Platform Perils

Software Requirements Specification

Based on the Volere Template

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Revision History

Date	Version	Notes
October 7, 2015	1.0	Created document
October 7, 2015	1.1	Major edits in progress
October 8, 2015	1.2	Major event and reqs additions
October 9, 2015	1.3	Final version for rev 0 hand-in
April 24, 2016	1.4	Final version for rev 1 hand-in

1 Project Drivers

1.1 The Purpose of the Project

The purpose of this project is to produce a game that will be used as a demonstration for students in a third year software engineering game design course at McMaster University. The game will incorporate the Chipmunk2D physics library and highlight its capabilities.

1.2 The Stakeholders

1.2.1 The Client

The client for this project is Dr. Spencer Smith of the Computing and Software department at McMaster University.

1.2.2 The Customers

The customers for this project are students who will take the game design course in the future.

1.2.3 Other Stakeholders

Other stakeholders include future instructors of the game design course or other similar courses, and future developers of the game.

2 Project Description

2.1 Game Overview

For this project a 2.5-D game will be created. It will consist of a game world within which a user-controlled hero makes progress by completing stages. The subsections that follow provide a more detailed explanation of the game.

2.1.1 The Story

Platform Perils focuses on a nameless hero who finds himself lost in a world full of dangerous hazards. It is up to the player to help the hero navigate safely through a series of perilous stages so that he can return home.

2.1.2 Game Theme

The game will be a fast-paced platformer game, in which the player must reach the end of stages without being killed. The game will have an adventure theme reminiscent of Indiana Jones, and will include spears, spikes, and boulders that must be avoided by the player.

2.1.3 Game Style

The game will utilize 2.5-D graphics and will have a semi-realistic style. This will be achieved through the use of textures and simulated lighting effects.

2.1.4 The Hero

The hero is the protagonist of the game, and is controlled by the user. The hero is able to move left or right, and to jump, in order to progress through the game. The hero can interact with different objects in the game. These objects include platforms, obstacles, and hazards. When the hero comes into contact with an object a collision event is triggered. Depending on the type of object, these events include:

1. If the object is a platform, the hero is supported (if standing on) or blocked (if jumping from below)

2. If the object is an obstacle the hero will be stopped and unable to pass.

3. If the object is a fatal hazard, the hero will be killed.

2.2   Mandated Constraints

The project is subject to several constraints. The following constraints are mandated by the client:

1. The game must make significant use of the Chipmunk2D physics library.

2. Project milestones must be completed by the dates given in the CS 4ZP6 syllabus.

3. The project must be fully completed by April 25, 2016.

The following constraints are mandated by the developers:

1. User inputs devices are limited to a mouse and keyboard.

2.3   Naming Conventions and Terminology

The terminology used in this project is given in Table 1.

Table 1: List of terminology

Term	Definition
Bounds	The boundaries inside which game play occurs
Hazard	An environmental object that causes negative effects to the hero
Hero	The main character of the game controlled by the user
Obstacle	A barrier that the hero cannot cross
Surface	An object the hero can stand on (e.g. platforms)
User	Player of the game

Table 2: List of constants

Constant	Value	Description
σ	60	Frame rate target
Θ	6	User testing entertainment target
Ψ	2	User testing challenge range
Ω	8	User testing controls target

3 Functional Requirements

3.1 The Scope of the Work and the Product

3.1.1 The Context of the Work

A context diagram of the the work is given in Figure 1.
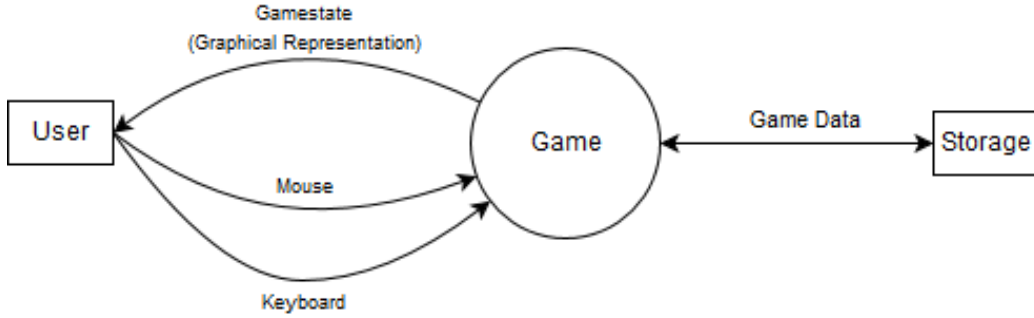
Figure 1: Context diagram of the work

3.1.2 Work Partitioning

The flow diagram in Figure 2 gives a rough representation of the operation of
the envisioned game. The user interfaces include a main menu as well as an
in-game menu, and an in-game interface in which all game play takes place.
The events are listed in Table 3.

