission restrictions, we could only collect 16 of the viewpoints in Ghost Ranch and Abiquiu Home. It is difficult to say how much of this experience can be built for any given painting. Some of the locations or subjects that O’Keeffe painted may have degraded or are inaccessible. Hence, we cannot say how long it would take to find all of these landscapes. There is limited information regarding the location of the subject if that subject still exists, as well as how many of the landscapes can be incorporated in the tours.

In addition to connecting O’Keeffe’s work to landscapes outside the museum, we sought to utilize the museum’s collections and holdings to better showcase what the museum already has or has access to. To gain a better understanding of how the Museum stores their data, we met with museum staff to learn about Vernon, the museum archive system; CONTENTdm, the museum’s online storage system; and Voyager, the museum’s electronic card catalog (See Figure 4). In addition we gained access to the museum’s file server for other relevant data not stored in these three systems.

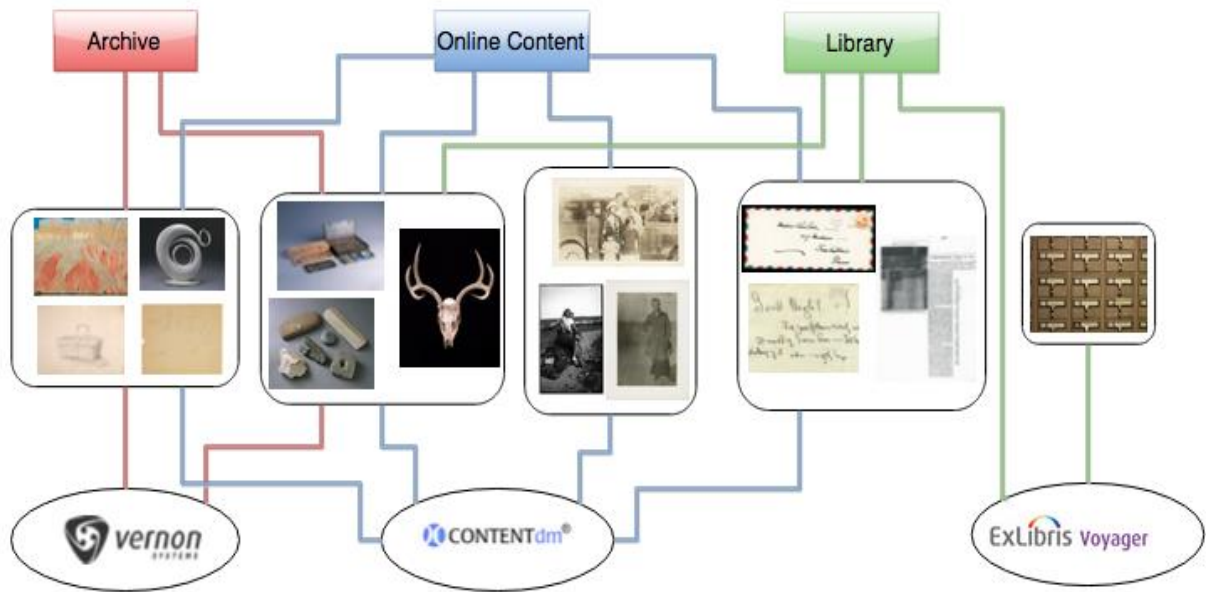


Figure 4: Museum data management systems

Once we had access to the systems, we began to organize the data that related to our selected painting *Untitled (Red and Yellow Cliffs)* as well as *Easter Sunrise* and *My Front Yard, Summer* (see Appendix F for our full table). We sorted the resources by type such as letters, related paintings, and photographs (See Figure 5).

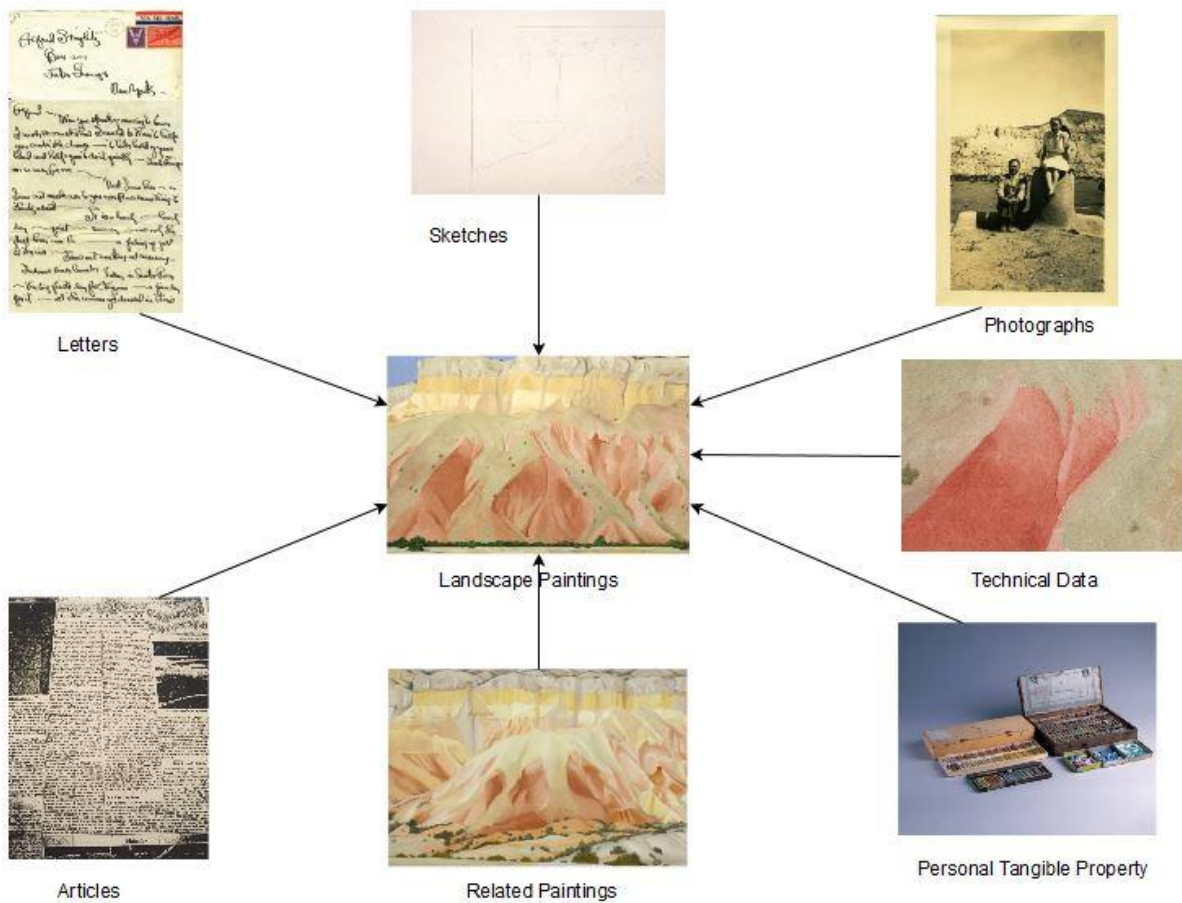


Figure 5: Best connections for the Landscape Paintings

As we did research in the museum’s data management systems, we also made assessments of how the data was organized, stored and interconnected between systems. Additionally for each system, we documented requirements to access data, if it could contain copyrighted information and what file types were stored in the system. By observing connections between the systems and their associated data we were able to make recommendations for future implementations of a digital asset management system. Taking all of this into account, we reported on how easy the data and systems are to connect and made recommendations for what the museum can do in the future.

Once we cataloged connections of O’Keeffe’s landscape paintings, as well as going out to the actual locations of the painted subjects to compile logistical data, we began to narrow down our selection of a platform. We considered three main ways conveying a immersive experiences: gallery exhibit, website, and smartphone app. We developed criteria that the experience would have to be tailored to such as the space limitations of The O’Keeffe Museum and the types of information and connections we wanted to display from the museum’s holdings.

Due to space limitations of the museum, we came to the decision that a gallery exhibit would not be practical. An exhibit would be limited to those visiting the museum and cut down on O’Keeffe’s work currently able to be displayed within the museum. We decided an app based immersive experience would best fit the museum and its needs and because nearly 67% of American adults own smartphones³, thus still reaching a wide audience. It could pull data from the museum’s systems either through WiFi or mobile data and provide users with in depth information regarding each painting in the museum and the artifacts that relate to them.

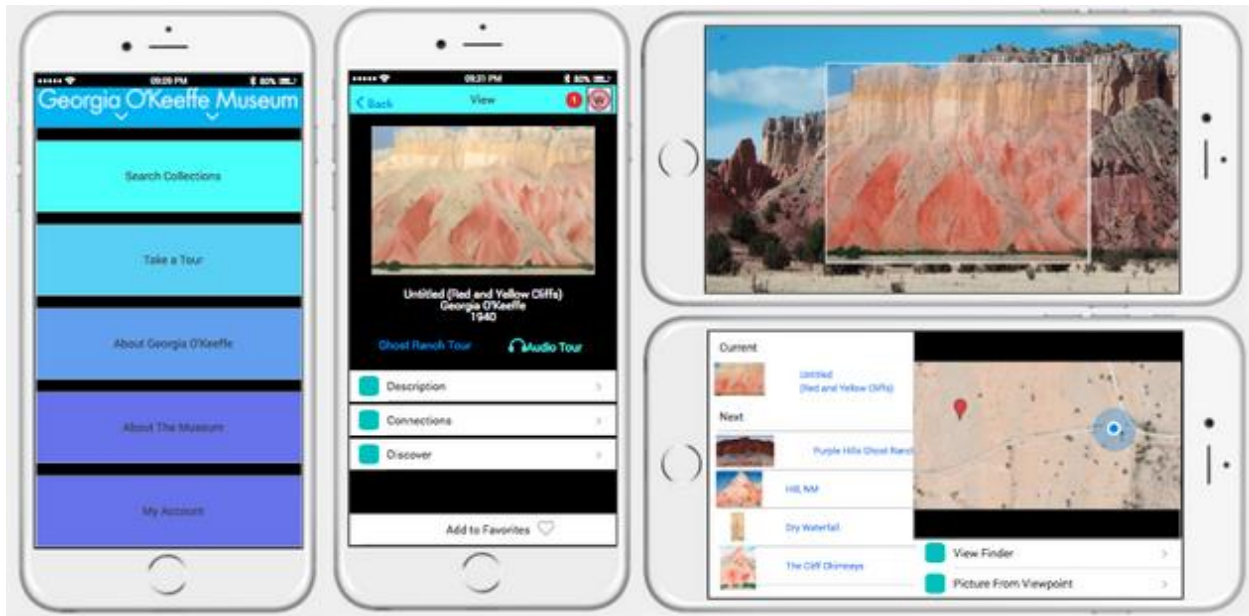


Figure 6: Screenshots of App Prototype

Using JustInMind, an app prototype builder software, we created a prototype of an app-based immersive experience shown in Figure 6. By interfacing social media outlets in the app, app-users will be able to interact with the museum and each other long after they visited. This paired with notifications will also keep users updated about changes in the museum such as exhibit changes or new collections. However before implementing an app like this, it is important to mention that connections between content must be established before continuing to the application. The app prototype will serve as our demonstration of those connections in relation the chosen painting and show how O’Keeffe’s art can create a hub for travel around Northern New Mexico.

From our research and evaluations, our team came to the conclusion that the museum’s data management systems should be restructured and reorganized. Each system in use now has limitations and there are few connections between them. Any future website or app could be used in conjunction with a digital asset management system or with more difficulty, draw

³ Aaron Smith, “U.S. Smartphone Use in 2015,” *Pew Research Center, April 2015.*

information from current systems. Our team recommends that before any plans to implement an immersive experience are made that the museum find and establish connections between all the works, artifacts photographs and documents. We found connections to museum content for three works and suggest that the museum continue to build a lookup table with connections to other works. An example of an entry for one of the works can be viewed in Table 1.

Target	Type	Location	Accession No.	CR # if Applicable	Other Titles
Untitled Red and Yellow Cliffs	Painting	Vernon, CONTENTdm	1997.06.036	998	
	Sketch	CONTENTdm, Vernon	2006.05.154	938	
	Sketch	CONTENTdm, Vernon	2006.05.156	1005	
	Sketch	CONTENTdm, Vernon	2006.05.163	1006	
	Sketch	CONTENTdm, Vernon	2006.05.165	1008	
	Photo	CONTENTdm	2006-06-0165	N/A	
	Photo	CONTENTdm	2006-06-0166	N/A	
	Letter	CONTENTdm	MS-OKAS-0198f	N/A	
	Letter	CONTENTdm	RC-2004-003	N/A	
	Painting	Vernon, CONTENTdm	2006.05.202	1150	
	Painting	CONTENTdm	N/A	931	
	Painting	N/A	N/A	955	
	Painting	CONTENTdm	N/A	997	
	Painting	N/A	N/A	1059	
	Painting	N/A	N/A	1060	
	Painting	N/A	N/A	1116	
Painting	N/A	N/A	1236		

Table 1: The lookup table for Untitled (Red and Yellow Cliffs)

With regards to connecting O’Keeffe’s paintings to surrounding landscapes, it is important to find a balance between preservation and documentation of the landscapes of New Mexico. Preserving the landscapes is very important because people should have the ability to visit them for years to come. Equally important, however, is the ability for people to visit and learn about O’Keeffe and New Mexico through these landscapes. To better find this balance, our team suggests working with local organizations to establish set trails the vantage point

locations to minimize harm to the environment while still allowing visitors to come and see the sites.

Our group recommends that the museum continue working on the Map of Painting Subject and Vantage Point Locations. As mentioned our team has documented 16 landscape painting vantage points and subjects out of the hundreds of landscape works Georgia O'Keeffe did in New Mexico. We believe it would be in the museum's best interest to continue focusing on Ghost Ranch where there are roughly 40 potential vantage points from within a mile radius. Because it takes roughly a half hour per site, doing as many as possible that are within close proximity would be more efficient. It could also potentially drive the desire to restore Georgia O'Keeffe's home there and open it to the public. We also suggest referring to the pamphlet guide by Mark Mongold which provides additional information on the viewpoints beyond our geotagging. This information could be utilized along with our app to create tours of the surrounding landscapes complete with specific directions, as well as other relevant information from our app.

We hope our concept of the app could be implemented eventually for developing an immersive visitor experience, however, our prototype design was only fully demonstrated for one chosen painting due to the time limitation. In the future, we hope the museum could expand our prototype design with its full collection of works and more creative features such as using augmented reality to display bones and other tangible property through the app. Through creating these connections and making an interactive experience we believe the museum will enhance its visitor experience greatly, provide a richer database of information and increase visitorship and membership.

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CHAPTER 1: INTRODUCTION

This project assisted the Georgia O’Keeffe Museum in developing an immersive visitor experience that connects the art and life of Georgia O’Keeffe as well as New Mexico landscapes represented in those works. Through this project, the O’Keeffe museum hopes to connect O’Keeffe’s paintings to landscapes of Santa Fe and expand their clientele to younger generations and other atypical museumgoers. To accomplish these goals we went to the locations where she painted and collected logistical data such as directions, parking, cellphone service, nearby facilities, and permissions required to be on site. Then, we compiled works included in the collections, archives, and artifacts of the museum that pertain to the landscape paintings. Finally we selected a platform for an immersive experience and created a visual for that experience for one painting. The visual incorporated the information we collected and demonstrated what the experience would look like.

With technology and daily life increasingly intertwined, many museums want to enhance the overall museum-going experience through technology.⁴ For example, science museums have begun to provide a more engaging and exciting atmosphere for learning over the past decades by using technology. Due to the nature of science, it is relatively easy to connect the way the world works with an interactive exhibit or experience. Art museums however, tend to have a more difficult time enhancing their archival-based displays with interactive experiences due to their content. It is harder to display art in an interactive way as compared to content in science museums. In order to attract more visitors, art museums need to make the experience of visiting their museum more engaging and educational through immersive technology.

The Georgia O’Keeffe Museum in Santa Fe, New Mexico has relied heavily on its core demographic (middle class, middle aged women) in the 18 years of operation and has not implemented sustainable, innovative solutions for drawing in a younger, more eclectic crowd to the museum. A study done by the National Endowment for the arts saw that the core group of museumgoers (non-Hispanic whites ages 45-54) has dropped thirty percent between 2002 and 2008.⁵ This means that the O’Keeffe Museum’s core group of visitors may not be a stable visitor base in the future.

The O’Keeffe Museum hopes to better connect with younger generations and enhance the experiences of those already attending. Since Georgia O’Keeffe has painted New Mexican landscapes that are within traveling distance of the museum, the directors of the O’Keeffe museum believe that connecting Georgia O’Keeffe’s art with these landscapes will provide a fresher more immersive experience to younger visitors. Recently, they created a Live View of Georgia O’Keeffe’s Abiquiu Garden after it was planted in an arrangement similar to that of O’Keeffe’s gardens by museum employees and local volunteers. The Live View was then displayed next to paintings in the museum. It successfully connected the museum to an aspect

⁴ John H Falk, Lynn D Dierking, “The Museum Experience,” *Whaleback Books*, 1992.

⁵ David Keen, Kevin Williams. “2008 Survey of Public Participation in the Arts,” *The NEA Office of Research & Analysis*, November 2009.

of Georgia O'Keefe's life and Santa Fe not obvious to the average patron by expanding the experience beyond the walls of the museum.

There are further opportunities to integrate interactivity through technology within the museum. Besides the Live View of the garden, the museum only utilizes audio tours to enhance visitors learning and experience. The museum does have an extensive database of its collections online but it is not accessible via a mobile platform and is therefore not accessible when in the museum or out exploring Santa Fe. The museum can take advantage of this deficit and integrate a way to access these collections via a mobile platform.

CHAPTER 2: BACKGROUND

For this project, it is necessary to understand who Georgia O’Keeffe was. Our focus for this project will be on her time and works in New Mexico due to the location of the museum and its properties. Additionally, understanding the inner workings of the museum and how museums implement interactive technology is necessary background information of our project. Finally in order to deliver an assessment of the current archival and data management systems, it is necessary to have knowledge of the systems currently in use and that can be used in the future.

2.1 Georgia O’Keeffe and Her Life

Georgia O’Keeffe has been recognized as the Mother of American Modernism in the 20th century.⁶ She is well known for her flower portraits and New Mexican landscapes.⁷ O’Keeffe was born in a farmhouse near Sun Prairie, Wisconsin on November 15, 1887. She grew up on her parents dairy farm which fostered a deep connection to nature. This connection with nature was what drew her to New Mexico and its vast, colorful landscapes. Ms. O’Keeffe received a formal education at the School of the Art Institute of Chicago as well as from the Art Students League in New York where she studied under William Merritt Chase. She disliked the formal academic framework of how art was taught and in 1908 abandoned her craft. However, in 1912, Arthur Wesley Dow, a well-known painter, photographer, printmaker and educator, introduced some innovative ideas of painting in an art course that O’Keeffe took which in turn inspired her to paint again.⁸ It was also at this time that Georgia O’Keeffe decided not to follow the formal academic path and began to paint in her own style which was further developed in the Palo Duro Canyon (painting shown in Figure 7 below) near Amarillo Texas while working as Head of the Art Department at West Texas State Normal College.⁹

⁶ Georgia O’Keeffe, “Georgia O’Keeffe: One Hundred Flowers,” *Knopf in association with Callaway Editions*, 1987.

⁷ Georgia O’Keeffe, “Georgia O’Keeffe: One Hundred Flowers,” *Knopf in association with Callaway Editions*, 1987.

⁸ Roxana Robinson, “*Georgia O’Keeffe: A Life*,” pp.81-84. University Press of New England, 1999.

