Software Requirements Specification

for

HumanVsZombies, Release 1.0

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Revision History

Name	Date	Reason for Changes	Version
Kaan, Jamie, Rounak, Yadira, Minh, Sarah	February 7, 2020	Initial draft	1.0 approved

Vision and Scope Document

1. Business Requirements

1.1 Background, Business Opportunity, and Customer Needs

As the need to relax and be free of stress is becoming more prevalent among people, gaming has become a crucial part of our lives. As one of the most popular games over the past several decades, Shooter was chosen by many gamers, mostly teenagers, as a form of entertainment because of the simplicity and nature of the game. However, after more than two decades, the functionality and features of Shooter have become outdated, which is why the idea of a newer, more updated version of a HumanVsZombies was proposed.

Compared to current types of games that may need an internet connection or external devices, HumanVsZombies requires nothing extra--a PC alone is enough for a person to start playing. The game rules are also very easy to understand yet captivating, which makes HumanVsZombies an entertaining game while having a suitable level of difficulty for users. The main characteristics of the classic Shooter game are kept, while some new, more exciting features and twists to the game are added to ensure that the user has an enjoyable and relaxing experience playing the game. People of all ages can entertain themselves with HumanVsZombies--from students looking to be free of stress, or adults after a long tiring day of work, to parents wanting to bond with their children, to name but a few.

1.2 Business Objectives and Success Criteria

BO-1: Create a relaxing, joyful, accessible and inexpensive alternative for everyone to be entertained.

BO-2: Compete with other categories of games existing in the industry.

BO-3: Improve on the original Shooter game to provide a better, upgraded version of the famous game.

SC-1: At least 100 downloads in the first month of the official release, and increasing click rates in the next two months.

SC-2: 20 users have downloaded and played HumanVsZombies within 6 months of the official game release.

1.3 Business Risks

RI-1: Failing to compete with other games, as the first shooter game came out almost 20 years ago, and users might choose other newer types of games as a form of entertainment.

RI-2: The customer market is limited, as HumanVsZombies only runs on Windows PC. In addition, downloaded games can be outdated and not supported.

2. Vision of the Solution

2.1 Vision Statement

The purpose of introducing HumanVsZombies is to give users everywhere, regardless of accessibility to the internet, an opportunity to entertain themselves freely. The game is fit for all ages, whether it is a teenager hoping to spend time doing a fun activity or an adult looking to relax with a captivating game. It will be particularly relatable to the audience of people who currently attend or have attended Case Western Reserve University because the setting will be most recognizable to them. HumanVsZombies also has a nontraditional take on how waves are structured since the power of the weapons will decrease as the waves continue.

2.2 Major Features

FE-1: The HumanVsZombies environment resembles the campus of Case Western Reserve University in some aspects.
FE-2: Characters resemble the Case Western Reserve University mascot.
FE-3: Zombies are randomly generated at the beginning of the game and follow the character around the map.
FE-4: A character can move objects within the virtual world such as boxes that will deter the path of zombies.
FE-5: Weapons are scattered randomly on the map, and the character can pick them up to use in attacking and killing zombies. How many and what weapons to design are left to the freedom of the developers.
FE-6: There are waves that are dictated by a function of the number of zombies killed. New waves spawn new zombies as well as new weapons on the map.
FE-7: As waves progress, the difficulty will increase as the damage done per hit by weapons decreases.

3. Scope and Limitations

3.1 Scope of Releases

Feature	**Demo 1**	**Demo 2**	**Release 1.0 (Official Release)**
FE-1	Should be fully implemented		
FE-2	Should be fully implemented		
FE-3	Should be partially implemented:	Should be fully implemented	

	zombies should appear on the map and be able to move around in some way		
FE-4	Should be partially implemented: player should be able to move around	Should be fully implemented	
FE-5	Should be partially implemented: at least one weapon should be available	Should be partially implemented: most weapons should be available	Should be fully implemented
FE-6	Not implemented	Should be partially implemented: wave function should be defined and there should be several wave rounds (with corresponding weapons, see FE-5) which can be triggered	Should be fully implemented
FE-7	Not implemented	Should be partially implemented: this feature should apply to the weapons that have been designed so far	Should be fully implemented

3.2 Limitations and Exclusions

LI-1: HumanVsZombies can only be used on a Windows PC desktop and no mobile devices.

