**Capstone Project Cover Sheet**

Capstone Project Name: BIN Student Mobile Application

Student Name: Ashley Carbone

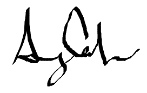
Degree Program: Bachelors of Science in Information Technology - Software

Student Mentor Name: Don Cook

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 7/14/2016

Student’s Ink or Electronic Signature Date Signed**Table of Contents**

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# Capstone Project Summary

Online learning has become increasingly prevalent in the last twenty years. Many applicants to online educational organizations and institutions state their reason for wanting online classes is so that they can maintain flexibility in their schedules. This allows them to work full-time, care for family, or earn a certificate and/or degree that may not be offered at their local institutions. Student also choose online learning due to lower tuition costs than a typical brick and mortar school.

Bartends Institution (BIN) is a privately owned and operated online bartending school created in January 2013. The institution currently services an estimated 270 students in the United States, and have over 510 graduates as of May 2015. For the 2016-2017 school year, BIN is expecting over 200 new admits, due to a heavy marketing campaign scheduled to run through the months of May to August 2016.

Enrolled students are able to login to the BIN student only website to access classes. All classes include assignments, eBooks, quizzes, and instructional videos. To pass a class, students must either take a written or performance exam to prove they have learned the content well enough to move on.

Since the school was established, Russell Canning, owner and lead developer/designer for BIN, worked on developing a mobile application to help students with memorizing specific drink recipes. Based on a study conducted on December 2015, more than 80% of students say they use the application more than three times a week and feel it is an excellent way to memorize recipes. At the end of the study, students were allowed to leave comments and suggestions regarding their courses and learning materials. Out of the 119 students who completed the survey, more than half recommended the application allow them to enter their own recipes or to increase the rate new recipes are added. Previous to completion of this project, the application only supported fifty drink recipes. Mr. Canning could only implement new recipes during application version updates, which run on a schedule of every six months. After running queries against the application, Mr. Canning found that the majority of students only used the application for six to nine months.

Mr. Canning requested the development of a custom recipe book function to satisfy the need of additional study materials, as well as create a more fun experience for users. By adding a game like feature to the application, we provided students a more unique way of studying rather than digital flash cards and quizzes. The addition of the recipe book feature assists students with memorizing new drink measurements and ingredients. The feature allows students to add, save, delete, and search all custom recipes. By allowing custom recipe entry, Mr. Canning no longer has to research, develop, test, and implement new recipes on each version update. This has allowed him to shift resources to other tasks and focus on fixing minor issues with the application. Both features promote long-term use of the application, as the drink list will be limitless.

As students memorize drinks, they can study the measurements and ingredients for any new drinks they add. Students cannot edit or delete any of the fifty recipes built-in to the recipe book, as these are standard drinks each student is required to know. The custom drink recipe feature does not support the import or export of file types at this time; recipe ingredients and measurements must be added manually. Initially we were to develop the recipe book to organize all drinks by alcohol types. Due to time constraints and allowing users to search for recipes, we decided to organize drinks alphabetically.

There were no budget constraints; however, time constraints for the project were strict. The release for the application update coincided with version update 0.9.0, which was released July 1, 2016. All development and testing was completed on June 30, 2016. Mr. Canning required development in the C# language, and use the JSON file type for recipes. Only one JSON file was used for all of the recipes. It was suggested to have a JSON file for each alcohol type (Vodka, Rum, etc.), which Mr. Canning was ok with, however we did not proceed with that idea. Unity 5.3.4 or later and Microsoft Visual Studio 2015 are both free environments and were used throughout the project.

Had the project not been completed on time or at all, Mr. Canning agreed to continue development of the project and potentially seek additional assistance. This would have caused the application to not be ready to release in the scheduled update version 0.9.0. All project objectives and goals were completed within the timeframe agreed by all parties.

In summary, this project report was used during the development of a highly requested update to the Bartends Institution Student Mobile Application. The application update included implementing a recipe book for students to store their own drink recipes. The application assists students as a studying tool as they progress through the bartender certification program. Since the project has been completed successfully, students are able to use the application to practice making drinks from the recipes they supply to the recipe book.

