

Opening the Frame of the Art Museum: Technology between Art and Tool

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ABSTRACT

In this paper, we present our experiences in building an interactive installation, dubbed Birdscape, for an art museum. Interactive installations in museums ordinarily have one of two goals: they are either artworks to be appreciated as part of the museum's collection, or they are tools that disseminate information about museum objects. Both possibilities tend to put visitors into the position of non-experts. Our goal was to open up the design space in the museum for new visitor roles by hybridizing these two functions: to provide an installation that was both **tool-like**, giving patrons information about the museum and their interactions with it, and **art-like**, creating opportunities for new experiences in an **aesthetic** and open-ended way. In the process, we ran into serious challenges in bridging the worldviews of art and human-computer interaction (HCI). In this paper, we reflect on our experiences to suggest possibilities, challenges, problems and possible solutions in leveraging 'art' and 'tool' to create something that pushes beyond the limits of each.

Keywords

Reflective design, museums, art practices, HCI

1. INTRODUCTION

Typically, technology enters into the art museum either as art or tool. The recent technological introduction of ubiquitous computing devices, such as sensors and location-aware systems, also tends to separate into the art and tool dichotomy [2],[3],[7]. For example, on the side of art, Simon Penny et. al.'s Traces [10] installation allows visitors to use body movement within a 3-D CAVE environment to orchestrate the production of and interact with semi-autonomous agents projected around the user's body. As an example of technology as tool, Flavio Sparacino and her research group at MIT created the Museum Wearable [13], a location-aware museum guide that adapts information presentation to visitors' patterns of preferences.

While the assumptions, goals, and methods underlying these approaches differ greatly, both technology as art and technology as tool tend to support the dominant frame of the art museum experience: artists are represented by their art, curators provide information about the art, and visitors, as non-experts, receive this

information. Our goal in the work described here is to push out of this dominant frame to offer new roles and relationships in the art museum by developing systems that transcend the art/tool dichotomy.

This goal is both practical and critical: we are designing, building, and testing systems to support previously marginalized experiences and, in doing so, to highlight previously implicit assumptions about **what an art museum – and technology – is for**. Because we are trying to straddle spaces with different objectives, strategies, and criteria for success, we have uncovered and been forced to deal with our own implicit assumptions about and mismatches between art and tool creation as cultural practices. We begin by outlining in more detail the impetus for this work as an example of Reflective Design, a practice toward reorienting the usability focus of human-computer interaction (HCI). Once this background is established, we will describe our projects in this area for the art museum and examine the challenges and issues that materialized in bridging both the desired outcome of an art/tool space and the practices toward this goal.

1.1 Opening the Frame of HCI

We approach the issues in this paper from our standpoint as researchers in HCI. This is a critical point for understanding the study presented here. Although we realize our audience includes artists, media theorists, and many other perspectives from the arts, humanities, social sciences and cultural studies, we are speaking primarily from the perspective of tool designers. Our goal in this paper is to move toward integrating different perspectives, but our starting point will influence and inform our trajectory. We imagine this paper as the start of a difficult but hopefully engaging conversation. Many terms may be familiar but used in unfamiliar ways and what counts for us as a research contribution may be different from some readers' expectations, yet this potential for confusion presents an impetus for dialogue and new interpretations. We believe this conversation of translation and interpretation is critical, as the variety of fields mentioned above will continue to collide.

Our work has traditionally been informed by designing and evaluating technology as tools in the art museum. The field of human computer interaction often approaches the design of new technology for art museums as a usability issue: Does the technology meet its defined objectives? Does it improve learning or understanding about the art? Is the tool easy and intuitive to use? These are undoubtedly important questions, but in our work we are interested not only in the functionality of the systems HCI researchers build, but also in examining the cultural implications of these designed experiences – why certain design choices and objectives are made in the first place, what design choices are systematically left out of consideration, and what roles and activities are supported versus marginalized.

This strategy is informed by our work in reflective design [11],[12] with the Culturally Embedded Computing Group at Cornell University. Reflective design is an emerging approach within HCI for critically examining the cultural implications of existing technology and provoking new design spaces. In reflective design, technical systems are designed to support and encourage critical reflection by both users and designers on the role of technology and the dominant practices it supports. In the case of the museum, the dominant practice supported by technology tend to be one-way transfer between experts – artists and curators – and the non-expert visitors.

The dominant frame of the museum as a typically one-way transfer of information begs the question of how to design for new experiences more generally. If we design for what we know and expect in the museum, how do we resist reifying existing practices? We believe exploring art and tool as a spectrum for technology design, particularly by trying to design for the underutilized design space between these extremes, may offer one approach for creating new museum experiences rather than reinforcing existing ones. In the case of the art museum, we provoke questions about dominant practices by designing for aspects of the museum experience that technology tends not to address: the social, liminal, and affective dimensions of this unique public space.

As a critical intervention, reflective design may seem to an HCI audience to run counter to advances in user-centered or participatory design, in which design practice is driven not by designer preconceptions but by stated user needs. In our case, museum curators and visitors did not specifically ask for technology to support experiences marginalized from design such as visitors' social interactions in or emotional reactions to the museum space. If we are to be reflective on our own practices, we must ask what our license is to insert designs that explore spaces that are un-designed for, un-imagined, or possibly un-necessary¹. However, there is a place for critical design (e.g. [6]) and user-centered design (e.g. [1]) to come together. Creating designs to reflect existing practices and provoke new ones encourages dialogue and reflection amongst the wide variety of museum stakeholders: e.g. visitors, curators, educators, and system designers. In this way, the designs act as a new form of needs assessment, stimulating reflection on, in some cases confirming and in some cases challenging, the museum experience.

