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PHEON: Practicing Problem Solving and Gaining Museum Literacy from Transmedia and Alternate Reality Games in Museums

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Abstract

The Luce Foundation Center of the Smithsonian American Art Museum ran a transmedia game, called PHEON, as an in-museum scavenger hunt-style game from October 2010 through September 2011. Players took on missions that sent them throughout the Museum's collections. From a summative evaluation of the game, we learned that PHEON supported problem solving skills, increased museum literacy, and helped players connect with the Museum and its resources. Players also identified opportunities for improvement related to the game materials and its narrative. The paper offers a summary of lessons learned for others hoping to deploy an ARG or transmedia game in their learning setting.

Key Words

Alternate Reality Game, Informal Learning, Museum Education, Narrative Play, Serious Games, Transmedia

I. INTRODUCTION

Museums have taken up the charge of creating immersive experiences for engaging visitors in 21st century skills and literacies like critical thinking and problem solving. People need these skills along with opportunities to practice and refine them, in order to succeed in the information age (IMLS, 2009). Alternate Reality Games (ARGs) and transmedia games have been shown to contribute to this type of skill development by bringing together multimedia and storytelling; games that are embedded with a narrative spanning media and real life contexts (Bonsignore et al., 2012a, 2012b; Jenkins 2006; Raybourn 2014).

ARGs/transmedia games initially gained popularity due to their use in marketing campaigns. For example, *I Love Bees* (http://www.42entertainment.com/work/ilovebees) generated excitement prior to the release of Halo 2, a popular video game. In another example, *The Lost Experience* (http://lostpedia.wikia.com/wiki/The_Lost_Experience) game helped keep loyal viewers of the television show, *Lost*, involved between Seasons 2 and 3. Though most ARGs have been designed as marketing tools, these types of games can also provide immersive

learning experiences (Bonsignore et al., 2013; Educause, 2009; Johnson et al., 2011; Niemeyer Garcia, & Naima, 2009). Several learning-based ARGs, including *World Without Oil* (http://worldwithoutoil.org/), *Urgent Evoke* (http://www.urgentevoke.com/; Hawkins, 2010), and *Black Cloud* (Niemeyer, et al., 2009) have shown how ARGs can create compelling learning experiences through complex gaming environments that bridge fictional worlds with real life social issues.

Increasingly, ARGs and transmedia games have found a role in museums (e.g. *Ghosts of a Chance*, http://www.ghostsofachance.com/), public libraries (e.g. *America 2049*, http://america2049.com/), and schools (e.g. the *Arcane Gallery of Gadgetry*, http://www.arcanegalleryofgadgetry.org/). From September 2010 through August 2011, the Luce Foundation Center (hereafter, Luce Center) of the Smithsonian American Art Museum (hereafter, American Art or the Museum) ran an ARG/transmedia game titled *PHEON* (http://pheon.org/, http://apps.facebook.com/playpheon/register/). There were two versions of the game. One version could be played online through a Facebook application. The other was an adaptation of the Facebook game for use in the Museum as a transmedia scavenger hunt-style game. This paper focuses on latter – the in-museum version of the game.

To play *PHEON* in the Museum, visitors arrived on selected days throughout the year or set up a private appointment. Players received a game card of missions and used a text messaging system with their personal mobile devices to complete the missions throughout the Museum (see Appendix A for a complete list of missions players could complete). The primary goal of this version of the game was to help museum visitors increase their familiarity with the Museum's collections, programs, and resources.

This paper presents findings from a summative evaluation of the game, which assessed to what extent and in what ways the game achieved its goal of helping Museum visitors increase their familiarity with the Museum's collections, programs, and resources. The evaluation also sought to uncover what worked well and what didn't about the game to document lessons learned for the future. The study revealed that the game allowed players to connect with the Museum and its collections while creating unique opportunities for group-based problem-solving and improved museum literacy. The study also identified areas for improving the game including spatial orientation in the Museum; usability issues with the text messaging system, game card, and Museum map; and a lack of cohesive game narrative. Taken together, these findings provide a set of lessons learned that others experimenting with ARGs or transmedia learning experiences in a museum context should consider.

II. BACKGROUND

About the Learning Environment

The Luce Center is located in the American Art Museum portion of the National Historic Landmark building in downtown Washington, D.C. The Museum shares this building with the National Portrait Gallery. The first floor of the building is split down the middle and visitors can easily move between the two museums throughout their experience (sometimes without realizing it).

The Luce Center is a visible art storage and study center within the Museum that has its own staff to manage programs and events, providing new ways for visitors to experience American art than in traditional exhibition halls. The Luce Center displays more than 3,300 works from the Art Museum's

permanent collection in 64 secure glass cases. To help visitors navigate these cases, computer kiosks are available among the cases, complete with a searchable database of what is on display. *PHEON* leveraged the entire Museum, but focused specific missions on using the computer kiosks in the Luce Center to help people better understand how to navigate the visible storage space in the future.

Luce Center staff helped create *PHEON* in collaboration with game designers from CityMystery (http://www.citymystery.info/about.php) and antiboredom (http://antiboredom.org/). The game designers consulted Luce Center staff on which pieces of art to include, and ultimately selected the ones they thought would be most memorable and fun. The in-museum version of the game began and ended in the Luce Center, but included missions throughout the Museum. Players could participate in the game once a month on weekends from September 2010 to August 2011, and by appointment through December 2011. *PHEON* enjoyed reasonable attendance, with 802 people participating in 29 game events over the year (this number includes public events and private events by appointment up through the months of the evaluation). By comparison *Ghosts of a Chance*, the Museum's first ARG, had 1,444 players in the first twelve months of the game.

About the Game

A narrative is a critical component of ARGs and transmedia games in order to scaffold the game experience and learning (Harley 2014). *PHEON*'s narrative incorporated a story that involved a secret world, called Terra Tectus, which was inhabited by clairvoyants, or seers. In this world, seers had existed in all facets of life throughout history. With the power to predict the future, they controlled it. Some chose to remain quiet participants while others surged toward power and conflict. The premise of the game was that a battle was raging between two warring factions of seers: the Staves and the Knaves. Staves were idealistic conservators and protectors of the planet. At best, they were stewards, and at worst, they were unyielding. They favored the simplicity of monks and shepherds. Knaves were pragmatic, self-interested seekers of wealth. At best, they were epicures and connoisseurs, and at worst, they were sociopaths. The narrative incorporated characters from history. For example, Hans Christian Ørsted, the 18th-century Danish physicist and father of electromagnetism, was the mentor of one of the story's main characters.

