

# Technologies for Reflection

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## A CALL FOR REFLECTIVE DESIGN

This paper is a proposal for and case study in 'reflective design' as an agent for critical thinking and potential change. Many previous studies have looked at technology as an (unconscious) agent of social change [e.g. 18] and examined the bi-directional influence of people adapting technology and technology adapting people's practices [e.g. 13, 10]. Disciplines of anthropology, sociology, psychology, design and cultural studies, to name but a few, explore how the shape and evolution of technology offers insights into the values, beliefs, and development of people as individuals and societies.

We build on this body of work by designing technology with the primary intention of stimulating reflection on existing practices and perceptions. Social scientists have studied technology as found artifacts reflective of ways of being and doing. Critical technical practice [1], on the other hand, has allowed researchers themselves to reflect on and change these assumptions as a part of technical practice. We are combining these ways of thinking to devise technological devices that encourage both ourselves as researchers *and* our users to reflect on and perhaps to change common perceptions, relationships, or behaviors. We call this approach to technical research, which draws on similar strategies in design [e.g. 4] and the information arts [17], reflective design [6,15].

Reflection is not a natural result of technology design because it tends to encourage reification. This obstacle to change occurs in two important ways. First, computer models tend to require a codified way of defining and instantiating practices. This codification necessitates viewing a practice or construct as something primarily static governed by set rules and options. Secondly, the fact that practices are codified suggests that other alternative practices are not addressed. Features that are implemented often represent unarticulated choices to support some activities at the expense of others. It is in environments where technology is most often employed to reify existing practices where reflective design is most powerful.

## DESCRIPTION OF THE DESIGN SPACE

In this case study, we are looking at technology designed for a generally traditional and conservative environment, namely art museums. Art museums in many ways have embraced technology from information kiosks to digital take-home collections of art to virtual museum web sites to audio and video tour guides inside the museum [11,14]. In some art museums, computational devices enter the museum as art itself, such as Simon Penny's Petit Mal at the Otso Contemporary Art Museum or Ken Goldberg's Ouija 200 at the Berkeley Art Museum.

We propose, however, that most applications of technology, whether on the side of art or tool, reify traditional museum practices. Specifically, technology in art museums tends to support the established roles of visitor as novice or passive recipient, the curator or exhibit designer as expert, and the artist as a remote entity communicating through his or her art or the curator's interpretation of this art. Furthermore, when implemented as a tool for art museums, technology is often designed to support the practice of information transfer between curators as expert providers and visitors as novice recipients. This is a valuable communion but suggests a limited view of what the museum experience could be.

We are seeking instead designs that draw the visitor's attention to these practices and the role of technology in them, as well as designs that potentially create space for new practices and perceptions.

## TECHNOLOGY FOR CHANGE IN MUSEUMS

A quick look at one of the most recent technology additions to art museums illustrates how technology design tends to perpetuate as opposed to challenge existing practices in museums. Handheld context-aware computers are being explored as an alternative or supplement to the popular audio tour guides many art museums offer. Most of the focus in designing and evaluating these guides has been on usability issues, such as supporting intuitive navigation, providing information just in time, or

customizing personal tours [2].

An advanced version of such guides called the Museum Wearable was developed at the MIT Media Lab [16]. Although this guide challenges the amount and customization of information typically available on a tour, it still supports a model of information transfer and individual, perhaps at the expense of social, experience. The success of the Museum Wearable is measured in part by how accurate the system is at anticipating a visitor's needs or interests. In other words, the emphasis is on making the system more aware of the user's context and using this awareness to present appropriate information.

It is only natural and sensible that technology design for art museums support existing practices. In actuality, many visitors to museums are there to seek information, to learn, to be entertained, etc. We are not suggesting that these practices and the technology to support them are wrong or without value. Instead, we are suggesting the opportunity to provide additional support for alternative practices. One such practice is the communion between visitors -- honoring the social presence of museum spaces -- and reversing the role of the visitor as novice to the visitor as expert or contributor.