1.2 Hybridizing Art and Tool

We realize that the question of 'what is art' and 'what is tool' is hotly contested and will continue to be a source of inspiration for artists and designers. By stating that technology in the art museum tends to fall into the category of either art or tool, we are not presuming that these categories are readily identifiable, discrete, or culturally universal. Nevertheless, it is clear that the organization of the museum itself, the practices that take place in it, and the roles offered to actors in the art museum induce these two dichotomous possibilities for technological artifacts, and, in turn, for the activities and roles on offer to visitors, curators, technologists, and artists. "Art" in this sense is things created by expert artists, explained by curators, and appreciated by visitors. "Tools" in this sense are created by technologists for curators,

either to help curators keep track of what is happening in the museum or to help them provide information about art to visitors.

Since we intend to combine art and tool in our own work, we need to describe in more detail how we think of 'art' and 'tool' aspects our own work. For the purpose of our work, we have identified art as evocative and poetic – something for provoking a reaction, perhaps a new way of thinking, seeing, or doing and something that is open to interpretation. An artist may indeed have a message to communicate but whether or not this message is received does not challenge its 'artness'. For us, a tool tends to embody the opposite of these characteristics of art. A tool is not an end in itself but is designed for purposeful action toward some other end. A tool is designed with specific goals or objectives in mind and the tool is judged in terms of both communicating its use appropriately and its effectiveness in attaining its ends. A tool, therefore, is more didactic than evocative and more prosaic or utilitarian than poetic. To return to our example in the museum, Simon Penny's *Traces* is an experience open to interpretation whereas the Museum Wearable is a tool designed to help explain or narrow the interpretations of the art on display.

We anticipate that this simple categorization leaves room for many arguments and objections. In fact, we hope this is the case. We believe the boundaries between art and tool in terms of technology is becoming murkier [9],[15] and the space of the museum environment provides an interesting context for exploring this divide. As stated before, in this paper, we will be speaking mainly in the voice of tool designers reaching out to the art community.

1.3 Imprints

Our first experiment in bridging art and tool is a system called Imprints [4]. Our experiences with this system highlight both the possibilities and problematics of attempting to bridge art and tool in a single system. These experiences will greatly inform our primary case study, *Birdscape*, which be described in the following section.

The Imprints program works in conjunction with a handheld tour of the Byrdcliffe Arts and Craft exhibit, a traveling exhibit about the works of an early 1900s American arts and crafts colony. The handheld tour presents visitors with additional information about select objects. As an optional feature of the handheld guide, the Imprint program allows visitors to create their own personal mark and associate this mark with their tour. The personal imprint is likened to the artisans' personal signatures that often marked their art. Before starting the handheld tour, a visitor has the option to create an imprint on a tablet PC. Once the tour begins, when a visitor stops to look at an object on the handheld, his or her imprint is associated with this object.

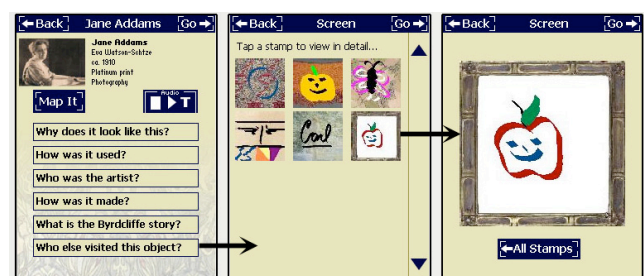


Figure 1: Three screen shots from the Byrdcliffe handheld tour with the Imprints program.

¹ In the context of this paper, it is interesting to note that artists do not feel a need to ask about this license – since it is part of artists' given cultural role.

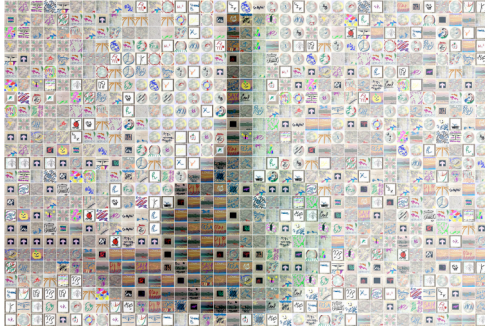


Figure 2: Photo-mosaic of all the Imprints projected on gallery wall.

Visitor imprints for each object appear after selecting the question: “Who else has visited this object?” (Fig. 1). At the same time, the imprints created by all visitors are projected onto a gallery wall in the form of a photo-mosaic of one of the craft objects on display (Fig. 2). Whereas visitors can use the information on the handheld to follow an imprint’s path or judge the popularity of an object based on the number of imprints, the mosaic is simply a collective representation of all past visitors.

1.4 Reflections on Imprints

Based on our initial evaluation of the Imprint program, the imprints appeared more successful when viewed on the handheld than in the collective display. When asked about the imprints on the handheld, people talked about looking for kindred spirits or the realization that someone was on the same path before them. They also talked about using the imprint on the handheld as a way to call out to their friends, to signal where they had been and what they had liked. With the photo-mosaic, people enjoyed finding their own mark but sought additional meaning to the display, asking why their imprint went to a certain location or why the imprints combined to show that particular vase. These questions seemed to be asked less as musings about presence and more about confusion in terms of the level of meaning embedded in the display.

We are currently working to improve the saliency of the Imprint display and the ‘kindred spirit’ feature of the handheld marks. Although the handheld interface was originally imagined to play the utility role of social navigation and the photo-mosaic would serve the reflective role of emergent art, the handheld display fared better in both conveying social information and stimulating reflection on what this information meant. Therefore, we wanted to push further on the idea of bridging art and tool within the same system. Rather than separating the functionality by form, we want to create designs that function simultaneously as art and tool, and, in a less literal way, cause reflection on presence in the museum.