# Review of Other Work

Our first task was to research alternative solutions for what the students requested. After searching on Google Play, the official application store for Android devices, a majority of applications available were standalone recipe books. 8500+ Drink Recipes Free (Webworks and Applications Inc., 2014) is a searchable list of drink recipes available for free (with Advertisements). The application does not include a game aspect to it, or any memorization tools. It also does not allow users to add their own recipes.

Bartender Insane (TDI Game, 2016), also available for free on Google Play, is an actual bartender game. Users are required to use the correct ingredients to mix and create drinks. Not all ingredients are available and users must progress through the game to unlock new items and drinks. Incorrect drink mixes cause the patron to breathe fire. It does not include a recipe list, or allow custom recipes to be added.

For the technical aspect of the development of the application, the JSON file type was used as it is a better alternative to reading plain text files. This proved to be very useful, even after we decided to change from organizing drinks by ingredient type to alphabetical. The World Wide Web Consortium (W3C), is an organization that creates and releases the standards for the world wide web. They stated in their best practices report, “Make data available in a machine-readable, standardized data format that is well suited to its intended or potential use. Using non-standard data formats is costly and inefficient, and the data may lose meaning as it is transformed” (W3C, 2016).

JSON allows serialization of data which provides a simple process for retrieving and organizing strings and their values. Using XML format would reduce organization, preventing use of objects and arrays, and increase download time and bandwidth consumption. Since we developed the application for mobile devices, we kept in mind the data limits and caps set by mobile service providers. Reducing bandwidth consumption will prevent too much data use and speed up the applications ability to retrieve recipes. Several tests were run during each development testing phase to report on bandwidth consumption.

According to LearningHouse.com study, the top three concerns with online learning was motivation/attention/focus challenges, tied with Perceptions of quality of online study (Clinefelter & Aslanian, 2015). Many students have reached out asking for more tools to help them study. By providing a fun way to memorize lists, this will encourage students to learn, without it feeling like they are learning. The goal was to draw focus more on the having fun aspect of learning the drink recipes, rather than just memorizing them for exams. Since adding the game function to the application, it has been found that students have created small competitions within their class to see who has the highest scores. This was unintended, but an excellent result from completing the project.

LearningHouse.com also reported that in 2015, 43% of online students prefer electronic course materials rather than paper materials (Clinefelter & Aslanian, 2015). By creating the recipe book, students do not have to use index cards to write recipes on to practice memorizing. They can also use their phone in any location, as opposed to carrying paper index cards, where they can get lost or ruined. A Procedia report from 2013 said the following about the mobility factor influencing mobile learning in education,

“Mobile learning is a learning model that allows the learners to gain learning materials anywhere and anytime. To be able to continue with the learning without the constraints of time and location is an important element that affects how learners may be motivated to use their mobile applications” (Bidin & Ziden, 2013).

Users can also look up recipes on the application quickly, instead of having to refer to a bartender’s book or notebook. Many students have shared their success and have been referring friends to the application for fun and for work. Since the application was not developed for students only, and is available to anyone, Mr. Canning is expecting more users than originally reported.

Additional recommendations for future projects include, recognize and adjust for time difference between developing for application features from scratch and from those that exist, being more aware of potential users, using the JSON file type is great for organizing data whether small or large amounts, and run bandwidth usage checks throughout all of the testing phases of the project.

# Project Rationale

As students continue their studies at Bartends Institution, use of the application has increased. Before the application release, Mr. Canning has found that, shortly after graduating from the bartending program, more than 80% of the students discontinued use of the application. More advanced students found that the application was useless since they had to wait six months for Mr. Canning to add new recipes. Many of the recipes that Mr. Canning added for each update were drinks that students may already knew.

While the application did provide students an excellent resource for memorizing drink recipes, Mr. Canning expected graduated students to continue to use the application when they are employed in their field. The number of drink recipes are limitless, and part of BIN’s mission statement is to encourage creativity and creationism in their students. Since adding the function to allow students to add custom recipes, it has allowed students to experiment and add their own concoctions, reinforcing the school’s mission.