⁹ Sarah Greenborough, “My Faraway One: Selected Letters of Georgia O’keeffe and Alfred Stieglitz,” *Yale University Press*, 2011.



Figure 7: O'Keeffe Painting of Palo Duro Canyon¹⁰

In 1918, Alfred Stieglitz, a photographer and modern art promoter, invited Georgia O'Keeffe to move in with him in New York. After some time, they became romantically involved. They began to spend their summers and autumns in Lake George, NY, Stieglitz's hometown. In that time, O'Keeffe was productive and created many paintings in oil along the lakeside. O'Keeffe began to gain popularity through these paintings in Stieglitz's gallery.

Through Stieglitz, O'Keeffe met Charles Demuth, Arthur Dove, John Marin, Marsden Hartley, Paul Strand and Edward Steichen, some of the most important American modernist painters and photographers, who deeply affected Georgia O'Keeffe and her artistic style.¹¹ In that period, Georgia O'Keeffe became well known for her flower paintings. She painted several flowers in a large-scale view with subtle curves and gradient colors such as "Calla Lily"¹² for nearly two decades.

It was not until later in O'Keeffe's life that New Mexico became important to her. After a visit to Santa Fe and Taos in 1929, she was very attracted to the landscapes and colors there. From 1929 to 1949, O'Keeffe would travel to New Mexico every year to paint the area's expansive and unique landscapes.¹³ It was not until Stieglitz's death that she made preparations to live there full time and finally did so in 1949. Georgia O'Keeffe outfitted her truck so she could paint in the back seat. She would drive to the locations of her selected landscapes and paint in what she referred to as her "favorite studio".¹⁴ Her truck offered shelter from the New Mexican

¹⁰ Georgia O'Keeffe, "No. 21 - Special, 1917", *Museum of Fine Arts*, 1917.

¹¹ "O'Keeffe Eclipses Stieglitz," *The Economist*, July 7, 1997.

¹² Roxana Robinson, "Georgia O'Keeffe: A Life," *University Press of New England*, 1999.

¹³ William Innes Homer, "Abiquiu Is a Long Way for You to Come," *American Art*, 2006.

¹⁴ "Life and Artwork of Georgia O'Keeffe," *National Cable Satellite Operation*, 2003.

heat and insects that constantly pestered her during her work while offering a real life viewpoint of the landscape instead of painting from a picture (See Figure 8).



Figure 8: Georgia O'Keeffe in her "Favorite Studio"¹⁵

While in New Mexico, O'Keeffe mastered her process and style. She would mix her own paint colors using manufactured paints and experiment with different materials for doing so, such as various oils and resins. These colors were organized into "subsets of varied value, opacity, gloss and texture."¹⁶ However, often the materials which she noted that she used were in fact incorrect.¹⁷ She had several paint card sets that she kept in different locations so she could paint using consistent colors at each venue. The paint cards are about 4"x3" and 3"x2" and are organized into 7 groups based on color. While there were a vast number of paints O'Keeffe could obtain from manufacturers, she only used a small number of them, preferring to simplify and distill. Instead of painting directly from the landscapes, she would like to sketch them roughly on canvas and write notes about the colors based on her paint cards. She would then have the sketches framed. When they were finished being framed months later, she would paint the landscape from memory using only the sketch and notes as guidelines. She was not limited by what was in front of her because she would paint from memory and use the color cards only as a reference.

During the time that O'Keeffe spent at Ghost Ranch, she became obsessed with Cerro Pedernal, a mountain that could be seen from her property. She often, because of its size, compared it with the heavens in her words and paintings.¹⁸ When talking about Pedernal, she said, "It's my private mountain. It belongs to me. God told me if I painted it enough, I could have it."¹⁹ She painted and sketched Pedernal over 10 times, its size and beauty impressed her. It

¹⁵ "Life and Artwork of Georgia O'Keeffe." *National Cable Satellite Operation*, 2003.

¹⁶ Dale Kronkright, "The Color Cards of Georgia O'Keeffe," *Georgia O'Keeffe Museum*, October 26, 2009.

¹⁷ Dale Kronkright, "The Color Cards of Georgia O'Keeffe," *Georgia O'Keeffe Museum*, October 26, 2009.

¹⁸ Georgia O'Keeffe, "Georgia O'Keeffe, A Studio Book," *Viking Press*, 1976.

¹⁹ Beverly West, "Remarkable New Mexico Women," *Morris Book Publishing LLC*, 2001.

also was easily painted from her from the front yard of her house and she named several of her paintings of the mountain *My Front Yard*.²⁰ (See in Figure 9)



Figure 9: My Front Yard, Summer²¹

Ms. O'Keeffe was not afraid of death and only lamented that she would no longer be able to see New Mexican countryside. She said, "When I think of death, I only regret that I will not be able to see this beautiful country anymore unless the Indians are right and my spirit will walk here after I am gone."²² O'Keeffe died on March 6, 1986, in Santa Fe, Mexico. Today her works can be seen at museums around the world as well as the Georgia O'Keeffe Museum in Santa Fe, New Mexico.

²⁰ Barbara Buhler Lynnes, "Georgia O'Keeffe: Catalogue Raisonné," Yale University Press, 1999.

²¹ Georgia O'Keeffe Museum, *The O'Keeffe Museum ContentDM*

²² Eisenberg, Paul Eisenberg, "Fodor's New Mexico: Fodor's Travel," Random House, Inc., 2007.

2.2 Georgia O’Keeffe Museum

In the 1950’s, shortly after Georgia O’Keeffe made New Mexico her permanent home, Santa Fe’s tourism started to grow due to an influx of artists migrating to the area.²³ People were not only drawn to the natural beauty of Santa Fe and the surrounding landscapes but also the cultural aspect that “Santa Feans” found so important to conserve. This created a cultural tourism industry that became essential to the economy of Santa Fe. With the growth of tourism in Santa Fe, the city found itself at a crossroads between building tourism and preserving the culture and integrity of the past.²⁴ To prevent the decay of culture amidst tourism, the city has established zoning codes as well as several historical societies for the preservation of the city. There are also several museums and galleries that helped build upon the culture of Santa Fe.

Among these museums and galleries, is the Georgia O’Keeffe museum (See Figure 10). The Museum opened in 1997 (originally founded in 1995 by Anne W. Marion and John L. Marion, residents of Santa Fe²⁵), eleven years after the death of the artist. The museum owns the largest collection of O’Keeffe’s works and loans many of their collections out to museums around the world. The museum shares her artworks with the public and wants to inspire all current and future generations with O’Keeffe’s artwork. The museum hopes that O’Keeffe’s legacy can be preserved, presented and advanced through innovative public engagement, education and research. The museum also aims to connect its visitors with Santa Fe’s scenery and culture using all types of Museum-owned properties including Ms. O’Keeffe and other artist’s’ landscape paintings.



Figure 10: Photo of O’Keeffe Museum by Robert Reck²⁶

²³ Andrew Leo Lovato, “ Santa Fe Hispanic Culture: Preserving Identity in a Tourist Town,” *University of New Mexico Press*, 2004.

²⁴ Andrew Leo Lovato, “ Santa Fe Hispanic Culture: Preserving Identity in a Tourist Town,” *University of New Mexico Press*, 2004.

²⁵ Kathryn Jones, “The Money of Color,” *Texas Monthly*, September 1999.

²⁶ Robert Reck, “The Georgia O’Keeffe Museum,” *Allegretti Architects*, 1997.

Currently the Museum holds over 3,000 works of art, 1,149 of which are O’Keeffe paintings, drawings and sculptures. However, due to space limitations (725 linear feet of wall space²⁷, see the floor plan in Figure 11), the museum can only display around 100 - 110 works at a time. They rotate through different collections throughout the year and utilize an online database to display other works, pieces, photographs and personal effects of O’Keeffe not shown on the museum floor. The founding curator of the museum Barbara Buhler Lynes compiled a Catalogue Raisonné²⁸ (CR) of all of Georgia O’Keeffe’s works organized chronologically and assigned each work an identification number.



Figure 11: Floor Plan of Georgia O’Keeffe Museum²⁹

2.2.1 Abiquiu and Ghost Ranch Homes

Georgia O’Keeffe owned two Residences in New Mexico, one located on Ghost Ranch and the other in the village of Abiquiu. When Georgia O’Keeffe visited New Mexico in the 1930’s she lived and worked in a home on Ghost Ranch (See Figure 12), a 21,000 acre piece of property in Abiquiu, New Mexico, until she bought the house and small part of the property in 1940.³⁰ Approximately 40 of her paintings depicting existing landscapes were created within a

²⁷ “Museum Galleries Linear Footage,” *Georgia O’Keeffe Museum*, 2015.

²⁸ Barbara Buhler Lynes, “Georgia O’Keeffe: Catalogue Raisonné,” *Yale University Press*, 1999.

²⁹ Robert Reck, “The Georgia O’Keeffe Museum,” *Allegretti Architects Santa Fe, New Mexico*, 1997.

³⁰ Georgia O’Keeffe Museum, “Her Houses,” *Georgia O’Keeffe Museum*, 2015.

one mile radius of this house. Today the building itself is owned by the museum, however the land surrounding the home belongs to the Presbyterian Church. The church employs an organization that runs Ghost Ranch and offers several tours around the ranch by bus or horse that show off many of O'Keeffe's most famous landscape painting subjects. Visitors can stay at Ghost Ranch and participate in several different activities offered daily such as rock climbing, kayaking, horseback riding or hiking. They also offer venues for retreats, gatherings, and spiritual workshops.³¹



Figure 12: Georgia O'Keeffe at her Ghost Ranch Home³²

³¹ Ghost Ranch, "Education & Retreat Center," *Ghost Ranch*, 2015.

³² Georgia O'Keeffe Museum, *The O'Keeffe Museum CONTENTdm*

In addition to the Ghost Ranch home, Georgia O’Keeffe bought and restored a home and studio in 1945 (See Figure 13), 15 miles south from her Ghost Ranch home (See Figure 14). The museum holds ownership of this property as well.³³ Visitors can view the subject of *Easter Sunrise*, *Mesa and Road East*, and *Mesa and Road East II* from the parking lot of the home. In the courtyard of her home resides the black door, in which O’Keeffe has painted several times and was one of the reasons she purchased the property in the first place. O’Keeffe would spend her summers in her Ghost Ranch home and winters in her Abiquiu home until she reached the end of her life in 1986. Today the trip would take 15 minutes along route 84, but for the majority of O’Keeffe’s stay in New Mexico route 84 did not exist. Tours are available for her Abiquiu home and studio, however her Ghost Ranch home is not open to the public due to its current state.³⁴



Figure 13: Georgia O’Keeffe’s Abiquiu Home and Studio³⁵

³³ Georgia O’Keeffe Museum, “Her Houses,” *Georgia O’Keeffe Museum*, 2015.

³⁴ Agapita Lopez, “A interview with Agapita Lopez (Director of Abiquiu Historic Home and Studio),” March 2015.

³⁵ Georgia O’Keeffe Museum, The O’Keeffe Museum *CONTENTdm*

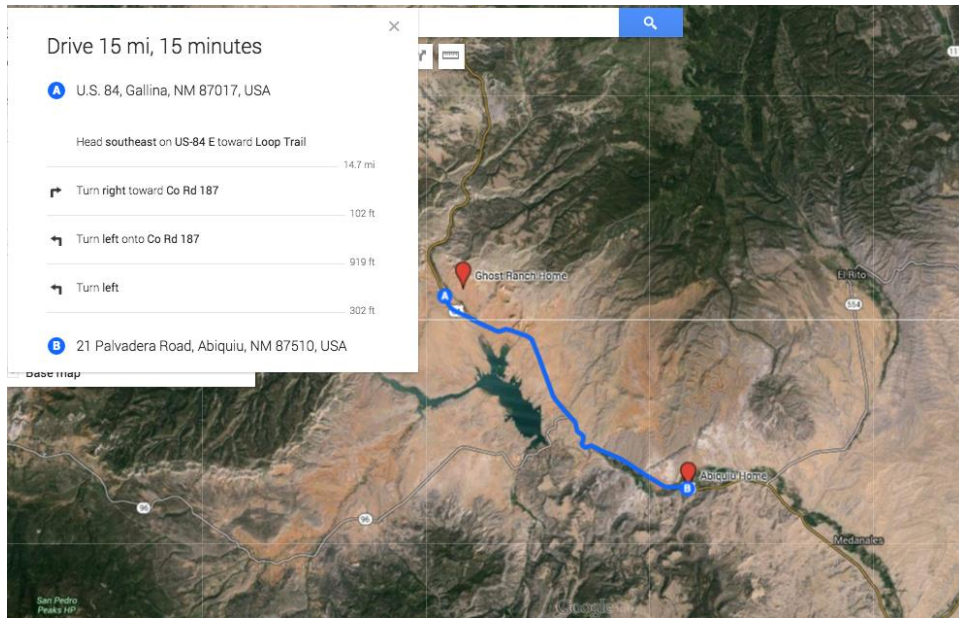


Figure 14: Google MyMaps from Ghost Ranch Home to Abiquiu Home and Studio

2.2.2 O’Keeffe Museum Operations

The museum is open daily from 10am to 5pm and until 7pm on Fridays. They offer several tours of the museum, research center and Abiquiu Home and Studio for an additional fee.³⁶ The Georgia O’Keeffe Museum is split up into several divisions such as curatorial, educational, research and historical documentation. Many of the operations take place outside of gallery itself (Refer to Figure 15 below). For example, the research, curatorial, educational, and information technology staff all primarily work in operational offices nearby the museum and in the research center next door.

³⁶ “Visit,” *Georgia O’Keeffe Museum*, 2014

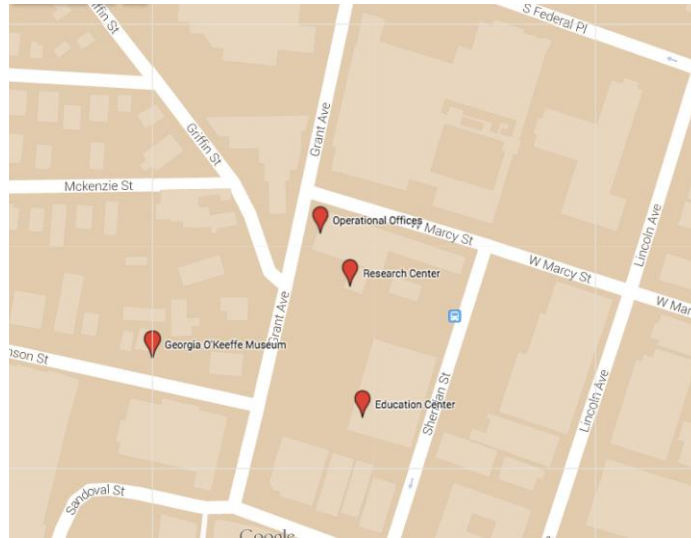


Figure 15: Locations of the Museum, Research Center, and Operational Offices

Although the museum is broken up into several divisions and employs over 70 people, we were only in contact with our main contact (Ben Finberg) and a few other employees directly involved with the subject of our project. Below in Table 2 are their job descriptions and divisions:

Main Contacts	Description	Division
Ben Finberg	Mr. Finberg is the Director of IT and Operations. He is our primary contact for the entire project and oversees all data management systems and operational technology of the museum.	Information Technology
Judith Chiba Smith	Ms. Smith is the Registrar and is in charge of Georgia O'Keeffe's personal effects as well as tracking the location of all of her works as they travel to different museums and exhibits.	Curatorial
Dale Kronkright	Mr. Kronkright is the Head of Conservation and is in charge of studying the paintings and developing methods to preserve and prevent damage and deterioration.	Curatorial
Tori Duggan	Ms. Duggan is the Research Center Associate and primarily works in the library scheduling research time and maintaining the library organization	Research Center
Mackenzie Salisbury	Ms. Salisbury is the Research Center Librarian and handles Voyager the online research library collection as well as the on-site library operations.	Research Center
Elizabeth Ehrnst	Ms. Ernst is Archives and Digital Collections Librarian.	Research Center
Agapita Lopez	Ms. Lopez is the Director of Abiquiu Historic Properties and the Rights and Reproductions Manager. She was a longtime assistant of Ms. O'Keeffe and now is in charge of the Abiquiu Home and Studio operations.	Abiquiu Historic Properties

Table 2: Essential Personnel of the museum

2.2.3 The Georgia O’Keeffe Museum Research Center

The Research Center opened in 2001 and employs several people who are in charge of collecting, cataloguing and organizing O’Keeffe’s works, sketches, personal effects and audio histories from colleagues and friends.³⁷ It is one of the few in the world dedicated to American Modernism, a style in which Georgia O’Keeffe helped create. Through appointments, independent researchers have access to the Research Center library, which contains all collected information as well as other research and books on other Modernist artists.

Additionally, the Research Center employs several data management systems for its online collections and archives including Vernon, Voyager and CONTENTdm (more information on these systems can be found in Appendix A). Below is a chart (Table 3) displaying what kind of information can be found in each system.




			
Paintings - Museum Owned	X	X	
Paintings - Privately Owned		X	
Letters		X	
Personal Effects	X	X	
Photographs- Museum Owned		X	
Photographs- Non-Museum Owned		X	
Other related books			X
Audio recordings		X	X
Video recordings			X

Table 3: Content in Data Management Systems

As of right now, much of the information is not catalogued in manner that is easy to find due to system design and functionality. For example Vernon requires complex search queries and CONTENTdm searches use general keywords that are difficult to utilize if the user doesn’t already know information of the collections. The many copyright laws also inhibit accessibility since the museum hides or doesn’t upload content that is privately-owned. The museum hopes to improve their data management and has looked into replacing Vernon, CONTENTdm and Voyager with a Digital Asset Management system like Piction or Extensis.

³⁷ “About Research Center,” *Georgia O’Keeffe Museum*, 2014.

2.2.4 Digital Asset Management Systems

Digital asset management systems (DAMS) are used to digitally store and organize media and its metadata in one place. This allows a user to quickly search for and retrieve the digital assets stored in the DAMS. Baylor University is currently using Portfolio by Extensis (a digital asset management system) to optimize their social media outlets. Every picture and video that Baylor’s photographers take are wirelessly transferred to Baylor’s Extensis Portfolio server. From there, administrators can use Netpublish, a tool for Portfolio that allows media sharing, to share pictures and video onto social media, local media outlets, and university staff.³⁸

Currently, the Cleveland Museum of Art uses Piction as their DAMS. Their online collections are all stored on Piction and some are displayed on their website’s online collections page. The DAMS also contributes to their interactive exhibit “Gallery ONE”. One part of this exhibit is a “40-foot, interactive, microtile wall featuring over 4,100 works of art from the permanent collection, most of which are on view in the galleries.” (See Figure 16 below).



Figure 16: Collection Wall in Gallery ONE³⁹

The display changes periodically and groups works using different criteria such as time period or subject matter. Visitors can interact with the wall using 8 docking stations in conjunction with their ArtLens app. The app gives visitors access to additional information on paintings throughout the museum as well as the ability to share their artwork on the collection wall. Visitors can favorite artwork and the collection wall will show them additional pieces that match their interests. This also allows the museum to see what pieces the visitors are interacting with providing metrics for the museum to use for future exhibits.⁴⁰ In addition, app-users can obtain

³⁸ Leila Meyer, “How Digital Asset Management Makes Social Media More Effective at Baylor,” *Campus Technology*, 2015

³⁹ Cleveland Museum of Art, “Collection Wall,” *Cleveland Museum of Art*, 2015

⁴⁰ Cleveland Museum of Art, “Collection Wall,” *Cleveland Museum of Art*, 2015

museum information and maps, learn about the exhibits, and go on or create their own tours. These features allow visitors to enhance and personalize their visits, which creates repeat visitation. The Gallery One and ArtLens app were successful during its first year as noted in a report on the Gallery’s success: “the museum’s attendance increased by 39%, reaching one of the highest levels in over a decade. Attendance by visitor groups with children has increased by over 25% since the opening. CMA also completed the first half of its fiscal year with an 80 percent increase in donations” .⁴¹

2.2.5 Museum Visitor Information

While the O’Keeffe Museum has recently seen an increase in visitorship from outside New Mexico, there has been a trend of decreasing local visitorship (Refer to Figure 17). To increase local visitors and bring back visitors from outside NM, the museum is currently exploring more innovative ways to bring in visitors besides changing exhibits and new collections. The museum envisions that it can become a hub for travel around northern New Mexico using O’Keeffe’s landscape paintings. By connecting museum owned artifacts, content from the research center and the New Mexican landscapes, visitors can potentially immerse themselves in Georgia O’Keeffe’s life and New Mexican culture more so than before and gain a new perspective of New Mexico.