3.1.3 Individual Product Use Cases

Due to the nature of the project, the product use cases are essentially equiv-
alent to the events identified in the work partitioning.
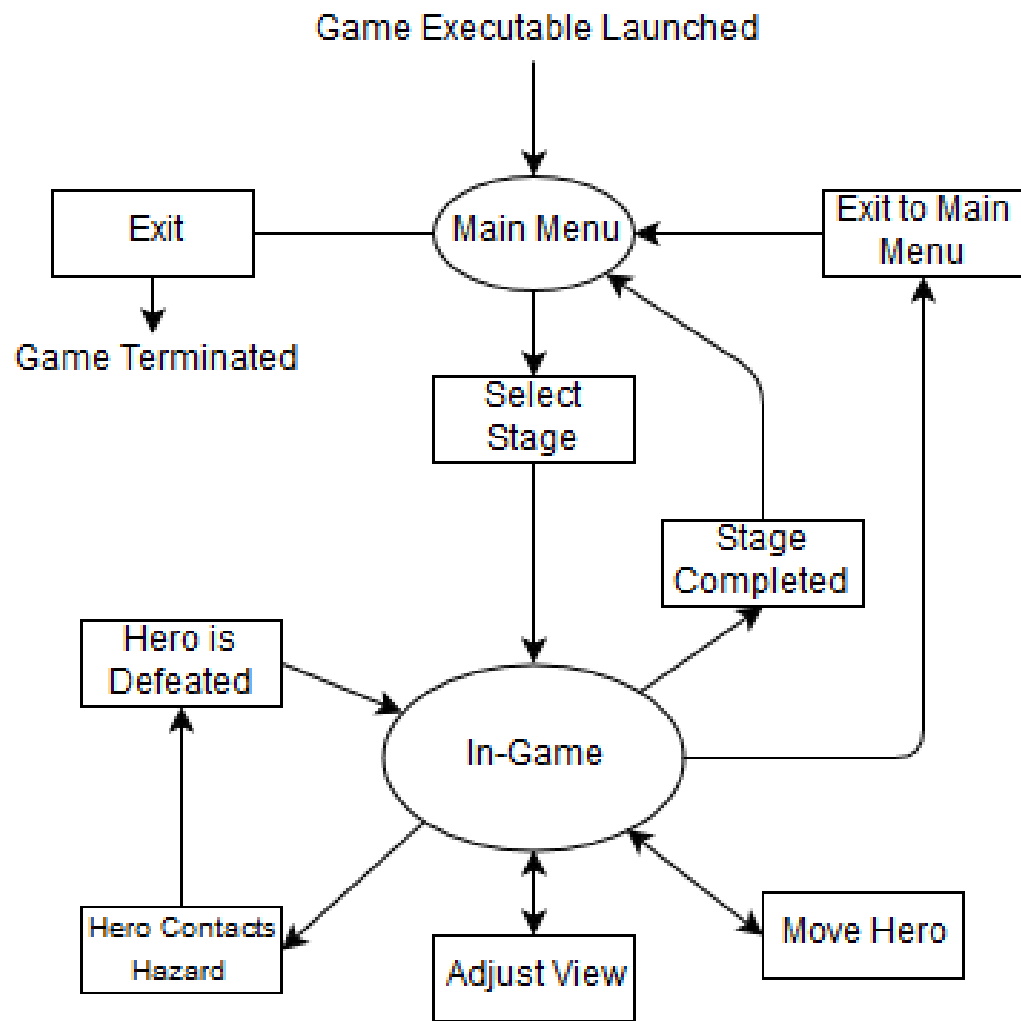
Figure 2: Flow diagram of the game. Ovals represent user interfaces and rectangles represent events.