More than 80% of students at BIN use and own an Android device, and around 60% of students own and use an iOS device. The application is available for Android only, and Mr. Canning plans to develop an iOS version in a later project. The Unity game engine was used, as it is cross-platform and provides ease of testing functionality and deployment. It also allows for development in 2D or 3D formats. The game only features 2D graphics to reduce the graphical requirements on devices.

We included a repercussion feature each time an incorrect ingredient is used when mixing a drink. This is similar to the fire-breathing customer in Bartender Insane. This encourages students to memorize the recipes and serve the correct drinks. A poison counter was added to the game to prevent guessing or “Christmas treeing” ingredients. The poison counter is added to the customer if an incorrect drink is served. Initially, the second poison counter would cause the customer will leave immediately without tipping and occasionally not paying for their bill. During testing it was found that this was slightly too difficult and we increase the maximum poison counter to three. This will provide two chances to students in cases of an accidental mistake or if they remember the correct ingredient after getting the first chance incorrect.

Another point brought up during the stakeholder meeting was that students could cheat and look up the recipe using an alternative device or bartender book. A time limit function was added to prevent cheating. This enforces students to have to recall drinks from memory in a timely matter, as they would when mixing drinks in real life. When the timer runs out, the customer leaves immediately without tipping, but will pay for any drinks previously served.

# Systems Analysis and Methodology

Previous to completion of the project. the application was used extensively, however more than half of its users discontinued use after completing the bartender program of study at Bartends Institution. It was determined by users that the application would become too repetitive and boring over a period of time. After students memorized all drink recipes built into the application, it would no longer present a challenge. Bartenders working in their field are encouraged to memorize many different recipes so they can be recalled, mixed and served to their customers in a timely fashion. Bartends Institution encourages students to do the same, but also to experiment and create their own drink mixes. The application now supports both of these goals.

While the previous state of the game was successful, it is more useful to students now that they have the ability to control the application to fit their needs. Students will learn different things at different speeds. By giving students the freedom to learn what they want, when they want and when they are ready, it is enforcing the ideology behind online learning.

This project followed a prototyping methodology. This allowed the game to be updated to support the recipe book function, and the creation of the recipe book to be added to the application. The game update was tested to verify all game asset changes were correct, and that the base game functions still performed as normal. The creation of the recipe book was developed, tested, then introduced to the base game. Finally, testing of the application update as a whole was conducted to verify both parts were performing as intended.

The application is efficient and organized to prevent confusion during the learning process. Efficiency is key to keeping students engaged and organization allows navigation and learning the application to be completed with ease. Speed was also a key factor, so that recipes can be added, edited, deleted, or searched from the game without taking a lot of time. The game is able to retrieve recipes quickly to simulate the fast environment when working a bar.

Using JSON files contributes to all of the factors mentioned above. Drink types are organized alphabetically so that students can either scroll to find the recipe or search for it. All animation files were saved using .mp4 format, static graphic files were saved using .png format, and all audio files were saved using .mp4 format.

Development to implement the recipe book was conducted in two parts. The first part of development was to edit the game to integrate the use of the recipe book and retrieve the JSON files that have the recipe’s data stored. The second part of development was for the recipe book system itself. This allows recipes to be added, changed, or deleted from the recipe book. The recipe book has its own section, separating it from in-game, which is accessed from the main menu.

Once development and internal testing was completed, the game was packaged into the APK file and submitted to Google Play. An email was sent to all students on release day, November 1st, 2016, when the application update was available for download. The email introduced the new recipe book feature and included a small tutorial of how to use the recipe book.

Surveys were sent out to students a day after students downloaded the update. The survey, powered by SurveyMonkey, asks how the application is performing since the update, and also asks students to give a rating to the new recipe book feature. After several days, if a survey has not been completed, an email reminder will generate and be issued to the student. This will give students a chance to try out the new features and decide if they enjoy it or not. Since the release of the game update, several surveys and ratings have been received and reviewed. At the time of writing this, the update has received all 5 star ratings, and much praise on the game feature and recipe book.