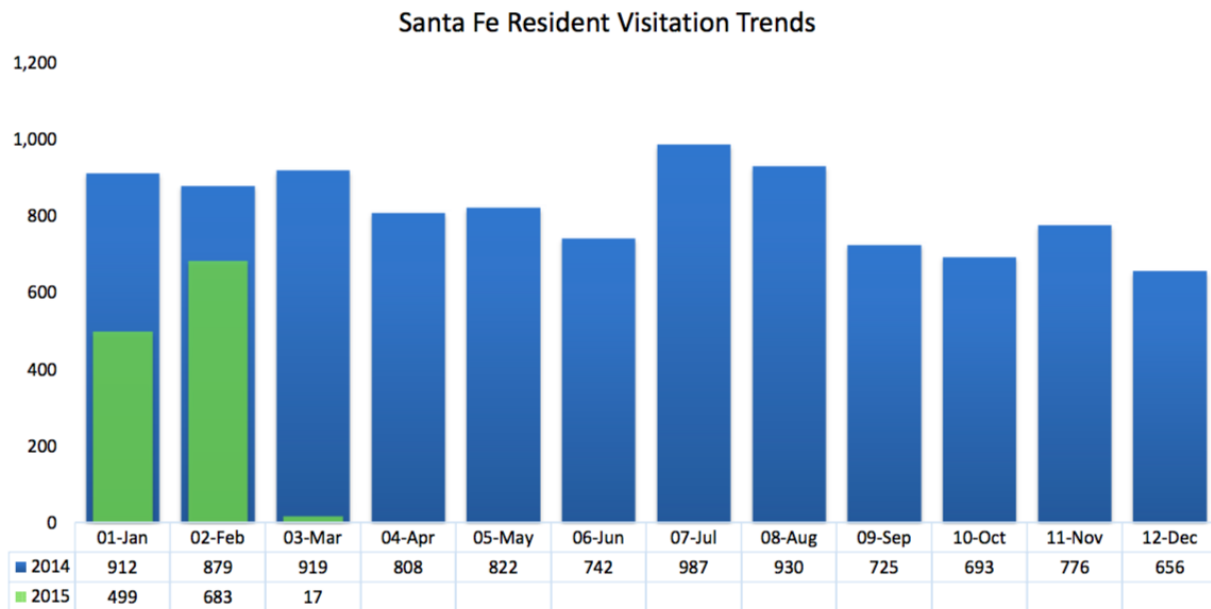


Figure 17: Santa Fe Resident Visitation Trends of the Georgia O’Keeffe Museum (Last Updated 3/01/2015)⁴²

⁴¹ Jane Alexander, “Gallery ONE, The First Year: Sustainability, Evaluation Process, and a New SmartPhone App,” *MW2014: Museums and the Web, April 2-5, 2014*.

⁴² The Georgia O’Keeffe Museum, “Feb2015 Gallery Visitation Report”, 2015

An immersive experience in which a visitor can view connections between works and landscapes can be accessible through a mobile device or website. Visitors from in or out of state could easily learn more about O’Keeffe before and after their visit. This is especially important to the museum because of their desire to reach out to new audiences and increase in out of state visitors (See Figure 18), thus potentially bringing in new return visitors.

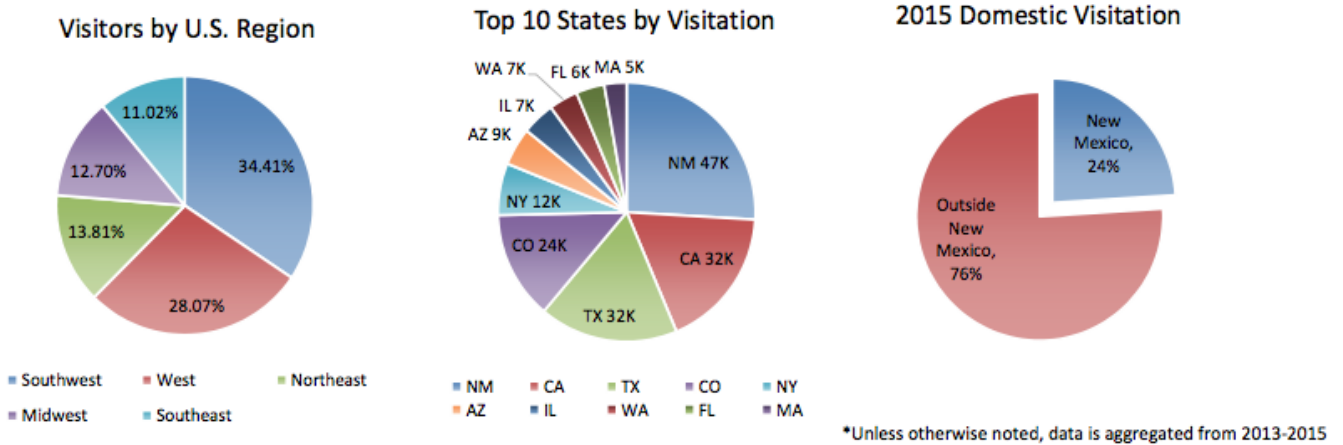


Figure 18: Georgia O’Keeffe Museum visitor distribution (Last Updated 3/01/2015)⁴³

2.3 Museum Immersive Experiences

The experience of going to a museum is unique to every visitor due to his or her own background, who they go with and how they approach the trip. Perhaps Julian Jaynes who compared an experience to a flashlight in the dark wrote the best analogy for this.

“...he suggested that what we are aware of is like a flashlight in a dark room. We can only see what is illuminated at any given instant; nothing else exists. Three people standing in a dark room, each with his or her own light focused on the same object, will illuminate the object differently because of the differing nature of their beams (personal context), the angle from which they cast their light (physical context), and the variable benefits of shared light (social context). Similarly, three people standing in front of an exhibit will each have a different experience.”⁴⁴

When creating immersive experiences, museums aim to incorporate all three contexts (personal, physical and social) in order to create a valuable and meaningful experience for visitors. There are several different ways immersive experiences with all three contexts can be

⁴³ The Georgia O’Keeffe Museum, “Feb2015 Gallery Visitation Report”, 2015

⁴⁴ John H Falk, Lynn D Dierking, “The Museum Experience,” *Whaleback Books*, 1992.

implemented such as integrated technology in a physical exhibit or supplementing a visit with a mobile application.

2.3.1 Immersive Exhibits

The Field Museum in Chicago, IL incorporates technology in their exhibits to enhance their visitor experience and has done extensive studies to find ways to best implement it. They conducted a survey to "...understand Field Museum visitors' motivations, desired experiences, meaning-making strategies, and preferences regarding technology in the museum experience."⁴⁵ They also used "uncued" observation and in-context interviews, and were able to further explore how visitors experienced their museum. From this, the museum found that the visitors most valued the learning experience, content of the museum, and the shared experience with those who accompanied them. By relating what they saw and learned to his or her own past experiences, the visitors formed a personal connection to the museum content.

Additionally, it was shown that 66 percent of visitors expressed interest in seeing new technology brought in.⁴⁶ In fact both younger and older visitors were open to using new technologies, suggesting that technological integration would benefit all visitors. Through their studies, The Field Museum found that visitors care less about the facts learned and more about "playing an active role" in the museum experience (physical context). Thus, making their goal to bring visitors closer to the content and enhance the social and personal aspect of the visit through technology.⁴⁷

Another museum that implements technology into their exhibits is The American Museum of Natural History in New York City. In one of their exhibits, "The Power of Poison," visitors can interact with an "enchanted book" about poisons. It utilizes both projection mapping and electromagnetic sensors to create animated images and text onto a 3x4 foot book.⁴⁸ Visitors can flip through the book and become "enchanted" by the various images and animations while still learning about various types of poisonous plants. The American Museum of Natural History also has a technology based immersive exhibit in the museum called "Pterosaurs: Flight in the Age of Dinosaurs" (See Figure 19). In the exhibit, visitors are given the

⁴⁵ Karlene Hanko, Sarah Lee, Nnenna Okeke. "What Makes a Great Museum Experience and How Can Technology Help?," *Field Museum of Natural History*, 2014.

⁴⁶ Karlene Hanko, Sarah Lee, Nnenna Okeke. "What Makes a Great Museum Experience and How Can Technology Help?," *Field Museum of Natural History*, 2014.

⁴⁷ Karlene Hanko, Sarah Lee, Nnenna Okeke. "What Makes a Great Museum Experience and How Can Technology Help?," *Field Museum of Natural History*, 2014.

⁴⁸ Hollander, Sophia. "Museum Brings Fossils to Life; Interactive Features at the American Museum of Natural History," *Wall Street Journal (Online)*, 2014.

unique experience of flying a pterodactyl. By standing on a pad, people can use their bodies to control a pterodactyl in a flight simulator⁴⁹.



Figure 19: Pterosaurs: Flight in the Age of Dinosaurs⁵⁰

In 2012, a research group investigated the use of a new interactive tabletop game at the Harvard Museum of Natural History. The game concerned evolution and was designed to teach visitors about the common ancestry of different species. The game, *Build-a-Tree*, allowed visitors to construct ancestry trees for various species using a touchscreen interface.⁵¹ The research team observed both family groups and singular visitors as a means of testing it. They found that while visitors were at the exhibit, “[they] were engaged in focused, on-topic interaction with our exhibit for prolonged periods of time.”⁵² The success of these exhibits demonstrates that technology has implications in all types of museums.

Another effective approach to immerse museum visitors using technology in physical exhibits is the use of large-scale displays. From 2010-2013, the Museum of London had the exhibit *Pleasure Gardens*, where figures dressed in period clothing walked across scenes of gardens, giving viewers a sense of context.⁵³ Similar to this exhibit is *Van Gogh Alive* (See

⁴⁹ Rothstein, Edward. “From Smallest of Clues, Flying Reptiles Reborn,” *New York Times*, 2014.

⁵⁰ Rothstein, Edward. “From Smallest of Clues, Flying Reptiles Reborn,” *New York Times*, 2014.

⁵¹ Horn, Michael et al. “Of BATs and APES: an interactive tabletop game for natural history museums,” *Conference on Human Factors in Computing System*, 2012.

⁵² Michael Horn, “Of BATs and APES: an interactive tabletop game for natural history museums,” *Conference on Human Factors in Computing System*, 2012.

⁵³ Elena Stylianou, Pam Meecham, “Interactive Technologies in the Art Museum,” 2012.

Figure 20). In it, visitors are surrounded by large screen projections of Van Gogh's works, allowing them to see close up the detail they were created with (Grande Exhibitions). These exhibits are effective since they allow visitors to place themselves in a different world thus showing them a different perspective they may not have considered before.



Figure 20: Van Gogh Alive⁵⁴

However, perhaps the best way to immerse visitors in the art and culture within the museum may be to allow patrons to physically experience artifacts through holding or touching the piece themselves. The *British Museum Experience* in London allows visitors to directly interact with various musical instruments and records (See Figure 21).⁵⁵ Bob Santelli, the director of curatorial affairs at the museum, says "it won't be somewhere to just look at exhibits and move on, it will be hands-on for visitors and will demand some critical thinking". This concept gives museumgoers new context by removing the barrier between the artifact and viewer.⁵⁶ Allowing them to feel what the musician may have felt like or more generally what the artist felt as he or she held an object they were painting, drawing, molding, etc. Including artifacts in exhibits also adds another dimension to the experience and can give museumgoers better context of what may have been painted, drawn or molded. Seeing an everyday object alongside the interpretation of the artist can change his or her own perspective or interpretation of that same object in the future.

⁵⁴ Grand Exhibitions, "Van Gogh Alive," Grand Exhibitions, 2014.

⁵⁵ The British Museum, "The British Museum Experience," *The British Museum*, May 28, 2012.

⁵⁶ "Interactivity Is Key to Making British Music Experience a Success," *Music Week*, 2008.



Figure 21: British Museum Experience⁵⁷

2.3.2 Immersive Mobile applications

Art museums face several problems in a world that is becoming increasingly dependent on technology. Since art museums have seen a decrease in their core demographic, non-Hispanic whites ages 45-54,⁵⁸ and technology-related museum experiences have done well (such as the Cleveland Museum of Art⁵⁹), art museums are seeking new ways to build technology based experiences. Art museums also want to reach a wider audience by expanding outside geographical boundaries using the Internet. To solve these issues, several art museums have conducted various studies and implemented solutions.

For example, many art museums and exhibits have already integrated technology into their programs with great success. One of the earliest types of technological integration was a simple handheld device. The Indianapolis Museum of Art created the first handheld device for visitor use in 2005 (See Figure 22). Specifically, they used a personal digital assistant (PDA) that utilized both sound and visuals to enhance the experience and give visitors an opportunity to give feedback to the museum.⁶⁰ PDA systems are now being translated into apps and websites because most visitors today have a smartphone and do not wish to carry around another device.

⁵⁷ "British Music Experience Museum at the 02: Exclusive £1 Ticket Offer."

⁵⁸ David Keen, Kevin Williams. "2008 Survey of Public Participation in the Arts," *The NEA Office of Research & Analysis*, November 2009.

⁵⁹ Jane Alexander, "Gallery ONE, The First Year: Sustainability, Evaluation Process, and a New SmartPhone App," *MW2014: Museums and the Web, April 2-5, 2014*.

⁶⁰ Elena Stylianou, Pam Meecham, "Interactive Technologies in the Art Museum," 2012.



Figure 22: Indianapolis Museum of Art PDA device⁶¹

As of April 2015, over 64% of american adults have a smartphones and 42% own a tablet.⁶² Many museums use this as opportunity to expand the museum experience without having add a new exhibit or collection. As mentioned in section 2.2.4, ArtLens by The Cleveland Museum of Art (shown in Figure 23) complemented their new Gallery ONE and allowed visitors to create tours, learn more about museum-displayed content, and save favorites, all on a device visitors already owned and carry with them.

⁶¹ Daniel Incandela, "Audiotours, iPhones and much more," 2008.

⁶² Aaron Smith, "U.S. Smartphone Use in 2015," *Pew Research Center, April 2015*.

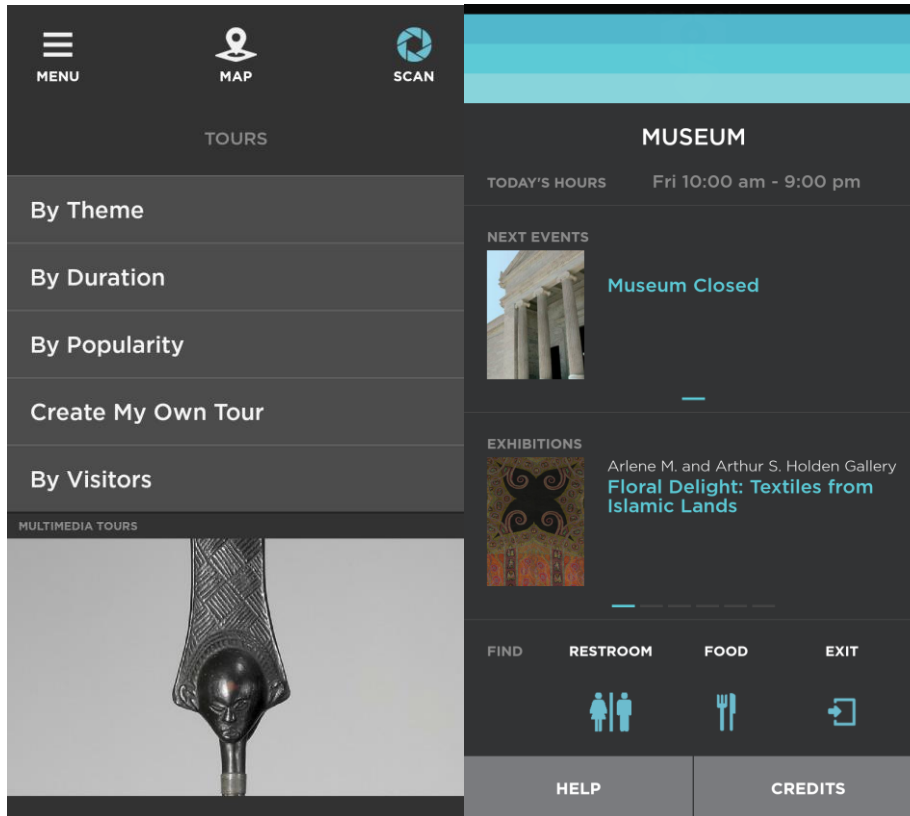


Figure 23: ArtLens Screen Captures

For smaller museums like the Georgia O’Keeffe Museum, this kind of immersive experience is very desirable because it does not require additional gallery space or integrated technology in the museum itself. As stated before in section 2.2, the Museum only has 725 Linear feet of wall space⁶³ and can at max show 100-110 works at any given time.

2.4 Immersive Experiences in Non-Museum Contexts

Outside of museums, there are several apps, websites and other multimedia outlets that also can contribute to create an immersive learning experience. There are many successful applications such as Worldwide Telescope, Discovr Music, Augmented Reality and Photosynth are being successfully are very successful and that museums could potentially use to bring a new perspective to visitors’ experiences. Although each application may not contain all three contexts in them (personal, physical, and social), they or their methods of immersion could be

⁶³ “Museum Galleries Linear Footage,” *Georgia O’Keeffe Museum*, 2015.

implemented in a museum program to potentially create an experience that would have all three.

WorldWide Telescope is a “rich visual environment” compiled with the highest quality images of space to create a virtual telescope. Users can explore different galaxies, stars and systems seamlessly. Its intended use is as a learning or research tool.⁶⁴ In a 2010 pilot of the Worldwide Telescope software, two groups of students studying astronomy (one with access to WWT and one without) were compared (See Figure 24). After six weeks of the two groups learning in different ways, researchers gauged interest in astronomy, factual knowledge and understanding. They found that students using the interactive software greatly surpassed those students without access in all areas.

