

FACE THE WASTE: A SOFTWARE PRODUCTIZATION PROJECT FROM THE COMPUTER SCIENCE STUDENT'S PERSPECTIVE

Matthew Pape, Bob Grube, and Stephanie Elzer
Millersville University
{mrpape, rcgrube, elzer}@cs.millersville.edu

ABSTRACT

This paper presents the overall production of the educational iPhone application, Face the Waste. Face the Waste is a children's recycling game by Runoff Studios developed in collaboration with the Software Productization Center at Millersville University. This paper is presented from the perspective of the Computer Science students, focusing on the tasks they completed, the problems they overcame, and the overall experiences that they gained.

KEYWORDS

Serious gaming, project management, mobile device, iOS, collaboration

1. Introduction

The Software Productization Center (SPC) at Millersville University is a PASSHE funded, cross-disciplinary program designed to serve several purposes: 1) stimulate economic development by assisting small technology-oriented companies, 2) provide students with practical experience, and 3) keep faculty in touch with the needs of the regional business community. Computer science, graphic design, and business students work together, along with faculty in their respective fields, to turn the software concept of the participating company into a marketable product. Once the collaboration with the SPC is complete, the company will be prepared to sell the software product, either by attempting to raise additional funds through existing companies or venture capitalists, or by directly selling to a customer base.

The SPC accepts applications from entrepreneurs located in Central Pennsylvania who are seeking to develop a software product that will directly bring revenue to the company. In other words, the software must be an integral part of a product or the product itself. Finalists are invited to the Millersville campus to present their ideas before the Advisory Board, which consists of prominent members of the local business community. Along with the student workers and faculty advisors, the Advisory Board helps to select the project that best meets the selection criteria, which include:

- Qualifications/experience/ability of proposed leadership team

- Potential for sustainability of business once launched
- Degree to which the proposed activity addresses a significant industry/market need or opportunity
- Potential for near-term commercial application in terms of job creation, capital investment or other identifiable economic activity
- Degree of innovation and originality of proposed software product
- Match of required assistance with SPC resources and skills

To date, the SPC has provided opportunities for over twenty students and worked with four different companies. Participating companies attribute over \$100,000 in sales, \$100,000 in cost savings, and \$80,000 in new financing opportunities to their collaboration with the SPC [1].

2. Project Overview

2.1 Runoff Studios

Runoff Studios was founded in 2010 as an environmentally focused game studio. They focus on development of games which leverage mobile device platforms, such as Apple's iPhone and iPod. Through these games, they aim to expand awareness of the hazards that the world's ecosystems face. Runoff Studios also aims to raise funds for environmental awareness organizations such as the National Environmental Education Foundation. Founder and Chief Creative Officer Jake Walker explains, "Runoff Studios recognizes the negative effects of our society's daily habits on the environment. We believe today's mobile media technology is an effective way to educate and inform younger generations about these problems.... Runoff Studios' donation program was created to aid conservation and restoration efforts, cultivate youth engagement, promote clean energy and preserve the Earth for future generations" [2].

2.2 Face the Waste

Face the Waste, Runoff Studios' first game release, is a result of their recent collaboration with the SPC. The game presents players with an increasingly large variety of recyclable objects and only a limited time to sort through them. It offers power ups for more varied game

play, and features the villain Toxic Tim to add an element of fun and challenge. In addition, the game provides educational facts about recycling and the harmful effects of waste. All of these facts, as well as high scores and achievements, can be shared through the game on both Facebook and Twitter. Face the Waste is currently available for the iPhone and iPod Touch through Apple's App Store for 99 cents. Runoff Studios will be donating 5 cents of every sale, up to \$50,000, to the National Environmental Education Foundation [2].



Typical game play from Face the Waste.

2.3 Team Organization

Three members of the SPC Faculty Steering Committee were involved in this collaboration: Center Director Dr. Stephanie Elzer (Computer Science), Ms. Nancy Mata (Art / Graphic Design), and Dr. Pat McCaskey (Business). The team also included nine student members: Matthew Pape and Bob Grube (Computer Science); Michelle Winey, Aaron Chu, Kate Anderson, Anthony Paparella, and Terrell McIntire (Art / Graphic Design); and Amanda Godley and Amy Huf (Business / Marketing).

2.4 Communication

This application, more than any previous SPC project, was very dependent on the graphical design work. Games are inherently visual, and the development of Face the Waste required copious assets to be produced by the graphic design team and leveraged by the computer science team within the game. For this reason, it was very important that we maintain open and clear lines of communication with the students from the Art and Graphic Design department. In order to organize the numerous assets, ranging from artwork and sound effects to class diagrams and code segments, we decided to use the project management software called Basecamp [3]. This allowed team members from each department to deposit files in a central location that was accessible by other team members at all times. In addition, Basecamp served as a way to communicate updates and track schedules and deadlines.