LI-2: While the choice of the number of weapons available in the game is flexible to the game designers, a finite number of types of weapons will be available in a game that is designed to be endless (until the player dies).

4. Business Context

4.1 Stakeholder Profiles

Stakeholder	Major Value	Attitudes	Major Interests	Constraints
Children aged 5-12	Looking to spend their free time and indulge in recreational activities	Easily attracted by the graphics and entertaining aspects of games	Captivating and playful games with simple rules	Very young children may have a limited understanding of the concepts and device required
Teenagers and students	Relaxation and moments of distraction from school and stress	Enthusiastic and up-to-date with new game releases and upgrades; concern about possibilities of being addicted	Games with a certain level of difficulty for entertainment purposes; making friends through competitive gaming	None identified
Adults	Being distracted and free of stress from work; relaxation through entertainment	Neutral but still have interaction with user-friendly games; or deeply involved in the competitive gaming network	User-oriented games that are simple and accessible; or multiplayer games	Very limited free time; not familiar with video games in general
Parents of young children	Bonding with their children through the time spent together playing games and having fun	Mostly neutral towards safe games with eye-catching graphics; concern about violent and inappropriate games for children	Games with easy rules and vibrant, youthful elements; free of graphic weapons, violence, or inappropriate scenes	Very limited free time

4.2 Project Priorities

Dimension	Driver	Constraint	Degree of Freedom
Schedule			First demo of functionality to be available March 2, 2020; second demo ready by March 30, 2020; official release ready by April 15, 2020 for official release 1.0.
Features		First increment of functionality ready by first demo, all features fully or partially implemented by second demo, and all features must be fully operational in final official release 1.0.	
Quality		Game is safe to run on user's PC	
Staff			
Cost			

Software Requirements Specification

1. Introduction

1.1 Purpose

This document describes the software functional and nonfunctional requirements for release 1.0 of the HumanVsZombies video game. This document is intended to be used by the members of the project team in order to implement and verify the correct functioning of the application. Unless otherwise specified, all requirements outlined on this document are considered high priority and will be implemented in release 1.0.

1.2 Project Scope and Product Features

HumanVsZombies is intended to be a game that engages various levels of complexity, while still being fun and creative for the user. This project will consist of designing players, zombies, weapons, and a setting. Additionally, the project will allow the user to interact with weapons, zombies, and the setting. A free for all scoring system will be implemented where each level becomes increasingly difficult (weapons become weaker and less effective) as the user levels up. The game ends when the player runs out of health.

The project is intended to be played on a Windows PC. For a more detailed project description, refer to the *Vision and Scope Document* [1]. The section titled "Scope of Initial and Subsequent Releases" lists the features that will be partially or fully implemented in demo releases and official release 1.0.

1.3 References

1. Akduman, et al. Vision and Scope Document. *Software Requirements Specification for HumanVsZombies*, 3-7.

2. Overall Description

2.1 Product Perspective

The HumanVsZombies game is an entertaining and addictive game that anyone can play. Figures 1 (page 11) and 2 (page 14) illustrate rough designs of the visuals of the game. Below is the general structure of the HumanVsZombies game, but we also expect some additional features to develop and evolve by its final release 1.0.

2.2 User Classes and Characteristics

Player: HumanVsZombies is a single-player game, and the player controls only one character in the game. The player's objective is to kill as many zombies as it can and to survive for as long as possible. It can navigate the board and pick up weapons. The player

also has a health bar, which is a quantitative way to characterize how many more times it can withstand direct contact with zombies.

2.3 Operating Environment

HumanVsZombies can be downloaded and played on the user's PC.

2.4 Design and Implementation Constraints

CO-1: The HumanVsZombies shall be a 2-dimensional game from a bird's eye point of view.
CO-2: The game shall be coded using Unity Real-Time Development Platform.

2.5 User Documentation

UD-1: A written gameplay explanation and tutorial shall be provided to the user.
UD-2: If time permits, a video tutorial shall also be made available to the user.

2.6 Assumptions and Dependencies

AS-1: The player reads or watches available tutorials for HumanVsZombies to understand the game's objectives and controls.
DE-1: New waves are triggered after the player kills a sufficient number of zombies (definition of "sufficient" to be determined by the developers), which the system keeps track of.
DE-2: More zombies spawn at the start of a new wave, which the system keeps track of.
DE-3: Lesser quality weapons are generated on the board at the start of a new wave, which the system keeps track of.
DE-4: When a player touches a zombie, this negatively affects the player's health until the player eventually dies, which the system keeps track of.
DE-5: When a player uses a weapon, this drains the weapon's "health" until the weapon becomes unusable, which the system keeps track of.