Visitors to the Luce Center competed as either Staves or Knaves. At the start of the game, Luce staff asked visitors a short series of multiple-choice personality questions to determine whether the group aligned with the Staves or the Knaves. Staff members informed players of the Museum rules and gave players an introduction to game, including telling players the Terra Tectus narrative. Player groups of Staves and Knaves would then play in parallel in the Museum, using faction-specific game cards that required them to answer different clues as part of their missions. Each group received a Stave or Knave game card, a handwritten note, map of the Museum, a pencil, and a *PHEON* button to signal to guards and other Museum staff that they were playing the game. At the end of each day of play, Luce Center staff tallied the number of Stave and Knave groups who completed their missions. The outcome of each group's game play was supposed to determine who controlled the fate of Terra Tectus. Appendix A includes the personality quiz used to determine the factions, a description of the game procedures, and a description of each mission which players used their mobile devices to complete.

III. METHODS AND SAMPLE

To understand to what extent and in what ways the game achieved its goal of helping people connect to the Museum, its collections, and resources, we conducted observations and interviews with player groups. We focused on identifying what players did (i.e. which missions they took, how much time they spent, etc.), how they completed the activities (i.e. strategies and approaches to completing missions), and what they thought about the experience, the Museum, and its art afterward. We collected data from three of the six groups that played the game in July 2011 and twelve of the eighteen groups that played the game in August 2011 for a total of k=15 groups. We observed groups of males, females, and mixed groups ranging (by observation) in age from 10 years old 50+ years old. Some groups were family groups and others were friend groups. Groups completed an average of three missions in a single museum visit (ranging from 1 completed mission to 6 completed missions). Each mission took approximately 45 minutes to complete (ranging from 35 to 70 minutes).

In addition to the observations and interviews, we sent a web-based questionnaire to any individual who had played the game during its run and provided an email address for follow-up, allowing us to capture data from a broader sample of players. A total of n=36 individuals responded to the web-based questionnaire, which included five open-ended questions, eleven scaled items, two multiple choice questions, and demographic and psychographic questions (see Table 1, for sample details).

Table 1. Characteristics of the survey participants (N=36)

Characteristics	**Survey Participants % (#)**
Gender	
Female	39% (14)
Male	31% (11)
Missing Data	31% (11)
Works or Studies in the Arts of Cultural Heritage	
No	42% (15)
Yes	31% (11)
Missing Data	28% (10)
State	
Maryland	36% (13)
Washington, D.C.	17% (6)
Other: VA, NJ, NY, GA, OH, CA, WA	19% (7)
Missing Data	28% (10)
Visited am art museum in the last 12 months (including for the PHEON game)	
1-2 times	28% (10)
3-4 times	14% (5)
5-6 times	14% (5)
7+	22% (8)
Missing data	28% (10)
Had heard of the Luce Center Foundation before playing	
No	53% (19)
Yes	47% (17)
Played PHEON as a...	
I'm not sure	31% (11)
Stave	28% (10)
Knave	28% (10)
Both	14% (5)
Knowledge of Facebook PHEON	
Aware that there was a FB version of *PHEON*	50% (18)
Played the FB version of *PHEON*	33% (18)

A. Analysis

Two researchers conducted thematic analysis (Braun and Clarke, 2006) of the qualitative data from the observations, interviews, and open-ended survey questions using an iterative, grounded theory approach (Charmaz, 2006). Each researcher developed themes in parallel, then merged the codes, determined proto-themes, and re-coded for consistency.

Due to the small sample size for quantitative analysis, we used nonparametric statistics to analyze the quantitative survey data to determine if there were group differences based on key variables related to satisfaction and attitudes towards art and the Museum. We did not find any statistically significant differences based on whether respondents had visited the Luce Center before playing the game, nor on whether they held a job or had studied arts and cultural heritage-related topics, so we have combined their responses (rather than separating them into two smaller sub-samples for analysis) and report the findings for the entire group in the sections that follow.

Table 2: Emergent categories and themes

Major Category	Themes
Problem-Solving	Technology literacy Trial and error Team work through division of labor Talking to strangers to advance through the game Group and intergenerational learning Re-reading and re-considering evidence
Museum Literacy	Engaging with staff Connecting with art Connecting with the museum as space Accessing creature comforts Label reading Using museum vocabulary Advanced organizing
Usability	Usability errors Spatial navigation and orientation Narrative Cohesion Satisfaction & Enjoyment

IV. FINDINGS & DISCUSSION

Players showed evidence of practicing problem-solving skills, gaining museum literacy, and displaying enjoyment as three main ways that the game helped players connect to the Museum and its collections. Players also identified areas for improvement in the game related to spatial orientation in the Museum (i.e. wayfinding), usability issues with the text messaging system and the game card, and a lack of cohesive narrative to the game (see Table 2). In the sections that follow, we describe each theme briefly within the context of the existing literature and then illustrate that theme with examples from each of the datasets (observation, interview, and survey) where appropriate.

A. Problem-Solving

Problem-solving skills are critical for 21st century engagement with information (IMLS, 2009). They include sub-skills like technology literacy and individual/group practices related to decision-making and critical thinking, such as trial and error and critical reasoning. *PHEON* offered many ways for player groups to practice these skills within the context of a Museum visit. Players showed technology through use of cell phones and through a learned use of the kiosks in the Museum. The Luce Center kiosks required users to search for artifacts in the visible storage area and learn how to interpret the storage codes.

Groups employed a variety of game-play strategies to solve their missions. Similar to strategies used in other types of mission-based games like *WolfQuest* (Schaller, et al., 2009) or *World of Warcraft* (Steinkuhler & Duncan, 2008), groups applied trial and error, read or re-considered evidence, worked in teams (division of labor), and talked to strangers (other game players) as strategies to solve the missions. Unlike *WolfQuest* and *World of Warcraft*, however, this did not happen in front of a computer screen – the main interface for *PHEON* was the Museum and its collections allowing participants to build connections with the space and its objects.

B. Technology Literacy

Technology or digital literacy is an increasingly important skill for 21st century problem solving, and game play in a museum is one more way to support individuals in this competency. *PHEON* required players to find and use the computer kiosks in the Museum early on. The kiosks provided a digital catalogue of works in the Luce Center with text, audio, and video interpretation. This experience early in the game enabled them to access this literacy strategically at other points in the game. For example, a group of players went to one of the visible storage units in the Luce Center (Case 28b) as part of a mission and looked for the "Preserve Jar" (Preserve Jar with Bilateral Lug Handles, 20th century, John McLuhan, Smithsonian American Art Museum, Gift of Herbert Waide Hemphill, Jr. and Museum purchase made possible by Ralph Cross Johnson, 1986.65.41). After several minutes the group decided to use the computer kiosk and its search tool to look up extra information about the jar and were then able to solve the mission immediately [observation of 2 adults at Knave Quest 1].