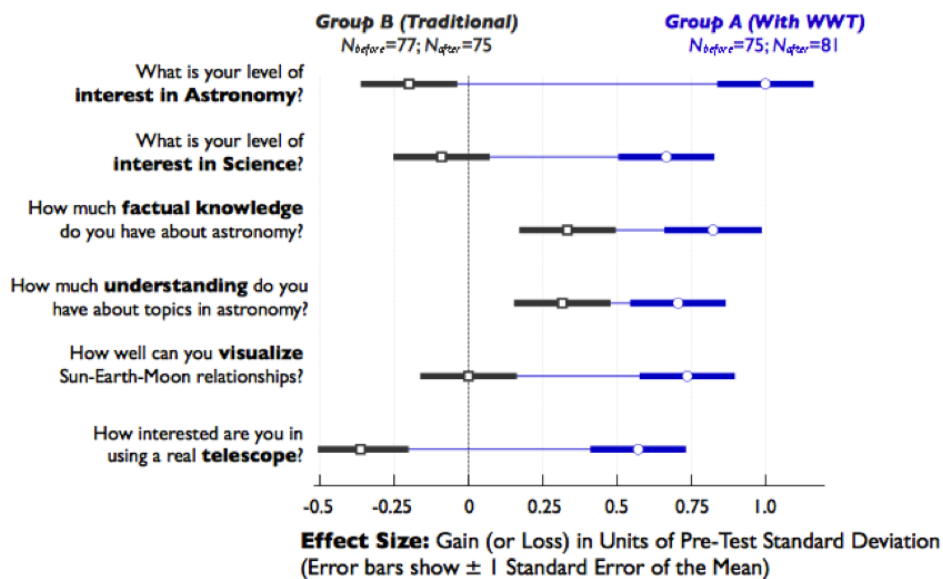


Figure 24: Learning With an Immersive Experience vs. Without one⁶⁵

Since this pilot study, the technology has since been implemented in several other university and high school astronomy curriculums.⁶⁶ WorldWide Telescope is a part of a much bigger program as well, coming out of the Harvard-Smithsonian Center for Astrophysics. The program is named “Seamless Astronomy” and has a goal of breaking down all boundaries of astronomical data collection to create a “seamless” environment for research and learning.

Another interactive technology that has been very successful is the app Discover Music by Filter Squad Pty Ltd. The app allows users to discover artists and bands similar to one they input. The app’s spider web layout (See Figure 25) is very easy to navigate and allows users to

⁶⁴ WorldWide Telescope, “Frequently Asked Questions” 2014.

⁶⁵ Alyssa A. Goodman, “Worldwide Telescope in Research and Education,” *Astronomical Society of the Pacific*, 2012.

⁶⁶ Alyssa A. Goodman, “Worldwide Telescope in Research and Education,” *Astronomical Society of the Pacific*, 2012.

quickly find new artists. Users can learn more about these new artists and even listen to a sample of their music by clicking on their profile.⁶⁷

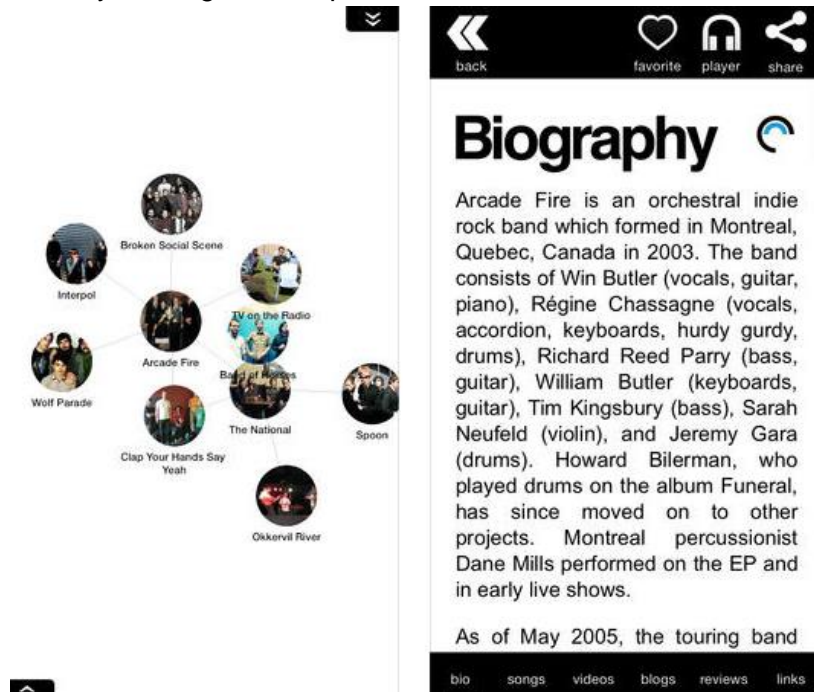


Figure 25: Layout of Discover Music App⁶⁸

A broader avenue for immersive learning is augmented reality (AR). AR overlays virtual information over a direct view of the real world. It differs from virtual reality where the user experiences a completely simulated environment without any elements from the user's surroundings. It enhances the user's experience with supplemental information that can help analyze environments, provide useful context or simply supplement understanding.⁶⁹ The field of AR can be very broad and also be used to catalogue pieces that a museum does not have space to display. One study saw that AR could be used in conjunction with a small portable tablet to create a guidance and information system for museums. It would replace information labels next to pieces and provide supplementary works to view that the museum may not have space to display in the exhibit.⁷⁰ With the success of AR in education, it is clear that it could greatly improve the museum experience. It does have several drawbacks such as cost of

⁶⁷ David McKinney, "Discover Music," *Filter Squad Pty Ltd*, 2014.

⁶⁸ David McKinney, "Discover Music," *Filter Squad Pty Ltd*, 2014.

⁶⁹ Kangdon Lee, "The Future of Learning and Training in Augmented Reality," *Insight: A Journal of Scholarly Teaching*, 2012.

⁷⁰ Dong-Hyun Lee, Jun Park, "Augmented Reality Based on Museum Guidance System for Selective Viewings," *Second Workshop*, 2007.

implementation and difficulty of integrating in existing programs, but with time it will surely become a valuable and well-used resource for informal venues.⁷¹

Finally, a new software program by Microsoft called Photosynth (See Figure 26), combines images of similar objects to create fluid panoramas, spins or shifts. It may provide a viable platform for our project by compiling photos of the landscapes O’Keeffe painted. Microsoft Photosynth is able to take a set of photos, recognize similar objects within the images and create a “steadicam-like” video effect that is nearly seamless. Photos taken by tourists at different landscape locations could be crowd-sourced and compiled to create panoramas for use in an immersive experience.⁷²



Figure 26: Example of Photosynth Compilation⁷³

Link to video: <https://photosynth.net/preview/view/c5bf5a01-f41b-4543-985b-64ef0a969fe>

2.4.1 O’Keeffe Experiences Outside the Museum

Outside The O’Keeffe museum, there are several websites, organizations and groups that incorporate O’Keeffe’s work and life into their attractions or as point of interest within their mission. One example is O’Keeffe Country is a website that uses O’Keeffe’s work and life as a reason to visit New Mexico. The website uses the regions she spent the most time in as areas of interest (Taos, Abiquiu, and Santa Fe) for travelers to visit. They give brief descriptions of her time in each location and compare what she did to what one can do there now (rock climb, raft,

⁷¹ Kangdon Lee, "The Future of Learning and Training in Augmented Reality," *Insight: A Journal of Scholarly Teaching*, 2012.

⁷² Microsoft Photosynth, "Preview," *Microsoft*, 2015.

⁷³ Jon Totzek, "Brandenburger Tor Berlin," February 21, 2015.

dine out and visit the famous landscapes depicted in her paintings).⁷⁴ The primary goal of the website is to promote Northern New Mexico and provide visitors with a travel guide whereas the O’Keeffe Museum seeks to educate visitors about maintain O’Keeffe’s vision, life and work. O’Keeffe Country has a timeline and historical information regarding O’Keeffe but does not go to extent the museum does in telling her full story.

Additionally, Mark Mongold, a website designer and programmer, created *Georgia O’Keeffe: The Tour*, a digital pamphlet guide through Northern New Mexico (See Figure 27). The pamphlet builds off of a guide to each of the locations O’Keeffe painted, originally put together by Craig Miller. He includes photos of each painting subject and information about the area (facilities, directions, etc).⁷⁵ The guide is useful however there is much room for improvement with interactive maps, apps and other immersive technology now available. For example everything is written by hand and scanned in, but by using online maps, users could contribute or easily plug in their current location to get more accurate directions to painting viewpoints.

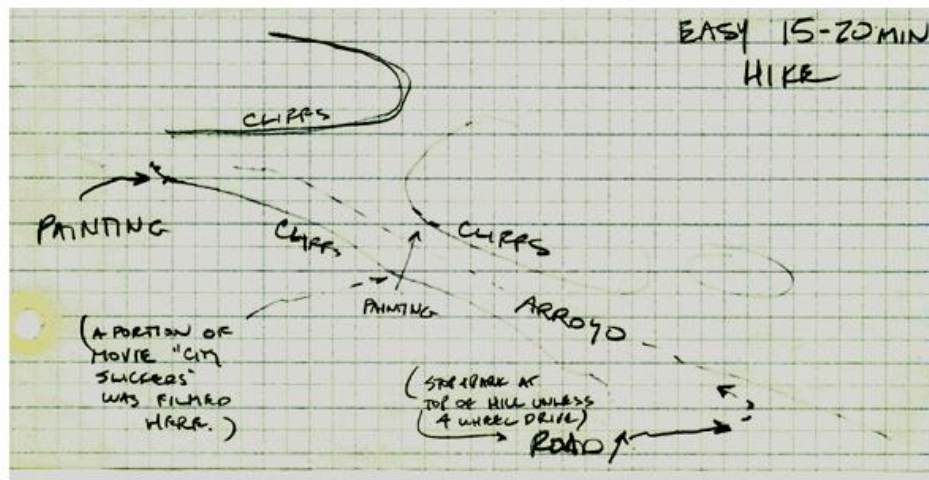


Figure 27: Georgia O’Keeffe: The Tour, Directions to Vantage Point

⁷⁴ O’Keeffe Country, “O’Keeffe in New Mexico,” *O’Keeffe Country*, 2014.

⁷⁵ Craig Miller, “Georgia O’Keeffe The Tour,” October 17, 1999.

CHAPTER 3: METHODOLOGY

To assist the Georgia O’Keeffe Museum in developing an immersive visitor experience that connects the art and life of Georgia O’Keeffe with the New Mexico landscapes represented in those works, our team established the following objectives:

1. Find the location of the painted subjects and vantage points from which O’Keeffe painted them and gather information on the area such as travel instructions and a history of Georgia O’Keeffe’s relationship with the area.
2. Explore the archives and resources in the museum to establish connections between Georgia O’Keeffe’s artwork and her life using artifacts and her other holdings found in the O’Keeffe Museum’s archives.
3. Evaluate platforms for an immersive experience and create a prototype that can deliver the information found in Objectives 1 and 2 in an easy to use format.

The key locations of this project were the Museum in Santa Fe as well as the two sites that Georgia O’Keeffe worked and lived, Abiquiu and Ghost Ranch (as shown in the Figure 28 below). Since we mainly focused on the chosen painting, *Untitled Red and Yellow Cliffs*, which was located in Ghost Ranch, we refined our research and data collection to that area along with less emphasis on other key locations.



Figure 28: The key locations of the project

Our goal was to have a visualization of the desired experience for one painting completed by the end of our time in Santa Fe. Research on this project was constrained mostly to the successful immersive experiences implemented in other museums. Our project's main focus was on Georgia O'Keeffe's art and life, meaning our created experience does not need to relate to any other artist or medium.

The following sections described the methods we utilized to accomplish each of the objectives listed above.

3.1 Connecting her paintings with the surrounding landscapes



Figure 29: Our Photo of Cedar tree next to O'Keeffe's Painting⁷⁶ in 1937

Our first step in connecting the paintings to the landscapes was to find the actual locations of the painted subjects and vantage point from which O'Keeffe painted them (See Figure 29). We compiled a list of landscape paintings by using Georgia O'Keeffe's Catalogue Raisonne (complete list of her works), organizing it by location and probability of finding the actual angle portrayed in the painting. We then refined the list based on feedback given to us by

⁷⁶ Lynes, Barbara Buhler. *Georgia O'keeffe and New Mexico: A Sense of Place*. 3rd ed: Princeton University Press, 2004

Elizabeth Ehrnst (Archives and Digital Collections Librarian), Darrah Wills (Assistant Registrar), and Agapita Lopez (Director of Abiquiu Historic Properties).

Upon completing the list, we then compiled a field guide containing pictures of each of the paintings organized by location. During the trips out to the sites, we gathered logistical information on the area in which the paintings can be found as well as at each viewpoint. The information was collected as follows:

Information for General Area:

1. Permissions for access to area
2. Nearby available parking
3. Nearby public restrooms
4. Access to Water or Supplies

Information at Viewpoints:

1. Photo of painted subject
2. Photo of someone standing at viewpoint
3. GPS location of viewpoint
4. Direction of the painted subject from viewpoint using compass
5. Cell phone service in viewpoint area (AT&T, Verizon, and T-Mobile)

We collected most of the information on site and found nearby facilities and public restrooms. Using Google MyMaps, we dropped pins on the viewpoint locations. Trips to areas not open to the public, such as Ghost Ranch, were organized by Museum. After completing the on-site data collection, we went back into MyMaps and used the dropped pins as a general location and found the actual viewpoint using our photos taken of a team member standing in the viewpoint. Using the recorded information from the compass, we also marked the location of the painted subject. We linked the photos taken from the viewpoints to the locations marked on the map. Based on the locations and where we were able to park, directions can be made to get from the parking area to the viewpoint. Our hope is that paths will eventually be created to the viewpoints to limit disturbance to the land.

All information was compiled onto a single map and a complementary document with linked information. Using this information, travelers and visitors will have all the resources readily available to them to go out and find these locations on their own. We also found other tours available in the area as well as travel options they can take to get there. We did this for paintings done at Ghost Ranch and O'Keeffe's Abiquiu home and then made plans for the paintings done at locations such as Taos and The Black Hills. (Details for the trip and Ghost Ranch & Abiquiu Itinerary can be found in Appendix B)

3.2 Linking Landscape Paintings to Museum Holdings

In order to build a connection between the landscapes around Santa Fe and Georgia O’Keeffe’s life, we sought to better understand Georgia O’Keeffe and the background of her paintings beyond what books and online research can tell us.

3.2.1 Learning about Museum Collection Systems

First, we scheduled meetings with museum employees to understand different collection systems that the museum currently uses (Details in Appendix A). We also requested access to those systems in order to collect data and learned more about how they work and can be used. Much of the data within the systems is not open to the public and because of this, we needed to work with IT to gain VPN access and set up users with access to private data on Vernon, contentDM and Voyager.

3.2.2 Classifying Museum collections

After learning about the museum collection systems and gaining access, we began to collect data utilizing the museum's collections of Georgia O’Keeffe’s various possessions. We paired the sponsor-chosen landscape paintings with relevant items found in the collections and archives such as the paint she was using, pertinent belongings, correspondences or other related works/sketches of hers at the time. To find this information, we narrowed our search down using the time period that each painting was done in. For our chosen painting, *Untitled (Red and Yellow Cliffs) that we are focusing on*, painted in 1940, we will mainly focus on three time periods: the years before painting (1937~1939), the year of painting (1940) and the years after painting (1941~1943).

Outside of the museum collection systems, we also set up meetings with personnel within the museum such as Dale Kronkright gain technical information about the paintings themselves. Mr. Kronkright was able to tell us more about connections regarding paint cards (paint color references used by O’Keeffe), conservations reports, and 3D-RTI imagery. His work in the Curatorial department was valuable for more scientific connections between O’Keeffe’s effects and her paintings.

To organize it all, we created tables detailing the connections between the landscape paintings and other objects, both internally and externally (See Appendix F and G). These tables also contain details and descriptions of the paintings and organize the related items by type, making them ideal for patron viewing. To supplement these tables, we created a lookup table for the three selected paintings. The lookup table simply contains a list of related paintings and artifacts alongside the location of each in museums databases. This table is not the most

efficient way to list connections to paintings, but it is very reliable because every connection can be listed and it is easy to add new paintings and related objects to the table as the museum acquires them. This table could be used on the backend of a visitor experience for easy lookup on an exhibit, website, or smartphone app. With those information catalogued as so, we believed it would be easy to present and translate into a visitor experience as well as have for future exhibits in the Georgia O’Keeffe Museum.

3.2.3 Determining the Feasibility of Connecting the Museum’s current Data Management Systems

As we did research in the museum’s data management systems, we also made assessments of how the data was organized, stored and interconnected between systems. Additionally for each system, we documented requirements to access data, if it could contain copyrighted information and what file types were stored in the system. By observing connections between the systems and their associated data, we reported on how easy the data and systems are to connect and made recommendations for what the museum can do in the future.

3.3 Prototyping an Immersive Visitor Experience in and outside the Museum

Through our research of different types of immersive experiences, we began to narrow down our selection of a platform. We considered three main ways conveying a immersive experiences: gallery exhibit, website, and smartphone app. We developed criteria that the experience would have to be tailored to such as the space limitations of The O’Keeffe museum and the types of information and connections we wanted to displayed from museum holdings. Finally, with all this in mind we selected a platform and what kind of features would be included within the experience that would best display the information and tailor to the O’Keeffe Museum’s needs.

3.3.1 Creating the Prototype

Once we selected a platform for our experience, we began to create a prototype for the experience. In general, we wanted our design to allow a visitor or user to search for any given painting; take a tour of the landscapes or museum; find relevant and interesting information about O’Keeffe, the paintings, and the landscapes of New Mexico; and communicate via social media using the experience. We planned on using either Adobe Illustrator or JustInMind App Prototype software to showcase our experience depending on whether it would be a physical

gallery exhibit, website or mobile application. Both would include our findings, shown through the lens of the experience to demonstrate what could ultimately be done with them.

CHAPTER 4: RESULTS

Following the implementation of the Methodology from Chapter 3, our team produced the following results. We connected a number of O’Keeffe’s paintings with the landscapes of New Mexico focusing mainly on Ghost Ranch. We collected map data for the view points and landscape locations, found reasonable parking options, and noted important logistical information such as cell service. Through use of the museum’s systems, we made a number of connections between the landscape paintings and appropriate artifacts. In doing this we evaluated the museum’s current data storage system and steps they could take to make finding connections easier in the future. Finally, to best deliver and show our findings, we chose to design an app as an immersive experience. The following results are broken up by the objective they fall under from the Methodology Chapter.

4.1 Connecting O’Keeffe’s Paintings with Surrounding Landscapes

From the trips (the itinerary can be found in Appendix B) out to Ghost Ranch, Abiquiu studio and other locations where O’Keeffe painted, we collected logistical information, took photos, and gathered accurate GPS coordinates of where she painted as well as the subjects she painted. This process took approximately 20-30 minutes per painting. (Painting sites to Document by Location can be found in Appendix C)

Our interviews with Ms. Lopez (Details can be found in Appendix D), gave us insight into the locations of several painting subjects and viewpoints. In addition, *A Sense of Place* by Barbara Buhler Lynes⁷⁷ provided us with additional information on the location of some of the viewpoints located on Ghost Ranch. The map of painting subject and vantage point locations in Ghost Ranch area can be found in Figure 30.

One of the biggest challenges we ran into was that most of Georgia O’Keeffe’s paintings we focused on were done on and of private property. For example, Ghost Ranch is owned by the Presbyterian Church and they employ a team to run the ranch and protect the land. They offer guided tours around the property but strictly enforce that people do not go off road which inhibited us from marking pins on some of the exact locations of where O’Keeffe painted from. This is done to conserve the land and maintain geology of the area.

⁷⁷ Lynes, Barbara Buhler. *Georgia O'keeffe and New Mexico: A Sense of Place*. 3rd ed: Princeton University Press, 2004.