3. System Features

System features are split into two main components: visuals and gameplay.

3.1 Visuals

3.1.1 8-bit Graphics

The game will have 8-bit graphics to simulate a classic, retro aesthetic.

3.1.2 "Bird's eye view" of Case Western Reserve University

The player will be presented with a 2-dimensional top view of the game map. The map will resemble the campus of Case Western Reserve University.

3-dimensionality of non-interactive game components such as buildings will be simulated in a 2.5D fashion.

3.1.3 Map Visibility

Only a portion of the map will be on display on the screen. As the player moves the sprite, more areas of the map are exposed while others are no longer displayed, simulating movement across the map.

3.1.4 Sprites

Like the rest of the interactive objects in the game, the sprites (protagonist and zombies) will be 2-dimensional. It will resemble a Spartan, the Case Western Reserve University mascot. Sprites will have 2-3 different "skins" with legs in different positions. These skins will be used interchangeably to simulate walking. There will also be skins representing damage. The protagonist sprite will have additional skins of the character carrying the different weapons of the game.

3.1.5 Aim Arrow

The protagonist sprite will also have an arrow displayed around it, representing the current direction in which the sprite is facing, or (equivalently) the direction in which the weapon is being aimed.

3.1.6 Player Status

At the bottom of the screen, the player will be able to view the two main character statuses: health and ammunition. Health will be represented as a green bar consisting of discrete boxes representing "hits." Ammo will be represented as a yellow bar directly beneath the health bar, with discrete boxes representing the number of "uses" left in the weapon. An icon of the current weapon being held by the player will also be displayed next to the status bar.

3.1.7 Current Score, Highscore, and Wave Number

At the top left of the screen, the player's current score and high score will be displayed. The current score will be a function of the time the player has lasted without losing all health and number of zombies killed. The current wave number that the user is playing will be at the top right of the screen.

3.1.8 Weapons

Weapons will be represented as 2D icons scattered throughout the map. Before they are "picked up," these icons will bob slightly up and down. Each weapon will have a unique icon. How many and what weapons to design are currently unspecified and left to the decision of the developers.

3.1.9 Non-Interactive Components

The non-interactive components on the map will include buildings and trees. These objects cannot be moved, picked up, or interacted with in any way by the

protagonist. The look of the buildings will resemble the buildings of Case Western Reserve University.