Table 3: List of events

	Event Name	Inputs/Outputs	Summary
1.	Select Stage	User Input (in)	A stage is started
2.	Exit to Main Menu	User Input (in)	Exit from current game to main menu
3.	Move Hero	User Input (in) Gamestate (out)	The hero moves through the game world
4.	Adjust View	User Input (in) Gamestate (out)	The view of the stage is changed
5.	Hero Contacts Surface	Gamestate (out)	The hero comes into contact with a surface
6.	Hero Contacts Obstacle	Gamestate (out)	The hero comes into contact with an obstacle
7.	Hero Contacts Hazard	Gamestate (out)	The hero comes into contact with a hazard
8.	Hero is Killed	Gamestate (out)	The stage resets
9.	Stage is Completed	Gamestate (out)	The
10.	Exit Game	User Input (in)	The game application is terminated

Use Case #: 1

Name:	Select Stage
Trigger:	The user selects to play a stage
Precondition:	The stage select menu is open
Postcondition:	The selected stage is loaded and play begins from a designated starting point

Use Case #: 2

Name:	Exit to Main Menu
Trigger:	The user selects to exit to main menu
Precondition:	The user is currently playing a stage
Postcondition:	The stage is ended and the main menu is opened

Use Case #: 3

Name:	Move Hero
Trigger:	Inputs from user related to controlling the hero movement
Precondition:	The user is currently playing a stage
Postcondition:	Hero moves according to input

Use Case #: 4

Name:	Adjust View
Trigger:	Inputs from user related to controlling the view
Precondition:	The user is currently playing a stage
Postcondition:	View changes according to input

Use Case #: 5

Name:	Hero Contacts Surface
Trigger:	Hero comes into contact with a surface
Precondition:	The user is currently playing a stage
Postcondition:	Hero is affected by the surface

Use Case #: 6

Name:	Hero Contacts Obstacle
Trigger:	Hero comes into contact with an obstacle
Precondition:	The user is currently playing a stage
Postcondition:	Hero is affected by the obstacle

Use Case #: 7

Name:	Hero Contacts Hazard
Trigger:	Hero comes into contact with hazard
Precondition:	The user is currently playing a stage
Postcondition:	Hero is affected by the hazard

Use Case #: 8

Name:	Hero is Killed
Trigger:	Hero contacts fatal hazard
Precondition:	The user is currently playing a stage
Postcondition:	The stage is reset and the hero is moved to the designated starting point

Use Case #: 9

Name:	Stage is Completed
Trigger:	Hero contacts the goal
Precondition:	The user is currently playing a stage
Postcondition:	The user is returned to the main menu

Use Case #: 10

Name:	Exit Game
Trigger:	The user selects exit game
Precondition:	The main menu is open
Postcondition:	The application is terminated

3.2 Functional Requirements

Requirement #: 1   **Requirement Type:** 3.2   **Use Case:** 1

Description: The user shall have the ability to select a stage to play
Rationale: The user must be able to play stages of the game
Fit Criterion: Stages are able to be selected for play

Cust. Satisfaction: 1   **Cust. Dissatisfaction:**   5
Priority: Medium   **Conflicts:**   None

Supporting Materials: None
History: Updated April 24, 2016

Requirement #: 2   **Requirement Type:** 3.2   **Use Case:** 1

Description: The game shall have three predefined levels
Rationale: The game is designed to have three levels
Fit Criterion: The game supports the selection of three levels

Cust. Satisfaction: 3   **Cust. Dissatisfaction:**   3
Priority: Medium   **Conflicts:**   None

Supporting Materials: None
History: Created April 24, 2016

Requirement #: 3   **Requirement Type:** 3.2   **Use Case:** 1

Description: The game shall load stages by parsing level scripts at
                       run-time
Rationale: The game must support loading custom levels
Fit Criterion: The game successfully loads levels from level scripts

Cust. Satisfaction: 5   **Cust. Dissatisfaction:** 1
Priority: Low   **Conflicts:**   None

Supporting Materials: None
History: Created April 24, 2016

Requirement #: 4   **Requirement Type:** 3.2   **Use Case:** 2

Description: The user shall have the ability to exit the current
                       game
Rationale: The user requires a method of quitting a game in
                       progress
Fit Criterion: User is able to exit the current game and return to
                       the main menu

Cust. Satisfaction: 1   **Cust. Dissatisfaction:** 5
Priority: Low   **Conflicts:**   None