# Goals and Objectives

The two main goals for this project was to provide students with a useful, efficient tool to study and to promote long term use of the application, and to assist students in memorizing drink recipes to ensure all program graduates are equipped and ready for a bartender job. The main objectives to complete these goals were:

1. Update the BIN student application to introduce a recipe book system.
2. Develop a recipe book system that will allow students to add, edit, remove and search drink recipes.
3. Encourage students to mix drinks correctly to promote memorization and practice mixing of drink ingredients.

For students who like to experiment to drink concoctions, they now have the ability to add their own mix recipes, and adjust or remove ingredients from recipes they add. The recipe book can be a great tool for students to use after they have completed the program. Through experience in the field, they will come across new drinks or will create their own. They may also find an existing recipe, but add a new ingredient to give it a different taste. Students are able to go into the recipe book, search for that recipe and edit it to include the new ingredient. This also works for removing ingredients.

As students commit recipes to memory and do not wish to practice them anymore, they may return to the recipe book and delete those recipes. The maximum number of recipes that can be added to the book is 450. This does not include the basic fifty recipes that all students are required to know. It may be unlikely that a student will added more than 450 recipes, but if they wish to, they can delete any recipes they no longer need to practice.

The in-game function of the application allows students to practice their memory skills of the drink recipes they have added. In-game customers are programmed to retrieve the name of a recipe and ask the student for that drink. The student will then recall the recipe and mix the drink for the customer. If the customer is satisfied, they may ask for another drink or pay their bill and tip based on speed of service. If the customer is dissatisfied, the customer will promptly leave, causing the user to not gain any money on the bill and reduce their current fund to pay for the customer’s order. This encourages students to memorize the drink recipes they have added to gain a high score on the game.

All three main goals for the project were successfully completed and delivered. The recipe book feature is available to use, and students are able to add, edit, delete, and search for their own recipes. The game feature has provided a competitive and fun environment for students to practice any recipes they add.

# Project Deliverables

Our first part of development was to complete all video/audio components for the application. Chris Smith was responsible for creating sound bites, music, graphics, and simple animations. Chris added sounds of glass clinking, drinks pouring, happy/angry customer noises (grunts, groans, laughing, sighs), and a money sound for when bills are paid and tips are collected. There is also be a sound for when links in the menu system are touched. Three music tracks were created and are looped, one for the main menu, another for the recipe book, and a third for the in-game music. Static graphics include the menu system, the recipe book, background for in-game, foreground for in-game (the bar), money, poison counter, drink bottles, glasses, ingredients, and four different customers (including happy, neutral, and angry facial expressions). All animations are simple and clean to keep the game size minimal. Animations include liquids pouring from bottles and filling glasses, money increase/decrease, and customer facial expression tweens. All deliverables were completed ahead of schedule.

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| **Project Deliverable** |
| **Graphic Development - Static** |
| Main Menu Design – Completed February 1, 2016 |
| Recipe Book Design – Completed February 3, 2016 |
| Background – in-game – Completed February 5, 2016 |
| Design bar – in-game – Completed February 6, 2016 |
| UI Interface – in-game – Completed February 6, 2016 |
| Money and Poison counter – in-game – Completed February 7, 2016 |
| Bottles, Glasses, Ingredients – Completed February 7, 2016 |
| Four customers w/ three facial expressions (happy, neutral, and angry) – Completed February 8, 2016 |
| **Graphic Development - Animation** |
| Liquid physics – Completed February 9, 2016 |
| Facial expression change tweens – Completed February 8, 2016 |
| Money gain/loss – Completed February 8, 2016 |
| **Audio Development** |
| Glass clinks – Completed February 9, 2016 |
| Liquid noises - Completed February 9, 2016 |
| Happy/angry customer noises (grunts, groans, laughing, sighs) - Completed February 9, 2016 |
| Money gain/loss - Completed February 10, 2016 |
| Poison gain - Completed February 10, 2016 |
| Button touch (on press) - Completed February 10, 2016 |
| Main Menu music - Completed February 10, 2016 |
| Recipe Book music - Completed February 10, 2016 |
| In-game music - Completed February 10, 2016 |

The second half of development was split into two phases. Phase 1 included development focused on updating the initial state of the game to prep for the addition of the recipe book and updating the code to retrieve drink requests from the recipe book. This task added a link on the Main Menu page to the recipe book and had the customers ask for drinks by name that are sourced from the recipe book. Since all audio/video components were completed earlier, Russell Canning was able to begin phase 1 of development early and all deliverables were completed ahead of schedule, enabling us to being phase 2.