Players also demonstrated comfort using cell phones and text messaging in a museum setting, staying focused on the task at hand. We did not observe any players using their phones for anything other than the game, which defrayed concerns that a cell phone-based game might detract from the Museum experience or interrupt other visitors. One visitor noted that the game had just the right amount of technology in it:

"[What I liked most was] the interactiveness with the phone, but also how the game wasn't just texting. The game didn't rely too heavily on the phone, but instead included art and other clues." [interview with 2 adults]

C. Trial and Error

Trial and error is a basic problem solving strategy, which tends to precede other types of critical thinking. It was a common form of initial problem solving that players employed in the game. We observed examples of trial and error in nearly every group. This strategy was most often used within the context of the technologies that were part of the game's interface, i.e. the text messaging system or the computer kiosks in the Museum. If players typed a response into the game system and returned an error, they would continually think up other variations of their response and keep typing answers until they got it right or until they tried another strategy.

D. Re-reading and Re-considering

Once players exhausted their trial and error strategies, they would typically advance to other types of problem-solving strategies; a common one was re-reading or re-considering the mission description or information available. Groups would retrace their steps, re-read the mission clue or the label of the artwork and then re-consider what to do next. Often, visitors skip or skim reading a label, but *PHEON* encouraged them to carefully read and

understand the different parts of a museum label. One group spent time in the *American Experience* gallery looking through every painting and reading all of the labels to try and solve the mission. More than once the group thought they had found the correct artwork, but realized they were wrong. They then re-read the clue and realized they needed to go to the *Folk Art* gallery instead [observation of 1 adult and 2 young people ages 12-17 at Knave Quest 2].

E. Team Work

Team work, in the form of division of labor, was another strategy that groups used when they were stuck. Groups would split up in a gallery space and examine object labels for something related to a clue. For example, one group entered the Lincoln Gallery and once there, they split up. They were thorough, looking at all of the labels associated with artwork in one area before moving on to the next. For another clue, they read the description as a group, then split up to find an artwork that featured rockets [*San Francisco to New York*, 1969, Alexander A. Maldonado, Smithsonian American Art Museum, Gift of Herbert Waide Hemphill, Jr. and Museum purchase made possible by Ralph Cross Johnson, 1986.65.126]. They covered the whole *Folk Art* section and finally found the painting [observation of 1 adult, 2 kids 11 and under at Stave Quest 2].

F. Talking to Strangers

Talking to strangers in art museums is typically a rare event. In most cases, groups or individuals come to art museums and interact silently with the artwork, or quietly with their group members; they rarely come to an exhibit to connect with other people they do not know unless the affordances are made in an exhibit or program for such interaction. *PHEON* proved to be a bridge for "stranger-to-stranger interaction" (Simon, 2010, p. 98) as some groups found themselves looking to other game players, who were easily identifiable by their *PHEON* buttons and *PHEON* related disguises, for help when it came to solving some of the missions (see Figure 1).

Figure 1. PHEON players with map in disguise at the Museum.

For the groups who used this strategy, it was often a last resort. If more than one group of Staves or Knaves was at an artwork at one time, a player from one group might ask a player from another group for help or double check an answer with that individual. Many examples of this occurred at the "License Plate" artwork (Preamble, 1987, Mike Wilkins, Smithsonian American Art Museum, Gift of Nissan Motor Corporation in U.S.A., 1988.39) because it required some amount of time to solve and was located far from the Luce Center, which made help from Luce Center staff difficult to obtain otherwise (see Figure 2).

Figure 2. "License plate" artwork based on the artwork called Preamble (image source: http://americanart.si.edu/collections/search/artwork/?id=27722)

One group asked another group for a hint as they worked through decoding the elements in the artwork shown above [observation of 1 adult, 1 kid under 11 years old at Knave Quest 3]. Stranger-to-stranger interactions also occurred indirectly when groups saw other players wearing the fake mustache or tie that was an element of the game, identifying the group as either Staves or Knaves. Two groups bumped into each other in the elevator and joked about how small the elevator was, but how grateful they were to not have to take the steps again [observation of 2 adults at Knave Quest 3].

G. Group and Intergenerational Learning

People often visit museums in groups. Packer and Ballantyne's study (2005) showed that while there is no learning advantage to visiting in a group versus visiting alone, group visits afford certain opportunities, like the sharing of ideas. Museums have the chance to capitalize on the unique dynamics of group learning for their visitors through unique interpretive strategies and programs. *PHEON* was deliberately designed in a way that working as a group would be more beneficial than working alone. Players displayed evidence of *group and intergenerational* learning in several ways. Some of the strategies described above (e.g. trial and error and team division of labor) were examples of ways that group learning occurred. In other scenarios, groups stayed together the whole time and truly working together to solve each mission. Though older individuals would often take a leadership role, younger players often helped with the text messaging system and contributed equally to mission completion. In all examples, every member of the groups we observed found themselves enjoying the successful completion of different missions.

In one group the adult male photographed the adult female and young female working together. The adult female texted the next clue, then listened to the recording and started laughing. The young girl worked with her to send the text again and then the adult female responded to the clue's request to sing a song. The adult male laughed and both he and the young girl demanded that she sing the song again. They continued to the next quest still laughing [observation of 2 adults, 1 kid 11 and under at Knave Quest 3]. In another example, one group member found the correct sculpture, called the others over, and they quickly solved the mission together [observation of 1 adult, 2 kids 11 and under at Stave Quest 2]. In a final example, one group mentioned in their interview that one of the best things about their experience playing *PHEON* in the Museum that day was in fact "working together" [interview with 2 adults].

H. Museum Literacy

"Museum literacy" is a concept that emerged in the 1980s and parallels other popular literacy concepts such as "computer literacy" or "library literacy" (Stapp, 1984). Literacy is a competence in understanding the language of a system and a familiarity with the system's environment. The concept has evolved to include reading the world around us, not just text (Hull, et al. 2003). Museum literacy, therefore, is a competence in understanding the language of objects and collections through labels and other interpretive devices (e.g. public programs, games, computer kiosks, museum staff, etc.) as well as the space itself.

PHEON engaged players in the Museum through clues and missions that forced them to understand and read labels and look carefully at artworks. Players demonstrated museum literacy through advanced organizing practices, engaging with staff, connecting with art, connecting with the Museum as a space, establishing a sense of ease in the environment by accessing creature comforts, and learning new terminology.

I. Advanced Organizing

Visitors often engage in museum literacy before they even step into a museum through a process of advanced organizing. Players reported *advanced organizing* activities such as reading about the game online and other pre-arrival activities to prepare for their visit and their game play. Several had played the Museum's previous ARG, Ghosts of a Chance. One such group had been waiting to play *PHEON* as a present for their daughter's birthday. In another group, one participant had already played *PHEON* as a Stave and brought his brother back to play as a Knave and complete new missions. They enjoyed the experience so much that they played all three Knave missions and then all three Stave missions in succession [observation of 2 adults]. Another group felt they "needed to get out of the house" and so went on the Museum's website and looked at the calendar to see what was on offer. One of the younger females in the group had played the online game through her mother's Facebook account and was excited about the prospect of playing in the Museum [interview with 1 adult, 1 young person 12-17, 2 young people 11 and under].