Supporting Materials: None
History: Created October 9, 2015

Requirement #: 5   **Requirement Type:** 3.2   **Use Case:** 3

Description:	The user shall be able to move the hero to the left
Rationale:	The hero must be able to be moved left to navigate the game world
Fit Criterion:	The hero moves left correctly based on specific user inputs

Cust. Satisfaction:	3	**Cust. Dissatisfaction:**	5
Priority:	Very High	**Conflicts:**	None

Supporting Materials:	None
History:	Created October 8, 2015

Requirement #: 6   **Requirement Type:** 3.2   **Use Case:** 3

Description:	The user shall be able to move the hero to the right
Rationale:	The hero must be able to be moved right to navigate the game world
Fit Criterion:	The hero moves right correctly based on specific user inputs

Cust. Satisfaction:	3	**Cust. Dissatisfaction:**	5
Priority:	Very High	**Conflicts:**	None

Supporting Materials:	None
History:	Created October 8, 2015

Requirement #: 7   **Requirement Type:** 3.2   **Use Case:** 3

Description:	The user shall be able to make the hero jump when standing on a surface
Rationale:	The hero must be able to jump to reach the intended areas of the game world
Fit Criterion:	The hero is able to jump based on a specific user input

Cust. Satisfaction: 3   **Cust. Dissatisfaction:** 5
Priority: Very High **Conflicts:** None

Supporting Materials: None
History: Created October 8, 2015

Requirement #: 8   **Requirement Type:** 3.2   **Use Case:** 3

Description:	The user shall not be able to make the hero jump when not standing on a surface
Rationale:	The hero must only be able to jump from surfaces
Fit Criterion:	The hero is unable to jump when not standing on a surface

Cust. Satisfaction: 3   **Cust. Dissatisfaction:** 3
Priority: High **Conflicts:** None

Supporting Materials: None
History: Created April 24, 2016

Requirement #: 9   **Requirement Type:** 3.2   **Use Case:** 3

Description: The hero shall be subject to the laws of physics
Rationale: The game world's laws of physics should apply to the
                      hero
Fit Criterion: The hero's movement responds appropriately to the
                      laws of physics

Cust. Satisfaction: 5   **Cust. Dissatisfaction:** 5
Priority: High   **Conflicts:**   None

Supporting Materials: None
History: Created October 9, 2015

Requirement #: 10   **Requirement Type:** 3.2   **Use Case:** 3

Description: The hero shall remain in bounds
Rationale: The hero must remain in the intended boundaries of
                      play for the game to function properly
Fit Criterion: Hero is unable to pass through walls and other
                      obstacles

Cust. Satisfaction: 2   **Cust. Dissatisfaction:** 5
Priority: Medium   **Conflicts:**   None

Supporting Materials: None
History: Created October 7, 2015

Requirement #: 11 **Requirement Type:** 3.2 **Use Case:** 3

Description: All intended areas of the game shall be reachable
Rationale: All areas of the game where the hero is intended to be should be reachable
Fit Criterion: All areas reachable when testing

Cust. Satisfaction: 2   **Cust. Dissatisfaction:** 5
Priority: Medium **Conflicts:**   None

Supporting Materials: None
History: Created October 7, 2015

Requirement #: 12 **Requirement Type:** 3.2 **Use Case:** 4

Description: The user shall be able to zoom the view of a stage in
Rationale: The user should be able to zoom in to improve stage navigation
Fit Criterion: The stage view is zoomed in based on specific user input

Cust. Satisfaction 2   **Cust. Dissatisfaction:** 3
Priority: Low   **Conflicts:**   None

Supporting Materials: None
History: Created April 24, 2015

Requirement #: 13   **Requirement Type:** 3.2   **Use Case:** 4

Description: The user shall be able to zoom the view of a stage out
Rationale: The user should be able to zoom out to get a better
                       idea of the big picture of the stage
Fit Criterion: The stage view is zoomed out based on specific user
                       input

Cust. Satisfaction: 2   **Cust. Dissatisfaction:**   3
Priority: Low   **Conflicts:**   None

Supporting Materials: None
History: Created April 24, 2015

Requirement #: 14   **Requirement Type:** 3.2   **Use Case:** 5

Description: The hero shall be supported when standing on sur-
                       faces
Rationale: The hero should be able to stand on surfaces
Fit Criterion: The hero is supported by surfaces

Cust. Satisfaction: 3   **Cust. Dissatisfaction:**   5
Priority: Medium   **Conflicts:**   None