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| **Project Deliverables** |
| **Game Development – Phase 1** |
| Add link to Main Menu -> Recipe Book – Completed February 3, 2016 |
| Update In-game code to retrieve recipes from JSON file – Completed February 6, 2016 |
| Code randomize drink retrieval by name – Completed February 29, 2016 |
| Develop Money and Poison counter tracking – Completed March 2, 2016 |
| **Game Development – Phase 1 Testing** |
| Phase 1 Testing – Completed March 14, 2016 |

Phase 2 of the second half of development was focused purely on creating and implementing the recipe book system. The recipe book includes the option to Add, Edit, Delete and Search recipes. All recipes will be sorted alphabetically. When adding a recipe, each ingredient is added by typing in the ingredient within a text box. We also added the ability for students to add their own image of the drink. The recipe is then saved with a name entered by the student. Removing the recipe drink categories deliverable, we were able to shave some time off of development, however the time needed for the entire receipt book was misjudged. It took more time than expected since this was an entirely new feature. We also had to extend the amount of testing time, but we were still able to complete all deliverables in time for final testing.

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| **Project Deliverables** |
| **Game Development – Phase 2** |
| Recipe Book – Add, Edit, Delete recipes pages – Completed April 15, 2016 |
| Recipe Book search function – Completed April 22, 2016 |
| *REMOVED - Recipe Book drink categories* |
| ADDED – Recipe Book drink image upload – Completed April 28, 2016 |
| **Game Development – Phase 2 Testing** |
| Phase 2 Testing – Completed May 8, 2016 |

Final testing included a short period of alpha testing that was conducted by all members of the team, Russell, Chris, and Ashley. Then, beta testing was conducted using a small group of students. These students were a mix of new students, students close to completing the program, and students who have graduated. Mr. Canning submitted a list of students who were part of the beta testing. They provided feedback for the team to resolve any bugs found during their testing. There were two major bugs and four minor bugs found during testing:

**Major:**

1. Duplicate drink requests in-game instead of different orders each time.
2. Search function would not return built-in recipes.

**Minor:**

1. Main Menu delay when tapping menu option.
2. Spelling errors in About section.
3. Missing facial expression tween for customer #3 – Going from angry to happy.
4. Missing a built-in recipe.

We were able to fix the code to prevent repetitive requests during a game. After all drinks have been served, or a maximum of twenty drinks, the game may use a previous drink request in the same session. The code was also fixed to return custom added and built-in recipes. All minor issues were resolved quickly by making adjustments to the code as well.

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| **Project Deliverables** |
| **Final Testing** |
| Alpha test and develop tutorial/instruction document – Completed May 14, 2016 |
| Release beta test version to selected group of students – Completed June 2, 2016 |
| Review feedback and resolve issues – Completed June 24, 2016 |

A Project Finalization meeting was held to mark the start of project closure. This helped us prepare for release and clean up any remaining documentation before submission. All documentation was submitted to Mr. Canning he compiled and submitted the APK file to Google Play. Google Play accepted the application update on October 31, 2016. Mr. Canning scheduled a system wide email to notify students of the update and included instructions for using the recipe book system. The game update was released November 1, 2016, on schedule with our initial release goal. No major issues occurred during release, and the team was able to focus on project closure.