2. BIRDSCAPE IN THE MUSEUM

The case study of focus for this paper is a project called Birdscape designed for the Asia Gallery in the Herbert F. Johnson Museum at Cornell University. While Imprints takes a fairly literal approach to reflection on visitor presence and tackles the art and tool divide by having two separate interfaces to the system, Birdscape is more abstract in presentation and aims to combine tool and art functionality into one experience.

In order to develop a system that better hybridizes art and tool, the authors initiated a collaboration with Xiaowen Chen, an artist and professor at Cornell University. This collaboration began with an initial conversation between Chen and Boehner. Boehner was

interested in pushing on the scope of usability and tool design in HCI by incorporating lessons from the arts and humanities. Chen was interested in exploring new artistic practices enabled by science and technology research. Therefore, as a simple strategy, they hoped to bridge art and tool in the museum by bringing together their disparate backgrounds and experiences. The following section will outline how this collaboration developed further, the resulting design, and an evaluation of the design in the museum.

2.1 Inspiration and Objectives

The initial starting point for the project as a reflective design practices was to identify marginalized aspects of the museum experience beyond information transfer between a curator or artist and a visitor about the art on display. To generate ideas for this end, the authors and Chen began by sharing points of inspiration.

Both Boehner and Chen identified The Weather Project by Olafur Eliasson as a motivating piece (Fig. 3). The Weather Project was installed in the foyer of the Tate Modern in London, England in 2003. It consisted of more than 200 low-sodium lights behind a translucent shield generating not only light, but also warmth. The sodium lights generated only the bottom half of the sun; mirrors on the ceiling completed the top. Eliasson cited the British’s obsession with the weather as his point of departure, and indeed sun-starved Londoners flocked to bask and picnic by the simulated glow. People soaked up the atmosphere, but they also became part of it as they quickly found and played with their reflections in the mirrored ceiling. Visitors could be seen simply waving at themselves or more ambitiously spelling words with the help of their friends’ bodies.

A couple of important points emerged from our discussion of the Weather Project. First, it was a very site-specific piece. It fit both the outside (London, specifically London’s characteristically horrible weather) and the inside (the dramatic open foyer of what used to be an industrial power plant). Secondly, the technology for reflection behind the Weather Project was the humble mirror. People intuitively interacted with the installation as it elegantly reflected presence in the museum.

This second point led to discussions of other media installation pieces known to the authors such as The Wooden Mirror by Daniel Rozin and Text Rain by Camille Utterback and Romy Achituv. In both of these works, the technology is simple but the conceptual experience rich. In the Wooden Mirror, a 6-foot tall display is created out of 830 wood chips, akin to 830 pixels, each driven by a motor and tilting dynamically for the required light intensity to reflect the image captured by a video camera behind the display. The artist suggests this piece plays with the divide between the analogue and the digital but whether the visitor grasps this distinction, the mirror is intuitively playful and a simple interaction causing wonderment about how it works. In the case of Text Rain, the shadow of visitors’ bodies or props provides a ground for catching the text of a poem falling from the top of the screen. Visitors catch words and phrases with various parts of their body, causing reflection on their movement and the interaction with words.

These examples contrast with systems designed with very complex technology and more shallow conceptual ideas. New York Times art critic Sarah Boxer’s assessment of the 2005 Boston Cyberarts Festival [5] resembles the criticism of technology tools that appear to be solutions in search of problems.



Figure 3. “The Weather Project” by Olafur Eliasson, view from the Tate Modern’s entrance foyer. Photo by Bob Binda.

In her review, Boxer suggests that the technical interactivity employed by several of the systems at the Cyberarts Festival were about creating novel interfaces for interaction, a showcase for the technology, as opposed to a richer evocative experience.

One caveat must be mentioned in reference to the installations just described. As described in the introduction, we want to bridge art and tool functionality. All of the pieces mentioned here as inspiration fall neatly into the category of art. They cause new reflections and new forms of participation but they do not necessarily engender new experiences of the museum visit, in other words, visitors would not likely use these pieces to inform the rest of their museum visit. These pieces comfortably occupy the pedestal of art as installations that the visitor interacts with before moving onto the next interaction. The installations do not permeate the museum experience except by the lingering effect they have in the visitor’s memory.

In addition to identifying art works that provide inspiration, Chen shared a personal anecdote that became a touch point for the resulting design. As a small boy growing up in China, Chen recounted visits to a modern shopping mall in his hometown. During each of these visits, Chen was mesmerized by the sight of swimming fish visible through the ceiling. He never explicitly questioned where these fish came from but enjoyed watching their darting movements. As he got older, he realized the black silhouettes were not fish at all but the soles of people’s feet as they walked on the translucent glass walkways above him. The shadows were a literal trace of presence – like the bodies reflected in the Weather Project – but unlike the mirrors, these shadows only revealed themselves for what they were after the passage of time.

From these stories and examples, we can now summarize the objectives guiding our new design. Specifically, we wanted to:

- Encourage reflection on other aspects of museum experience beyond just the individual art objects. This reflection may occur during the initial visit or perhaps only from repeat visits.
- Design for openness to interpretation. Whereas the Imprints program or something like the Weather Project created simple one to one mappings between individual and impact, we wanted to leave more room for interpretation and adaptation.
- Be technically simple yet evocative. We did not want to simply create a technically novel interaction interface.

- Avoid creating a separate art installation but instead something that permeates the museum experience.
- Integrate with the specific space.

2.2 Sketching the Design

As we worked toward the design objectives described above, a simple metaphor of migrating birds, dubbed Birdscape, began to materialize. Chen suggested the sound of birds as a proxy for presence, or rather lack of presence, in undiscovered areas of the museum. The connection of birds with visitor presence would be achieved by implementing a sensor network attached to speakers across the gallery space. Based on measurements of activity levels, bird sounds would trigger from the speakers in areas lacking visitor activity. If visitors are drawn to this space, or if they navigate there independently, the bird sounds stop as the birds metaphorically fly elsewhere. We felt this design embraced both the functionality of art and tool. As art, it had the potential to cause reflection and be open to interpretation. As tool, it could be used to navigate to new areas of the gallery.