In an early study of handheld guides in museums for example, the Cornell HCI Group pushed on the one-way information transfer model by adding a bulletin board for visitor comments and questions [7]. In implementation, however, we found this feature underwhelming in the type of dialogue it generated and the value visitors attributed to it. When analyzing this result, we compared the experience to a similar handheld guide developed for campus tours [1]. In the campus setting, tour participants utilized and enjoyed the ability to leave comments about different areas of campus. In short, similar populations used similar devices for a tour, but in the museum experience the social aspect was far less popular.

Comments from these different studies indicated that one of the reasons people did not leave comments during the art tour was because they underestimated their license or authority to speak about art. In contrast, on the campus tour, students using the guides felt their experiences were valid and important enough to share with others. For the museum environment, simply having a channel for visitor communication and social engagement is not enough. There must first be motivation for and awareness of this potential.

This observation of how deeply embedded existing practices of museums are led us to design devices that would begin by first illuminating the social presence of museums and the individual's mark on this collective space. Our goal is to draw attention to the museum not just as a house of objects but a collection of people dynamically changing the museum experience.

## STRATEGIES FOR REFLECTIVE DESIGN

There are several possible strategies for reflective design in museums that would draw visitor attention to elements of the museum experience that are under-represented or over-represented in existing technologies. One possible strategy for reflective design is to violate expectations through destabilization or defamiliarization.

Destabilization is the approach used, for example, in technology value fictions [4]. A technology value fiction employs existing or plausible technology for disturbing or questionable ends. For example, Maywa Denki's Uke-TEL clock [5] consists of a small water basin of swimming fish. A series of sharp spikes, suspended above the basin, release on the hour potentially spearing the fish. Value fictions tend to connect with people already questioning reified values. For audiences who miss the point, at best the value fiction causes discomfort to be examined and perhaps resolved. At worst, the fictions reinforce the values being called into question.

A possible defamiliarization experience with technology in museums might be to use electronic tour guides for presenting questionable, even false, information or information not in the curator's authorial voice. This might serve to draw attention to the role of possible other voices and the amount of trust placed on both the curator as expert and the technology as a deliverer of truth or facts. However, as with the value fictions example, the danger here is that the design intention might resonate with a very limited audience and serve as a source of confusion, alienation, or misinformation.

We have opted instead for a strategy of explicit representation. This strategy starts from the position that there are practices and occurrences that are so habitual we don't even see them anymore. If we re-present these practices in a different way, however, it draws them into sharper relief. People recognize implicitly that the museum is a social place and unconsciously they will use peripheral cues of others' presence (e.g. noise level) to inform and influence their experience in a museum. Visitors may not attend *consciously*, however, to this presence and reflect on the potential for social engagement or recognize the effect of their individual choices on the museum experience as a whole.

If we re-present the presence of people in alternate ways, such as a large visual display of patterns and preferences, this may serve to stimulate reflection both on the museum experience and the role of technology in this experience. One option would be an art installation that draws attention to the presence of others in the museum and the tendency of technology to support individual information transfer experiences. The difficulty of this option is that it maintains to some degree the same museum practice of remote artist communicating a message

through his or her art around which visitors may choose to engage. Instead, we wanted something that would not just draw attention to one particular installation but would pervade or reflect the entire museum experience.

We therefore set out to create something that would have aspects of art, as a commentary open for multiple interpretation, and aspects of a tool, with a level of utility and task-focus. The desire to position the re-representation displays as tool-like was also motivated by the fact that we were working within the constraints of a conservative environment. We could not build something that challenged existing practices outright. Instead, we needed to design something that could both support and build from traditional views and practices of technology in museums.

### DESIGN SKETCH

We have worked with curators and museum visitors to identify what type of information about the museum experience is of value and how best to display this information. Simultaneously, we are experimenting with different data collection methods, from tracking visitors' locations and choices via their use of handheld guides to monitoring indicators of presence and activity levels with embedded sensors throughout the museum space. We will describe some preliminary results of the research on displays before outlining our next design for testing.