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| **Project Deliverables** |
| **Project Finalization** |
| Verify all deliverables complete – Completed June 28, 2016 |
| Submit APK to Google Play – Completed June 28, 2016 Google approved June 30, 2016 |
| Release game update – Completed July 1, 2016 |
| Standby for any issues after initial release – Completed July 7, 2016 |
| Submit all documentation – Completed July 6, 2016 |
| Project close and sign-off – Completed July 7, 2016 |

# Project Plan and Timelines

Project kickoff began with a meeting on February 1, 2016. This meeting was to review the project milestones and timeline, discuss change management, and verify that everyone had their necessary resources to complete their tasks and responsibilities. Once the meeting concluded, Chris began developing all graphic and audio files.

Video/Audio Development began February 1, 2016 and ended on February 10, 2016. Chris was able to complete development much sooner than anticipated. He worked closely with Mr. Canning to ensure that all designs and audio changes were suitable. All video and audio assets were completed before Phase 1 development.

Game Development – Phase 1 began February 3, 2016 and ended March 2, 2016. Chris was able to complete graphic and audio development early, so Mr. Canning started Phase 1 sooner than expected. This left additional time for testing. Testing began March 5, 2016 and ended March 14, 2016. Phase 1 development was completed before Phase 2 began.

Game Development – Phase 2 began March 18, 2016 and concluded April 28, 2016. As with Phase 1, testing was performed throughout development. Being ahead of schedule was very helpful during this time as phase 2 development took longer than estimated. This was caused by having to develop the entire recipe book system from scratch. The testing phase for phase 2 began April 29, 2016 and ended on June 8, 2016, one day after expected.

Final Testing lasted for the estimated seven weeks, and included internal and beta testing. Additional testing time was given to students so they had enough time to add many different recipes and play the game with them. All bugs were addressed and resolved during this time, and was priority given to the two major bugs found, even though the game was still playable. The four minor bugs were able to be resolved in time for release.

Project Finalization concluded all project tasks to prepare for project closure. A final project meeting took place on June 28, 2016. All tasks were verified and signed off. There were no remaining bugs to add to the Bug Fix Request Sheet. The week of application release, July 1, 2016 – July 7, 2016, all members of the team remained on standby for any issues with release. They also prepared and submitted all documentation to Mr. Canning. Students were given instructions and a video tutorial on how to use the application through their email. The final three days of release concluded this project, and all documentation was submitted by end of day July 7, 2016.

**Initial Project Timeline:**

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| --- | --- | --- | --- |
| **Project Deliverable or Milestone** | **Duration** | **Planned Start Date** | **Planned End Date** |
| Project Kickoff Meeting | 1 day | February 1, 2016 | February 1, 2016 |
| **Video/Audio Development** | ----- | ----- | ----- |
| Create graphics | 2 weeks | February 2, 2016 | February 15, 2016 |
| Create audio | 2 weeks | February 16, 2016 | February 29, 2016 |
| **Game Development** | ----- | ----- | ----- |
| Begin development – Phase 1 | 4 weeks | February 29, 2016 | March 27, 2016 |
| Testing – Phase 1 | 1 week | March 28, 2016 | April 3, 2016 |
| Begin development – Phase 2 | 4 weeks | April 4, 2016 | April 31, 2016 |
| Testing – Phase 2 | 1 week | May 1, 2016 | May 7, 2016 |
| **Final Testing** | ----- | ----- | ----- |
| Alpha Testing – Internal only | 1 week | May 8, 2016 | May 14, 2016 |
| Beta Testing - Students | 2 weeks | May 15, 2016 | May 28, 2016 |
| Bug Fixes | 2 weeks | May 29, 2016 | June 12, 2016 |
| Additional Testing and Fixes | 2 weeks | June 13, 2016 | June 26, 2016 |
| **Project Finalization** | ----- | ----- | ----- |
| Project Finalization Meeting | 1 day | June 28, 2016 | June 28, 2016 |
| Week of Release | 1 week | July 1, 2016 | July 7, 2016 |
| Project Closure | 3 days | July 5, 2016 | July 7, 2016 |