Once this initial idea materialized, the team could align and assess the implementation around the guiding objectives. In terms of a site-specific design, for example, the bird metaphor was a perfect fit. The gallery space holds Asian art with many pieces about honoring or representing nature. The space itself is a quiet haven for contemplation. Most dramatically, however, are the 360 degrees of windows surrounding the perimeter and looking out from the perch of the fifth floor toward Cayuga lake and the hills of Ithaca. Many visitors come to the Johnson Museum simply to take in this view. Finally, Cornell University has a special relationship with birds as the home for one of the premier ornithology research labs.

The decision to use sound helped achieve the objectives of permeating the museum space and designing for open interpretation. Prior to deciding upon the bird metaphor we had engaged in discussions about whether the installation should be a visual display of people’s presence or a visual representation depicting something like the emotional climate of the gallery. These ideas all took shape around some form of abstract animations or images projected onto a screen. In one design idea, we proposed immersing visitors in a room and projecting images of reflected emotion along the walls. In these examples, however, we ran the risk of creating an art installation separated from the rest of the museum. Furthermore, the visual displays tended to be better for conveying information, depicting presence for example [3], as opposed to encouraging an alternate experience of the museum space. We were striving for a design that would indicate presence while experiencing the space as opposed to depicting presence at a single point in space.

The technical apparatus for the Birdscape system is purposefully simple. Engineered by Eric Lee and Arun Israel, the system consists of four small devices, each comprised of a PIR motion detector, a small speaker connected to a sound-chip, and a small PC board containing an EEPROM chip and a serial port. These four devices are placed into floor recesses in the Asia Gallery (Fig.4), as far as possible from each other. The motion detector is then positioned to measure motion within a wide angle of view. Every time the motion detector is triggered the event is logged on the device’s internal memory. The motion detector thus tracks an approximation of the activity level, but not exact head counts or direction of traffic.

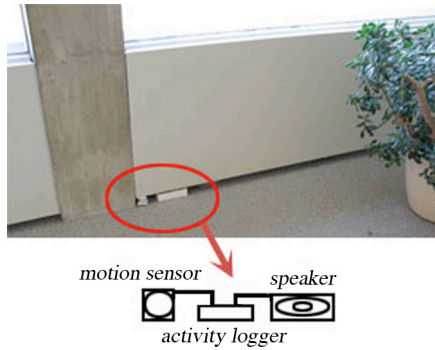


Figure 4: A bird sensor in one corner of the Johnson Museum Asia Gallery, and a simple schematic of component parts.

If the detector is not triggered for two minutes, a short sound loop of wild birdcalls starts playing from an attached speaker. When an object crosses into the detector's range, the birds "fly away" and the singing stops.

Finally, we can consider the first objective, the overarching objective of the entire project, to design technology for alternate activities in the museum. Rather than occupying the role of art itself or the role of providing information about the art on display, we wanted the Birdscape to occupy a new design space by augmenting marginalized aspects of the museum experience. For the HCI group, the marginalized aspect we wanted to design for was the fact that the museum houses not only objects but people and any experience in the museum is textured by this dynamic presence. Whether or not visitors attend to this presence explicitly, a crowded gallery influences our experiences in ways that an empty gallery does not. This is why the bird sounds keyed off the presence and absence of visitors.

Because we were concerned about the motion sensors simply becoming a novel interface turning the system on and off, we provided an explicit 'frame' to the experience in the form of a small placard or sign near the front entrance of the gallery. Underneath the title Birdscape and the creators' names, the placard read:

"The bird sounds you hear in the Asia gallery today are generated by the absence and presence of visitors, including yourself. Motion detectors are monitoring the level of activity in various parts of the gallery. Areas with minimal activity will produce bird sounds. Once activity resumes in these parts of the gallery, the birds 'fly away.' This movement of sound creates a dynamic soundscape of presence in the gallery."

Therefore, we directly linked the birds to presence in the gallery. Although the explicitness of this signage may seem to close off room for interpretation, we felt it was open enough to allow different interpretations of what to do with this information. In other words, if the birds are keyed off of presence, what does this experience mean? How might people respond to or make sense of this information?

However, Chen also brought a slightly different focus to the project. For Chen, the marginal experience to augment was the outdoor view. He wanted to play with the fact that visitors came to the gallery not just for the artifacts inside, but also for what was outside. He sought to permeate the boundary between outdoors and indoors, bringing sounds of nature inside as art and directing the eye outside to the aesthetic of the natural world. We felt the

Birdscape project could encompass both of these marginal aspects of the museum experience.

2.3 Criteria For Success

Up to this point, the discussion of collaboration between our resident artist and the designers from the HCI team has proceeded with relative ease. Although we may have outlined slightly different perspectives in terms of the marginal experience we wished to augment, these were not incompatible. On the contrary, we felt a design that could encompass both would push us toward designing for the openness to interpretation we hoped to achieve. However, at this point, the story becomes a little more complicated. Once we have designed and implemented a system, the next step for HCI researchers is to evaluate the system. This evaluation is informative both in terms of understanding the design, for example what features supported or hindered usability, and in terms of understanding larger aspects of study, for example how people communicate, make meaning or construct identities. In order to proceed with the evaluation of a system, HCI researchers begin by identifying the system objectives and the criteria by which they would judge its success or failure.

However, the idea of evaluating art work by the artists' themselves or by anyone outside the realm of art critic seems out of place or alien to the art community. Evaluating art in terms of meeting its 'objectives' seems tantamount to treating art as 'tool' as opposed to recognizing the implicit dichotomy we articulated in the introduction. Sengers and colleagues [8] have begun exploring how art practice and HCI practice may negotiate this realm of evaluation and mutually inform each other.