In an initial user study, we presented two focus groups with several displays about social presence and activities in a generic museum space. The initial idea was that these displays would be projected to visitors on their handhelds as a navigation tool and also projected on a large communal space, such as on a blank wall in the foyer or even the side of the museum building. One focus group consisted of six museum curators and staff. The second focus group consisted of 11 museum visitors.



Figure 1: Atmosphere Display

The displays showed visualizations of population (e.g. population density around certain exhibits), popularity (e.g. frequently visited objects), paths (e.g. common paths of different demographics), and affect (e.g. the emotional climate of different gallery wings). The displays ranged in the level of abstraction. For example, some displays would represent individuals in the museum against the backdrop of a museum

floor plan. Other displays depicted the atmosphere of different rooms in the museum like a climate map (see Figure 1). One display tested the concept of emergent art: where visitor patterns and preferences contributed to an aesthetically pleasing impression of visitor experiences. In this way, visitors would not just be viewing art but participating in a creative process as well.

We found in testing these displays that both visitors and curators found the views interesting, informative, and potentially behavior changing, although to various degrees. From a qualitative analysis of participants' comments we will underscore three main lessons for future designs:

*Engagement Through Ambiguity.* People tended to engage more with the ambiguous displays [8] or displays that lent themselves to user-constructed narratives [12] as opposed to the literal displays that left little room for interpretation.

*Finding Self in the Collective.* Some of the displays depicted only aggregation and for these participants asked to be able to identify their own place. There was an expressed desire not necessarily to isolate oneself but to be able to see how one's own participation influenced the overall display.

*Traces of Expression.* People responded enthusiastically to displays that allowed them to leave a mark in the museum, such as the emergent art display or the popularity displays indicating how one's preferences influenced the paths of others.

*Context Specific Designs.* Our initial displays were designed for a generic museum. We recognize, however, that the displays' interpretive affordability requires resonance with a specific museum context.

Given the lessons described above, we are currently building a new design implementation for the Johnson Museum of Art at Cornell University. We are working with one floor of the Johnson Museum, the Asia Gallery which houses several objects about nature, contemplation, and spirituality. We wanted our designs to therefore resonate with this type of content. Furthermore, the physical space of the museum is also largely influenced by nature as the external corridors consist of wall-to-wall windows looking out over Cayuga lake and the surrounding hills of Ithaca.

After reviewing several possible designs, we ultimately decided to build as a first test a visual display of presence and an auditory display of absence. The auditory display would consist of a series of wireless speakers placed throughout the Asia gallery. The speakers would emit bird sounds emanating from areas of the gallery with the least amount of visitor traffic. As people move into the space where birds are singing (metaphorically), the bird sounds will stop and move elsewhere. In addition to the auditory displays of absence we will

also project displays of presence or popularity represented by a montage of popular exhibits in the museum (see Figure 2). Both the absence and presence information will be drawn from a combination of sensors and use of handheld guides.



Figure 2: Simulated Object Popularity Display

### EVALUATION

As we look toward implementing the new design in the Johnson Museum, one of the biggest issues revolves around evaluation. How will we define success? And by what metrics will we measure this? Returning to our objectives of causing reflection on the museum experience and the role of technology beyond information transfer, one possible metric of success would be eliciting people's perceptions of the museum experience before and after the introduction of the display. What or how do people talk about the museum experience without the display? Are the narratives people tell about the museum experience different with the displays? What are people's interpretations and valuations of the displays?

As we explore different methods for answering the questions above, we will look toward combining methods for evaluating a 'tool' such as traditional usability studies and methods for evaluating 'art'. This latter approach is somewhat controversial [9]. What does it mean to evaluate art? To some degree, artists or art historians would argue that art is beyond evaluation – people either get it or they don't. Yet, there are lessons to be learned from performance art, for example, in terms of what characteristics of exhibits tend to engage people versus exhibits that don't command or hold attention and involvement.

### CONCLUSION

In critical technical practice as conceived by Agre, critical reflection is dialectically linked with technical research through the researcher's reflection on his or her own work. We are extending critical technical practice to incorporate reflection not only by researchers but also by users. In the process, we are beginning to leverage user reflection to help us understand and refine our own assumptions. Reflective design, therefore, supports both user reflection and our own.

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