**Actual Project Timeline:**

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| --- | --- | --- | --- |
| **Project Deliverable or Milestone** | **Duration** | **Actual Start Date** | **Actual End Date** |
| Project Kickoff Meeting | 1 day | February 1, 2016 | February 1, 2016 |
| **Video/Audio Development** | ----- | ----- | ----- |
| Create graphics | 8 days | February 1, 2016 | February 8, 2016 |
| Create audio | 3 days | February 8, 2016 | February 10, 2016 |
| **Game Development** | ----- | ----- | ----- |
| Begin development – Phase 1 | 4 weeks | February 3, 2016 | March 2, 2016 |
| Testing – Phase 1 | < 2 weeks | March 5, 2016 | March 14, 2016 |
| Begin development – Phase 2 | 6 weeks | March 18, 2016 | April 28, 2016 |
| Testing – Phase 2 | 2 weeks | April 29, 2016 | May 8, 2016 |
| **Final Testing** | ----- | ----- | ----- |
| Alpha Testing – Internal only | 5 week | May 8, 2016 | May 14, 2016 |
| Beta Testing - Students | 3 weeks | May 15, 2016 | June 2, 2016 |
| Bug Fixes | 4 weeks | May 8, 2016 | June 12, 2016 |
| Additional Testing and Fixes | 2 weeks | June 13, 2016 | June 26, 2016 |
| **Project Finalization** | ----- | ----- | ----- |
| Project Finalization Meeting | 1 day | June 28, 2016 | June 28, 2016 |
| Week of Release | 1 week | July 1, 2016 | July 7, 2016 |
| Project Closure | 3 days | July 5, 2016 | July 7, 2016 |

# Project Development

Despite the few issues, changes, and extended development time for phase 2, the project completed on time and successfully. All graphic and audio asset development was completed much faster than expected. Chris has noted that developing these assets for a mobile application is simpler than his typical development workload for websites. He was also able to work closely with Mr. Canning to ensure that all assets are approved. Phase 1 of development and testing went quicker than expected as well. The base of the development had been completed prior to the start of this project. Many of the proposed changes were requested by Mr. Canning, who worked solely on phase 1 development. Phase 2 development hit a few snags due to deviations from the project plan and also due to incorrect time expectancy. Development time was increased to six weeks. Because of this, testing for phase 2 ended a day later. We were still able to start alpha testing on time. Please see Appendix 2 for evidence of implementation of deliverables.

## Problems Encountered

One major problem encountered during project development was the inability to complete organize recipes by ingredient type. Shortly after beginning development of this part of the recipe book, it was determined that creating each of the JSON files for the main ingredient type would be too difficult. For one, we were unable to predict what main ingredient type the user would choose for their recipes. Secondly, we were unable to define what a “main” ingredient would be as many drinks can have multiple “main” ingredients.

The second major problem encountered during project development was a longer development time than initially scheduled. It was assumed that development of the recipe book would be simpler since the base of the game was developed separately. However, it was found that the creation of the add and edit pages were time consuming. We also started development on the organization aspect of the recipes, before deciding that we would be unable to complete what we originally intended.

Both of these issues caused phase 2 development time to increase from four weeks to six weeks and shift resources to focus on completing phase 2 development instead of prepping for phase 2 testing.

## Unanticipated Requirements

One unanticipated requirement for project development was to add the ability for users to add an image of the drink to the recipe. This was added so that students could have a visual reminder of the drink. This would prove more helpful for the learning process, and also for drinks that users experimented with. This ability was also added so students could see types of garnish styles for the drinks. Many of the student’s exams do not focus on garnishes, although it is a standard at many establishments. By adding the image upload, students can have a physical reminder of what the drink should look like and also the different types of garnishing available to use.

## Reasons for Change

For the changes during project development discussed above, we made sure to have specific reasons for them. Instead of organizing by ingredient type, we knew we had to organize the drinks in some fashion. This was also to keep in line with project requirement of providing an efficient learning tool. The final decision was to organize alphabetically. Regardless if students use the search tool or scroll down to find the recipe they need to access; an alphabetized list keeps all recipes in order. The JSON files store recipes by their first letters, A-I, J-R, S-Z.

