Final Report

IPRO 329 – Edutainment

Team members:

Asad Akram
Natalie Hammer
Joel Huish
Ippei Iwata
Michal Kaska
Heajin Lee
Joseph Lloyd
Jeff Rebacz
James Runge
Daniel Rutherford
Shubhi Sharma
Mikhail Zaturenskiy

Advisors:

Laura Batson
Laurence Friedman
Anthony Mcfadden
Greg Pulliam

1.0 Introduction

Our IPRO has the specific purpose of designing a training simulation for Health Physics Technicians. HPT's; or specifically, Radiation Control Technicians or RCT's work to ensure that radioactive materials are being handled correctly in a variety of settings, including nuclear power plants, scientific research facilities, and weapons plants. Our simulation is meant to be a self-assessment for a potential HPT, who is preparing for their oral certification exam.

2.0 Background

This project is currently in its third semester of development at Illinois Institute of Technology. Our first semester focused on the creation of a Proof of Concept; a basic simulation with a simple scenario. This simple scenario was tested at Argonne National laboratory in April 2007 and the results revealed that the simulation was a viable tool, and the technicians who tested the game considered it worthy of further development. Last semester, we continued to develop the simulation in a similar direction, using Flash as our programming language and many of the same graphical styles from the first semester. A new scenario was implemented, and again tested at Argonne National laboratory. Again our game received positive feedback, but also came back with suggestions to be implemented. This semester, we have implemented the changes suggested by the technicians. Our objectives were slightly more ambitious also, as we updated the entire simulation's backgrounds from 2D models to 3D. We aimed to roll out a product that can be used by any potential HPT by the end of the semester.

3.0 Purpose

This team's objective was very clearly defined at the beginning of the semester as refining the training simulation created last semester into a more robust, complete product that is ready for rollout at the end of the semester. At the end of the previous semester, we fell short of accomplishing our goal of having a finalized product because of time constraints. This semester, we have updated all of our backgrounds to a modernized version of the game, increased its usability by working on the question database, and increased the overall functionality of the game. Our objective will be completed by IPRO day, when we will have a final CD copy of the game ready to give out and be used by HPT's. Continuation from here will include adding more scenarios to the simulation, allowing for better self-assessment by the RCT.

4.0 Research Methodology

Our main research took the form of Usability Study performed at Argonne National Labs. The simulation was tested by 6 certified HPT's, who all provided constructive feedback on our work. At this Usability study, our IPRO team used likert scales and post-simulation debriefings to collect the information necessary to measure our

progress. One of our faculty advisors, Laura Batson has worked with Usability Testing, so her input was invaluable in designing the testing materials and reviewing the results from our tests at Argonne. Other research was done through another advisor of our IPRO, Anthony McFadden. He is employed by a nuclear power plant, and is currently going through the training to become a certified HPT. He has been another invaluable source of information, as a student in the health physics program; he was able to tell us what information would be most useful in the game.

5.0 Assignments

Please see accompanying file "Task Breakdown S08.xls" for a listing of each member's contributions this semester. This task breakdown is similar to those given for the midterm report and project plan, as our project went well, and we accomplished all of our goals.

The Team Leader, Natalie Hammer, compiled all the IPRO deliverables after she received input from the sub-team leaders. The meeting minutes were handled by our minute-taker, Michal Kaska.

The sub-team leader of the Development team, Joseph Lloyd, broke down the development teams tasks this semester, and was responsible for any deliverables needed from the team. Joseph's tasks included planning out and finalizing the question database algorithm, updating the graphics for the house and map layout, and making new objects "drag-able". He also spent a large amount of time debugging the game and fixing problems left over from previous semesters. Daniel Rutherford worked mainly on updating and expanding the question database, and helped to enhance the consistency of the scenario through the question database. He also did a lot of debugging of the game, helping to fix problems found at the user testing at Argonne National Labs. Mike Zaturenskiy worked mainly on updating the user interface, and making it easier to use. He began the semester by debugging this interface, and making it more robust for the newly designed graphics that would be added. He also added new tools to the game that are needed for the scenario, and updated their functionality so that all the new tools worked. Ippei Iwata designed a new introduction video that will be used as an introduction to the game, a way for the user to be familiarized with how game play works. He also integrated the new graphics rendered by the design team.

The sub-team leader of the Design team, Shubhi Sharma, broke down the design tasks for the semester and was responsible for any deliverables needed by the team leader. Shubhi's tasks included searching the Internet for 3D models in order to create backgrounds for the game, as well as designing the kitchen, exterior of the house, and the lobby scenes from the game. He also worked on the poster for IPRO day. Asad Akram was responsible also for finding 3D models for the backgrounds in the game. He was specifically responsible for the living room and bedroom scenes of the game. Also, he was in charge of the website for IPRO 329. Heajin Lee was also responsible for finding 3D models for the backgrounds of the game, mainly

focusing on the office and cafeteria scenes of the game. She was in charge of these scenes, and worked on the IPRO website along with Asad, and added her insights to the final poster. Jeffrey Rebacz gave a tutorial to the rest of the design team at the beginning of the semester helping them to learn the rendering tool Blender. He served as the lead designer for the design team, helping to design the construction site, two hot labs, portal monitor rooms, and hallways for the game. He also created the inventory tools that are used in the game. He contributed to the IPRO day deliverables by creating the brochure. Finally, Joel Huish found 3D models in order to create the parking lot, the inside of the car, and the locker room scenes for the game. At the end he began and contributed to the design of the IPRO day poster.