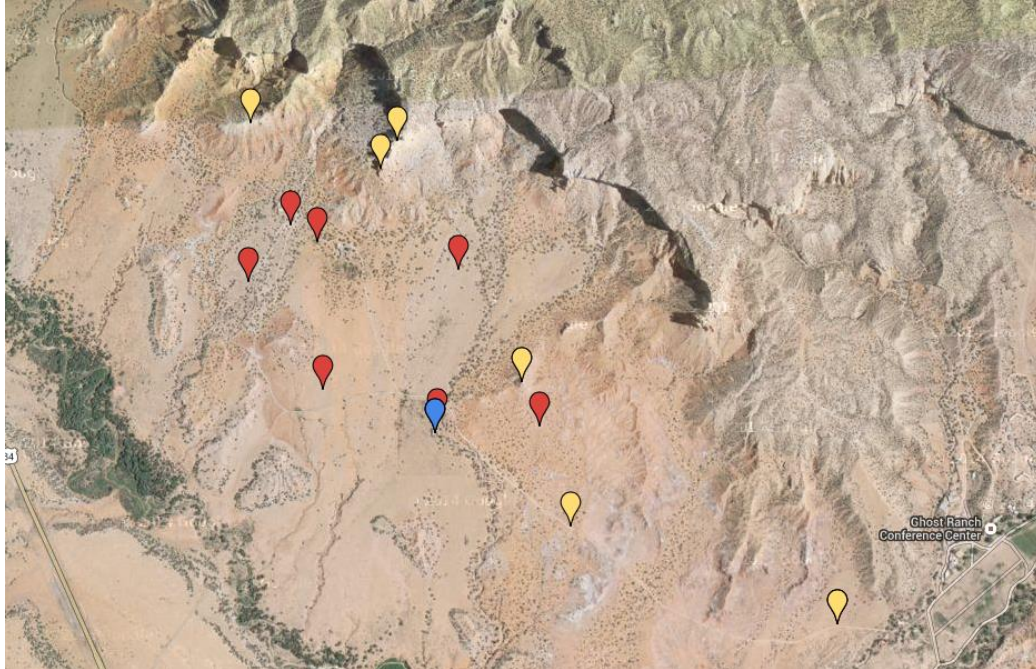


Figure 30: Map of Painting Subject and Vantage Point Locations in Ghost Ranch Area

The interactive map can be found in the link below:

https://www.google.com/maps/d/edit?mid=zTCGMITRmcQI.kFe1pJBFV_gQ

As mentioned, the logistical information shown for *Untitled (Red and Yellow Cliffs)* was found for each vantage point and can be found by clicking on each pin while in Google MyMaps (screen capture of map shown in Figure 30 and Figure 31). We also took several photos from what we believed to be the vantage point and overlaid the painting on the corresponding photo to confirm the accuracy of our locations (examples are shown in Figure 32 and 33). In total, we located the subject and vantage point as well as collected logistical information for 16 paintings. Complete logistical information can also be found in Appendix E.

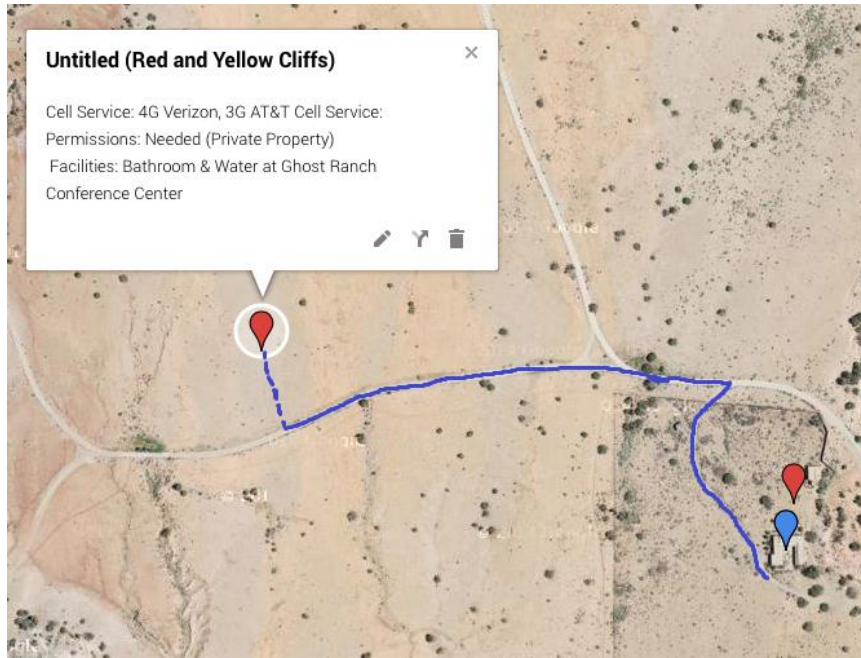


Figure 31: Logistical information for Untitled (Red and Yellow Cliffs)

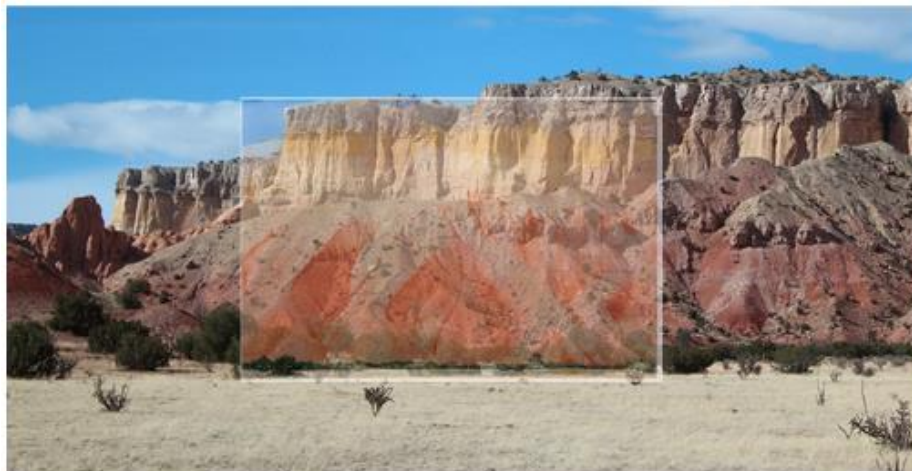


Figure 32: Overlay of Untitled (Red and Yellow Cliffs)

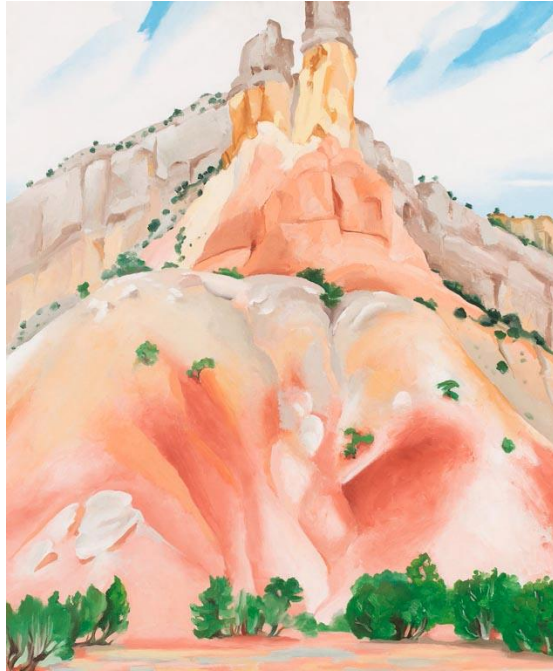


Figure 33: Overlay of *The Cliff Chimneys*

4.2 Connections to Untitled (Red and Yellow Cliffs) Painting

Following meetings with several museum employees and extensive time in the museum research center, we were able to create a lookup table of information about and related to

Untitled (Red and Yellow Cliffs), Easter Sunrise, and My Front Yard, Summer (Table 4 below). Additionally there is a table in Appendix F that includes further information and connections regarding the three paintings. The lookup table is very important because it shows the necessary connections to be made before future implementation of a DAMS or immersive experience.

Target	Type	Location	Accession No.	CR # if Applicable	Other Titles
Untitled Red and Yellow Cliffs	Painting	Vernon, CONTENTdm	1997.06.036	998	
	Sketch	CONTENTdm, Vernon	2006.05.154	938	
	Sketch	CONTENTdm, Vernon	2006.05.156	1005	
	Sketch	CONTENTdm, Vernon	2006.05.163	1006	
	Sketch	CONTENTdm, Vernon	2006.05.165	1008	
	Photo	CONTENTdm	2006-06-0165	N/A	
	Photo	CONTENTdm	2006-06-0166	N/A	
	Letter	CONTENTdm	MS-OKAS-0198f	N/A	
	Letter	CONTENTdm	RC-2004-003	N/A	
	Painting	Vernon, CONTENTdm	2006.05.202	1150	
	Painting	CONTENTdm	N/A	931	
	Painting	N/A	N/A	955	
	Painting	CONTENTdm	N/A	997	
	Painting	N/A	N/A	1059	
	Painting	N/A	N/A	1060	
	Painting	N/A	N/A	1116	
	Painting	N/A	N/A	1236	
	Report	Fileserver	N/A	N/A	Conservation report
My Front Yard, Summer	Painting	Vernon, CONTENTdm	2006.05.173	1023	
	Sketch	Vernon, CONTENTdm	2006.05.169	1019	
	Painting	CONTENTdm	N/A	898	
	Painting	CONTENTdm	N/A	899	
	Painting	CONTENTdm		1002	
	Painting	CONTENTdm	1997.06.08	1117	

	Painting	Vernon, CONTENTdm	2006.05.170	1020	
	Painting	Vernon, CONTENTdm	2006.05.172	1022	
	Painting	Vernon, CONTENTdm	1997.05.12	1029	
	Photo	CONTENTdm	2006-06-0168	N/A	
	Photo	CONTENTdm	N/A	N/A	Adobe House and Pedernal
	Photo			N/A	Pedernal (1977)
				N/A	Pedernal (1980)
	Report	Fileserver	N/A	N/A	Conservation report
Easter Sunrise	Painting	Vernon, CONTENTdm	2006.05.245	1266	
	Painting	Vernon, CONTENTdm	2006.05.234	1234	
	Painting	Vernon, CONTENTdm	2006.05.235	1235	
	Sketch	Vernon, CONTENTdm	2006.05.239	1255	
	Sketch	Vernon, CONTENTdm	2006.05.240	1256	
	Sketch	Vernon, CONTENTdm	2006.05.241	1258	
	Sketch	Vernon, CONTENTdm	2006.05.242	1259	
	Sketch	Vernon, CONTENTdm	2006.05.243	1260	
	Sketch	Vernon, CONTENTdm	2006.05.821	1995	
	Photo	CONTENTdm	RC-2001-002- 061		Abiquiu Landscape
	Report	Fileserver	N/A	N/A	Conservation report

Table 4: The lookup table for the chosen paintings

Through our search of the letters from 1937-1944, we found that few actually mentioned specific works. Her letters are difficult to read and included "...many misspellings, idiosyncratic spelling, punctuation errors, and grammatical irregularities."⁷⁸ Additionally, most letters written by O'Keeffe during this time period were solely written to express how much she missed

⁷⁸ Georgia O'Keeffe, "Letter from Georgia O'Keeffe to Alfred Stieglitz (1944.08.30)" *The O'Keeffe Museum CONTENTdm*

Stieglitz. However, in one letter she wrote to Stieglitz (See Figure 34), she expressed her deep interest in the Ghost Ranch and the New Mexico landscapes and wanted to share the beautiful view with him.

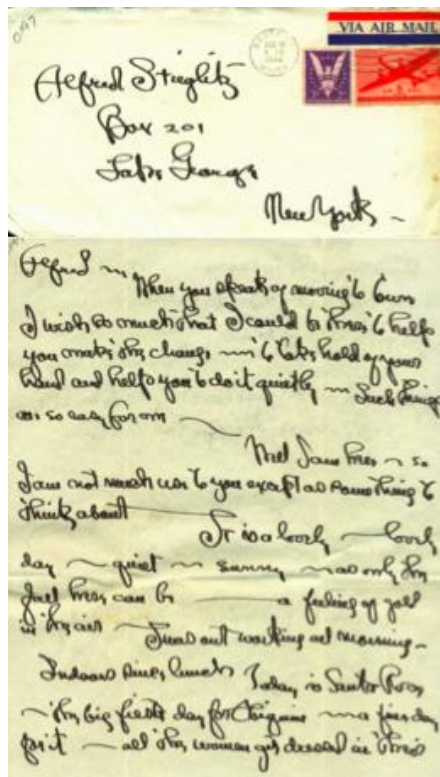


Figure 34: Letter from O’Keeffe to Alfred Stieglitz in 1944⁷⁹

In addition to correspondences, we read through newspaper articles and reviews in the same time period. One review, *Contemporary Types in Art*, written by Carlyle Burrows in 1941, mentioned the ghost ranch cliffs and described them as “...stratified cliffs...which are characteristic of the Southwest.”⁸⁰ Burrows gave O’Keeffe high marks on her Ghost Ranch landscape paintings, praised her “charming” exhibits and commented on her “original sense of design with feeling for paint and color.”

The largest part of the museum’s holdings are Georgia O’Keeffe’s personal belongings. These include, but are not limited to, brushes, clothing, stones, bones, and paints with their associated paint cards. Because *Untitled (Red and Yellow Cliffs)*, contains no bones and it is difficult to connect specific materials like brushes to a given painting, we chose to focus on connecting paint cards to our selected painting. With the help of Mr. Kronkright, we were able to obtain specific paint colors used in *Untitled (Red and Yellow Cliffs)* such as cobalt cerulean blue, lead white, zinc white, iron red ochre and burnt Umber. These colors can be then connected to logged paint cards kept in the conservation department.

⁷⁹ Georgia O’Keeffe, “Letter from Georgia O’Keeffe to Alfred Stieglitz (1944.08.30)” *The O’Keeffe Museum ContentDM*

⁸⁰ Burrows, Carlyle, “Contemporary Types in Art,” *New York Herald Tribune*, 02/02/1941.

In addition, to paints used, Mr. Kronkright gave our team technical information about *Untitled (Red and Yellow Cliffs)* including conservation reports and descriptions of O’Keeffe’s process and style that could be delivered to visitors.

4.2.1 Evaluation of Systems

We evaluated the systems and their interconnections through finding connections within the museum data management systems (See Figure 35). We found that Vernon is useful for finding basic information of museum-owned paintings including the date of creation, its CR number and other relevant data. However, it is not easy to look for the related works or artifacts because of the search engine’s limited functionality.

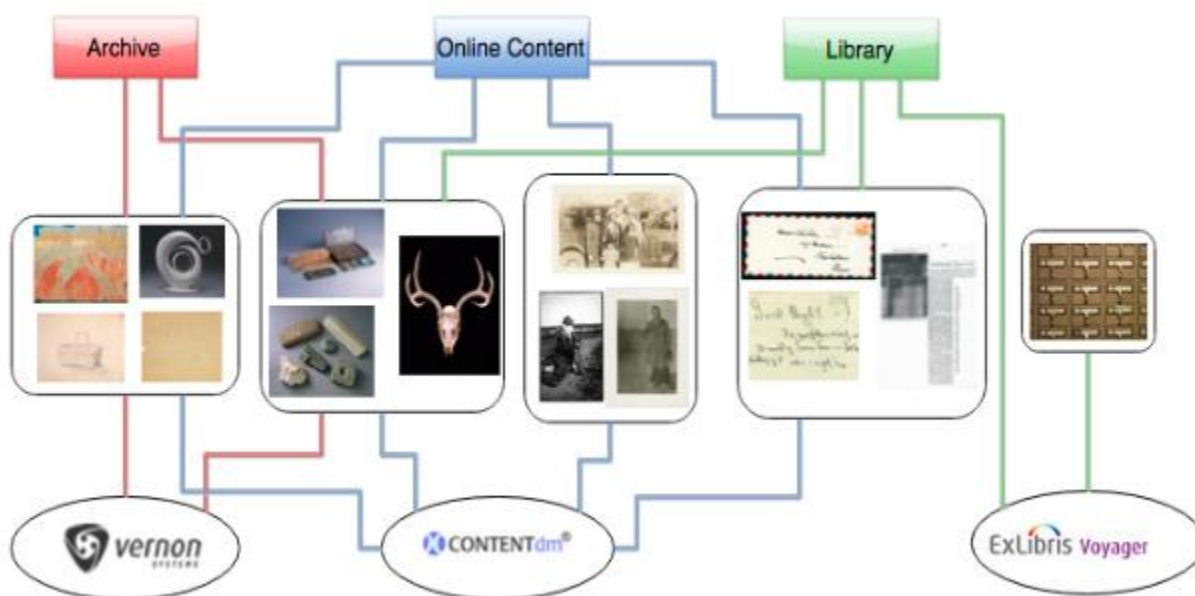


Figure 35: Detailed content of each Museum System




CONTENTdm allows users to browse all the paintings, sketches, personal tangible property and related photographs. It has content available to the public (museum-owned works) and via a login, those with access could see non-museum owned content. However it is primarily an image hosting website that offers has no interconnections between different content.

Voyager is the online search engine for the museum library. It contains some digitally uploaded letters and files but is primarily used for reference numbers of the material to help find the location within the library. The relevant information such as correspondences and the newspaper reviews can be located in the library according to Voyager. Voyager’s functionality

and usefulness could be greatly improved if in addition to being a card catalogue it also had transcribed versions of letters or online full-text documents.

In addition to the three database systems, the museum has a file server where they store additional data. This includes conservation reports and educational plans for children. However, this information is highly sensitive, so we were only given limited access to a select few documents. Therefore, we cannot evaluate this system.

As the museum’s data is split across three different systems and a file server (Number of items in each system can be seen in Table 5), it is difficult to make connections between works within the systems since most of the content lacks searchable keywords that may show connections between the works such as subject matter or the locations of the landscapes depicted. Viewing all connected holdings is possible but requires a higher level of access than museum visitors currently have. The museum needs to find a way to display this information but remain in compliance with the copyrights of the connected holdings.

	 vernon SYSTEMS	 CONTENTdm®	 ExLibris Voyager
Paintings - Museum Owned	X	910	N/A
Paintings - Privately Owned	N/A	368	N/A
Letters	N/A	884	N/A
Personal Effects	2200	53	N/A
Photographs- Museum Owned	N/A	581	N/A
Photographs- Non-Museum Owned	N/A	1440	N/A
Other related books	N/A	N/A	10124
Audio recordings	N/A	1	20
Video recordings	N/A	N/A	60


 Public Available

Table 5: Detailed content of each Museum System

4.3 Choosing a Platform

Based on the information we collected, we had several different features we wanted to implement in our immersive experience. All of the information and connections that we found should be easily accessible to each user or visitor of the experience to enhance the viewing of the paintings of O’Keeffe. The experience needs to be able to take visitors on tours of both the museum and the landscapes of New Mexico. In order to build a community around the museum

and landscapes, social media integration will be included to connect people and share experiences. Because of this criteria and the space limitations of the museum, we came to the decision that a gallery exhibit would not be practical. It would also be limited to those visiting the museum and cut down on O’Keeffe’s work currently able to be displayed within the museum.

We decided an app based immersive experience would best fit the museum and its needs and as discussed in section 2.3.2, nearly 67% of American adults own smartphones, thus still reaching a wide audience. It could pull data from the museum’s systems either through WiFi or mobile data and provide users with in depth information regarding each painting in the museum and the artifacts that relate to them. Additionally, because it will be implemented on a smartphone, it could be taken out to the landscapes themselves and still be able to provide an experience. The app could also be conveyed through a website, possibly building off their current one or contentDM, and would only lack the portability and accessibility of a smartphone app. In the future a website could also be implemented to supplement an app, allowing users to create tours online or see maps on a larger screen. Linking the app to a website could allow for social media integrating of forums or blogs and allow users to share experiences among one another.

4.4 Visualization of App

Taking all of the information we gathered through our research, we presented a potential immersive app experience through JustInMind. JustInMind, an app prototyping software, allowed us to showcase the various features we wanted to implement. Below are images of the most important screens of our app design (See Figure 36-46).