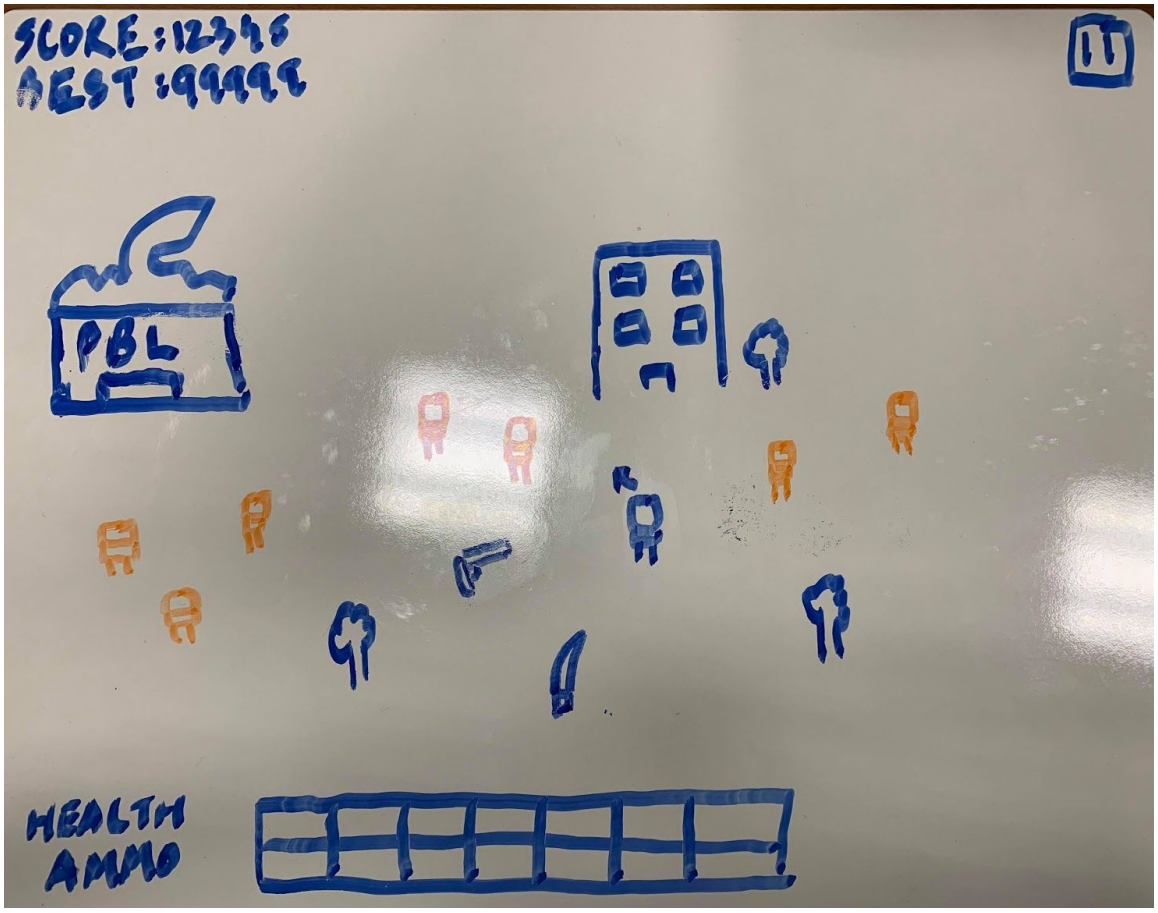

Figure 1: Sketch of possible game map with the player (with arrow indicating the direction it is facing), zombies (in orange), scattered weapons, buildings, health and ammo bars, scores in upper left, and wave number in upper right.

3.2 Gameplay

3.2.1 Player Movement

The player can move their character using the arrow keys or the WASD keys. The character can only move up, down, left, or right; diagonal movement can be achieved by pressing the up/down and right/left keys simultaneously.

3.2.2 Aiming and Using Weapons

The player aims using the mouse. An arrow displayed over the character points in the direction that character is currently aiming at. The arrow moves in a circle around the character as the mouse position is adjusted. The player uses their weapon by left-clicking the mouse.

3.2.3 Zombie Waves

Zombies will spawn randomly across the map in waves. The zombies will be programmed to move in the general direction of the player. New weapons will

spawn at random locations across the map with each zombie wave. The player progresses to the next wave when they have killed a sufficient percentage of zombies on the map (for now, the definition of a "sufficient" percentage will be left to the decision of the developers). Once this happens, the next wave of zombies spawns, and any live zombies from the previous wave remain. Waves of zombies get consecutively larger, but the "difficulty" of zombies (speed, accuracy at tracking player, etc.) will remain the same.

3.2.4 Weapons

Weapons spawn randomly across the map with each new zombie wave. Weapons are picked up by the player by coming in contact with them, and cannot be "dropped" until they are completely used up. There will be 3 main types of weapons: powerful weapons, mid-range weapons, and melee weapons. Powerful weapons (potential candidates: flamethrower, rocket launcher) deal the most damage but can be used very few times. Melee weapons (candidates: katanas, clubs) deal much less damage but last very long. Mid-range weapons (candidates: pistol) split the difference between powerful and melee weapons. The "quality" of weapons, i.e. the amount of damage they do, their range, number of uses, etc., gets progressively worse with each wave. The exact weapons which players will be able to use are not specified in this document and are instead left to the creativity of the team to decide during the later stages of game developing process.

3.2.5 Scoring

The player's score will be a fast-growing function of the amount of time the player has "survived" and the number of zombies they have killed. The player's personal best is stored by the game and displayed on the screen during gameplay. The player's wave number serves as an additional scoring metric. The exact function to calculate the score is currently left to the decision of the developers.

3.2.6 Health

The zombies damage the player's health when they touch the player. This is the only way the player can lose health. The player dies when they sustain a certain number of hits. There is no way to replenish health.

3.2.7 Ammo

The game uses the more general concept of "uses" for weapons, to account for melee weapons. Each weapon can be used by the player a certain number of times before it is depleted and despawns.

