Infinite Art with Data Visualization and Indoor Positioning: the Digital Reformation of the David Owsley's Museum of Art, Ball State University

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Abstract

This paper shares the investigative hypothesis and methods used for matching the David Owsley Museum of Art (DOMA) with data visualization development and indoor positioning technologies.

The outcome from this investigation packages the combination of both technologies within a tablet-based mobile app. This app, and its underlying technologies, can serve as an on-demand docent for museum visitors. Merging these technologies for use with smart devices provides significant opportunities for measurable change to any museum experience.

Making Connections

The foundation of this investigation began with a few questions. Would a museum experience be more meaningful if the visitor were given more details about the artist's inspiration or their associations with other artists or other works of art? Would the experience be more memorable if connections were made between a work of art and the social, religious, or political temperament of its period? Would the experience be more emotional if links were made to music compositions, literature, or poetry? Could emerging mobile tools and technologies provide a platform to aid visitors in these explorations and discoveries?

Throughout the initial stages of this journey, research favored these endeavors. According to the annual Museums and Mobile survey, conducted in 2013 by Pocket-Proof, the most popular objective for pursuing a mobile initiative was to experiment with visitor engagement, closely followed by the desire to provide a more interactive experience, and to make additional interpretive content more readily accessible.[1] The 2012 David Owsley Museum of Art Interpretive Plan details a number of short- and long-term goals, among them the development of new tools and connectors, like mobile apps, to help visitors engage with works of art in new and innovative ways.[2] The plan strives to ensure the visitor experience remain at the forefront of all decisions, along with the continued support of teaching and learning through "creative, critical and analytical thinking, visual literacy, cultural context, and interdisciplinary study."[3]

These questions and supporting research became the stimulus for combining the museum's data with relational visualizations and emerging way-finding technologies. Prior research conducted by the consultants, Marin & Marin, found these distinctions among visitors to the David Owsley Museum of Art: 1) experienced visitors of art museums, 2) adults 18 years and older, including university faculty, staff and students, 4) adults from the surrounding community, and 5) adults visiting the campus. "At least half of those who visit the museum are visiting an art museum for the first time."[4] First-time and occasional visitors serve as the largest target group and the foundation for planning the usability, information and functionality found in this mobile app.

Most first-time museum visits begin in the same way. The new visitor enters a gallery, and then chooses the closest object in the room to begin the tour; many times the individual's path imitates the sequential trail already established by proceeding visitors or the museum's set tour. The visitor reads the wall label and admires the work of art for a few seconds or several minutes. In popular exhibits, visitors compete to read the associative text while catching a momentary glimpse of the object on display.

With this mobile app, individuals could learn more about the piece as they wait for their opportunity to stand directly in front of the object and appreciate its value and significance to the world's culture. According to the

2011 New Media Consortium Horizon Report, this capability and all associated activities are among the top six key trends that are "currently affecting the practice of museum education and interpretation," [5] and will continue for the next couple years. For the David Owsley Museum of Art, the creation and implementation of this mobile initiative will enable the museum and its visitors to interact with a deeper network of historical, social, creative, and personalized information to make art meaningful to people of all ages and backgrounds.

For instance as a visitor stands in front of the museum's Jean-Baptiste-Siméon Chardin painting, *The Bird-Song Organ* (c. 1751), which shows a woman sitting in her drawing room, winding a music box as her pet canary sings in a nearby cage, the visitor will have access to additional texts explaining upper-class leisure in the 18th century, along with audio clips that will make both the canary's and the music box's sound come alive for them in the gallery. The visitor will be able to learn more about Chardin's career as one of the preeminent painters of the 18th century by connecting to other museums' websites and seeing works by Chardin at the Louvre in Paris and the Metropolitan Museum of Art in New York.

The portal designed for the museum's colossal abstract expressionist painting by Lee Krasner, *Right Bird Left* (1965), will have information about Krasner's artistic network, including her teacher Hans Hofmann, her husband Jackson Pollock, and other women artists like Grace Hartigan and Joan Snyder, both of whom are represented in the museum's collection. With a tap and swipe of the finger, the visitor will experience an immersive collection of photographs of these artists at work, (with headsets) listen to sound clips of the jazz music that inspired them, see images of other comparative works that the museum owns, and even view short video clips of Ball State art students demonstrating the making of abstract expressionist works.

In the African gallery, as a person stands in front of a sealed case of Yoruba, Mende, and Kuba masks, he or she will be able to watch video clips of those cultures performing their religious and social rites in full costume, with the music, dancing, and drumming that are essential components of the function and significance of the objects on view. In the Asian galleries, notifications—triggered by position and personal preferences—will appear on visitors' devices alerting them to upcoming events like yoga and meditation sessions, which would encourage return trips to experience the contemplative environment of the museum in a new and dynamic way.

Another virtue of this technology is that it allows visitors to make comparisons between objects that are not currently installed near one another. For example, a visitor will be able to stand in front of the Chinese Buddhist *Standing Kuan Yin* sculpture (13th-14th century), a bodhisattva who represents compassion, relatability, and worldly luxury, and compare it with a more stoic large-scale Japanese sculpture of the *Amida Buddha* (1680). Interactive features will lead the visitor to discover how the various attributes of each religious icon—hand gestures, clothing style, pose, jewelry, and facial expressions—establish the character's distinct role within Buddhism. That visitor can then compare these objects to other works elsewhere in the museum, like the fiercely powerful Hindu creator and destroyer of the world in the Indian *Stele of Shiva as Bhairava* (13th century) and the vulnerable and painful Spanish Christian sculpture of Jesus being crucified (13th century).

