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Field Studies and Ethnography for the Creation of Museum Exhibits

In eighth grade I brought my giant tri-fold poster board through the front doors of the middle school and made my way over to my designated spot in the school "cafetorium" (for those unfamiliar with a small public school setting, a cafeteria and auditorium rolled up into one shared space) for the annual science fair. Dozens of students and parents gathered in the cafetorium to walk up and down the rows of tables covered in poster boards that threatened to block the smiling faces. Along with the poster boards, many students had brought petri dishes containing weird "things" or had pictures of some type of experiment they conducted or contraption they built. I other the hand, and unlike all my peers had focused my science fair project on social science and did an analysis of dreams. I had a well-written report taped onto my poster board. However, I knew nobody was going to want to come over and take the time read my report while standing. However I wanted the strolling passersby to stop and take interest in the work that I was so interested in. My first goal was to make it visually appealing by adding dream catchers and elaborately designed titles that were a work of art. Then I realized I still wanted people to learn something about dreams and their social importance, so I created artistic flash cards with some fast facts for people to pick up and quickly read. I tried to make it interactive, but I had tough competition 3 poster boards down because that girl did an experiment with a mouse trying to get it to successfully get the other side of the maze. Who doesn't love watching a mouse in maze, especially when the mouse finally figures it out?

The purpose of this anecdote is to explain on a much smaller scale the process that museums undergo to create exhibits that people will want to visit and become immersed in and interact with their friends and families- whether it's a parent trying to teach their young son or daughter about the heart, or even an older couple that want to learn about the heart. The challenge is that the exhibits will remain the same as visitors come and go, but the way these visitors engage in and interact with the technology will be vastly different between the family with young children and the older couple. It is the goal of the museum curators and technologists to create interactive ubiquitous computing technologies and test it's effectiveness through field studies and in-situ observations to create memorable experiences.

In 2010, the Department of CIS at the University of Strathclyde, Glasgow, was commissioned by the National Trust Scotland to conduct user studies of prototypes of interactive installations for the new Robert Burns Birthplace museum in Alloway Scotland. The interactive installations' goal is to create a "show not tell" environment. The installations are treated as mini games and are geared towards children and teenagers. The four installations are PhotoFit, Spooky Stories, The Poetry game, and Burns Supper Table. The PhotoFit game allows children to choose different facial features such as eyes, nose, mouth, ears and hairstyle in various combinations to create a portrait of Burns. Each feature is associated with a quote from Burns contemporaries. Spooky Stories is an interactive game that brings to life the "Tam O'Shanter" poem. The Poetry game requires users to "keep in time with rhythm and rhyme" by tapping a button to the start of "To a mouse" and "Tam O'Shanter". Lastly, the Burns Supper Table is a multiplayer game that lasts the duration of five rounds. The game is centered on the

Burns supper tradition and is played on a top-projected interactive table that uses physical buttons. To test the interactive installations, the design team sectioned off an area of the library at a local museum and invited families with children of different ages to test the games. (Because the Burns Supper Table has a complex setup, it was tested at the University lab). At least eight families tested each game, and most families had more than two children or had the child's friends attend with them as well. Families were told to fill out consent forms and then were given basic instructions to play the games. After playing the games, the adults of the families were told to complete a questionnaire and children drew pictures to reflect on their experiences. This was then followed by an open-ended group interview that took place for approximately 40 to 60 minutes. All sessions were recorded and detail notes were taken, and for about half the sessions two observers were present.

After the user study was conducted using the prototypes, the second phase of the research began with the in-situ observational study. The start of the in-situ study was led by questions left unanswered by the prototype user studies. Observers wanted to see if interaction patterns would remain the same now that the installations were "in the wild". New factors introduced in the museum setting were the layout of the installations meaning which games were placed near each other. One observer collected over 20 hours of observations and video recording over the span of 6 days. Another observer focused on taking field notes.

It was observed that parents often helped to guide their children through the interaction of the games on the installations. They would engage their children by asking them questions and encouraged thinking while interacting with these games, and not just

the pushing of random buttons in random patterns. It was also noted that the results of the user studies done at the library and lab were very similar to the results of the in-situ testing done at the newly designed museum (Hornecker and Nicol).