Even still, as time progressed we found that indirect methods of communication failed in many instances. The students working on art assets often failed to understand

the technical requirements or specifications required of them. They would produce pieces in the wrong size, resolution, and file type, which couldn't be incorporated into the game without modification. In lieu of the constant back and forth messages we opted for a cohabitation of our work environment. By setting up hardware and software for the art students in our own lab, we were able to work out of the same room at the same time. This allowed us to communicate more directly our requirements and the limitations of the hardware for which we were developing the application. In turn, it also opened our eyes to many of the aspects of graphic design we might not have otherwise been exposed to.

2.5 Scheduling/Task Managing

As with past projects, we found it beneficial to develop a timeline for the development of the application. By setting guidelines and due dates, we were able to keep Runoff Studios updated on both our current progress and what to expect in the future. In addition to keeping them informed, it was also helpful to both the art and business students as well. The art students were able to concentrate their efforts on the assets they knew we would need during each stage of the development, before we actually reached it. The business students, who investigated application review websites, publicity, and press releases, were able to promote the game prior to its release, but not so early that any of the hype wore off before it reached the market.



Meeting to discuss development schedule.

In order to track and enforce these schedules, we again used Basecamp's built-in scheduling functionality [3]. It allowed us to create calendars, task lists, and deadlines. Each member of the team was able to update their task list and post memos for everyone else involved.

3. Project Details

3.1 Conceptual Design

We began initially by hosting a meeting with Runoff Studios' Jake Walker and Angele Lilley, as well as the art students on the project. Jake explained his basic concept for the game, but was still very open for input. Drawing

upon our past experiences with games, both good ones and bad ones, we were able to flesh out many of the details relating to how the game would work and how the menu and settings would flow. These were converted to sketches and storyboard sequences which were presented to Jake for his approval. After clearly explaining what type of game play experience we intended to create for players, we began the technical design process by diagramming the classes that would build the backbone of the application, and how they would interact with each other.

3.2 Design Pattern

Because of the separation of roles between the programmers and artists, a very strict design pattern had to be upheld. As programmers, it was especially important to not mix the model and control of the game with the view. All aesthetic features had to be abstracted away from the game logic so it could be easily changed. The main artistic design of the game changed several times throughout the course of the project and we were able to keep the code in a state that supported the changes.

3.3 Technical Specifications

Face The Waste was developed in a mix of Objective-C and Objective-C++. Static menu screens were also developed using Apple's Interface Builder. This made adding updated designs and artwork for the game much simpler than going about it programmatically. The game was developed using iOS version 4.2, but we chose to only make older API calls to ensure that the game would run on older devices.

3.4 Social Network Integration

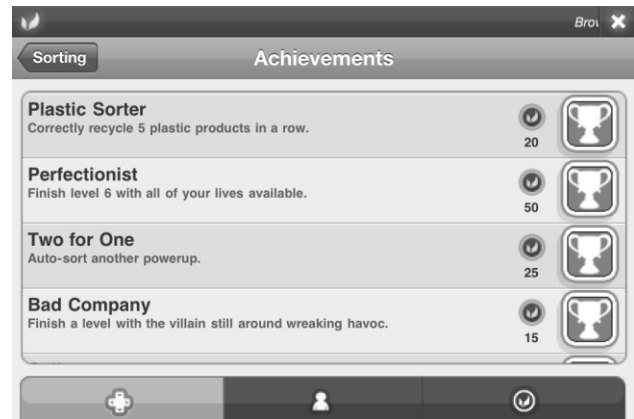
To help attract users to Face the Waste, a lot of time was put into social networking integration. The first way we did this was adding Twitter support. We wanted users to be able to tweet about their high scores and different educational facts that they learned about in the game. Because Twitter has a very mobile friendly page, we were able to quickly incorporate this by bringing up a WebView object right inside of the game and using the official Twitter webpage [4].

Adding Facebook integration took much more time. We used the Oauth2.0 protocol for authentication and authorization. Just like Twitter, we wanted people to be able to share both high scores and facts. We decided that the best way to do this would be to post these as status messages on the user's profile. This would allow the user to easily see exactly what was being posted. The word would still travel through Facebook's mini-feed feature [5].

Facebook and Twitter connected the general community together, but we also hoped to reach a more centralized gaming community with the app. For this type of social networking, we integrated the OpenFeint dashboard into the game. With OpenFeint, we were able to easily

integrate achievements and challenges into Face the Waste.

From the beginning of the development process, achievements were recognized as a critical component of a successful game. A lot of time was spent going through the app and finding clever places to give the user an achievement. A variety of achievements were identified so that some of the achievements were easy to find and obtain, while others could only be obtained after long amounts of time spent playing. This ensured that players would have a good reason to keep playing the game.



The OpenFeint interface for Achievements.

Challenges were also important for success. With challenges, players are able to send their score to a friend to see if the friend can beat it. OpenFeint saves each user's record for challenges. This encourages users to practice so they will be ready to win a challenge. Sending a challenge can also get another player to play the game again after the initial novelty has worn off [6].