In our experience, however, Chen did not find the question of defining success a difficult one to answer. In fact, he had a very clear view of what would constitute a failure and what would constitute a success. Chen identified two main types of failure for interactive installations in general: 1) if people don't even recognize that it is there, or they choose to ignore it, and 2) if people interact with it only at the level of the technical interface. They may approach it as a novel game and once they've found the underlying apparatus (such as the motion sensor), they lose interest rapidly. We felt if these two types of experiences were the only ones to materialize, then we would consider the installation a failure.

Therefore, in some ways, we defined success in terms of not being a failure, a condition more easily identified. Yet, we could speak in positive terms about the kinds of experiences we hoped to engender. For example, Chen described what he would like if he were a visitor to the space:

"I would imagine myself getting up [to the gallery], walking into the space, being immersed into the space, and seeing the works -- the art work, seeing the beautiful landscape. But then gradually, I might notice there are some bird sounds. And this might make me start to feel like I am not in the museum. I see that moment as very powerful...it's not the museum, but it is the museum. It's nature, but it's not nature. So you blur that boundary."

Similarly, Bochner would describe a successful experience as:

"I would imagine walking through the space, looking at the art, looking outdoors, looking for something interesting. And then I would hear something unexpected: the sound of birds. Perhaps the sound would draw me toward it to see if I could find its

source. But the closer I get, the further it goes. Maybe I would play with this a little bit, chasing it perhaps. Ideally, I might stop and watch how other people interact with this same event.”

Both of these stories lay out an ideal type of interaction, although we had also hoped the design was ambiguous enough that experiences we did not anticipate might also occur. It is interesting to note how despite close affinity in terms of inspirations and objectives, at this point, one can see the differences in perspectives emerging. Although both described narratively, Chen’s description focuses on one evocative moment whereas Boehner’s description reads as a much more goal oriented activity.

3. EVALUATION

Birdscape was installed in the Johnson Museum for a period of three months. Ultimately, we plan to modify various attributes of the system to assess how people make sense of different configurations, for example altering how the experience is framed in terms of the signage available or altering whether there is visual feedback in addition to the auditory feedback of bird sounds. For this first installation, however, we chose to implement the basic Birdscape design and assess visitor and staff reactions.

3.1 Evaluating the Experience

For our evaluation, we used a combination of sensor data, observations, interviews, and feedback cards (**Fig. 5**). The motion sensors collected information about activity levels and time of day. In the original evaluation plan, we intended to collect activity information with the bird sounds turned on and off. This would allow a comparison of visitor patterns that may be attributed to the absence or presence of the bird sounds. We will not discuss the sensor information at this time, however, as the logging functionality needs improvements in order to make meaningful assessments of it. Instead, we will discuss evaluation results from the observations, interviews and feedback cards.

In designing the evaluation cards for visitors, we specifically drew from our objective of openness to interpretation and from art practices in general. As opposed to a rigid experimental survey

asking for set demographics or asking questions with set answers on scales of 1 to 7, we wanted to leave visitors room for expressing themselves in a variety of ways. As a result, we received comments, scribbles, pictures, and indications of emphasis such as underlining certain words or exclamation points. This type of feedback card is a departure from a traditional HCI evaluation method (although similar to ethnographic approaches as employed in HCI). Instead of setting up the exploration to allow for statistical analysis of majority opinions along predefined categories (e.g. ‘on a scale of 1 to 7, how much did you like the bird sounds?’), we were primarily interested in different shades of the visitor experience that might emerge.

The feedback cards were made available at the entrance of the gallery near the sign describing the installation. The first round of feedback cards were designed to look like postcards with two prompts: “Today I heard soft bird sounds in the gallery, these made me...” and “I’m visiting the gallery today because...”. The cards were short and open-ended to encourage a range of responses. The main problem encountered with the feedback cards was that visitors took the cards as keepsakes instead of leaving them behind. In our first pass, only 10 out of 20 cards were returned. Therefore, as a next pass, we created a comment book with the same prompts on each page. Each page was marked with a bird bookmark that visitors could take away as a thank you.

The prompts on the cards and in the book deliberately did not include a verb (“...these made me...”) in order to see how people chose to describe their interaction. As a quick description of 37 responses gathered, almost half (51%) indicated the sounds made them ‘feel’ something, such as happiness, calm, surprised or natural. Of these responses, two people indicated feeling ‘annoyed’ and although we hoped the experience would be open for interpretation, for this particular piece we would classify ‘annoyance’ as another type of failure in addition to ignoring the piece or engaging only at the level of technical interface. However, within this small sample, the annoyance factor appears small. A quarter of the 37 responses (24%) commented that the sounds made them think of birds or nature. The rest of the responses were either general comments about liking the Birdscape (5%) or general comments about the museum (19%)².

Several of responses indicated that visitors blurred the indoor/outdoor boundary:

[The sounds made me...] “feel invited. I loved the bird chatter. It added to the serenity and felt like wonderful company”.

[The sounds made me...] “feel surprised at first because I thought I was outside. But it was actually pretty peaceful. Props.”

[The sounds made me...] “feel as if I could picture myself outdoors in one of the lovely scenes depicted in the hanging scrolls.”

[The sounds made me...] “on a beautiful day like today, they made the indoors like the outdoors.”