J. Engaging With Staff

Similar to talking to strangers in museums (see previous section), visitors may avoid engaging with museum staff proactively during their visit. This phenomenon is observed even in living history museums, where the interaction between visitor and staff member (interpreter) is deliberate (Association for State and Local History, et al., 2009, p. 62). *Engaging with staff* in *PHEON* took the form of game players asking for help not only from Luce Center staff members, but also security guards and information desk attendants located throughout the Museum. One activity within the game required participants to make a funny face at the Museum staff member in order to advance through the game.

Outside of the narrative, several groups engaged with Luce Center staff by asking where they could find the computer kiosks [observation of 1 adult, 2 young people 12-17 at Knave Mission 1; observation of 2 adults at Knave Mission 1; observation of 2 adults, 1 young person 12-17, 1 kid 11 and under at Stave Mission 1; among others]. Other players asked security officers for help finding their way around when Luce Center staff were physically farther away [e.g. groups Stave Mission 1]. Some groups even engaged staff in the mission and a discussion about the artwork. For example, one group showed a security officer the text message for the mission. The

security officer directed the group to the driftwood horse in the *Lincoln Gallery* and read the label with them. While the group completed the required task of creating a foil sculpture to look like the sculpture, the adult male in the group discussed some of the interesting things his group had seen in the Gallery to the security officer [observation of 2 adults, 1 young person 12-17, 1 kid 11 and under at Stave Mission 1].

K. Connecting With Art

Connecting with art was a literacy we observed and that players described specifically in interviews and surveys. Player responses indicated that the game helped them notice new artworks, engage with artworks deliberately, and connect art to other life experiences. They also described learning something new, recalled objects and galleries after the fact, and from time to time, let the art overshadow the game play, which is directly in line with the Museum's primary goals for *PHEON*. Specific missions required participants to engage with art directly. Two examples, which participants particularly enjoyed, involved one mission that required players to find a specific sculpture in the *Lincoln Gallery* and reproduce it using a piece of foil [Stave Mission 1] and another mission required players to "read" the sheet music on a painting and then call the cell phone system and sing their own rendition of the song.

Players also engaged with art serendipitously as they went through their missions. Individuals broke away from their group to investigate an artwork or installation more closely [observation of 1 Adults and 1 kid 11 or under at Knave Mission 1]. Another group had solved a clue, but rather than rushing towards the Bierstadt painting (*Among the Sierra Nevada, California*, 1868, Albert Bierstadt, Smithsonian American Art Museum, Bequest of Helen Huntington Hull, granddaughter of William Brown Dinsmore, who acquired the painting in 1873 for "The Locusts," the family estate in Dutchess County, New York, 1977.107.1) which was the next location in the game, they took their time looking at art along the way [observation of 1 adult, 1 young person 12-17 at Knave Mission 1].

In interviews, participants recalled gallery names and specific paintings, and described new things they had learned. For example, one participant exclaimed, "The horse [was the most interesting artwork]! [It was] hard to find. We walked passed it. [We] never would have known it was bronze" (*Monekana*, 2001, Deborah Butterfield, Smithsonian American Art Museum, Gift of the American Art Forum, Mr. and Mrs. Frank O. Rushing, Shelby and Frederick Gans and Museum purchase © 2001, Deborah Butterfield, 2002.3) [interview with 2 adults, 2 young people referencing Stave missions]. Another said, "[There were] lots of interesting pieces. [We] liked the Folk Art throne…even though it wasn't part of the game" [interview with 2 adults who played as Staves referencing *The Throne of the Third Heaven of the Nation's Millennium General Assembly*, ca. 1950-1964, James Hampton, Smithsonian American Art Museum, Gift of anonymous donors, 1970.353.1). Another individual commented that he did not know that Samuel F. B. Morse (of Morse code) used to be an artist and said that was the most interesting thing he had learned [interview with 1 adult referencing Stave missions].

Participants in the web-based survey also recalled the most interesting thing that they saw while they visited the Museum to play *PHEON*. The vast majority of respondents (83%, n=30) recalled an artwork, gallery, or event by name or through description. Even participants who played the game nearly a year before they took the survey remembered artwork related to the missions, especially the *Monekana* (Deborah Butterfield), the Roszak (*Recording Sound*, 1932, Theodore Roszak,

Smithsonian American Art, Museum, Museum purchase, 1989.25), Mrs. Adams (*Mrs. John Quincy Adams*, ca. 1824, Charles Bird King, Smithsonian American Art Museum Adams-Clement Collection, gift of Mary Louisa Adams Clement in memory of her mother, Louisa Catherine Adams Clement, 1950.6.5) (n=1), and the *Folk Art* gallery in general, as shown in the examples below:

"the cool metal dinosaur sculpture in the modern art area. Got a neat photo of our group by that" [survey participant, played *PHEON* in September 2010]

"I loved walking through the Folk Art section" [survey participant, played *PHEON* in September 2010]

"recording sound by Roszak" [survey participant, played *PHEON* in January 2011]

"Mrs. John Quincy Adams painting" [survey participant, played *PHEON* in August 2011]

Others mentioned things that were not directly connected to the game, such as: "they had a painting exhibit of insects" referencing the exhibit "Alex Rockman: A *Fable for Tomorrow*" [survey participant, played *PHEON* in May 2011]. Another play mentioned, "The sculpture installations took me a little off guard since everything else seemed mostly traditional, but after passing by them a few times I became more interested" [survey participant, played *PHEON* in October 2010].

A couple others commented on the experience more broadly highlighting the range of prior knowledge individuals walked in with and how that affected their experiences:

"I already have a fair bit of art-historical knowledge and specific knowledge about many pieces in the Museum, so it was fun to draw on that knowledge in a whimsical competition with some really smart college students." [survey participant, played *PHEON* in April 2011]

"Some of the clues felt very engaging and it was fun to know that others in the Museum shared my inexperience with the subject matter rather than feeling intimidated by the artwork or those who understood it better than we did." [survey participant, played *PHEON* in October 2010]

L. Connecting with Museum as Space

Not only did participants connect with art explicitly through the game and through other serendipitous encounters, but they also connected with the Museum as a space. Players reported seeing parts of the Museum they never would have seen before or had not expected to see. They indicated that they experienced the art museum in a new way and still found artworks that they had been hoping to see unrelated to the game. Several groups walked through the *Robert and Arlene Kogod Courtyard* and pointed at the ornate ceiling, admiring the space although it was not a specific component of the game [observation of 2 adults at Knave Mission 3]. One girl also mentioned, "Some of it was silly. It was an excuse to be silly in a museum" [interview with 1 adult, 1 young person 12-17, 2 kids 11 and under]. Another participant said that it was enjoyable to have "Exposure to new parts of the Museum—parts [he'd] never paid attention to [before]" [interview with 1 adult, 1 young person 12-17].