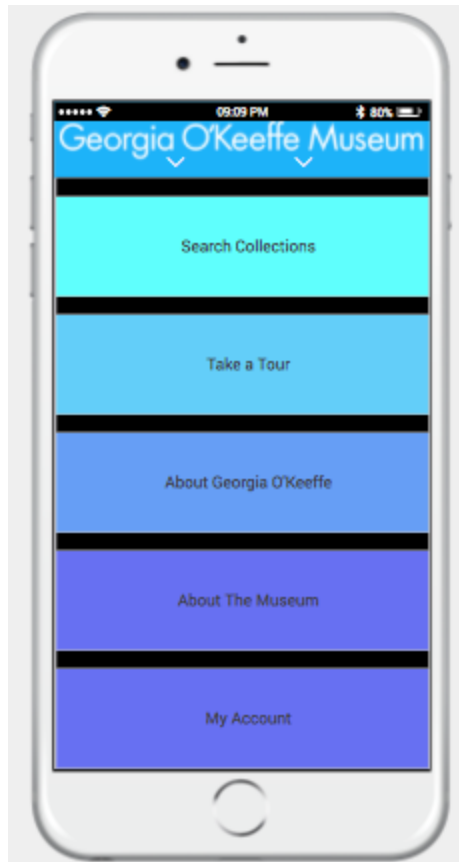


Figure 36: App Main Menu

The Search Collections section (Figure 37) was designed to give app users easy access to the museum's vast collection of O'Keeffe's Works. The search function was modeled after searching in CONTENTdm with the same categories and fields. We also added the ability to search by picture; when a user is in the museum, simply holding up their phone's camera to the painting can bring them to that painting's page. The full collections page allows the user to look through all of the paintings at once. Ideally, the search function would also yield a page similar to this one after entering a search query.

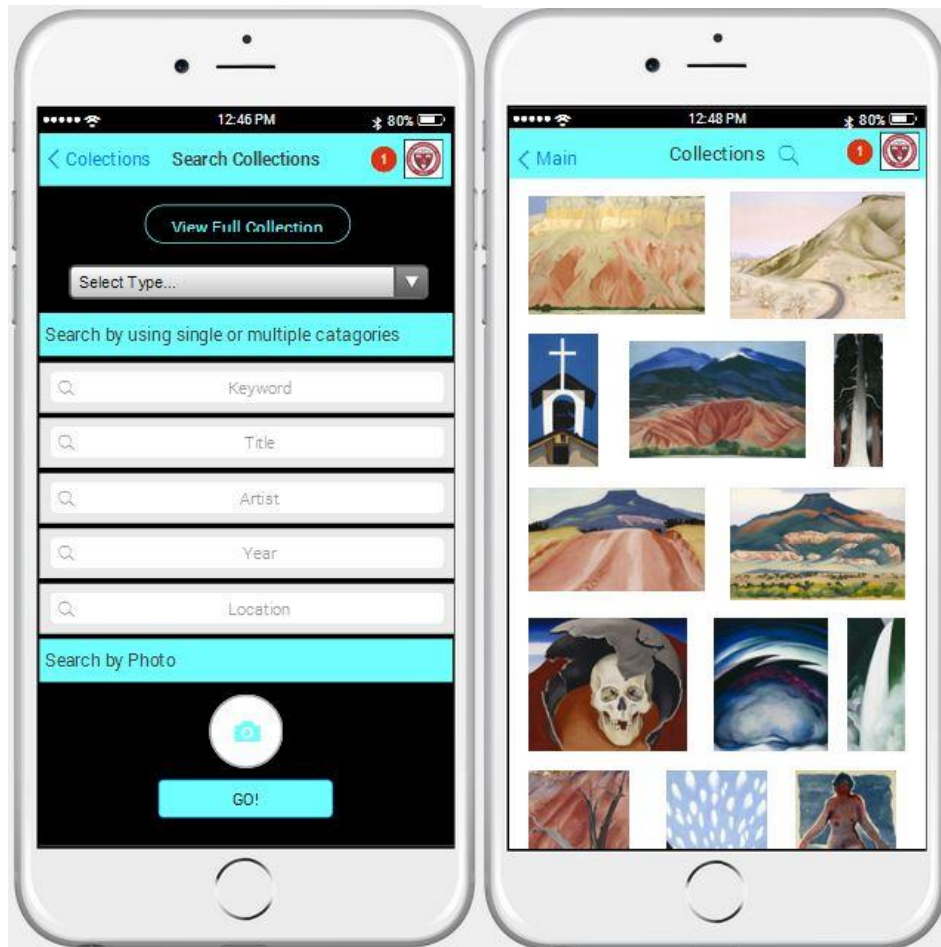


Figure 37: App Search Collections

When a user goes to a painting's page, it is important that they see more than just a picture of the painting with some basic information. We wanted to give the app user a greater understanding and appreciation of O'Keeffe and her works without having to do much research. For example, by touching the painting, a full view of the painting comes up and can be enhanced using RTI imagery to show close ups of the paintings (See Figure 38 and 39). In this way, an app user can see O'Keeffe's brushwork and technique.

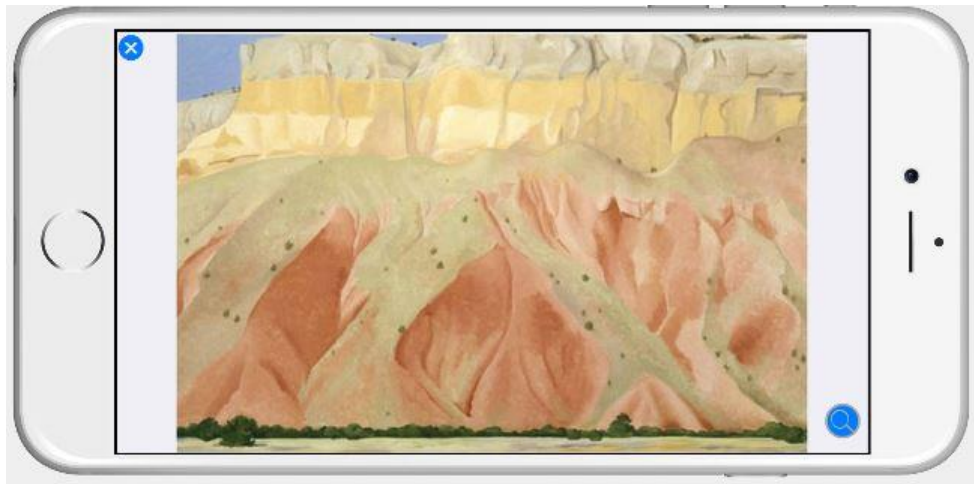


Figure 38: Screen Displaying Painting

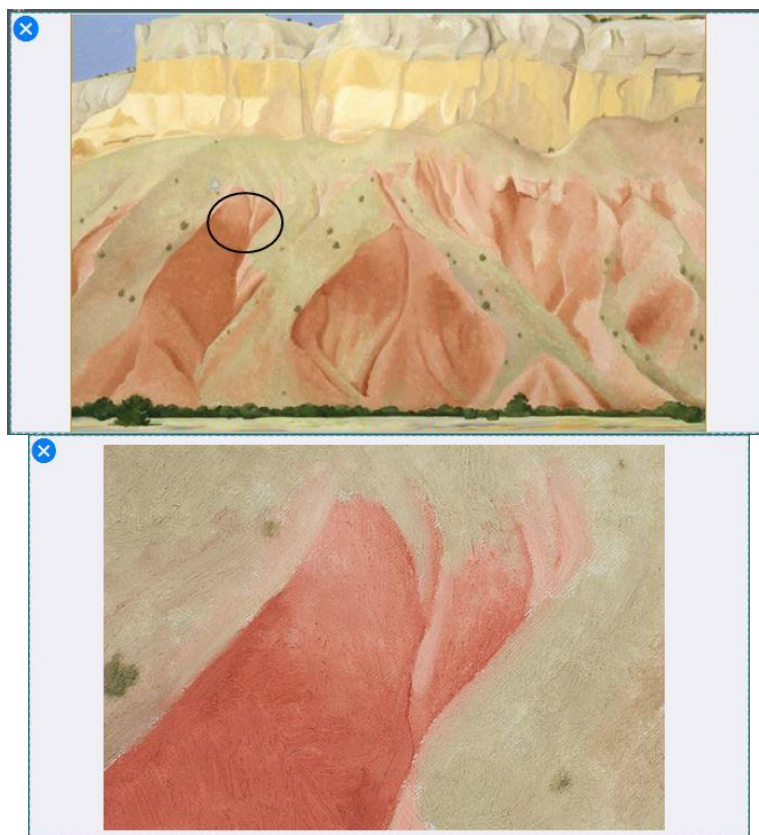


Figure 39: Closeup of *Untitled (Red and Yellow Cliffs)*

The connections tab contains images of the related artifacts associated with the given painting organized by type such as sketches, letters, paint cards, articles, and photographs (See Figure 40). Each of these can be clicked on to give a better view or more information when

appropriate. For the letters, ideally there would be a transcribed version as they can be very difficult to read. And finally, to show the paints that O’Keeffe used, we included the paint cards with lines drawn to example points in the given painting.

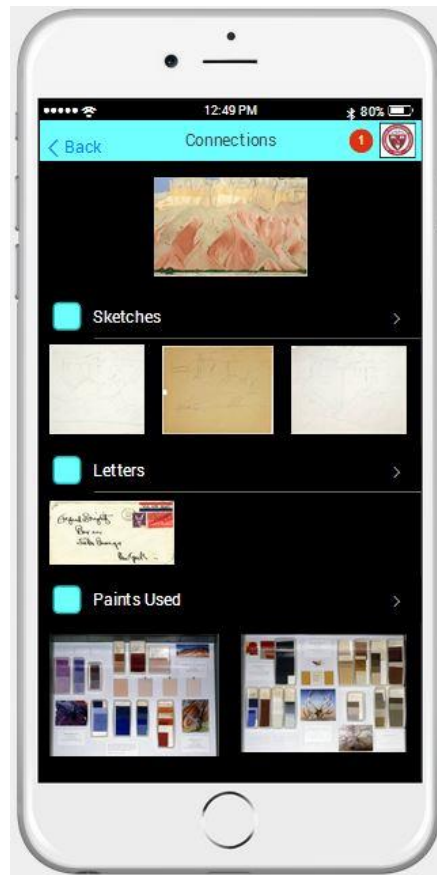


Figure 40: App Connections

On the discover tab (See Figure 41), visitors can find other related paintings to the one they are currently viewing. Connections will be made by similar painted subject, time period, or by the locations of where the works were created. By displaying it in a web format, visitors can see multiple connections at once. Clicking on a painting will bring up that painting’s main page with more information and further connections can be made from the new selected painting, much like how the Discover app makes connections between music.

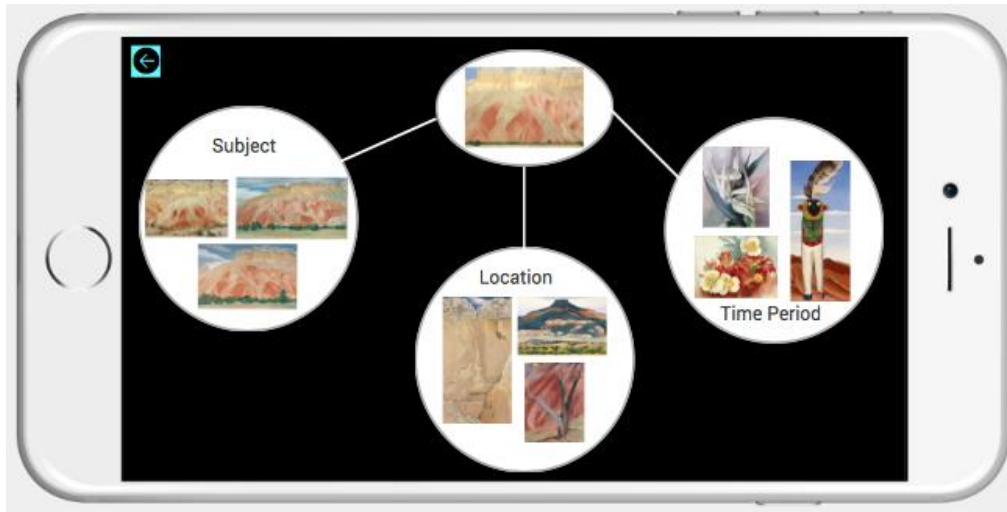


Figure 41: Discover Page

In the About Georgia O’Keeffe and About the Museum pages (See Figure 42), visitors can gain important biographical information about O’Keeffe and general information about the museum such as directions to the museum, information about exhibits, and information about the museum’s properties and staff.

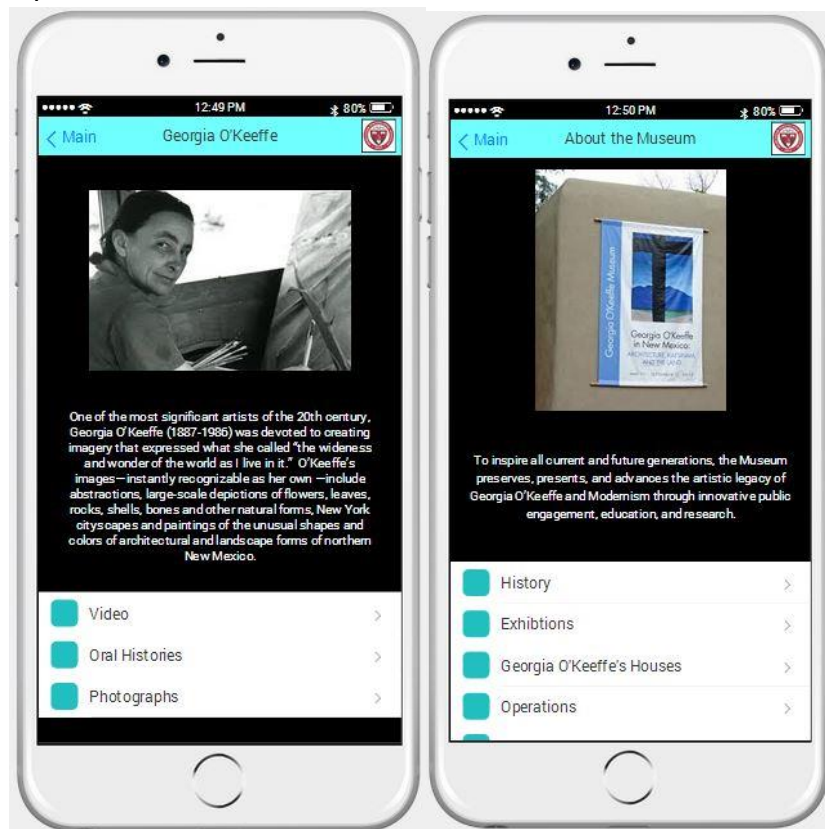


Figure 42: App About Georgia O’Keeffe and About Museum

Next in the Take a Tour section (Figure 43 and 44) there would be a variety of tours including an O’Keeffe Museum audio tour and Ghost Ranch tour. Tours could include maps (Figure 44) with directions to each stop and information at each point. For the landscape tours, parking information and restroom locations would be included for the convenience of visitors. In addition, once at the viewpoint location, the user can use the viewfinder function (See Figure 45) to overlay a translucent picture of the painting over their camera, so they can see that they are in the correct spot and so that they can compare O’Keeffe’s work to the actual landscape.

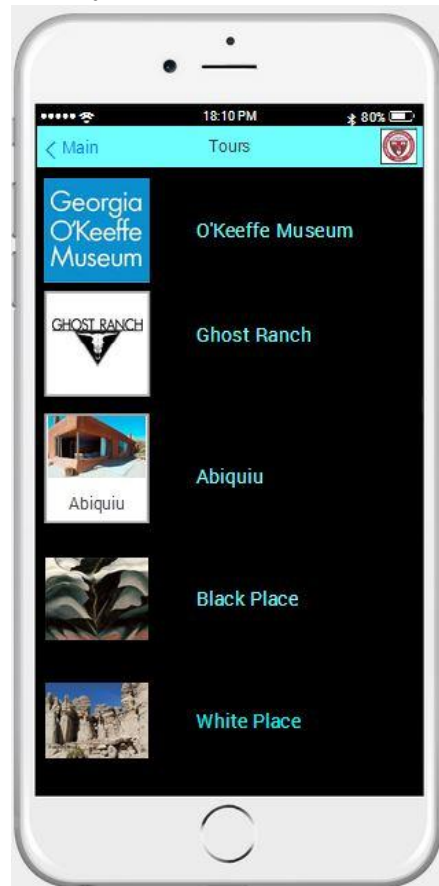


Figure 43: Take a Tour Screen

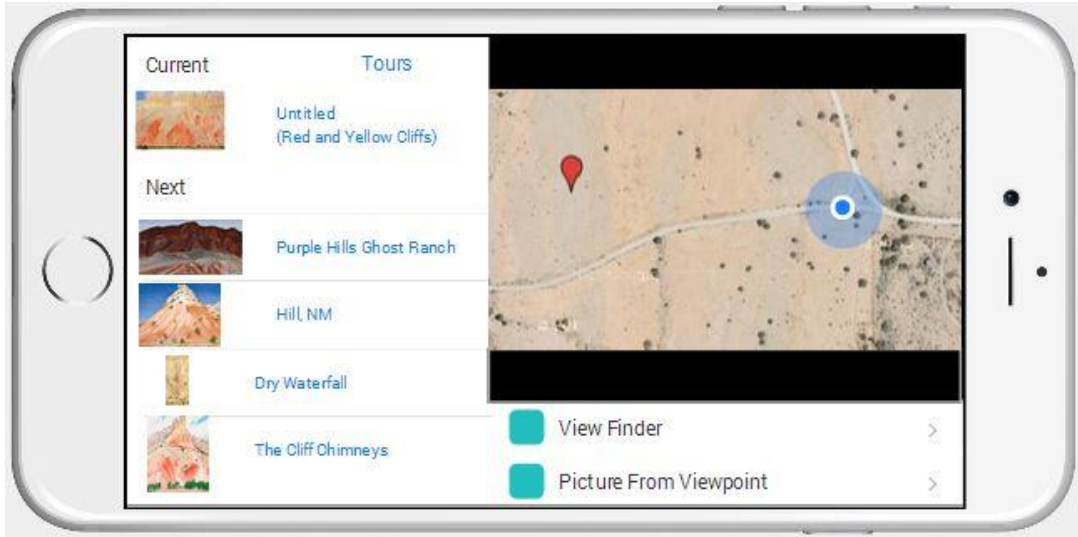


Figure 44: App Ghost Ranch Tour



Figure 45: App Viewfinder

Finally in the My Account section (See Figure 46), users would be able to create their own account to store their personal information. Users could share personal media such as photos from their trips to the landscapes, mark tours that they have been on and keep track of the current exhibitions of their favorite paintings. The museum could then use this metadata to showcase more of the works that people are favoriting and want to see in person. By interfacing social media outlets in the app, app-users will be able to interact with the museum and each other long after they visited. This paired with notifications would keep users updated about changes in the museum such as exhibit changes or new collections.