A couple of people indicated changing how they moved in response to the bird sounds:

[The sounds made me...] “At first I didn’t hear the sounds [but because of the comment book]...I

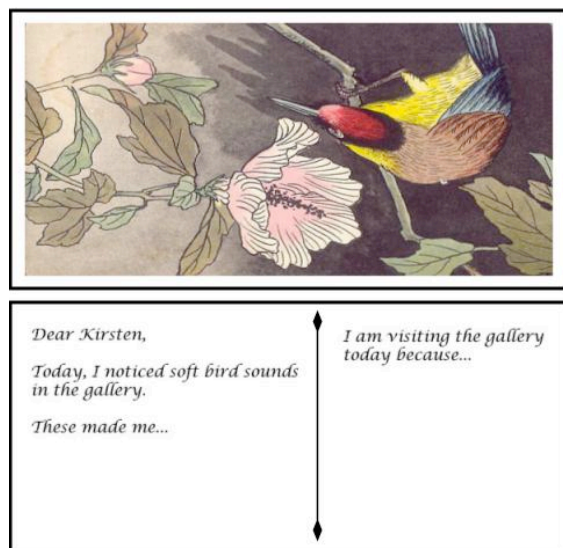


Figure 5: The front and back view of the evaluation postcards

² Percentages were rounded to the nearest whole number, therefore don’t add up to 100%.

walked back toward the main quad until I was about to give up...then finally I heard them. Feel very high up. Go towards the sounds, feel more connected to the environment.”

[The sounds made me...] “The bird sounds were great. They created a sense of playfulness and calm. They also drew my attention from room to room. Like walking in a forest. It was lovely.”

As a self-selection method, the comment cards and book only provide insight from people who actively chose to comment on the birds. Therefore, to provide additional views onto the visitor experience, we conducted interviews and observations. For the interviews, we spoke with visitors, the security guards, and the curator of the Asia gallery.

The security guards provided a broad summary view of visitor reactions in addition to specific anecdotes. The guards in a sense became a critical interface to the project as visitors would often stop and ask them where (or what) the birds were. We interviewed separately six security guards and all of them indicated that when asked by visitors about the Birdscape they would explain it as a ‘project’ (as opposed to an installation or art) about visitor movement in the gallery. Most explained it in terms of using motion sensors to identify popular areas in the gallery. One guard said he explained it almost as a zen-like version of hide and seek: you look for something only to discover it’s not there.

When asked to summarize visitor reactions, the guards felt many people simply did not seem to notice the birds. This is the same impression the curator had of the visitor experience and corroborated by our own observations and interviews. When visitors did notice the birds, however, the guards recounted watching people look around, first outside and then inside, for the source. When people explicitly asked about the sound and the guards explained it, the guards and our own interviews with visitors indicated that visitor reaction was positive. People commented that the sounds were soothing or made them feel like they were outdoors. The curator of the gallery also felt that response to the birds, when noticed, was positive. However, from the guards, the curators and our own interviews, it was evident that people did not connect the bird sounds to the absence or presence of visitors. When reflection was triggered, it was about the connection between indoors and outdoors.

Several people interpreted Birdscape as an ambient part of the Asia gallery. Some thought it was for atmosphere whereas a couple of people thought the birds were connected with a particular piece in the gallery. This latter impression happened only in the room with no windows. Three of the four sensors were placed on the perimeter of the gallery, but one sensor and speaker were placed in an alcove without a direct line of sight to windows. When people were asked about the birds while in this room, they tended to assume the sound was connected with either one of the Japanese nature prints, or interestingly enough, with the most prominent piece in the room: a samurai warrior’s battle gear.

We had little evidence of people simply interacting with sensors as a novel interface – i.e. tripping the sensors with no reflection on the overall experience. Although the sensors were placed in recesses on the floor, they were still visible if a visitor directed his or her eyes toward them. In the three months of installation, however, we observed only one person literally laying on the floor and looking at the apparatus and one person actually turned the play button of the speakers off and left a note: “Ha ha Bird Man. The gig is up.”

In addition to asking for and observing visitor impressions, we were also interested in interviewing the guards and the curator for their own impressions of Birdscape. Five of the six guards we interviewed felt the Birdscape added to the museum experience because it was something different, it made people stop and think, or it added an element of life to an otherwise quiet space. Some of the guards played with the Birdscape functionality. One guard, for example, would augment the sounds with his own bird calls. Another guard extended the Birdscape scope by using his push to talk radio to broadcast the birds throughout the museum. His fellow guards thus became mobile speakers, something they quickly stopped. When asked, all of the guards felt the Birdscape was more art than tool, even though they described it as a project about visitor movement and monitoring popular areas in the gallery.

Our discussion with the curator was enlightening about the art and tool distinction as well. She worked with us during the earliest discussions of this project, prior to the bird metaphor even developing. Her original interest was in the data that could be collected about visitors’ patterns and preferences. In other words, she saw the project as a useful tool for curators and museum staff. At first, she was not sure how this same information might be valuable or interesting to visitors. As the project progressed, however, she also began offering suggestions for how to augment presence information for visitors. For example, she suggested creating designs that played off of the behind the scenes presence of the museum staff to show the living but invisible presence of the museum.

3.2 Examining the Process

The section above is an initial analysis of how visitors and the museum staff interacted with the Birdscape. In this section, we would like to examine the process of both designing and evaluating the system. We had a number of challenges during the design process including technical and collaborative. These will be described in turn.

Most of our technical challenges resulted from the limited range and imprecision of the PIR motion detectors in our devices. We chose PIR detectors because we found other sensor systems to either be equally imprecise or too expensive. The result of this imprecision is that it is not possible to measure the number of visitors present in an area – the devices miss people who are close to the sensor but not within its range of sight, but at the same time a visitor walking slowly through the sensor’s range could trigger it multiple times. For this reason, we have chosen to design for this level of imprecision and to measure approximate activity levels rather than body counts. However, this imprecision may interfere or prevent visitors from developing interpretations about the functionality of the system and their respective influence. Furthermore, controlling the range of the sound to avoid overlaps is difficult and visitors may not be able to place where sounds are coming from in some locations in the gallery. However, we argue that these ambiguities could actually afford greater freedom in interpretation and prevent the installation from being labeled as purely a “presence-awareness tool”.

