

# Final Report

## IPRO 329 – Health Physics Computer Training Simulation

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## 1. Abstract

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. This specific semester's goal was to create, design, and develop another scenario for the training simulation that will bring us one step closer to completing our overall goal of creating an effective training tool for RCT's. This simulation would allow RCTs to go through a zero-risk assessment of a specific situation involving radiological material and additionally, allow for the RCT to practice federal procedures without a board of professionals to present scenarios through an oral exam.

## **2. Background**

This project is currently in its fourth 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 training viable tool for RCTs, 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. Once 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 have a finished product that can be used by any potential HPT by the end of the semester.

## **3. Objectives**

The scope of this semester's work included the design and implementation of a new scenario that could be yet another part of the larger HPT training tool. Such a tool should be reliable, accurate, and test users in a virtual way while promoting the critical thinking skills and knowledge necessary in the real world to handle any one of a number of problems a HPT may come across. With these factors in consideration, the following objectives of IPRO 329's fall semester were developed:

- Design a new training simulation scenario that expands and builds upon previous semester's flash based program.
  - o Create the simulation's graphics into a 3D more real life model.
  - o Integrate the navigation systems into the new scenario.
  - o Create a plausible game scenario to make the simulation more realistic.
  - o Update the in-game tools to current tools used in industry.
  - o Perform usability testing and improve with feedback.
- Put together a final product including a final packaged game.

## **4. Methodology**

See attached file TaskBreakdown\_F08.xls for additional details.

A. Define the Problem(s)-

The problem we are solving this semester is the lack of effective training materials available to help potential RCT's prepare for their certification exam. This is a continuation of our addressed problem from the three previous semesters.

B. Describe how your team will go about solving the problem(s).

- By planning, creating, and testing a flash game that effectively simulates an RCT oral exam, we will provide potential RCT's with alternates to studying written documents or attempting to organize a mock oral exam. Due to the success seen from last semester's program, we are developing a new scenario to expand and further develop the training tools available for an RCT exam.

C. Explain how potential solutions will be tested.

- Potential solutions to the issue will be tested through usability testing and utilizing the knowledge and experience of our content advisor.

D. Describe how results of research and testing will be documented.

- The usability tests are documented, along with written notes being taken of all feedback and comments made by the volunteers. This gathered information is compiled and organized at a later date, and analyzed for all useful comments and suggestions.

E. Define how analysis of the test results will be conducted.

- Students who have background in focus groups will do analysis of the test results. They will analyze the results to determine the different likeability factors that are measured in the test. This information will be used to help further develop the game.

F. Explain how the IPRO deliverable reports will be generated.

- The Project Management team will be in charge of all IPRO deliverables, and will be concerned with getting them in on time.

Additional Details about each Sub-Team:

Development Team:

The development team's goal is to deliver a high quality executable containing an operational version of the game. The development team's final delivery will be an executable that can be locally installed and distributed either through download or CD-ROM. The executable version of the game will be of production quality ready to be distributed to end-users. The final version of the game to be delivered will be of professional visual quality and will contain an immersive environment through the visuals and the user interface.

Design:

The goal of this year's design team is to develop scenes for the new scenario in Blender, an open source 3D modeling program. Using Blender, the new scenes will be designed for realism and accuracy. A second goal of the design team is outputting or contributing to the media related to the game and IPRO, such as the game manual, a tutorial, the IPRO Day poster, and the IPRO day website. The third goal of the design team is to research any new items that need to be added to the game as tools.

Project Management:

The project management team's goal is to complete a plausible working scenario for the training simulation game. They will also work on the IPRO deliverables, and coordinate the midterm and

final presentation.

## 5. Team Structure and Assignments

We kept our team structure as is, and found that it worked well to facilitate communication between the teams. Additionally, the teams contributed to the overall success of the IPRO by achieving these objectives:

Design Team: The design team was able to create a working story board for the scenario. Additionally, the team was able to use the Blender software in order to make designs of all the environments that were used in the simulation.

Development Team: The development team used the designs created by the design team and incorporated them into a working simulation using Flash software. The team created the simulation in a flexible manner in order to allow for future IPRO teams to be able to add and improve upon this semesters work easily.

Project Management Team: Overall, the project management team ensured that all of the deliverables that were required to be completed were indeed finished. Additionally, the project management team was able to look for external funding by utilizing a variety of different sources including the various contacts that David Baker has in the government. Furthermore, team prepared a letter of intent for funding possibilities from the Nuclear Regulatory Commission. The result of all of this external funding searching is still unknown.

A detailed description of what each team member contributed to the overall progress and success of IPRO 329 can be seen in the attached file TaskBreakdown\_F08.xls.

## 6. Budget

Although CD cases and gas for transportation to Argonne National Laboratories was budgeted for, no funds were spent in the course of the semester by the IPRO team.

## 7. Results

A. Describe research findings and state resources.

- Over the course of the semester, the project management team sought various avenues of external revenue. By reaching out to Dave Baker, IPRO 329 hoped to use his contacts in order to find interested parties. A letter of intent was written to the Nuclear Regulatory Commission in order to gain grant funding for future semesters.

B. Describe major accomplishments by the project team.

- A working, playable scenario was created that is capable of easily being expanded and changed.

- Despite still being under development, usability testing was performed, providing effective feedback.

C. Describe both the objectives that were met and the ones that were not met.

- A working scenario was produced.
- The simulation was not ready to burn to CD.
- There was no need to design a question/answer database at this point, as we did not reach the point to contact the delivery driver
- Current tools were upgraded to ones specifically needed in such a potential contamination situation
- A new navigation system for movement in the simulation was made.
- Usability testing

D. Describe any ethical, moral, cultural or scientific issues that occurred or were discussed while investigating the problem(s).

- Providing accurate training to these health physics professionals is key. IPRO 329 does not want to create a simulation that falsely trains a potential expert in the field.

## **8. Obstacles**

The primary obstacle that IPRO 329 faced this semester was time restrictions. Originally, the team wanted to have a completely finished simulation at the end of the semester. However, due to the development and design teams having to become familiarized with the programs that each team used, this objective was not complete. However, a working simulation was still created and was able to be presented to working health physics professionals in the field and the potential of the simulation was emphasized during usability testing.

## **9. Recommendations**

Due to the positive reactions the simulation has gained from professionals in the field, it is important that the IPRO continues to make progress towards the overall goal. This would include finishing the scenario that has been worked on this semester and additionally, create more scenarios for the training of RCTs. By creating more scenarios, RCTs will have a larger database of training situations to choose from, allowing for an overall more effective training simulation.

## **10. References**

All of the research that was done during the semester came from our advisor, Lawrence Friedman who is a board certified Health Physics Professional. His experience in the field proved to be invaluable when learning background information about health physics, creating the story board and learning about how the tools used in the field work.

## **11. Resources**

Please see attached TaskBreakdown\_F08.xls. Due to the fact that there was no visit to Argonne and the simulation is still under development this semester, no money was expended this semester.

## **12. Acknowledgements**

The experiences of our advisors proved to be invaluable during the course of the semester.

1. Lawrence Friedman, as mentioned above, is a board certified Health Physics Professional, whose experience helped us better understand health physics and allowed us to create a realistic story board.
2. Susan Feinberg and Laura Batson's guided the team with their experiences in e-learning and educational games.
3. Anthony McFadden and Sangho Nam provided value feedback through usability testing of our simulation.