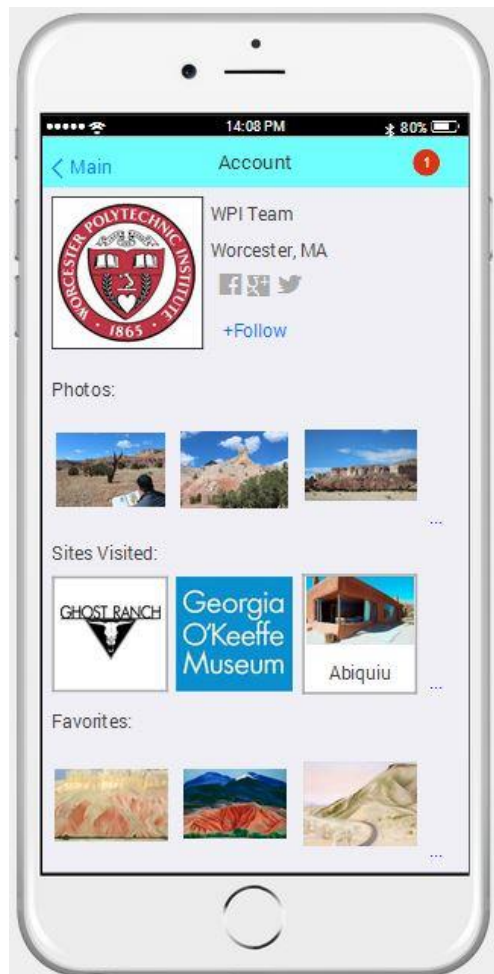


Figure 46: My Account

CHAPTER 5: CONCLUSIONS & RECOMMENDATIONS

5.1 CONCLUSIONS

From our research and evaluations, our team came to the conclusion that the museum's data management systems should be restructured and reorganized. Each system in use now has several limitations and there are almost no connections across them. When looking for connections to the chosen painting, there were no ways of searching for related works through any of the systems besides keywords and narrowing the search via time period. Most of the information we found using visual cues (similar looking subject matter) from our research of the painting or by reading letters online and in the library collection.

Our prototype design of the app could be used in conjunction with a DAMS or draw information from current systems. We focused primarily on how content could be better displayed or linked together, therefore we recommend a DAMS be used for the primary database for the app. A DAMS would allow an app to only have to pull information from one system instead of drawing content from multiple.

To help measure how successful this new program could be, we can directly compare it to the Cleveland Museum of Art's Gallery ONE exhibit and their app ArtLens which, as previously discussed in section 2.2.3, were very successful.⁸¹ The ArtLens app itself is very similar to what we have designed for our app. They both share similar searching features, include tour integration, and provide additional information about paintings on exhibit. However, our app differs in that it doesn't constrict the experience to the museum. Instead, the app expands the experience out to the landscapes of New Mexico and the homes of Georgia O'Keeffe. Because of this, we believe The O'Keeffe museum will find success not only in attracting more visitors to the museum but also to its off-site locations.

In addition, an app will help visitors connect better in terms of personal, physical, and social contexts- museum-goers will be able to see the personal context to Georgia O'Keeffe's works through her letters and other artifacts; hikers will be able to understand the paintings in a physical context by going to the actual landscapes and viewpoints; app-users will be able to connect with their friends and meet new people through the social media features and share their thoughts and experiences.

It is difficult to say how much of this experience can be built for any given painting. Some of the locations or subjects that O'Keeffe painted may have degraded or are inaccessible. Hence, we cannot say how long it would take to find all of these landscapes. There is limited information regarding the location of the subject if that subject still exists, as well as how many of the landscapes can be incorporated in the tours.



⁸¹ Jane Alexander, "Gallery ONE, The First Year: Sustainability, Evaluation Process, and a New SmartPhone App," *MW2014: Museums and the Web*, April 2-5, 2014.

The most important thing we found through our work was the importance of striking a balance between preservation and documentation of the landscapes depicted in Georgia O’Keeffe’s works. Preserving the landscapes is very important so that the environment is not harmed or disrupted. For example, walking off trail in Ghost Ranch leaves footprints that will last months and foliage can be easily damaged. Equally important, however, is the ability for people to visit and learn about O’Keeffe and New Mexico through these landscapes. Any future programs to these locations will have to work with local organizations and take the utmost caution in order to preserve the landscapes for generations to come.

5.2 RECOMMENDATIONS

While the museum should look to building an immersive experience like the one we have designed, it will be impossible to do so without first finding connections to the paintings and storing them in a database or server. Consequently, we recommend that the museum begin making these connections and storing them in a lookup table like in Table 3. Additionally, since the data is spread across multiple systems, which will make this process more challenging, we recommend the museum implement a digital asset management system like Extensis to better organize their data. It will make connecting museum holdings and online content easier, and, ultimately deliver a better experience to their visitors (See Table 6 and Figure 47 for content Extensis could ultimately contain).

Connecting this new database with social media could also allow for crowdsourcing photos of landscape painting sites and vantage points while allowing people to favorite content in the museum and see connections between correspondences, tangible property, sketches and paintings.

	 vernon SYSTEMS	 CONTENTdm®	 ExLibris Voyager	 Extensis™
Paintings - Museum Owned	X	910	N/A	X
Paintings - Privately Owned	N/A	368	N/A	
Letters	N/A	884	N/A	X
Personal Effects	2200	53	N/A	X
Photographs- Museum Owned	N/A	581	N/A	X
Photographs- Non-Museum Owned	N/A	1440	N/A	
Other related books	N/A	N/A	10124	X
Audio recordings	N/A	1	20	X
Video recordings	N/A	N/A	60	X


 Public Available

Table 6: Comparison of Features with Extensis

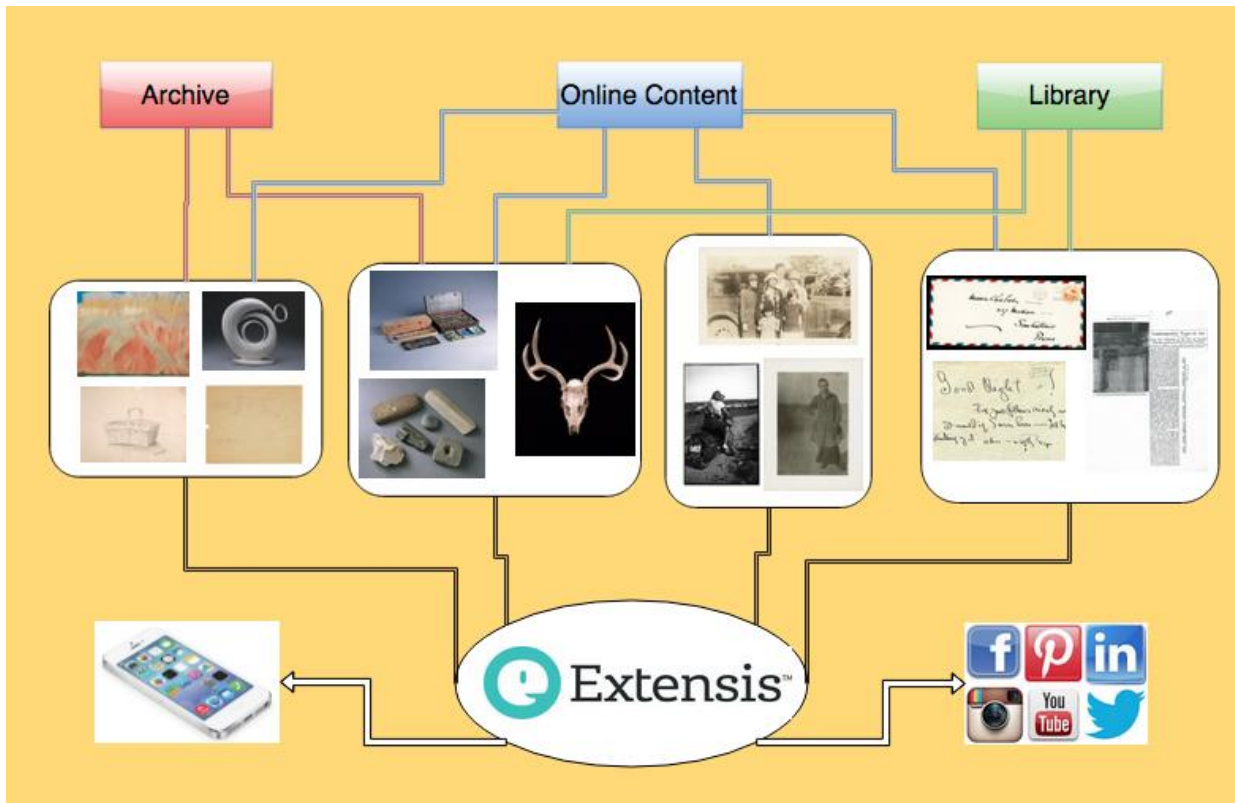


Figure 47: Flowchart of System Information and Connections

Our group also recommends that the museum continue working on the map of painting subject and vantage point locations. Our team documented 16 landscape painting vantage points and subjects out of the hundreds of landscape works Georgia O'Keeffe did in New Mexico. We believe it would be in the museum's best interest to continue focusing on Ghost Ranch where there are roughly 40 potential vantage points from within a mile radius. Because it takes roughly a half hour per site, doing as many as possible that are within close proximity would be more efficient. It could also potentially drive the desire to restore Georgia O'Keeffe's home there and open it to the public. We also suggest referring to the pamphlet guide by Mark Mongold which provides additional information on the viewpoints beyond our geotagging. This information could be utilized along with our app to create tours of the surrounding landscapes complete with specific directions, as well as other relevant information from our app.

We hope our concept of the app could be implemented eventually for developing an immersive visitor experience, however, our prototype design was only fully demonstrated for one chosen painting due to the time limitation. In the future, we hope the museum could expand our prototype design with its full collection of works and more creative features such as using augmented reality to display bones and other tangible property through the app. Through creating these connections and making an interactive experience we believe the museum will enhance its visitor experience greatly, provide a richer database of information, and increase visitorship and membership.

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APPENDIX A: Detail description of Museum Management System

Vernon

- Catalog of everything
- Incomplete, missing a lot of important information, just the **core** information
- Information on catalogued items not found in Vernon can be found in files through Judy Smith
- Closed to the public
- Includes location history and conditioning reports
- Includes information of other related artists
- includes letters O’Keeffe wrote in that time, however, no links between paintings and letters
- Underutilized, can be used to make connections and provide other information

Vernon is the museum’s main system for cataloging their property, including paintings and Georgia O’Keeffe’s various effects. This system only contains the core information about any given artifact, like the history of where the painting has been, but it lacks many important details. For instance, up-to-date conservation reports are not stored in this system. In addition, due to lack of manpower, many artifacts lay undocumented and there are no listed connections between the paintings and other artifacts. Despite this, the system has a lot of potential for improvement, as it has the ability to support much more information than it currently stores.

Voyager

- Online library that O’Keeffe museum used
- Closed to public
- On-site (vpn needed)
- Library holds some artifacts including paints, bones, and O’Keeffe’s personal books
- Contains copy of Catalogue Raisonne
- Contains Research information for art history

Voyager is an online library system that the Georgia O’Keeffe Museum used for cataloging their property. It closes to public and can only use in the museum area. Voyager holds a plenty of artifacts including paints, bones, and O’Keeffe’s personal books. Moreover, Voyager also includes information for other related artists and the art history during the time of Georgia O’Keeffe.

Voyager is the museum’s electronic library catalog.

CONTENTdm

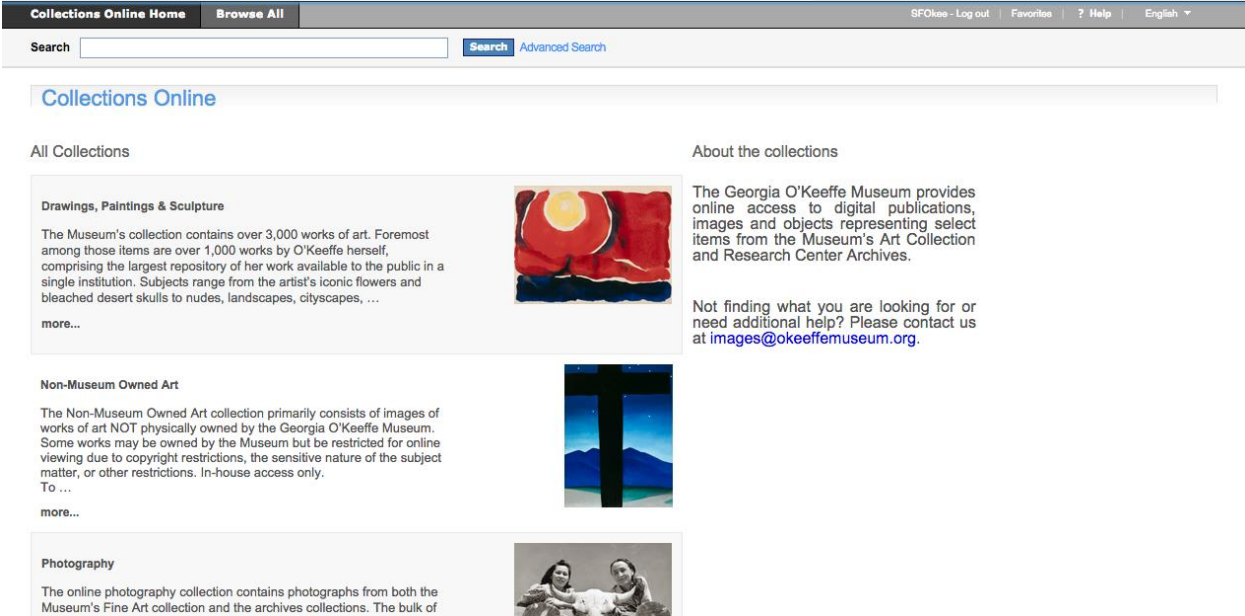


Figure 48: the CONTENTdm website

- Partially open to public
- High-res pictures of content- paintings, letters, etc
- Non-Museum owned photography (Copyright Restrictions)
- Oral Histories
- Property images
- Exhibition Brochures

CONTENTdm (See Figure 48) is an online system for online collections under the website of the Georgia O'Keeffe Museum. It partially open to public. Because of the Copyright Restrictions, visitors can view the Non-Museum owned photography by the permission of museum officers. However, people can still view high-res pictures of content- paintings, letters, etc through CONTENTdm without an account. CONTENTdm also contains some oral histories and Exhibition Brochures.

DAMS (Digital Asset Management System)

- Extensis and Piction
- Not yet implemented
- Extensis Portfolio has a Sandbox and is less expensive than Piction
- Extensis is based off of Licence subscription

- Piction is a more customizable, more powerful interface but has more power than necessary
- Tech support is more difficult with Piction
- Gallery ONE Cleveland art museum
- Social Media Sharing

While the museum has these systems in place now for storing its information, it will soon be moving to a Digital Asset Management System (DAMS). A DAMS is a comprehensive database which can hold a suite of information. For the Georgia O'keeffe Museum, it will hold all information located in Vernon and CONTENTdm, as well as conservation reports and other relevant data

APPENDIX B: Ghost Ranch and Abiquiu Home Itinerary

Before Trip

1. Finalize Paintings that will we will try to find
2. Using a map and resources, have a basic idea of where each one is
3. Create order/itinerary of paintings to see and have them grouped by location

During Trip

- At Each Location

1. Drop pin at vantage point
2. Checklist for Painting:
 - a. Take a Photo of Subject
 - b. Take a photo of someone in viewpoint
 - c. Photo of surrounding area
 - d. Direction of subject
3. Checklist for Area
 - a. Where to park
 - b. Compass orientation to see subject
 - c. Cell Reception
 - d. Directions from parking
 - e. Permissions needed?
 - f. Parking
 - g. Public Restroom Finder
 - h. Water Access (?)

After Trip:

1. Update Pins to actual locations
2. Link pictures and paintings to location
3. Directions from Parking
4. Direct Path off of Set Path to Viewpoint

APPENDIX C: Painting sites to Document by Location

Ghost Ranch

- Lavender Hills (A Sense of Place pg. 34-36)
 1. CR 836 Lavender Hill Forms
 2. CR 837 Purple Hills Ghost Ranch (Could be a different area)
 3. CR 838 Small Purple Hills (Could be several different areas)
 4. CR 871 Lavender & Green Hill
- Road to Ghost Ranch
 1. CR 872 Hill, New Mexico (A sense of Place)
- Cedar Tree
 1. CR 934 Dead Cedar Tree
 2. CR 935 Cedar Tree with Lavender Hills
- Red and Yellow Cliffs down the road from her house
 1. CR 938 Untitled (Cliffs)
 2. CR 997 Red and Yellow Cliffs Ghost Ranch
 3. CR 998 Untitled (Red and Yellow Cliffs)
- Behind Ms. O'Keeffe's House
 1. CR 931 Part of Cliffs
 2. CR 932 My Backyard
 3. CR 1059 My Backyard
 4. CR 1060 Cliffs Beyond Abiquiu
 5. CR 1061 Cliffs Beyond Abiquiu - Dry Waterfall
 6. CR 1071 Untitled (Dry Waterfall)
 7. CR 1116 My Backyard
 8. CR 1150 Part of Cliff
 9. CR 1226 Dry Waterfall
- Behind Ms. O'Keeffe's house, looking at house
 1. CR 913 The House I Live In
- West Side of Ms. O'Keeffe's house looking south
 1. CR 898 Red Hills With The Pederna
 2. CR 899 Red Hills with Pedernal, White Clouds
 3. CR 900 Pedernal With Red Hills
- Driving Toward Ghost Ranch
 1. CR 907 Untitled (New Mexico Landscape)
- From Area Near Abiquiu Lake
 1. CR 901 Pedernal, New Mexico

- Off US 84 before going down Trujillo hill facing East⁸²
 1. CR 850 Untitled (Landscape)
 2. CR 851 Chama River, Ghost Ranch, New Mexico
 3. CR 933 Chama River, Ghost Ranch
 4. CR 1418 Untitled (From The River)
- Above Casa Del Sol Retreat Center (A Sense of Place pg 24-25)
 1. CR 955 The Cliff Chimneys
- Looking West from Garage Area of Ranch House
 1. CR 1236 Ghost Ranch Cliff
- From Ghost Ranch House Front Yard
 1. CR 912 Ghost Ranch Landscape
- Wildcards (Anywhere on Ghost Ranch)
 1. CR 956
 2. CR1021

Abiquiu Home

- From the Alcalde Area
 1. CR 793 Back of Marie's No. 4
- Behind Abiquiu elementary school
 1. CR 743 Red Hills Beyond Abiquiu
- Actual Home
 1. Black Door
 - a. CR 1271
 - b. CR 1280
 - c. CR 1281
 - d. CR 1282
 - e. CR 1283
 - f. CR 1284
 2. Mesa
 - a. CR 1234
 - b. CR 1235
 - c. CR 1253
 - d. CR 1254
 - e. CR 1255
 - f. CR 1256
 - g. CR 1257
 - h. CR 1258
 - i. CR 1259

⁸² US 84 wasn't in the current location until the 1950's so she travelled the old road through a community called Barranco and right into where the Abiquiu Lake is today.

- j. CR 1260
- k. CR 1266
- l. CR 1477

APPENDIX D: Ms. Lopez's Note for the landscape locations

Ghost Ranch (Probable)

CR 836, 837, and 971	See A Sense of Place, pages 34 to 36
CR 838	Could be several areas at the Ghost Ranch Education and Retreat Center
CR 898, 899, 900	From the west side of Miss O'Keeffe house looking south
CR 907	I think it is driving toward Ghost Ranch
CR 933, 850, 851	Off US 84 before going down Trujillo hill facing East
CR 936, 937	According to what Miss O'Keeffe told me, it no longer exists
CR 955	See A Sense of Place, pages 24 and 25, above Casa del Sol Retreat Center
CR 956	Could be anywhere on the Ranch if it still exists
CR 1020, 1019	Could be dirt road out of the Ranch facing south by cabin
CR 1021	Location could be anywhere on the Ranch
CR 1022, 1023, 1029	Could have been done from the area where the Abiquiu Lake is now -
road to Ghost Ranch did	not go in until the 50's. These were done in 1941/1942.
CR 1236	I think this is looking west from her garage area at the Ranch
CR 1487, 1488	See Georgia O'Keeffe publication with image #104 - Miss O'Keeffe
explains it to you	

Ghost Ranch (Improbable)

CR 849	No idea
CR 871	Probably driving toward the Ghost Ranch house
CR 901	From area near the Abiquiu Lake perhaps
CR 908,909,910,911	No idea
CR 912	From Ghost Ranch house front yard
CR 928, 929, 930, 954, 995, 999, 1025	No idea - could be from anywhere on the Ranch
CR 1165, 1164	Could be in area of gully in front of her house at Ghost Ranch
CR 1233	No idea
CR 1244	No idea
CR 1418	Off north side of US 84 from above Trujillo hill facing east
CR 1481, 1480	No idea

The dates of these works will give you a clue of when or where she was when she painted the work. US 84 wasn't in the current location until the 1950's so she travelled the old road through a community called Barranco and right into where the Abiquiu Lake is today. You also have to take into consideration that her painting areas might have been in a location that is now privately owned and not accessible. The entrance to Miss O'Keeffe's house in the 30's and early 40's was straight from the highway and not from the Ranch area. This is the research you have to work with.