Aside from technical difficulties, we have encountered challenges in the design process inherent in trying to pull from different fields to inform a new space. We are attempting to bridge both art and tool, but the metrics of success and strategies for each are quite different. As ‘non-artists’ ourselves, we have included artists in our design process but the challenge is similar to what we faced with the Byrdcliffe installation described in the introduction

where art and tool co-exist but do not necessarily co-inform. In other words, we are approaching this space from the perspective of HCI designers, and by training have traditionally focused on issues of functionality and usability. By wanting to incorporate artistic practices, we must be careful not to adopt an ‘art goes here’ approach, reminiscent of early critiques of user interface design where the interface was considered as an afterthought to the functionality [16]. Instead, we are working to improve the ways in which we collaborate with artists in a mutually informative, and transformative, manner.

In addition to bridging the design of art and tool, we are attempting to explore a space that draws from both critical design and user-centered or participatory design. These practices do not currently have substantial overlap in terms of strategies and objectives. For critical design, the designer plays the role of commentator or provocateur. For user-centered design, the designer’s role is more of facilitator and advocate for the articulated needs of users. This latter approach is more familiar territory for HCI and the design of technology as tool for museums. The critical design approach is more familiar for the production of art in the museum. Therefore, our challenges in bridging this space echoes the challenges described in designing for both art and tool applications.

4. DISCUSSION

We can now take a step back from the results presented in the evaluation section to discuss how these insights will inform our next steps both in terms of the design and the process of collaboration. Only two visitors indicated that the bird sounds caused them to navigate the museum differently than they might have without the sounds. This impression of art resulted even though we attempted to frame it explicitly as both art and tool by indicating in the placard language how visitors might use the information and by coaching the security guards to refer to it as a project on movement and popularity.

We also discovered that the nature metaphor seemed to dominate and determine the interpretation. When people attended to the bird sounds, they either thought the birds were real or some kind of ambient noise intended to cause reflection on or a feeling of nature. This experience suggests that Chen’s original desire to blur the boundary between indoors and outdoors was successful for this group of visitors. However, no visitors connected the bird sounds with visitor presence as a whole even if a few visitors indicated they realized their individual presence triggered the displays. Including a visual representation may again address this connection between sound and presence. Other alternatives that have been suggested would be to use inaudible voices or whispers as sounds more coupled with presence or alternatively using the bird metaphor but in a space without windows so as to be more startling and without an easily discounted explanation. However, although these ideas might advance the concept of augmenting presence, they may lose the experience Chen was striving for to exploit the boundary between outdoors and indoors, between nature and art.

Finally, one critical area has arisen in our discussion of future designs that is only tangentially reflected in our evaluation results but is most appropriate to discuss here in relation to the conceptual design. As we move forward, we are experimenting with more sophisticated sensor technology being developed and tested in Stephen Wicker’s Wireless Intelligent Systems Laboratory at Cornell University [14]. An area of great concern for this group as they work with embedded sensor networks is the

issue of privacy. As tool designers, we are also sensitive to the need for full disclosure and safeguards for how personal information is collected and ultimately used. However, privacy concerns may be a relatively new topic in the art community. When something is an art work, do the same privacy regulations apply? Do visitors who become part of a participatory art installation require the same informed consent and control over their image? Or, does visiting the art museum and participating with a piece give implied consent? For participatory art installations rooted in one location, visitors can choose to interact or not, but in a soundscape installation such as ours, visitors participate in the piece by virtue of visiting the fifth floor gallery. We attempted to address this concern with signage that indicated how the Birdscape worked and indicating that the sensors could be turned off should anyone desire. However, as we develop more projects to bridge the space of art and tool, we anticipate privacy issues becoming something requiring further consideration.

In addition to insights regarding the conceptual design and implementation, our experience has also caused reflection on the process of design, specifically on bridging arts and HCI practices. As HCI designers, we have had a lot of experience working across disciplines including design, sociology and psychology and computer science. At least one of our authors has considerable experience working with artists as well. But for this particular experience, we found the collaboration challenging and speculated that this was due to the somewhat disjointed nature of the collaboration. As we are all physically dislocated and maintain somewhat different objectives in terms of the audience we hope to reach, we felt the collaboration at times felt more like a coordination effort as opposed to something mutually transformative. As Medynskiy reflected when asked about the process:

“The challenges came from bridging the definition of the project between the designers, the engineers, and the artist. The engineers worked with a technical definition of “working” -- something that produced an output in a specified range when given a fixed input (e.g. the people counters, or motion sensor), that didn’t necessarily mesh with the designers’ definition of working in the “real life” context. The artist, on the other hand, seemed to find that coming up with and thinking about the idea was the most important part, and everything else was just “filling in details” -- not really worth worrying too much about.”

However, we discovered that our read on the process of collaboration with the artist may have been colored by the kind of dichotomy that we’ve been presenting and reaffirming. When asked about his view of the process, Chen described it as a collaborative effort from the beginning thru to the end. Boehner had expressed concern that the deadlines imposed, something we are quite used to from an HCI perspective, were an obstacle or a hindrance to the artistic process. This assumption was informed partly by a romantic view of art happening by inspiration, irregardless of deadlines. Chen, however, has disabused us of this notion, commenting that at least for his own work, he welcomes deadlines as a way of encountering problems sooner rather than later.