The user studies conducted by the University of Strathclyde is a good example of how many museums go about creating technologically immersive experiences. It's all about engaging users by capturing their interests by understanding how they interact with technology, how they interact with information, and how they interact with their setting including the people around them. In order to understand these interactions it's vital to conduct field studies to test the prototypes and in-situ observational studies to see how people interact with the installations.

Other examples of ubiquitous computing in museum exhibits include the work done by the Learning Science Research Institute at the University of Nottingham in Nottingham, UK. The research team spent 2 years creating a prototype, undergoing scenario-based design, observational studies, and consultations with museum stakeholders to create *Re-tracing the Past* at the Hunt Museum. Museumgoers used RFID-tagged keycards to interact with the trunk, desk, recording station and the Virtual Touch Machine within the different designated rooms of the museum. Some of the features enabled by the keycard were activated in certain locations, information would be provided to the user about the object on the card. Another feature accessed by the keycard was an animation embedded in a two-way mirror frame. In a span of ten days, over 900 people visited the exhibition and a total of 326 school children had the chance to interact with the exhibition. Similar processes to that of the Burns Museum exhibit research process was the data collection of user experience and feedback through sketches, short

essays, and videos. From this, the researchers were able to identify issues in order to further better the exhibit to make it more inclusive and immersive for returning and future visitors (Hall and Bannon).

Taking a slightly different approach, a research study conducted by a team of researchers from Hewlett-Packard Laboratories at the Exploratorium in San Francisco focused on how people approach exhibits and how they determine what to do with the exhibit. The researchers discovered that visitors often only read the exhibit label after they finished doing what they wanted to accomplish or if they had difficulties or even failed to make use of the exhibit. It was also observed that when people didn't read the labels, typically more time was spent at the exhibit, so there was a connection made between the reading of the label and the level of play and exploration. In addition, they noticed that people preferred to interact with exhibits with other people as well. It was discovered that it is common for one person to read the instructions while the other person actually carries out the actions said in the instructions. Based on this newfound knowledge, when proceeding with their prototype of *Guidebook*, a device that enabled access of online information about the exhibit in combination with the physical label, the researchers wanted to see if museumgoers behaviors changed (Hewlett-Packard Laboratories).

Last but not least, often time museum spaces are used to replicate the outdoors or are even taken to outdoor spaces. That brings us to examine the last two ubicomp Museum technologies, which include *A Walk in the Wired Woods* and the *Ambient Wood*. A Walk in the Wired Woods was another project done by Hewlett-Packard Laboratories in which they partnered with local artist Liz Milner and musician Armin Elsaesser in an

exhibit called *A Year and A Day*. The exhibit is in an indoor space, the atrium of the Hewlett-Packard Company in Bristol that is a compilation of woodland photographs taken by Milner and coupled with an augmented digital soundscape. Exhibit-goers are told to wear headphones that have ultrasonic sensors and wear a bag over their shoulder that houses a HP Jornada 568 handheld computer. While walking around the exhibit, the computer senses where you are and based on your location, you can hear certain sounds that are associated with the pictures that you are looking at, whether it is woodland sounds or woodland mythology (Richard Hull and Josephine Reid).

The Ambient Wood project, as discussed in Ubiquitous Computing Fundamentals and led by the Department of Electronics and Computer Science at the University of Southampton, UK, is a mixed reality space in an actual outdoor woodland area located in Sussex. The woodland utilizes mobile sensors that allow children to collect geo-tagged light and moisture readings as well as tagged objects to be explored through the use of installed information appliances. In addition, there is a series of wirelessly connected devices employed to create ambient sounds based on contextual triggers (John Krumm). The goal of the woodland "exhibit" was to see how children interacted in a setting that mixed both real and digital experiences and how these experiences would be remembered and used in the classroom setting (Weal, Michaelides, Thompson, DeRoure).

In conclusion, the role of ubiquitous computing in museum exhibits involves a lot of research that concerns itself with human behavior and the way that people interact with information, objects, settings, and the people in those settings. Immersing oneself in knowledge and having the ability to interact with new concepts and ideas is the most effective way to engage people and have them really understand and remember the things

that they learn. Walking from room to room to read signs is only so mentally engaging, but asking a museumgoer to play a game or scan objects to discover new features is far more engaging thus demanding a higher level of mental focus and involvement to participate. Ubiquitous computing has completely evolved the way people experience museums because the interaction we experience with other people can now be replicated and enhanced with the technologies available today.

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