



The RISE Project: Post Mortem

Team: Greg Bliss, Fan Fang, Danielle Holstine, Lauren Lanster, Andy Ping Li, Katie Smith

Advisors: Shirley Saldamarco, Chris Klug

Overview

The RISE Project was a semester long collaboration between Carnegie Mellon's Entertainment Technology Center and the Museum of Science and Industry in Chicago (MSI). The MSI is one of the largest science museums in the world. Their massive 400,000 square foot space houses interactive exhibits utilizing advanced technology such as augmented reality, RFID, surface tables, thermal sensing, touchscreens, and interactive screens. The Entertainment Technology Center is a two year graduate program at Carnegie Mellon where students work on collaborative teams to develop interactive content for a wide range of platforms.

The goal of the semester for the ETC team was to develop a proof of concept for a new hands-on interactive experience for MSI's *Fast Forward* gallery. The *Fast Forward* gallery is intended to envision what the future will look like by featuring innovators whose work will begin to impact our lives in the near future. At the beginning of the semester, we were given a list of seven candidates that MSI was considering adding to the gallery. The list of possible candidates were chosen from a wide range of fields:

Craig Venter — *Synthesized organisms for use as BioFuels, mapped human genome*

Graham Hawkes and Sylvia Earle — *Underwater Robotics/ Exploration and Ocean Conservation*

Catherine Mohr — *Surgical Robots*

Jane McGonigal — *Game Designer*

David McCandless — *Information Design*

Tan Le — *Brain wave control*

Geoff Barnett — *Shweeb monorail*

The interactive proof of concept is intended to best connect the guests with the essence and potential of the innovators' work. We spent the first several weeks researching all of the candidates in order to familiarize themselves with their work. After the research phase, we began to brainstorm exhibition concepts for all of the candidates. The list of candidates was narrowed to five, when the ETC and MSI jointly decided to eliminate Tan Le and Jane McGonigal. Tan Le's work, while enormously innovative, requires precise calibration for each user, which is not feasible in the museum setting. The teams felt that it would be better for Jane McGonigal, a game designer, to create an interactive game about her work rather than have us attempt to replicate it. We brainstormed concepts for Craig Venter, David McCandless, Geoff Barnett, Catherine Mohr, and Graham Hawkes. We developed concept art for all of these candidates, and pitched the ideas to the

MSI team.

After the concept pitch, Geoff Barnett and David McCandless were selected as the candidates to move forward with. After contacting them, MSI learned that these candidates were not available to collaborate on this project. Craig Venter was selected as the next innovator to focus on. It was soon apparent that he was also not available. Graham Hawkes was then chosen and the team flew to San Francisco to meet with him. In discussions with Graham, it was decided that we would develop a submarine simulation in order for guests to have the experience of navigating the Super Falcon submarine. Graham expressed that he would continually be going on new dives and it was desired that the proof of concept be easy to update with new video content.

The challenge for us was to design an interactive submarine simulation using video that could be synced with the Super Falcon's pitch, roll, and yaw data. However, neither the video footage or the data was available for testing and development. In order to overcome this hurdle, the ETC and MSI teams discovered that there was an application commercially available on the iPod that would use the device's built in gyroscope to record pitch, roll, and yaw data. We tested the app and then shipped an iPod with the app installed to Hawkes to take with him on his next dive.

The second challenge to overcome was not having Hawkes' video to develop with. We used video footage captured from a video game, *Dive to the Titanic*, to create our proof of concept. Since it was discovered that we would not have access to Hawkes' video at all during the course of the semester, the video game footage was used as a placeholder to invoke the sense of an immersive, underwater experience that the final footage will. We crafted a story line for the experience and developed narration. The storyline was that guests get to go on a dive to the Titanic site with Graham Hawkes as their co-pilot. As the guests navigated through the wreckage, Hawkes would provide instructions on how to steer the Super Falcon. A tutorial was developed to help guests better understand how to use the controls. The goal of the experience was for the guests to keep their roll bar arrow lined up with the guide arrow that charted the desired course. If they were successful, they would receive a pilot license at the end of the experience; they can obtain a Master, Pilot or Trainee license.

What Went Well

Early on the MSI and ETC teams established a set weekly conference call meeting time. This allowed both teams to keep each other updated of new developments and changes. In addition, there were many opportunities for face-to-face discussion. The MSI team flew to Pittsburgh to kick off the semester, we flew to Chicago to explore the gallery, members from both teams traveled to San Francisco to meet with Graham Hawkes, and the MSI team made three additional trips to Pittsburgh to assess progress. It was highly beneficial that the MSI team was able to check on our progress at key points during the development. The MSI team was highly engaged and involved in the process.