Development time for phase 2 increased due to the change of how the recipes listed. We also added the upload image function, and reasons for it are discussed above. While we were ahead of schedule for much of the first half of development, lack of preparation for phase 2 caused phase 2 testing to extend by one day. We were able to remain on schedule despite the increase in development time.

## Actual and Potential Effects

After receiving feedback from students, it was found that the application update introduced a competitive aspect to the game. Students have shared it with friends and family, thus increasing their study habits. The application has turned into not just a study tool but also a fun game that anyone can play. Mr. Canning has agreed to support all users of the application, in addition to students of the institution.

Mr. Canning also has plans to implement a daily or weekly goal quest, where students can gain money bonuses for their next game. With the money system in place, one student has recommended an in-game shop for students to buy perk items such as a glass of water to remove a poison counter or to increase the time limit by a few seconds.

It has been predicted that the future of the application will expand to worldwide use as it has gained a lot of traction since the update. Mr. Canning plans to hire a full-time staff to accommodate the increase support requirements. He will also reduce the time between updates to better serve the users.

# Conclusion

In conclusion, Russell Canning, owner of Bartends Institution (BIN), employed a team of three developers to carry out the development of a mobile application update. This update would provide students a means of storing drink recipes and suggest use of the application as a study tool. The update introduces a game aspect to increase usability, and promote long term use of the application. The game allows students to practice mixing drinks for patrons and the goal is to gain the maximum amount of money from each customer for a higher score. Students have found the application more helpful since the update, and have begun sharing their scores and competing for higher goals with their friends and family. This not only encourages students to use the application, but has also increased their study habits as well. The stakeholders, Mr. Canning and the students of BIN, have praised the quick delivery of this application and are satisfied with the deliverables provided.

# References

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Appendix 1**:**

**Project Request Form**

**Project Overview**

Bartends Institution (BIN) owner, Russell Canning, currently develops and supports an application that assists students with memorizing drink ingredients and amounts. This application provides students a convenient and fun way to remember recipes for many types of drinks.

Students have requested ability to enter a “custom concoction” mode to enter and save their own drink recipes. Students can add recipes that are not already provided in the game. This gives student’s freedom to add their own drink mixes. It also extends the life of the application for long-term progress, instead of students memorizing pre-loaded recipes and deeming the application useless. The recipe book should provide simple, mobile access to custom entered drink recipes.

1. Created recipes must be exported to a JSON file.
2. Basic buttons, checkboxes and/or sliders for the ingredient amounts requested.
3. Mr. Canning does not wish to have independent JSON files for each recipe. He has suggested setting up files by drink type (ex. – Vodka, Rum, etc.).

**Strategic Goals and Objectives**

1. Create primary drink recipe book system for bartender application.

2. Implement ability to create, save, and delete custom drink recipes.

**Impact of Non-Completion of Project**

In the event the project is not completed, Mr. Canning has agreed to continue development of project and potentially seeking additional assistance. This will cause the application of not being ready to release in scheduled update version 0.9.0.

**Stakeholders**

Internal stakeholders: Russell Canning – Owner, primary designer/developer

External stakeholders: Students of Bartending School

**Project Timelines**

Start Date: July 1st, 2016

End Date: November 1, 2016

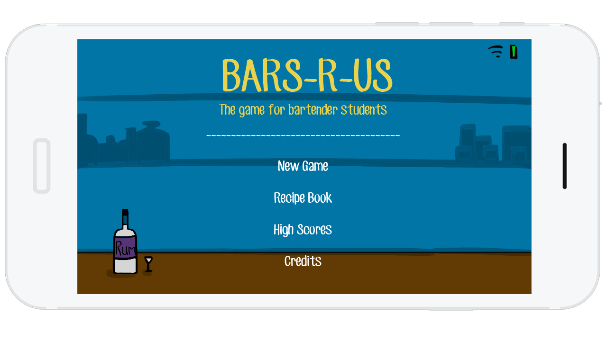
**Anticipated Resources Required**

Unity 5.3.4 or later

Microsoft Visual Studio 2015

Appendix 2:

Evidence of Deliverables

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