4. External Interface Requirements

4.1 User Interfaces

4.1.1 Main Menu

4.1.1.1 Description and Priority

The game will display its main menu when first started. The main menu will include a visual of the game's title, a background image from the game, and buttons for the following options:

1. Play Game
2. Options/Settings
3. Quit Game

Priority: High

4.1.1.2 Stimulus/Response Sequences

Stimulus: Player presses the "Play Game" button.
Response: The story video sequence is played (see 4.1.2).
Stimulus: Player presses the "Options/Settings" button.
Response: The settings menu is opened (see 4.1.3).
Stimulus: Player presses the "Quit Game" button.
Response: The game exits.

4.1.1.3 Functional Requirements

Requirement	**Description**
Game.Start	The game starts by playing the story video sequence when the "Play Game" button is pressed.
Game.Settings	Open the settings menu when the "Settings" button is pressed.
Game.Quit	Quit the game when the "Quit Game" button is pressed.

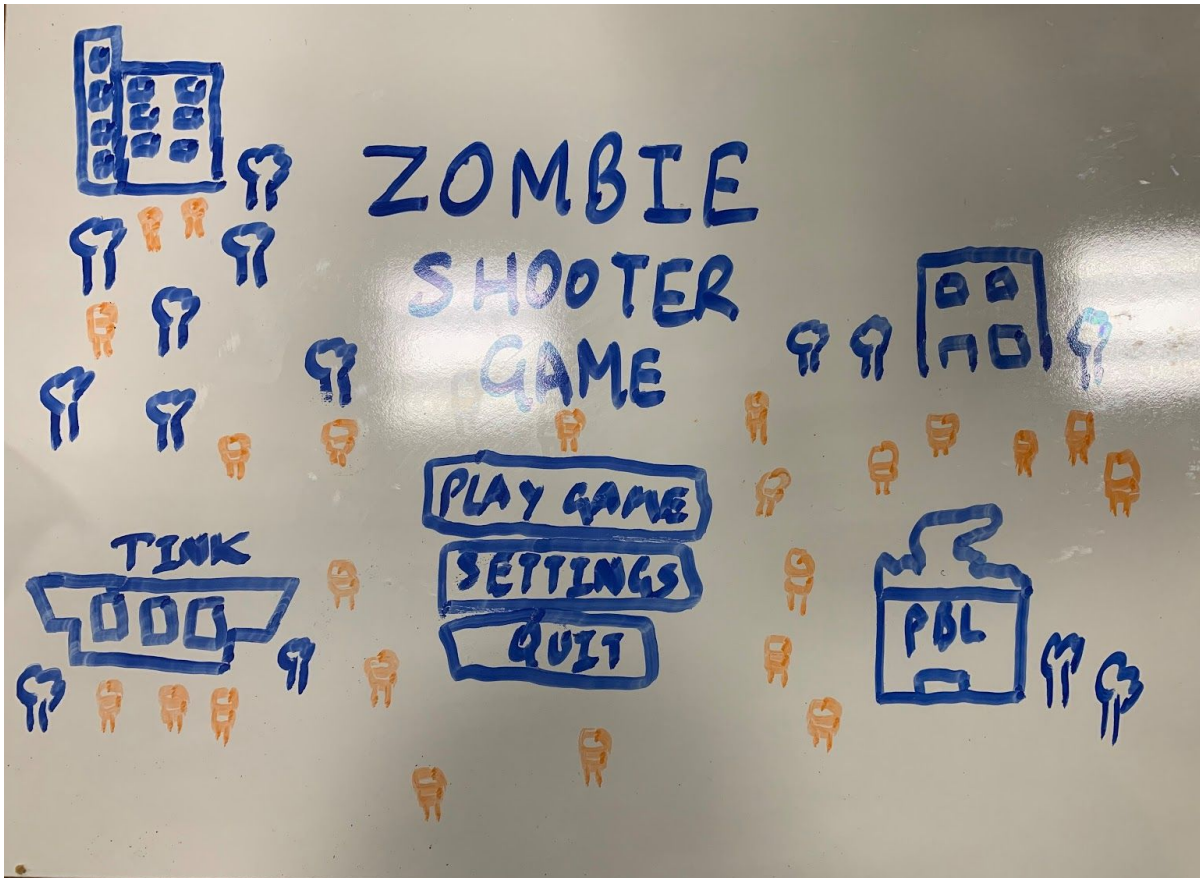

Fig 2: Sketch of Main Menu

4.1.2 Story Video Sequence

The first action to take place when the game is played is that the story video sequence is played. The video will be 10-20 seconds long, provide a brief outline of the zombie apocalypse in the game, and introduce the protagonist.
Priority: Low