Some survey participants listed experiencing the space as the thing they most enjoyed about *PHEON*. A few representative examples include:

"[I most enjoyed] *how it got me around to different parts of the Museum that I may not have seen before.*" [survey participant, played *PHEON* in May 2011]

"[My favorite part was] *discovering parts of the Museum that we would not have explored*" [survey participant, played *PHEON* in April 2011]

M. Accessing Creature Comforts

Accessing benches, coffee, and other comforts is a useful component of museum literacy because it displays a level of comfort with the space and it may help reduce museum fatigue, which can cut museum visits short or lead to feelings of dissatisfaction following a visit (Davey, 2005). Game players typically completed three missions, each averaging 45 minutes in length. In order to maintain stamina, players accessed benches, chairs, elevators, and the free coffee provided in the Luce Center. This museum savvy helped them complete the game and stay for more than two hours per visit, on average.

N. Label Reading

Label reading is also an important skill, particularly in art museums, because it is the primary language or interpretive medium used to convey information about an artwork. Studies have shown that visitors have difficulty attending to both objects and labels simultaneously and may skim or skip reading many labels (for example, see Bitgood, 1993 and 2000). In addition, we know that learners construct new meaning when learning through reading and interpreting texts and other sources, such as objects (Eakle & Brooke, 2008). As an explicit component of playing *PHEON*, players had to look closely at labels to solve missions, in many cases re-reading labels to ensure they had not missed anything. In some instances, as described above, participants would read the labels of nearly every painting in a gallery hoping to solve a mission, inadvertently practicing an important piece of museum literacy.

O. Terminology

As a by-product of label reading (described directly above) and technology literacy (previously described), participants also demonstrated a range of understanding about different types of terminology or concepts. While many players knew where the Luce Center was located and knew how to find a computer kiosk, others were less aware of these concepts. One mission in particular helped players learn how the Luce Center used case numbers (Stave Mission 3), which is an important element of understanding how to find artwork in an open storage facility.

P. Usability

In order to better understand what worked and what did not about the game, we assessed factors related to usability that arose as we observed, interviewed, and surveyed players. Usability includes the learnability of systems (how quickly users learn the system); efficiency of use (how quickly a user who knows the system can use it); memorability (how easy the system is to remember the next time it is encountered); error frequency and severity (how often do users make errors and how serious are they); and overall user satisfaction (U.S. Dept. of Health & Human Services, usability.gov, N.D.). Usability errors in all of these categories occurred with the text messaging system, the game card, and the Museum map. Despite these challenges, overall satisfaction for the game remained high. The game's narrative showed the greatest room for improvement.

Q. Usability Errors

Usability issues emerged related to the text messaging system, the game card, and the Museum map. At times, issues with one or more elements conflated each other and were hard to separate. In one example, the team was able to find the painting

of interest right away, but was confused about how to solve the mission. They texted the answer at first instead of completing the interim step of singing into the phone [observation of 1 adult, 2 kids under 11 at Stave Mission 2]. Though they had successfully solved the mission, usability issues related to instructions and understanding the game system prevented them from advancing through the game several times.

Game card descriptions used abbreviations and gallery labels that were not always easy to decipher since they were not labeled on the map. Once inside the Museum, the north, east, south, and west orientations became difficult to maintain mentally. In addition, one description referred to "2N", which confused several people because the previous missions used a slightly different notation (e.g. E252, representing the direction first, then the floor, and then the room number). One group thought "2N" (mentioned in a mission) referred to a case number in the visible storage area in the Luce Center rather than the second level north end [observation of 2 adults at Knave Mission 3].

These usability issues some times resulted in players feeling embarrassed or uncomfortable. For example, one group had the following conversation, which was representative of the issue:

> Female: I feel like an idiot right now.
> Young male: How long has it been?
> Female: an hour.
> Young male: an hour!
> Female: I'm embarrassed. I don't want to ask [for help], but I'm ready to quit. I'm not asking. You have to ask. I'm too embarrassed. [observation of 1 adult, 1 young person 12-17 years old at Knave Mission 1]

Wayfinding in the Museum was a challenge more broadly as well. As described earlier in this paper, the American Art Museum shares a building with the National Portrait Gallery, and the division between the two in the physical space is not very distinct to the casual visitor. Many players spent time going through the National Portrait Gallery during gameplay without realizing that they were in a space that would not contain any clues to the game. This is an ongoing challenge for the two museums, however, a game like PHEON affords the opportunity to help reduce this confusion by making distinctions to players within the game's narrative, which was a missed opportunity. For example, perhaps the Portrait Gallery could have represented some "bad" location within the Terra Tectus world and if players wished to successfully complete their missions they would need to carefully avoid that area.

Players had difficulty interpreting the American Art Museum map within the context of the game. PHEON required that individuals find stairwells, which were not clearly marked on the map, and required that they move between floors constantly (one of the least favorite components of the game described by survey participants). The map's horizontal layout created a disconnect the real world and the alternate reality created by the game. A map designed specifically for the game, which highlighted the less-traveled spaces of the Museum would have removed this obstacle without detracting from game play.

Many groups repeated the same mistakes over and over again, resulting in a frustrating and aggravating experience for players. One member of a group commented loudly and with frustration, "This map sucks!" [observation of 2 adults during Stave missions]. Another woman threw up her hands in the air two times when in the Great Hall, because she felt like she was going in circles [observation of 2

adults during Knave missions]. A third group had the following conversation:

> Male: This museum is really confusing me.
> Female: This isn't right.
> Male: I don't think so either, but it said 'leave the Luce Center'.
> [observation of 2 adults, 1 kid 11 and under]

R. Narrative Cohesion

Another major challenge in the game was that participants were unsure of the purpose of the narrative that staff members shared with them at the beginning of the game. The missions did not always bring players back into the story line and some groups simply forgot the narrative shortly after starting the game. Even though the in-museum game was intended to be a more like a scavenger hunt-style transmedia game rather than a full-fledged ARG, participants had other expectations. One group described the following:

> Female: I liked the story better in Ghosts of a Chance. It stayed with the narrative better. [PHEON] lost the narrative.
> Male: Yeah it mentioned [Terra Tectus] a few times in the beginning but then it just dropped off. [interview with 2 adults, 1 kid 11 and under]

Another group had no idea whether they played as Staves or Knaves when a researcher approached them during their third Knave Mission, indicating a lack of "sticking power" for the narrative. During a follow-up interview the Adult Female mentioned that she was not sure she understood the story behind the game [observation and interview with 2 adults for Knave missions].