We were greatly assisted by the ETC community. It was quite fortunate that the neighboring

team was working on a research project exploring the features and capabilities of the Unity game engine. Once we decided to switch to Unity, we were able to consult the Unity team for advice and assistance.

We had a broad range of skill sets and team members were willing to learn new skills as needed. When the artists were overwhelmed with the amount of concept art needed to prepare for the concept pitch, other team members learned Illustrator in order to help out. One team member was able to switch back and forth from working as an artist to working as a programmer as the work load required. This team had three programmers which was highly beneficial when developing the demo in Unity.

It was fortunate that we were able to find the game *Dive to the Titanic*. Since we knew we would never get to work with any actual footage from a Graham Hawkes dive, we were able to record gameplay from *Dive to the Titanic* and use that for our project. It was HD resolution footage, meaning we got to build the actual experience to the same specs that it would need to be once real footage is captured. This will help with phase 2, as the platform is already set up and ready to use any other HD footage.

The museum introduced us to the *ButtKicker* haptic feedback device. We attached this to an office chair and integrated it with our program to imitate the rumble of the submarine's engine. This truly made our project more immersive and after careful testing we determined the frequencies that make for the best experience. This will also help with the final version of the project; if the museum decides to use such a device, we already have it working in the program and know what settings to put it on to maximize the experience.

What Could Have Been Better

In hindsight, there are a few things that could have been better about the semester. First, if the museum had determined an innovator and gotten confirmation about their involvement before the start of the semester, we would have avoided the roadblocks that came with the first six weeks of the semester. Time spent researching seven innovators and coming up with exhibition concept ideas for five of them could have been used to start brainstorming for the one innovator. We would have had several more weeks to iterate through our proof of concepts and may have even been able to start developing concepts for the final form factor and experience design.

Since this was not the case, another area we could have improved in was in having a backup plan. Had we anticipated setbacks more, we could have rebounded more quickly and we could have been developing other ideas in tandem with the ones we presented to minimize lost time in the case of a suddenly changed direction. It would have been better if as a team, we had implemented more of a scrum-style plan for the semester rather than trying to plan out the entire semester from the beginning. This would have allowed for more flexibility when our direction did change and would allow for more productivity in the long-term.

In terms of our deliverable, there are a few things that could have gone better this semester. Once we found out we were building an experience around video, we needed to use place-holder footage in lieu of footage from one of Graham Hawkes' dives. We were fortunate to find the game *Dive to the Titanic*, which we recorded and used as our video. If we had known what footage we would end up with, we would have been able to script the story to be more like what the final version would be. Since this was not the case, we scripted the experience around the game footage, which will end up being less useful for the museum as it is unusable for the finished exhibit.

Finally, if we knew who were handing the project off to, we would have been able to structure our project to make the transition as easy as possible. Knowing the specs and requirements needed by the development team would have given us more direction in both our coding and technical implementation, as well as our hand-off documentation.

Lessons Learned

We learned a great deal about remaining flexible and adaptable. It was a challenge to stay motivated as the chosen concept switched from Geoff Barnett to David McCandless to Craig Venter and finally to Graham Hawkes. Though one of our advisors, Chris Klug, had forewarned that this could be a possibility, we were not prepared for this reality. We learned to focus on what we could move forward with, instead of regretting discarded ideas.

We also learned a great deal about designing for museum settings. The client was very forthcoming with knowledge they had learned through their experience regarding what kinds of exhibits stand the test of time and what elements break frequently. During our brainstorming and pitch process, they were able to point out which parts of our designs would ultimately be successful and which parts would prove problematic. This feedback influenced our continued designs and we began to plan our interactive elements around objects that we knew would last (i.e. if a design involved loose objects, we tried to make sure the objects had no function outside of the interactive space; this made them less likely to be stolen since they had no purpose once outside the context of the museum).

Another important lesson we've taken away from our development process is to assess the goals and evaluate how much time each goal will take. One feature we would like to have added was having two displayed, one containing the HUD and one with the video projected in front of the guest. However, while this is possible in the Unity game engine it would have taken too much time away from development of other features. Therefore we decided to leave this feature out of our proof-of-concept, so we could research and implement other lesser-known features.