4. Project Deliverables and Results

4.1 Face the Waste Debut Event

On October 26th, 2010, the Software Productization Center and Runoff Studios hosted the official debut of Face the Waste. The debut was designed to introduce Runoff Studios' first game to the community and celebrate its successful release. The event was held in the Ford Atrium, at Millersville. Attendees were also presented with the chance to partake in a number of eco-friendly crafts and activities, play the game for themselves on a number of iPod Touch and iPad devices, and even meet the game's villain, Toxic Tim, in person. The event was very successful in generating interest in both the game and the future of Runoff Studios.



Children play Face the Waste.

4.2 Time and Monetary Savings to Client

Runoff Studios' collaboration with SPC enabled them to release their first title, Face the Waste. The company had begun concept and the SPC team had turned ideas into a marketable product. In addition, the SPC team helped Runoff Studios develop their website and corporate identity. All of these artifacts will be crucial in aiding Runoff Studios in securing investments and investigating offices in York, Pennsylvania for their headquarters [7].

5. Student Experiences

The work experience gained on this project was extremely valuable for all of the students involved. The role of the computer science students was similar to that of professional software developers working on a contracted job. The initial concept and requirements came from the entrepreneur, and while the client remained involved in the high-level decisions throughout the project, the technical design decisions were all handled by the students.

This project involved the most interdisciplinary work of any previous SPC project. The last SPC project, for example, was a piece of software which now serves as the user interface for a lab device. Since the primary users of this software were lab technicians, there was an emphasis on functionality and efficiency. Visual aesthetics were only a secondary concern. Face The Waste, however, required that a heavy emphasis be placed on graphical design that would appeal to the target audience. This involved heavy interaction between programmers and artists.

In order to facilitate this interaction, we would make our own functional interface that included all of the required user interactions, but none of the graphical aspects. We would then send screenshots and explanations of the interactions to the artists who would completely incorporate the ideas and functionality into graphics. Their design, however, would just be sent to us as an image. We would then attempt to replicate it as best we

could in the program. This type of collaborative work is not available anywhere else in Millersville University's Computer Science department. Collaboration in the workplace is very common outside of school and becoming familiar with this type of collaboration takes students a step closer to real world experience than any class can.

In addition to working with students from other disciplines, we gained a good deal of experience working with Apple's standards for practices and application submissions. The submission process in particular is especially time consuming and often baffling. Apple's documentation outlines a very long and drawn out process for code signing and packaging your binary submission file, which is at times not kept up to date with the latest SDK. The review team at Apple does do their best to respond with useful feedback, but often times it takes days or even weeks before such a response is ever sent. We found this to be a crucial flaw in our overall project schedule, and recommend a buffer of several weeks, whenever possible, at the submission phase of publication.

6. Conclusion

This paper has briefly described the completion of Face the Waste, the result of collaboration between Runoff Studios and the Software Productization Center at Millersville University. It should be noted that although many departments and students from diverse backgrounds worked on this collaboration, only the perspective of the Computer Science students has been clearly presented in this paper. One of the most unique aspects of the Software Productization Center is the fact that many equally enlightening and worthwhile stories exploring entirely different aspects of the same project could be gathered from other members of the development team.

As the third full project completed by the SPC, Face the Waste has again proven the Center's ability to stretch the realm of student experiences to new levels, by providing them with technical and leadership experience they would never find inside the classroom; the kinds of experiences that will become invaluable in the search for careers in their respective fields. Faculty members continue to gain practical knowledge of current real world projects, which they can impart on their students, and meaningful mentoring experiences. The clients themselves also gain meaningful experience working with a diverse team of specialists, as well as a functional product and business model for the sale or distribution of that product.

7. Acknowledgements

Although this paper is presented from the perspective of the Computer Science department, this project was truly a cross disciplinary effort. Without the work completed by both the art and business students it could not have been successful. Additionally, the support and guidance of Ms. Nancy Mata (Art/Graphic Design) and Dr. Pat McCaskey (Business) was much needed and welcomed. The contributions of Ken Mueller, of Inkling Media, to the publicity of the project were also greatly appreciated. Finally, none of this would have been at all possible without the courage and entrepreneurial vision of Jake Walker and Angele Lilley of Runoff Studios. Their dedication was a driving force throughout the duration of the project. The Software Productization Center wishes Runoff Studios the best of luck and much future success.

8. References

[1] Software Productization Center at Millersville University. <<http://www.millersville.edu/spc>>.

[2] Runoff Studios. <<http://runoffstudios.com>>.

[3] Basecamp project management, collaboration and task software. <<http://basecamphq.com>>.

[4] Twitter. <<http://twitter.com>>.

[5] Facebook. <<http://www.facebook.com>>.

[6] OpenFeint. <<http://www.openfeint.com>>.

[7] Walker, Jake. Personal Interview. 10 Feb. 2011.