4.1.3 Settings Menu

4.1.3.1 Description and Priority

The settings menu can be accessed through the main menu. It will contain buttons for the following options:

- Toggling music
- Toggling ingame sounds
- Resetting highscore
- Return to main menu

Priority: Low

4.1.3.2 Stimulus/Response Sequences

Stimulus: Player presses the music toggle.
Response: Music in the game is toggled.
Stimulus: Player presses the ingame sounds toggle.

Response: Ingame sounds are toggled.
Stimulus: Player presses the reset high score button.
Response: Highscore is reset to zero.
Stimulus: Player presses to exit to the main menu.
Response: Main menu is opened.

4.1.3.3 Functional Requirements

Requirement	Description
Settings.ToggleSound	Toggle ingame sounds when the corresponding switch is toggled.
Settings.ToggleMusic	Toggle music when the corresponding switch is toggled.
Settings.HighscoreReset	Set highscore to 0 when the user presses the “Reset high score” button
Settings.MainMenu	Return to main menu when the user presses the corresponding button.

4.1.4 Pause Menu

4.1.4.1 Description and Priority

At the top right of the screen, there will be a button that pauses gameplay when pressed. A menu with the following options will be overlayed on the screen when this button is pressed:

1. Resume game
2. Settings
3. Quit to Main Menu

If the player quits to the main menu from here, game progress will not be saved, unless a highscore is achieved, in which case the high score is saved and updated.
Priority: High

4.1.4.2 Stimulus/Response Sequences

Stimulus: Player presses the “Resume game” button.
Response: The pause menu disappears and gameplay resumes.
Stimulus: Player presses the “Settings” button
Response: The settings menu is opened.
Stimulus: Player presses “Quit to Main Menu” button.
Response: Gameplay is terminated without saving progress and the system returns to the main menu.

4.1.4.3 Functional Requirements

Requirement	Description
Pause.Resume	Resume gameplay when the “Resume” button is pressed
Pause.Settings	Open the settings menu when the “Settings” button is pressed
Pause.MainMenu	Return to the main menu after terminating gameplay, when the “Return to Main Menu” button is pressed.

4.2 Hardware Interfaces

No hardware interfaces have been identified.

4.3 Software Interfaces

No software interfaces have been identified.

4.4 Communications Interfaces

No communications interfaces have been identified.

5. Other Nonfunctional Requirements

5.1 Performance Requirements

PE-1: Melee weapons should begin swinging within 0.02 seconds after clicking the attack key.

PE-2: Bullets or some other form of ammunition should come out of ranged weapons within 0.02 seconds after clicking the attack key.

PE-3: Zombies should lose health within 0.02 seconds after the melee weapon or ammunition comes in contact with it.

PE-4: If a zombie’s health reaches 0, it should die within 0.02 seconds.

5.2 Safety Requirements

SA-1: All six personal computers owned by the developers should be able to run the game without catching on fire.

5.3 Security Requirements

SE-1: Users should not be able to remotely access the contents of someone else's game.
SE-2: HumanVsZombies should not make an attempt to access the microphone or camera.

5.4 Software Quality Attributes

Availability-1: HumanVsZombies should run even when not connected to the Internet.
Reliability-1: HumanVsZombies should save high scores without corruption 99.9% of the time.

6. Inspection Report

Team Member	**Findings**	**Resolution**
Kaan Akduman	SC-2 gives an ambiguous and unclear description.	Modified description to be unambiguous.
Jamie Booker	Vague conditions for what amount of zombies should be killed in order to trigger a new wave.	For now, we will just leave these decisions up to the decision of the developers. Once those values are specified, they will be added to subsequent releases of this document.
Rounak Chawla	Vague descriptions about User Interface requirements.	Added Stimulus/Response Sequences and Functional Requirements in section 4.1 of the SRS
Yadira Gonzalez	Incomplete Product Perspective in section 2.1 of the SRS.	Modified description.
Minh Pham	Did not find any issues.	
Sarah Yurick	Confusion about timeline of feature implementations.	Clarified scope and limitations for demos and official release in Vision and Scope document, section 3.1: Scope of Releases.