We acknowledged from the beginning that the dichotomy of art and tool is difficult to hold up in practice, and although it makes intuitive sense to talk about bridging art and tool, in reality the space we are designing for is blurry. We believe that the ideas

discussed here have underscored this tension but although the dichotomy may not exist cleanly, this does not negate the need for a greater understanding of how arts practices and HCI practices may inform and influence each other. What would an arts based HCI practice, or an HCI based art practice, look like? What would its problem space or objective encompass? What methods would it employ? One area we are particularly keen to develop is the idea of evaluation. As mentioned in the introduction, HCI evaluation begins from a defined objective and measures whether or not this objective has been met. HCI evaluation, largely influenced by experimental methods, tends to focus on majority experience and significant difference, smoothing out the uniqueness of individual experiences and marginal outliers. In contrast, in the art community, evaluation is a less uniform discipline and often relegated to the realm of subjective opinion and personal experience. Yet as tool designers become more interested in designing for unique experiences and as artists become more interested in the medium of technology as a tool for their own and for audience expression, the interplay between forms of evaluation seems a fruitful tension to explore further.

4.1 Summary of Design Lessons

Overall, our first attempt with the Imprint program was experienced more as tool than art, and our second attempt with Birdscape was more art than tool. In the above discussion we have attempted to describe why this was and how Birdscape might become more ‘tool-y’. In other words, what redesigns would influence where visitors go and encourage visitor reflection on how they move through the museum space? Our major lessons learned are as follows:

Supporting Multiple Encounters. One drawback of the Birdscape system in drawing attention and conveying that the sounds were linked to presence was simply its small scale. With only four sensors/speakers placed in four corners of the gallery, visitors did not have enough opportunity to develop an understanding of how the system responded to their behavior. Designing in more points of interaction would allow visitors more opportunities for connecting with the information provided.

Finding the Sweet Spot of Defamiliarization. In many instances, visitors simply did not attend to the sounds – they faded into the background and did not provoke reflection. We believe this is largely due to the familiarity of bird sounds – especially when surrounded by a view to the outside. People are used to hearing but not actually reflecting on the sounds of birds in the environment. Therefore, in order to provoke both reflection and identification with one’s own impact, we are looking for more defamiliar representations to encourage a pause and puzzling out of responses. Yet, from previous experience we know that if an experience is too unfamiliar, then this will also often result in either ignoring or declining the invitation to participate. Therefore, we will experiment with a range of designs to find the ‘sweet spot’ of defamiliarization for this particular context.

Block Misleading Interpretations. Although we want to allow for open interpretation, there are some interpretations we can anticipate that will be misleading – for example we want to prevent interacting with the system simply as a novel technology interface. One way of doing this might be to build in the capability to sense rapid repetitive triggering and to simply turn off the system when this happens. As another example, when thinking about how to connect the sounds to presence rather than literal birds, we have discussed using voices or murmurs to indicate traces of previous visitors. This however blocks the

indoor-outdoor divide interpretation but does tie the system more directly to visitor movement.

Targeting Gut Feelings for Conveying Information. The fact that people did not use the sounds to inform their behavior or navigation led us to discuss whether we should try a visual representation. We wondered if a visual display would be easier to read in terms of ‘information’. However, we realized this would have side effects that we wanted to avoid. In particular, depending on how implemented, it could encourage a rational processing of the information rather than a gut feeling. Although we want people to ‘puzzle out’ and engage with the representations, we don’t want them to do so by stopping and taking themselves out of their visit. Therefore, one possible response in our current system is to vary the intensity of the sounds that emanate from the speakers. The sound in Birdscape is binary: on or off. Louder or softer sounds may allow for a more intuitive processing of more or less presence. Future installations will draw from this type of environmental and peripheral processing of information and meaning.

The above lessons are just a starting set for continuing to explore the idea of designing technology for both art and tool in the museum. As we engage in this exploration, we have to challenge our own predefined notions of what we mean by tool and what we mean by art. This tension continues to become evident as we engage in cross-disciplinary collaboration and move back and forth between the categories we have defined. In some ways, we are altering the designs but in other ways, we are altering how we think about the utility of art and the poetics of tool.

5. CONCLUSION

This paper presents two case studies of an ongoing project for using new technology to encourage reflection on under-designed for experiences in the museum. The strategy of reflective design we have explored seeks to provide for new experiences by bridging the functionality of art and tool.

Specifically, we described how our attempt to hybridize art and tool in the Imprint program with two different interfaces to the same information resulted in an experience described as more tool than art. We therefore set out in the second case study, Birdscape, to try for a more integrated approach. Birdscape used sounds of nature as an ambient, imprecise display of presence (or absence) in an explicitly low-bandwidth (i.e. minimal information) and low-tech (i.e. minimal intrusion) way. We intended for Birdscape to augment two under-designed for aspects of the museum experience: 1) the boundary of the museum space, and 2) the presence of people in this space. The metaphor was intuitive enough for conveying this experience yet evocative enough that patrons may experience the installation in alternate ways.

Through an evaluation consisting of visitor comment cards, observations, and interviews with museum staff and visitors, we discovered that the Birdscape program was interpreted more in terms of art than tool. In this instance, it was mainly seen as an object or experience itself as opposed to something that supported or informed the experience of other objects or navigating the gallery. When visitors noticed the Birdscape, they felt it was pleasing and it did appear successful in terms of causing reflection on the surrounding landscape and the line between indoors and outdoors. However, visitors did not make the connection between the bird sounds and the presence of other visitors.

In addition to describing the Birdscape design and implementation, we also detailed the process of working in a

cross-disciplinary fashion. With the goal of hybridizing art and tool, we began a collaboration between tool designers and an artist. We believe the process of negotiating between and exploring different practices holds great promise both for rethinking how we define, design and evaluate tools and how we define, create, and appreciate art. Our experience has further outlined how the form of art and tool in and of themselves is not as interesting but the cultural practices that develop around these constructs. In other words, Birdscape may be seen as a project on visitor traffic or it may be seen as an installation on the boundaries of the museum space. Depending on how Birdscape itself is framed influences who becomes involved, the language for discussing it, the goals and methods for advancing its development. By trying to hybridize art and tool, we hope to pull critical design, art practice, and user-centered design together in a way that affords new roles to visitors, museum staff, designers and artists in the co-construction of new museum experiences.

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