Visitors will be able to understand how different cultures around the world visualize deities and how themes of death, afterlife, and salvation are articulated in myriad ways. The app will encourage them to consider such common human themes as they move through the different galleries, and can suggest works of art that may interest them, based on the choices they make within the app.

With data-driven visualization mapping, indoor positioning and way-finding, the experience can change from a linear path into a dynamic exploration of the museum's galleries. The visitor could choose to follow their unique interests. They may choose to investigate such topics as botany, politics, or fashion; or embark upon a scavenger hunt to find like symbols used in art across cultures. The visitor's active engagement determines the path he or she chooses. As brain-based research has found, the act of being engaged in the process of learning "actually increases one's capacity to learn."[6]

Way-finding for museum visitors is achieved through the deployment of over 40 Bluetooth 4.0 Low Energy (BLE) beacons, strategically placed throughout the 25,000 square feet of gallery spaces. The beacons represent a minimal expense for the museum, and the small, autonomous devices tucked behind cases and positioned on top of partition walls avoid any disruption to the aesthetic nature of the galleries. The beacons provide proximity detection or geo-fencing, with an approximate accuracy of three meters, which defines a virtual boundary around a physical location. This geo-fence establishes a point of reference the app can use to push targeted notifications to visitors based on their location within the galleries.

By packaging both technologies within a mobile app, the museum visitor can access more details about focal works within each gallery, follow the patterns and relationships among the works in the entire collection, and know the location of a work of art within the building. Willis, in her research on brain-based learning, states "When graphic organizers help cluster information, the process enhances the brain's natural tendency to construct meaning by forming patterns."[7]

The visitor, along with curators and other museum guests, can discover and associate video, audio, and other media assets with the works of art, allowing them to gain a deeper understanding of the piece and assign their own interpretation. Through these discoveries, cognitive, artistic and personal meanings are assigned to the artwork. This trend also illustrates an important move for museums to develop close ties "with educators and technologists to embrace the opportunities provided by using digital resources to enhance multimodal learning both online and in the galleries."[8] The proliferation of social media and networks provides visitors with the ability to share and discuss their newfound discoveries, while exploring how others see the artwork. With these innovations and new social interactions, the boundaries of the physical museum begin to disappear and new audiences are introduced to the wealth of content the museum has to offer.

Introducing multiple pathways to information using multiple senses (sight, hearing, and touch) provides an opportunity for the information to engage more regions of the brain. The process of cross-referencing of stored knowledge with new information within the brain strengthens the chance of it becoming a new stored memory, improving one's ability to recall what has been learned.

For centuries, permanent art exhibits typically use small wall labels next to each object to display its title, the artist's name, and its dimensions. Many times, the amount of space allocated to the exhibit and the aesthetics of the surrounding gallery limit the ability to lengthen those details beyond the established minimum.

Yet, humans are drawn to images and are compelled to understand their meaning. While viewing a work of art, many questions come to mind: "What is it?" "How was it made?" "What does it mean?" or "Why was it made?" All are typical questions aimed to satisfy one's natural curiosity for meaning. Finding meaning allows visitors to successfully build relationships between known information and new information. As the learning process repeats, the numbers of connections within the brain increase and the new information becomes a memory with connections to other stored memories. [9]

In most cases, the passive wall label standing guard next to the painting, sculpture, or object provides minimal information about the artwork, causing the visitor's natural curiosity for discovery to end. Applying data-driven visualization mapping to the museum's collection with Thinkmap [10] a process is established that allows the visitor to build connections between objects based on the object various attributes. Relationships between similar or seemingly dissimilar objects materialize with the added inclusion of details about the object. Cognitive research suggests, "Whenever new material is presented in such a way that students see relationships, they generate greater brain cell activity and achieve more successful long-term memory storage and retrieval."[11]

For first time visitors, all or most of the information in the museum is new. Using the map however, if one of the relational details about the object touches upon the person's interests (a stored memory), the new

information has a greater chance of moving from awareness to working memory to "relational memory" which occurs as a new piece of information adds to what the [visitor has] already mastered.

"Art is the living production of people and cultures, the expression of social realities and ideals, and a synthesis of deeper thoughts, emotions, needs, fears, and hopes that are common to people of all periods and all places."[12] Merging these new way-finding and mobile app technologies with information about the creation and significance of works of art in museums like the David Owsley Museum of Art will enliven the visitor's experience, making more meaningful connections between people, art, history, and technology.

References

[1] Pocket Proof. "Mobile Strategy in 2013: an analysis of the annual Museums and Mobile survey." Accessed March 20, 2014. http://www.museumsmobile.com/wp-content/uploads/2013/07/MMSurvey-2013-report-V2.pdf

[2] Marin & Marin. David Owsley Museum of Art at Ball State University: Interpretive Plan. October 2012.

[3] Ibid, 3.

[4] Ibid, 4.

[5] Johnson, L., Adams, S., and Witchey, H. The NMC Horizon Report: 2011 Museum Edition. (Austin, TX: The New Media Consortium, 2011), 4.

[6] Willis MD, Judy. Research-Based Strategies to Ignite Student Learning (Alexandria, VA: ASCD, 2006), 8.

[7] Willis MD, Judy. Research-Based Strategies to Ignite Student Learning, 17.

[8] Johnson, L., Adams, S., and Witchey, H. The NMC Horizon Report: 2011 Museum Edition, 4.

[9] Malamed, Connie. Visual Language for Designers (Beverly, MA: Rockport Publishers, Inc., 2011), 9.

[10] Thinkmap, Inc. Software Development Kit. http://thinkmap.com/.

[11] Willis MD, Judy. Research-Based Strategies to Ignite Student Learning, 15.

[12] Art: A World History (New York: Dorling Kindersley 1997), 4.