Supporting Materials: None
History: Created April 24, 2016

Requirement #: 15 **Requirement Type:** 3.2   **Use Case:** 6

Description: The hero's movement shall be obstructed when he comes into contact with an obstacle
Rationale: Obstacles should stop the hero
Fit Criterion: The hero cannot pass through obstacles

Cust. Satisfaction: 3   **Cust. Dissatisfaction:** 4
Priority: Medium   **Conflicts:**   None

Supporting Materials: None
History: Created April 24, 2016

Requirement #: 16 **Requirement Type:** 3.2   **Use Case:** 7

Description: The hero shall be killed when he comes into contact with a fatal hazard
Rationale: Hazards are fatal
Fit Criterion: The hero is defeated

Cust. Satisfaction: 3   **Cust. Dissatisfaction:** 3
Priority: Medium   **Conflicts:**   None

Supporting Materials: None
History: Created April 24, 2016

Requirement #: 17 **Requirement Type:** 3.2   **Use Case:** 8

Description: The current stage shall be reset when the hero is killed
Rationale: The user begins from the beginning of the current stage when the hero is defeated
Fit Criterion: The stage resets when the hero is defeated

Cust. Satisfaction: 1   **Cust. Dissatisfaction:** 3
Priority: High   **Conflicts:**   None

Supporting Materials: None
History: Updated April 23, 2016

Requirement #: 18 **Requirement Type:** 3.2   **Use Case:** 9

Description: The user shall return to the main menu when a stage is complete
Rationale: The user must be able to complete stages
Fit Criterion: The user is returned to the main menu upon the hero reaching the goal

Cust. Satisfaction: 1   **Cust. Dissatisfaction:** 3
Priority: High   **Conflicts:**   None

Supporting Materials: None
History: Updated April 23, 2016

Requirement #: 19   **Requirement Type:** 3.2   **Use Case:** 10

Description: The user shall have the ability to exit the application
Rationale: The user must be able to terminate the game when
                        done playing
Fit Criterion: User is able to successfully terminate application

Cust. Satisfaction: 1   **Cust. Dissatisfaction:**   2
Priority: Low   **Conflicts:**   None

Supporting Materials: None
History: Created October 8, 2015

4 Non-functional Requirements

4.1 Look and Feel Requirements

Requirement #: 20   **Requirement Type:** 4.1   **Use Case:** N/A

Description:	The game shall use 2.5-D graphics
Rationale:	The game is intended to be a 2.5-D game
Fit Criterion:	2.5-D graphics are used for the game

Cust. Satisfaction:	5	**Cust. Dissatisfaction:**	5
Priority:	Low	**Conflicts:**	None

Supporting Materials:	None
History:	Updated April 24, 2016

Requirement #: 21   **Requirement Type:** 4.1   **Use Case:** N/A

Description:	The game shall be a fast-paced platformer with an Indiana Jones adventure theme
Rationale:	The game is intended to be an adventure platformer game
Fit Criterion:	The game is an adventure platformer type of game

Cust. Satisfaction:	4	**Cust. Dissatisfaction:**	3
Priority:	Low	**Conflicts:**	None

Supporting Materials:	None
History:	Created April 24, 2016

Requirement #: 22	Requirement Type: 4.1	Use Case: N/A

Description: The game theme shall have a semi-realistic aesthetic

Rationale: The game is intended to have a semi-realistic aesthetic

Fit Criterion: The game incorporates textures and lighting that provide semi-realism to objects

Cust. Satisfaction:	3	**Cust. Dissatisfaction:**	3
Priority:	Low	**Conflicts:**	None

Supporting Materials: None

History: Created April 24, 2016

Requirement #: 23	Requirement Type: 4.1	Use Case: N/A

Description: The game shall include sounds that enhance the feel of the game

Rationale: The game is intended to have background music and sound effects

Fit Criterion: The game incorporates background music and sound effects

Cust. Satisfaction:	3	**Cust. Dissatisfaction:**	3
Priority:	Low	**Conflicts:**	None

Supporting Materials: None

History: Created April 24, 2016

4.2 Usability and Humanity Requirements

Requirement #: 24 **Requirement Type:** 4.2 **Use Case:** N/A

Description: The game shall be entertaining
Rationale: A game should be fun
Fit Criterion: The game should be ranked at least Θ for entertainment based on a usability study