Survey participants also mentioned that there was a lot of opportunity to improve how the narrative mixed with the game play:

"[The game needed] *a more intriguing plotline, more realistic situations that makes the story believable.*" [survey participant, played *PHEON* in April 2011]

"[The game needed] *more of a connection between the game play and the back story re: Terra Tectus and the two worlds"* [survey participant, played *PHEON* in September 2010]

"*Ghosts of a Chance was good because you could believe the Museum was haunted, but maybe PHEON was too much of a stretch and we all just acted silly instead, including the staff. If it's supposed to be a family game, might as well make the storyline a bit more family-friendly as well (I don't think people on my team cared much about it anyway)."* [survey participant, played *PHEON* in October 2010]

"*...More pervasive narrative instead of one paragraph of mythology at the start that had almost nothing to do with playing the game. Feeling like our actions were heroic or important to something (e.g. the preservation of the Museum)."* [survey participant, played *PHEON* in May 2011]

S. Satisfaction and Enjoyment

Despite some challenges with the game materials, players demonstrated and reported a great deal of satisfaction and enjoyment with the game. We observed players jumping up and down, pointing excitedly at an artwork, and exclaiming when they solved a mission. They reported that the game was challenging and stimulating. In a follow-up interview, one group said they would play additional versions or levels of the game if they were made available, "Because it [was] fun, challenging, stimulating, but not overwhelmingly so" [interview with 2 adults, 2 children 11 and under]. Players stayed longer in the Museum in order to finish the game, often playing multiple levels and solving all of the missions.

Players were motivated and made more determined by the prospect of prizes like the fake mustaches and stamps that they received on their game cards.

Further, survey participants rated their satisfaction with the game high, with an average 8.2 out of 10 (standard deviation = 1.30) on average. Participants also indicated that they were likely to recommend the game to a friend with an average rating of 5.8 out of 7. Overall players found the game to be an exciting way to engage with art (M=5.94 out of 7) and made people want to play additional versions or levels (M=5.67 out of 7). Respondents also reported that it was challenging (M=5.86 out 7) and enjoyable (M=5.80 out 7). See Table 3 below for a summary of average scores for the scaled responses.

Due to the small sample size, we used nonparametric statistics to analyze the quantitative survey data to determine if there were group differences in satisfaction or attitudes based on demographic variables like gender or game variables like whether the group played as Staves or Knaves. We did not identify any statistically significant differences based on whether respondents had visited the Luce Center before playing the game, nor on whether they held a job or studied arts and cultural heritage-related topics.

Participants who were extremely satisfied were more likely to say that *PHEON* was a more exciting way to engage with art and objects compared to other museum experiences ($r(35)=0.71$, $p<0.01$); to say that *PHEON* allowed them to see objects they never would have found in the art museum on their own ($r(35)=0.39$, $p<0.05$); to say that playing *PHEON* made them feel more comfortable visiting an art museum ($r(35)=0.50$, $p<0.01$); to find the game enjoyable ($r(35)=0.68$, $p<0.01$); and to be likely to recommend *PHEON* to a friend or family member ($r(35)=0.66$, $p<0.01$).

Table 4: Survey participants' ratings for scaled items in survey (N=36)

Attitudes towards *PHEON* (scale 1-7)	**Mean**	**SD**
Scale 1-7, 1= strongly disagrees, 7= strongly agrees		
PHEON was a more exciting way to engage with art and cultural objects compared to other art museum experiences I've had.	5.94	1.26
If there were additional versions or levels of PHEON to play in the Museum, how likely would you be to play them?	5.67	1.41
PHEON allowed me to see objects I never would have found in the Smithsonian American Art Museum on my own.	5.50	1.59
Playing *PHEON* made me feel more comfortable visiting an art museum than other art museum experiences I've had.	4.92	1.66
I felt strange playing a game like this in an art museum setting compared to other art museum experiences I've had.	3.44	1.70
Scale 1-7, 1=not very and 7=extremely		
How appropriate did you feel an art museum was for playing a game like this?	5.86	1.33
How enjoyable did you find the game?	5.80	0.87
How challenging did you find the game?	4.37	1.50
How complicated did you find the story line?	4.40	1.74

Participants who played both as Staves and Knaves (6 missions instead of 3), were more likely to rate the game as challenging compared to individuals who played as only one type or who could not remember for which team they played ($\chi 2(3)=7.832$, $p<0.05$).

Males were more likely to indicate that it felt strange to play a game like PHEON in an art museum setting compared to other museum experiences they have had ($U=33.50$, $p<0.05$, $r=0.49$). Further, people who did not feel that the Museum was an appropriate place for a game like *PHEON* also indicated that they felt strange playing a game like *PHEON* in an art museum ($r(35)=-0.35$, $p<0.05$). Their perceived role of art museums and patron behaviors may have clouded their ability to feel comfortable playing the game in the Museum.

We found significant positive correlations between age and reported interest in playing additional levels of *PHEON*, if they were offered ($r(25)=0.41$, $p<0.05$), and reported likelihood to recommend the game to a friend or family member ($r(25)=0.52$, $p<0.01$).

V. CONCLUSIONS & LESSONS LEARNED

This paper describes the results of a summative evaluation that used observations and interviews as well as a web-based survey of players to learn more about the experience of playing PHEON in the Museum context. The in-museum game achieved the right balance of technology, game play, and connections to art to support a series of outcomes related to problem-solving and museum literacy, while also supporting enjoyable experiences for visitors of all ages. Listed below is a summary of the key findings from this study:

- *PHEON* encouraged visitors to stay in the Museum for a long time. Players frequently stayed over two hours to complete an average of three missions.
- In order to complete missions, teams found themselves accessing and practicing critical thinking and problem solving skills through trial and error, team work, intergenerational learning, and other practices.
- Participants exhibited and practiced museum literacy by applying advanced organization skills (e.g. planning their trip ahead of time using the website and other tools), engaging with staff, connecting with art, connecting with the Museum as a space, establishing a sense of ease in the environment (e.g. accessing benches, coffee, and other comforts), and using museum terminology.
- The interaction between the game missions and the artwork created a memorable experience. Even participants who played the game a year ago were able to remember artwork and galleries that they encountered by playing the game.
- Participants reported that *PHEON* was a more exciting way to engage with art and objects compared to other museum experiences and that PHEON allowed them to see objects they never would have found in the art museum on their own.
- Usability errors occurred with the text messaging system, the game card, and the Museum map. These issues affected the overall visitor experience by reducing efficiency of game play and increasing user frustrations.
- Despite usability challenges, overall satisfaction for the game remained high.
- Navigating the game with the Museum map was a major challenge for all groups because the game card emphasized hidden stairwells and room numbers, while the map emphasized gallery names and collections that were not always apparent in the physical space.
- Integrating the narrative into the game play was an area for improvement. The narrative needed to be more cohesive between the missions and better connected to the Museum and its collections.