The project management team was lead by the IPRO team leader, Natalie Hammer. She was in charge of splitting up tasks for the project management team, as well as making sure the rest of the IPRO team members stayed on task throughout the semester. She was also responsible for all deliverables due to the IPRO office. Michal Kaska was the team's minute taker, and he has worked week by week to keep up with what each person was working on. He also contributed to the scenario, by working with our trained RCT's to make sure everything was plausible. James Runge worked mainly to fix the problems found by usability testing last semester at Argonne National Labs. He successfully re-wrote the scenario including all suggestions, so that each part was plausible and consistent. He also helped the other teams by writing up instructions for them to be used in the game, and instructions to help development.

6.0 Obstacles

The development team:

The development team ran into a few obstacles during the course of this project. One of their main obstacles was their synchronization with the design team, as they had to wait for the design team to render the backgrounds before they could integrate them into the game. They resolved this issue by asking the design team to render each background one at a time, and turn it over as soon as they were finished. This helped them because they were able to add backgrounds to the game one by one rather then having many at once.

They also ran into problems with user interface optimization. While designing the game they made some assumptions as to how the interface should look, and only in testing the game would they find out if their designs were effective. After the team's trip to Argonne National Labs, they were able to fix any issues with the user interface that came up.

A major issue the design team saw was the operating system interoperability. While the game itself was programmed on a windows computer, it still needs to include the option to run on a Mac computer. We have solved this problem by having the team members with Mac computers allow the development team to work on their computers for testing.

Finally, the development team ran into a problem with the tool functionality. The original functionality of the game did not allow for some of the new tools implemented in the game to work as desired. The development team solved this problem by rewriting the backbone software of the game to allow for these new changes.

The Design team:

The design team also ran into a few obstacles over the semester. The design teams biggest and most difficult obstacle to overcome was learning how to render in the program Blender. Only one member of the team had used this program previously, so it was difficult to get started on the project. The team member with Blender experience held a couple of sessions to teach the other members the basics of the program. He helped the other members with the problems throughout the semester, solving the issues.

The design team also became aware of the short period of time in which they had to have the backgrounds completed. They solved this problem by not designing every object in the backgrounds themselves. Instead, they found copyright free 3D models available over the Internet, which would allow them to insert the model into the background and move on. This saved hours of time that could have been spent designing object by object in each room.

The final issue of the design team was the difference in styles of each of the modelers. Since each member had different rooms assigned to him or her, the team had to make sure each room was consistent, and had the same look and feel presented in the game. The sub-team leader was in charge of making sure this look and feel was consistent in each room.

The Project Management team:

The major issue the project management team ran into was working with the scenario of the game. At the beginning of the semester, the team started with a scenario that was not a plausible real life situation, and the team was tasked with transforming this into a real life story. This was a difficult problem, as none of the students on the team have experience in the field of radiation or radiation control, and therefore do not know the appropriate steps to take when dealing with it. This problem was solved with much help from our content advisor, and one of his radiation control students. Without their knowledge, the team would never have been able to develop a scenario that was approved by the trained radiation technicians at Argonne National Labs.

7.0 Results

In the end, the team has accomplished all of our goals for this semester. Thanks to the development team, we have enhanced the interface, graphics, and interaction

with the player. We have corrected scenario problems, and completed a robust, reliable code that is complete for future upgrades to the game. Thanks to the design team, we have redesigned all the backgrounds in the game, making them a more realistic 3D model. We discovered throughout the semester that some aspects of development were harder then expected, such as the tool implementation into the game. The development team spent many more hours on the tool implementation than originally expected, however they were able to split up the work to still accomplish the goals. We also learned from testing that game play depends directly on the games ability to answer the questions asked by the user. The design team learned a lot about using a rendering tool to create 3D images, and learned that the overall difficulty was more than originally assumed. In the end, we will have a final, professional looking package, ready to hand out to the potential user. Our scenario is finalized, and ready to be used as a self-assessment tool by potential Radiological Control Technicians, RCT's.

8.0 Recommendations

Our conclusion this semester is a final deliverable CD with our final game on it. Our suggestion for next semester is to develop a different scenario that can be implemented easily into the pre-existing platform that we have developed. The more scenarios implemented in the game, the more helpful it is to the user, as the user can test themselves on multiple scenarios. Since the team received positive feedback at Argonne National Labs, we see that there is a use for this game, and can continue to develop it further.

9.0 References

For the most part, our IPRO relied on our content advisor, Professor Friedman, to make sure we were moving in the right direction with our scenario details. During the semester he gave us many examples of scenarios in the form of case studies from DOE incident reports, and cited equipment catalogs when describing the in-game tools. Also, a student of Professor Friedman in the Health Physics program gave us insightful feedback into what a student would look for in this game. Our team did not work directly with these sources, however, and do not have any direct references.

10.0 Acknowledgements

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