Cust. Satisfaction: 5   **Cust. Dissatisfaction:** 5
Priority: Medium   **Conflicts:**   None

Supporting Materials: None
History: Created October 7, 2015

Requirement #: 25 **Requirement Type:** 4.2 **Use Case:** N/A

Description: The game controls shall be intuitive
Rationale: The game should be easy and intuitive to control
Fit Criterion: The game should be ranked at least Ω for intuitive controls based on a usability study

Cust. Satisfaction: 3   **Cust. Dissatisfaction:** 5
Priority: Medium   **Conflicts:**   None

Supporting Materials: None
History: Created October 7, 2015

Requirement #: 26   Requirement Type: 4.2   Use Case: N/A

Description: The game shall be moderately challenging
Rationale: A game should be moderately challenging
Fit Criterion: The game should be ranked $5\pm\Psi$ for entertainment
                   based on a usability study

Cust. Satisfaction: 3   Cust. Dissatisfaction: 3
Priority: Medium   Conflicts: None

Supporting Materials: None
History: Created October 7, 2015

4.3   Performance Requirements

Requirement #: 27   Requirement Type: 4.3   Use Case: N/A

Description: The game shall maintain an average framerate of at
                   least σ fps
Rationale: A framerate of σ fps or greater will ensure smooth
                   animation
Fit Criterion: The game runs at σ fps or greater when testing

Cust. Satisfaction: 5   Cust. Dissatisfaction: 5
Priority: High   Conflicts: None

Supporting Materials: None
History: Created October 7, 2015

4.4   Operational and Environmental Requirements

There are no operational and environmental requirements related to this
project.

4.5   Maintainability and Support Requirements

Requirement #: 28	**Requirement Type:** 4.5	**Use Case:** N/A

Description: The game shall support Windows, Linux, and OS X operating systems

Rationale: Students use a variety of operating systems

Fit Criterion: The game compiles and runs on each operating system

Cust. Satisfaction: 5   **Cust. Dissatisfaction:** 3

Priority: High   **Conflicts:** None

Supporting Materials: None

History: Created October 7, 2015

4.6 Security Requirements

There are no security requirements related to this project.

4.7 Cultural Requirements

Requirement #: 29	**Requirement Type:** 4.7	**Use Case:** N/A

Description: The game shall use the English language

Rationale: Students at McMaster University are expected to speak English

Fit Criterion: The game uses proper English free of spelling and grammar errors

Cust. Satisfaction: 1   **Cust. Dissatisfaction:** 3

Priority: Low   **Conflicts:** None

Supporting Materials: None

History: Created October 7, 2015

4.8 Legal Requirements

There are no legal requirements related to this project.

5 Project Issues

5.1 Open Issues

There are no open issues at this time.

5.2 Off-the-Shelf Solutions

Pre-existing open-source games developed using Chipmunk2D could be considered off-the-shelf solutions for this project. These games include Ognom-keeper, Kineticart, Sole-scion, and several others. Developing a custom game, however, allows the game to be tailor-made for use as a classroom example.

5.3 New Problems

No new problems are expected to arise as a result of this project.

5.4 Tasks

The project will be broken down into the phases given in Table 4.

Table 4: List of project phases

	Phase Name	Summary
1.	Interfaces	Programming game interfaces (i.e. working menu systems).
2.	Structures	Programming of game structures and classes.
3.	Mechanics	Programming of game mechanics including physics implementation.
4.	Graphics and Sound	Addition of textures and sound to the game to provide an enhanced audiovisual experience. This phase is non-crucial.

5.5 Migration to the New Product

There is no product being replaced, and thus no migration is required.

5.6   Risks

The successful completion of the project depends on overcoming the following significant risks:

1. In order to use the Chipmunk2D library it must first be successfully compiled. Since we intend for the game to be compatible with Windows 7, Mac OS X, and Ubuntu, there is a significant risk for the project to fail if compilation is not achieved on all three operating systems.

2. Chipmunk2D is a large library and its use is not straight forward. Successful implementation of the library features is crucial to the success of the project and the failure of this poses another significant risk.

5.7   Costs

There are no costs associated with this project.

5.8   User Documentation and Training

User documentation will be created as per the CS 4ZP6 guidelines. No training will be required.

5.9   Waiting Room

There are no backlogged requirements at this time.

5.10   Ideas for Solutions

There are no ideas for solutions at this time.