Based on these findings we identified the following lessons learned to share with others who might embark on a similar in-museum transmedia game approach:

- Problem-solving: The gaming elements of *PHEON* supported problem-solving skills important to 21st century literacy. The use of a mission- or clue-based game required participants to access critical thinking and problem solving skills. The level of difficulty of the missions was ideal for groups, and the integration of technology through the text messaging system supported intergenerational learning. All of these elements contributed to the success of the game for groups that played it.
- Museum literacy: Terms that are common in a museum setting are often foreign to visitors. Examples from this study included "kiosk", "Luce Center", "accession number", and directional labels like "2N". The results showed that the game helped participants learn these concepts and reuse them again later in the game, but the initial learning curve often negatively affected game play. If new terms are used, consider providing a glossary along with the game card to support both game play and museum literacy. Test the game card with visitors prior to game launch to identify what terms need defining.

  The study also showed that players engaged with museum staff at different points throughout the game. Because staff members have expertise and knowledge that can support a positive museum experience for visitors, increased comfort talking to museum staff is a desirable outcome. Incorporating staff directly into the narrative was a successful strategy for supporting this outcome.

  Most importantly, the game encouraged visitors to connect with art through the missions themselves and also serendipitously as visitors moved through spaces they had never seen before, or had not intended to visit. They connected with the space of the Museum, admiring architectural features and gaining comfort in the environment. These are mission critical goals for many arts institutions and the use of an immersive game to achieve these ends was very successful.
- Usability: The difficulty of a game should be determined by the complexity of the storyline and the challenging nature of the missions and not by factors related to interpreting the game card or figuring out how to use the text messaging system. Structural elements of the game should fade into the background so that players can immerse themselves in the storyline and with the art. This study uncovered usability issues with the game card and text messaging system that might have been mitigated through remedial usability testing earlier in the game's implementation. Such planned, iterative testing is critical to the success of complex games.

  The Museum map posed substantial usability challenges to the players. Every single group that played the game struggled with the map. The decision to use an existing tool like the map was resourceful, but the needs of the game did not align well enough with the map's layout and labeled features. Adapting or augmenting the Museum map for future games and incorporating the game's narrative into the map may help with wayfinding as well as the cohesiveness and continuity of the storyline.

- Narrative: At first it seemed the complex narrative Might have been an issue affecting players' experiences. The results showed, however, that visitors did want a complex narrative; they just wanted it to be integrated better into the game. In order for a complex narrative to succeed, it needs to connect to each mission and artwork in the game and do so in a way that progresses the story and its plot. Narratives that relate explicitly to a museum context might be more ideal than something more fantastical or science fiction-oriented like PHEON's narrative.

Overall, the findings suggested that the format of PHEON as a transmedia, scavenger-hunt style game was a good model for in-museum game play to encourage problem-solving skills and increased museum literacy. The findings did not provide conclusive evidence for why the game was not better attended in the Museum, but it did point to possible areas for improvement related to the narrative and usability, which may have had an impact on word-of-mouth marketing from visitors who played the game, though that is speculation.

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VII. APPENDIX

A: GAME DESCRIPTION

Prior to game

1. Staff alerts other museum staff (security, custodial, information desk volunteers) of game in case they get asked unusual questions by players and so that they do not remove clues.
2. Staff members set up game by placing clues throughout the Museum. Staff members monitor the clues during game duration and replace clue (for example, tin foil sheets) as necessary.

At Registration Table

1. Staff administers knave/stave questions to establish which game they will be playing (knave or stave). Staff asks participants 3 of the questions from the list and mixes it up so that different groups are asked different sets of questions:

   Which would you rather pig-out on?
   - Salted peanuts (Stave)
   - Cupcakes (Knave)

   When you meet someone new, do you:
   - Compare him/her to someone you already know. (Stave)
   - Zero in on how unique he/she is. (Knave)

   You witness a crime, which would you do?
   - Take off, and once out of danger call the police. (Stave)
   - Physically intervene. (Knave)

   You're having a dream about fishing, are you?
   - Wading in a stream. (Stave)
   - On a boat in the middle of the ocean. (Knave)

   If you have a choice, which route do you take?
   - Uphill (Stave)
   - Downhill (Knave)

   Which would you rather untie?
   - A knot (Stave)
   - A bow (Knave)

   If you played professional football, which squad would you be on?
   - Defense (Stave)
   - Offense (Knave)

   You like someone. Do you show it by buying them—
   - Candy (Knave)
   - Flowers (Stave)

   A flower you identify with.
   - Daisy (Stave)
   - Rose (Knave)

   Shoes you prefer to wear.
   - Running shoes (Stave)
   - Boots (Knave)

   Your favorite drink.
   - Soda (Knave)
   - Juice (Stave)

   Would you prefer spending a day
   - At a spa (Knave)
   - Hiking (Stave

2. Staff member informs player of museum rules and gives introduction to game, including telling players the Terra Tectus narrative.
3. Each team receives a knave or stave game card, a handwritten note, map of the Museum, and a pencil. Each player receives a button.

Knave Mission 1

1. The player has a knave game card and a small handwritten note that says "INVISIBLE FORCES" on one side, with a nice message from a previous player on the other (players write anonymous notes at the completion of all three missions). The player texts PHEONPHEON to 56512 to set up with Guide by Cell.
2. The game card directs the player to search for "Invisible Forces" on a Luce Center kiosk (keyword search). They find *After Wood* (1990.46a-b). In the media section is a file named "Terra Tectus, the Great, is Fallen!" Game card instructs player to write down "Terra Tectus."
3. Game card directs players to *Babylon, The Great, Is Fallen* in Folk Art on the 1st floor West. They are directed to text "what waters =" to 56512. Players text "nations." (The painting includes text that says "waters = nations")
4. Players receive text that tells them to turn around and look behind the pedestal. They find a box with tickets. The ticket directs them to *Among the Sierra Nevada* (1977.107.1). The ticket also includes a confirmation code: NCHCAGVVG.
5. Player goes to *Among the Sierra Nevada* on the second floor. The game card leads them to decode the confirmation code to get "LAFAYETTE." (A=Y, H=F, C=A, etc. subtract two from each letter to get the answer. Players might find it helpful to write out the alphabet)
6. Game card instructs players to find "LaFayette" in the Luce Center in case 20B (They find out the case number by adding the number of deer in the painting (7) to 13, per game card).
7. They find a sign near *Head of Marquis de Lafayette* tells players to go to the Registration Table and make "the face you'd make if you suddenly found yourself in Terra Tectus."
8. If the player makes a good face, the Museum staffer stamps the "1st quest" part of the game card and says: "That's a great face! But you will need to disguise yourself as a stave for the next mission." Staffer gives each player a skinny tie.