Abiquiu Home (Probable)

CR 743	Possibly from behind the area where the Abiquiu Elementary building is today
CR 1068, 1118	More likely from the Ghost Ranch area than from Abiquiu

Abiquiu Home (Not Probable)


CR 1026, 1065

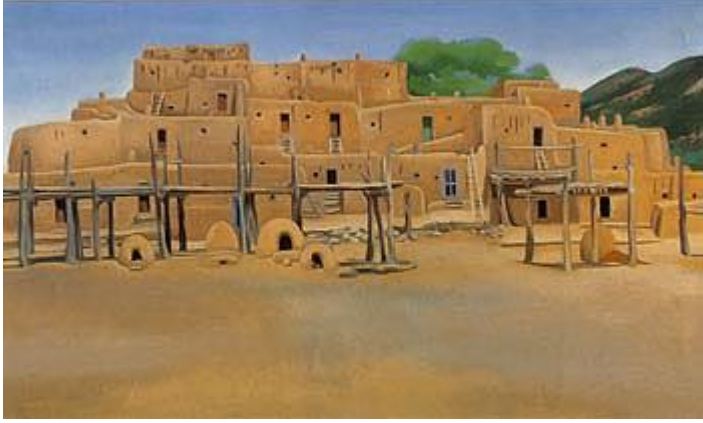

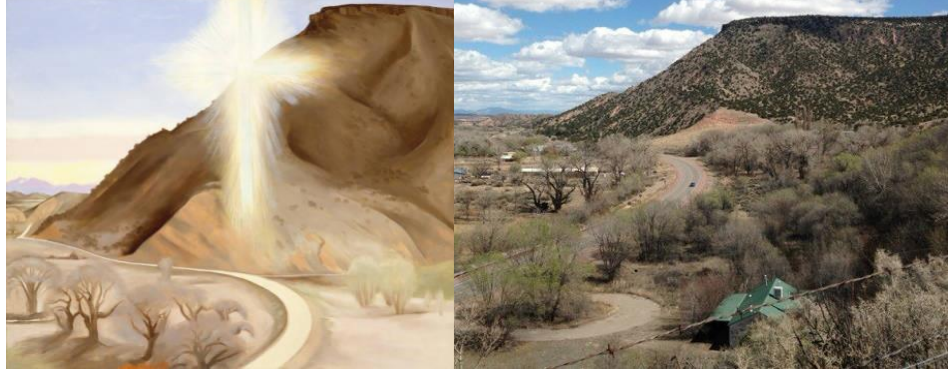
No idea



CR 793

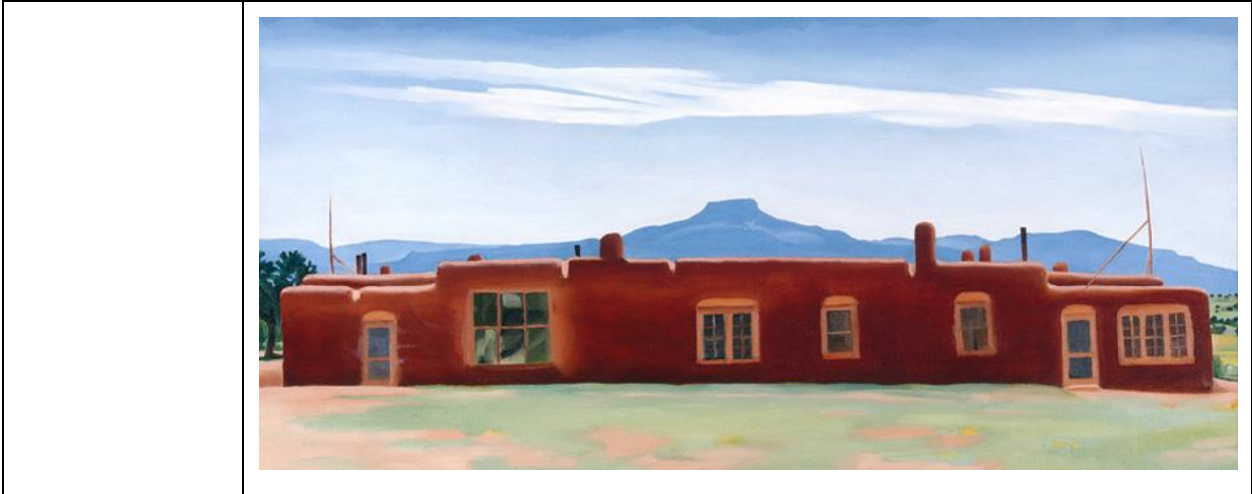
From the Alcalde area

APPENDIX E: Logistical Information of Ghost Ranch

Ghost Ranch	<ul style="list-style-type: none"> • Access: Private Property, access through Ghost Ranch • Parking: Ghost Ranch Home or Conference Center or Abiquiu Inn with transportation to site • Bathroom or Water: Possibly the Ghost Ranch Conference Center or Bode's General Store
Abiquiu Home and Studio	<ul style="list-style-type: none"> • Access: Private Property, Owned by O'Keeffe Museum • Parking: Abiquiu Inn with transportation to site • Bathroom or Water: Bode's General Store or Abiquiu Inn
Chama River	CR 933 Cell Service: Good (Verizon 4G) Moderate (AT&T 3G)
	
Taos Pueblo	CR 699

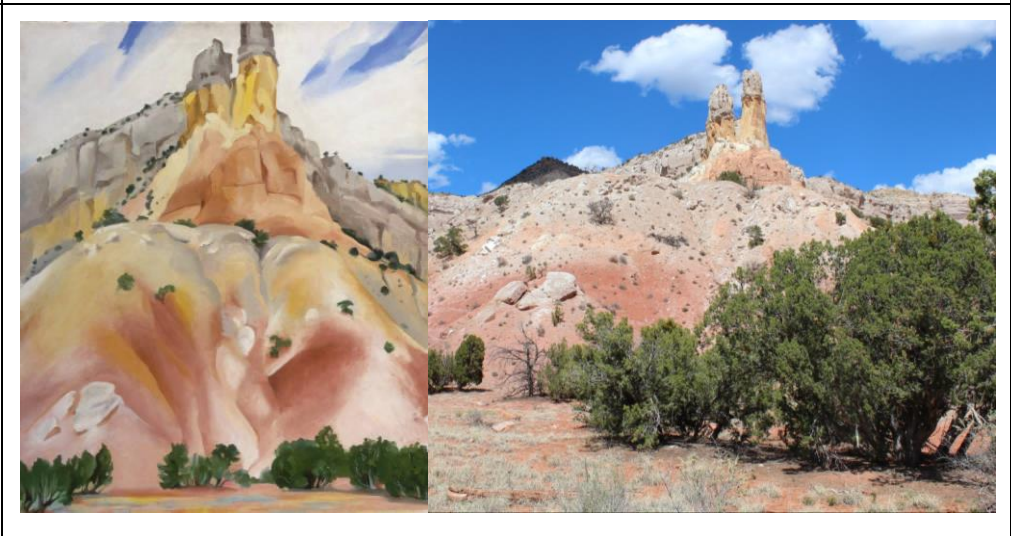
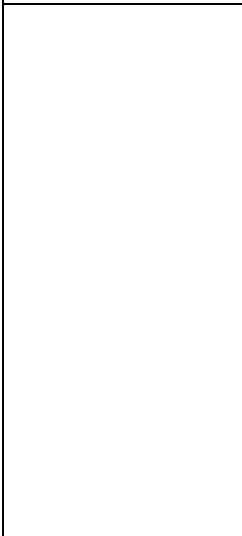
	
<p>Dry Waterfall</p>	<p>CR 1226</p>
	
<p>Easter sunrise</p>	<p>CR 1266 Cell Service: Good (AT&T) Moderate (Verizon) Poor (T-Mobile)</p>
	

<p>Cedar Tree with Lavender Hills</p>	<p>CR 935 Cell Service: Moderate (AT&T and Verizon) 3G</p>
	
<p>Hill, NM</p>	<p>CR 872 Cell Service: Moderate (AT&T and Verizon) 3G</p>
	
<p>The House I live in</p>	<p>CR 913 Cell Service: Good (Verizon, AT&T, T-mobile) 4G</p>





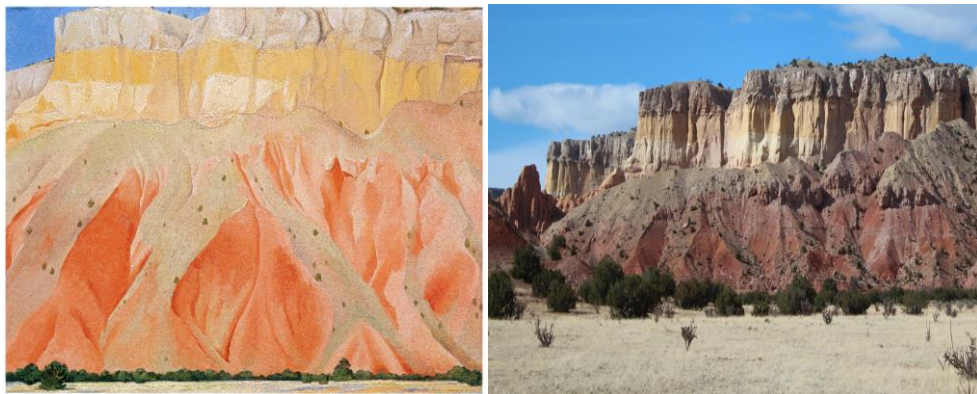
The Cliff
Chimneys


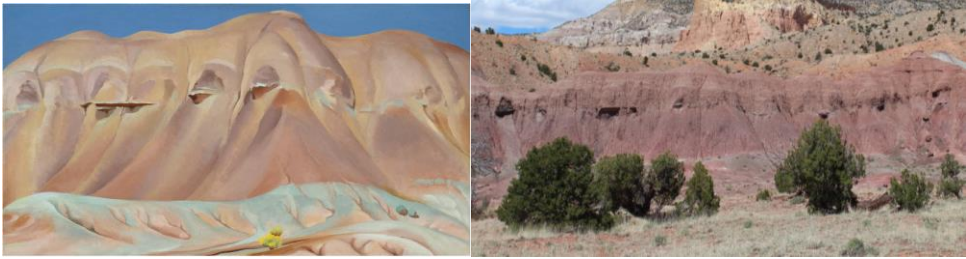
CR 955
Cell Service: 4G Verizon, 4G AT&T, 4G T-Mobile



Red and Yellow
Cliffs Ghost
Ranch

CR 997

	
My Backyard	CR 1059
	
Untitled (Red and Yellow Cliffs)	CR 998 Cell Service: 4G Verizon, 3G AT&T Cell Service:
	
Gerald's Tree Viewpoint	CR 936 Cell Service: Moderate (AT&T and Verizon) 3G

	
<p>Lavender Hill Forms</p>	<p>CR 836 Cell Service: Moderate (AT&T and Verizon) 3G</p>
	
<p>Mesa and Road East</p>	<p>CR 1234 Cell Service: Good (AT&T) Moderate (Verizon) Poor (T-Mobile)</p>

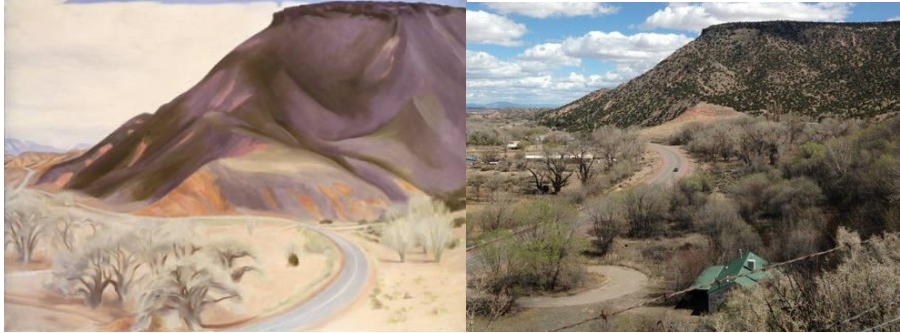
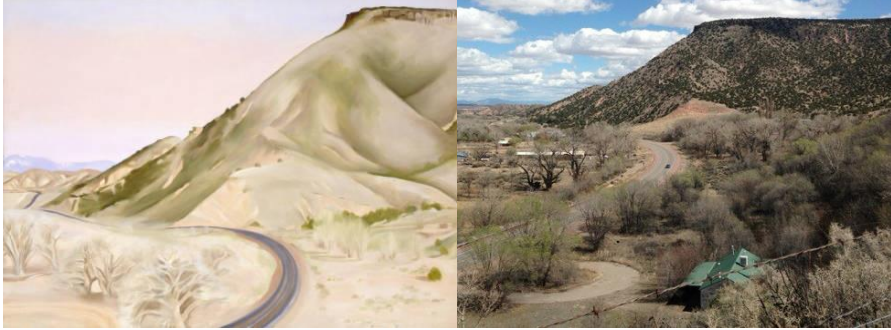

	
<p>Mesa and Road East II</p>	<p>CR 1235 Cell Service: Good (AT&T) Moderate (Verizon) Poor (T-Mobile)</p>
	
<p>Cliff's Beyond Abiquiu - Dry Waterfall</p>	<p>CR 1061</p>
	

Table 7: Logistical Information of Ghost Ranch

APPENDIX F: Information/connections for internal museum

	Untitled (Red and Yellow Cliffs)	My Front Yard, Summer	Easter Sunrise
Catalogue raisonne No.	998	1023	1266
Artist/Creator	Georgia O'Keeffe	Georgia O'Keeffe	Georgia O'Keeffe
Creation Date	1940	1941	1953
Materials	Oil on canvas	Oil on canvas	Oil on canvas
Dimensions	24 * 36 in	20*30 in	30 * 36 in
Landscape Location	Ghost Ranch, NM	Ghost Ranch, NM	Abiquiu, NM
Repository	Georgia O'Keeffe Museum	Georgia O'Keeffe Museum	Georgia O'Keeffe Museum
Online Collection	Museum Art Collection	Museum Art Collection	Museum Art Collection
Accession No.	1997.06.36	2006.05.173	2006.05.245
Date Accessioned	N/A	12 Sep 2005	12 Sep 2005
Copyright	Copyright Georgia O'Keeffe Museum	Copyright Georgia O'Keeffe Museum	Copyright Georgia O'Keeffe Museum
Credit Line	Gift of The Burnett Foundation. Copyright Georgia O'Keeffe Museum	Gift of The Georgia O'Keeffe Foundation. Copyright Georgia O'Keeffe Museum	Gift of The Georgia O'Keeffe Foundation. Copyright Georgia O'Keeffe Museum
Conservation report			
Brief Description	Horizontal canvas of cliff formation that dominates the majority of the canvas. Only a small section of blue sky is in the upper left corner. The upper cliff area has a vein of yellow between white and grey, while the flowing hills below are rust red that end in a thin line of greenery along the bottom edge.	Pederal rises up over the New Mexico landscape. Much of the mountain is covered in various shades of green. Shrubs dot the landscape in the fore- and middle-ground.	A winding road enters the scene from the base of the canvas in the center. It curves to the right before weaving off into the distance to the left. A large mesa rises from the right side of the work, its hills sloping down towards the left. Several trees dot the landscape in the foreground. The sky is lighter near the horizon and darker farther away from it. In the center of the work, a large cross from which light emanates is suspended in front of the scene.
Related Paintings (Museum Owned)	CR 1150 (1946)	CR 1002 (1941) CR 1020 (1941) CR1022 (1941) CR 1029 (1941/1942)	CR 1234; CR 1235 (MESA) (1952)

Related Paintings (Private Owned)	CR 931 (1937) CR 955 (1938) CR 997 (1940) CR 1059(1943) CR 1060 (1943) CR 1116 (1945) CR 1236 (1952)	CR 898 (1936) CR 899 (1936)	
Sketches (Museum Owned)	CR 938 (1937) CR 1005(1940) CR 1006(1940) CR 1008(1940)		CR 1255 (MESA) CR 1256 (MESA) CR 1258 (MESA) CR 1259 (MESA) CR 1260 (MESA) CR 1995
Sketches (Non-Museum Owned)	CR 1009(1940)		
Photography (Museum Owned)	Ghost Ranch(Undated) (2006-06-0165) (2006-06-0166) Georgia O'Keeffe and Mr. Chu at the Ghost Ranch House(1944) MS-OKAS-0198f	Ghost Ranch and Pedernal (2002) Abiquiu Landscape(undated)	Abiquiu Landscape(undated)
Photography (Non-Museum Owned)		Adobe House and Pedernal (1945) Pedernal (1977) Pedernal (1980)	
Correspondence	Letter from Georgia O'Keeffe to Alfred Stieglitz(1944.08.30) (RC-2004-003)	O'Keeffe Opinions Under Postage (1941.6)	
Reviews	Contemporary Types in Art (Burrows Carlyle 1941.5)	"Miss O'Keeffe's New Paintings put on Display" (1942.1)	
Books			
Personal Property			
Social Media			

Table 8: Information/connections for internal museum

yellow- Vernon
blue- Library/ Voyager
green- contentDM

APPENDIX G: Information/connection that can display to visitors

Title	Untitled (Red and Yellow Cliffs)	My Front Yard, Summer	Easter Sunrise
Catalogue raisonne No.	998	1023	1266
Artist/Creator	Georgia O'Keeffe	Georgia O'Keeffe	Georgia O'Keeffe
Creation Date	1940	1941	1953
Materials	Oil on canvas	Oil on canvas	Oil on canvas
Dimensions	24 * 36 in	20*30 in	30 * 36 in
Landscape Location	Ghost Ranch, NM	Ghost Ranch, NM	Abiquiu, NM
Repository	Georgia O'Keeffe Museum	Georgia O'Keeffe Museum	Georgia O'Keeffe Museum
Related Paintings (Museum Owned)	CR 936 (1937) CR 955 (1938) CR 1150 (1946)	CR 1002 (1941) CR 1020 (1941) CR1022 (1941) CR 1029 (1941/1942)	CR 1234; CR 1235 (MESA) (1952)
Sketches (Museum Owned)	CR 938 (1937) CR 1005(1940) CR 1006(1940) CR 1008(1940)		CR 1255 (MESA) CR 1256 (MESA) CR 1258 (MESA) CR 1259 (MESA) CR 1260 (MESA) CR 1995
Photography (Museum Owned)	Ghost Ranch(Undated) (2006-06-0165) (2006-06-0166) Georgia O'Keeffe and Mr. Chu at the Ghost Ranch House(1944)	Ghost Ranch and Pedernal (2002) Abiquiu Landscape(undated)	Abiquiu Landscape(undated)
Correspondence	Letter from Georgia O'Keeffe to Alfred Stieglitz(1944.08.30) (RC-2004-003)	O'Keeffe Opinions Under Postage (1941.6)	
Reviews	Contemporary Types in Art (Burrows Carlyle 1941.5)	"Miss O'Keeffe's New Paintings put on Display" (1942.1)	
Books			
Personal Property			
Social Media			

Table 9: Information/connection that can display to visitors

yellow- Vernon
blue- Library/ Voyager
green- CONTENTdm