Knave Mission 2

1. Players wear their skinny ties. The ties say "35 Year Portrait" on the back. Game card instructs players to look for the "Preserve Jar" in case 28B.
2. A sign on case 28B near the jars tells players to look for the sculpture named on the back of their tie. The game card hints that it is in the Lincoln Gallery.
3. Players find *35 Year Portrait* (2005.5.2) in the Lincoln Gallery. The game card asks them to text missing word to 56512. Players text "Virgo" to 56512
4. Players receive a text that directs them to find "H&H" in room S222. They find *Hermia and Helena* (1990.21). Game card asks them to text the "latest year this work may have been painted"
5. Players text "1817" to 56512. The text response tells them to find *San Francisco to New York* (1986.65.126) on the first floor (folk).
6. Game card asks them to call 202-595-1193 and enter how many feet below the surface the rockets are (160, from the painting). The audio prompt gives directions to the plants in the "Moran's West" area on the 2nd floor. It tells them to find a Stave message in one

of them, instructs them not to take it, but to memorize it. Game card tells them to return to Luce with the message.

7. Players find message in plant near Moran's Yellowstone paintings.
8. Player must whisper the message: *Preserve the past to protect the future – Staves!* to a staffer.
9. If they whisper the message correctly, staffer stamps the "2nd quest" part of the game card and retrieves the skinny tie.

Knave Mission 3

1. Game card directs players to the bottom of the West Stair Tower, where there is a VIP poster on the wall and a flashlight nearby.
2. Game card directs player to take a flash photo or to use the flashlight in order to see a hidden message written in glow in the dark paint on the poster. The message says: HALL 2N / RECORDING / ROSZAK
3. Players find *Recording Sound* (1989.25) on the 2nd floor in the north hallway. Game card asks them what kind of music the tiny figure in the piece is singing. Players must read the gallery label to discover that the answer is "opera", which they text to 56512.
4. Text response tells them to find the "early 1st lady of our republic, playing a harp on the 2nd floor (E252)." Players find *Mrs. John Quincy Adams* (1950.6.5).
5. Game card asks them to call 202-595-1193, press 0#, and sing what they imagine is the tune to "Oh Say Not A Woman's Heart is Bought" – the sheet music in the painting.
6. Voice message after the recording sends players to the first floor, south wing, to find a painting by a "Dove" of a source of light.
7. Players find *Sun* (1989.83.3). Game card instructs them to text "sun" to 56512. Response is a coded message that reads: AZ 1, AK 1, IN 4-5, DC 2-3, SC 1-2, VT 2, AZ 2, CT 1-2, OK 4-5
8. Game card tells them to go to the 1st floor, north wing, around the corner from the gift shop to decode the message. Players decode the message using *Preamble* (1988.39) – "AZ 1" means the first letter on the Arizona plate, "IN 4-5" means letters four and five on the Indiana plate, etc.
9. The decoded message is "OPTIMAL INFINITY." Game card directs players back to the Luce Center.
10. Players are directed to write down the decoded message (Optimal Infinity) on a piece of paper, and to write a pleasant message to the next player on the back. Once they've done this (and got the code correct) they receive their final stamp.
11. Players ring the bell and enter their team name on the scoreboard.

Stave Mission 1

1. The player has a stave game card and a small handwritten note that says "OPTIMAL INFINITY" on one side, with a nice message from a previous player on the other. The player texts PHEONPHEON to 56512 to set up with Guide by Cell.

2. The game card gives the players a key to rearrange the letters in "OPTIMAL INFINITY" to read "IMITATION FLY PIN."
3. Game card directs players to search for "Imitation Fly Pin" on the Luce Center kiosks. They find *You're Perfect* (2000.4).
4. Game card directs players to read the label to find the word "magnetism" and to text this to 56512. The response leads them to find "a painting of magnetic phenomenon" on the second floor.

5. Players find Aurora Borealis (1911.4.1) in E235. Game card directs them to text the last name of the explorer whose sketches served as inspiration for this painting.
6. Players text "Hayes" to 56512. Response leads them to Monekana (2002.3) in the Lincoln Gallery. They find foil nearby (under the bench) and the game card directs them to create a foil sculpture of Monekana and return it to the Luce Center.
7. Players submit their foil sculptures. Museum staffer stamps the "1st quest" part of the game card and says "Great work on that horse! You will have to disguise yourself as a knave for the next mission." Staffer gives each player a fake mustache.

Stave Mission 2

1. Players wear their fake mustaches. The mustaches have "Spy" written on the back. Game card directs players to text "spy" to 56512.
2. Text response instructs players to find The Man with the Cat on the 2nd floor, east wing. Players find Man with the Cat (1952.10.1) in E231.
3. Game card directs players to record which of the man's hands is visible (the left) and which is hidden (the right). They then follow the directions on the game card to the top of Stair 3.
4. A sign at the top of the stairwell directs players to return to the Luce Center and locate a "Knave agent" by searching for "effigy" on the kiosks.
5. Players find the painting of Wee-ke-ru-law, He Who Exchanges (1985.66.121) in case 3A in Luce. A sign on the case instructs them to go to the Courtyard and look under the chair with the blue tape. (Note, there will be two chairs with tape).
6. A sign on the bottom of the chair sends them to look for "A New York Lady on this floor – it's Art, Folks!" Players find Statue of Liberty (1997.124.74). Game card directs them to call 202-595-1193 and enter how many points are on her crown (7). (Note that there are two statue of liberty artworks, but they both have 7 points in the crown).
7. Voice prompt tells player to avoid capture by returning to the registration table and dance as outrageously as they can to prove their knaveishness.
8. A staffer verifies the dancing with a signature and then stamps the "2nd quest" space on the game card and retrieves the fake mustache.

Stave Mission 3

1. Game card directs players to *An American Puzzle* (2006.2) to find the word that comes before "Extra Heavy Flannel" (buffalo). Players note down buffalo as a keyword.
2. Game card sends players to Case 36A. A sign on the case instructs them to find a bust on the second floor of the man that helped to invent Morse code.
3. Players find *Samuel F. B. Morse* (1919.1.1) in the south hallway of the 2nd floor. The game card tells them to call 202-595-1193 and enter the year in which this bust was made (1831).
4. Players enter 1831# and hear an audio response that gives them a piece of Morse code: (first character: ...—second character: ._. third character: -..) They write this down on the game card.
5. The game card tells players to text the earlier keyword (buffalo) to 56512 in order to translate the Morse code.

6. Text response directs them to the area near "Moran's West" and to look under the buffalo pelt on the round seat. Players find a Morse code key. [Morse code key]
7. They decipher the Morse code to read "3rd" Game card together with the decoded message directs the players to find "Atomic Age" on the 3rd floor.
8. Players find *Sculpture Symbolizing World's Communication in the Atomic Age* (1979.107a-d) in the Lincoln Gallery. Game card directs them to write down two words from the label "We live in a time dominated by these _____/_____. They write down "INVISIBLE FORCES." Game card instructs them to return to the Luce Center.
9. Players are directed to write down the decoded message (Invisible Forces) on a piece of paper, and to write a pleasant message to the next player on the back. Once they've done this (and got the code correct) they receive their final stamp.
10. Players ring the bell and enter their team name on the scoreboard.