



# **Development of a Game on Landslide Disasters in North-eastern States of India**

## **Software Requirements Specification Document**

**1.0**

**25<sup>th</sup> January 2018**

160001004 - Amit Meena  
160001011 - Ashutosh Bang  
160001026 - Joshi Niranjana Suhas  
160001033 - Mahesh Kumar  
160001034 - Anish Sri Chandra

*(This page is intentionally left blank.)*

## Revision History

Date	Description	Author	Comments
24/01/2018	Version 1.0	Group H	First Revision

## Document Approval

The following Software Requirements Specification has been accepted and approved by the following:

Signature	Printed Name	Title	Date

## Table of Contents

<b>REVISION HISTORY .....</b>	<b>3</b>
<b>DOCUMENT APPROVAL .....</b>	<b>3</b>
<b>1. INTRODUCTION .....</b>	<b>1</b>
1.1 PURPOSE .....	1
1.2 SCOPE .....	1
1.3 DEFINITIONS, ACRONYMS, AND ABBREVIATIONS .....	1
1.4 REFERENCES .....	2
1.5 OVERVIEW .....	2
<b>2. GENERAL DESCRIPTION .....</b>	<b>2</b>
2.1 PRODUCT PERSPECTIVE .....	2
2.2 PRODUCT FUNCTIONS .....	3
2.3 USER CHARACTERISTICS .....	3
2.4 GENERAL CONSTRAINTS .....	3
2.5 ASSUMPTIONS AND DEPENDENCIES .....	3
2.6 FLOWCHART FOR GAME FLOW .....	4
2.7 DETAILS OF THE GAME SEQUENCES .....	5
<i>The Main Screen:</i> .....	5
<i>Game Progress Screen:</i> .....	5
<i>Mission 1: Planting the trees</i> .....	5
<i>Mission 2: Redirection of water flow</i> .....	6
<i>Mission 3: Land use zoning</i> .....	6
<i>Mission 4: Evacuation</i> .....	6
<i>Mission 5: Rescue camp</i> .....	6
<b>3. SPECIFIC REQUIREMENTS .....</b>	<b>7</b>
3.1 EXTERNAL INTERFACE REQUIREMENTS .....	7
3.1.1 <i>User Interfaces</i> .....	7
3.1.2 <i>Hardware and Software Interfaces</i> .....	7
3.2 FUNCTIONAL REQUIREMENTS .....	7
3.2.1 <i>Overview of Functional Requirements</i> .....	7
3.2.2 <i>Template for Describing Functional Requirements</i> .....	7
3.2.3 <i>Introductory Movie</i> .....	8
3.2.4 <i>Main Menu</i> .....	8
3.2.5 <i>Game Sequence</i> .....	8
3.2.6 <i>Ending Scene</i> .....	9
3.3 NON-FUNCTIONAL REQUIREMENTS .....	9
3.3.1 <i>Performance</i> .....	9
3.3.2 <i>Availability</i> .....	9
3.3.3 <i>Security</i> .....	9
3.3.4 <i>Maintainability</i> .....	10
3.3.5 <i>Portability</i> .....	10
3.4 DESIGN CONSTRAINTS .....	10
3.5 OTHER LOGICAL REQUIREMENTS .....	10

## 1. Introduction

This document lays out a project plan for the development of the game - Salvos. This game is intended to promote the awareness on landslides. This document defines the purpose, the scope along with the general description of the game. This document also states the hardware constraints along with the functional and non-functional requirements expected from the software.

### 1.1 Purpose

The purpose of this document is to describe the proposed functionality of the software product requested by Dr. Neelima Satyam of The Department of Civil Engineering, IIT Indore. The SRS will include the details of the project's requirements, interface, design issues, and components. The intended readers of this document are the current and future developers working on the project and proposer of this project. The document is the collection of all assorted ideas that have come up to define the system, its requirements with respect to help our clients in their research. Few ideas may get evolved or may get discarded as the project develops.

In short, the purpose of this SRS document is to provide a detailed overview of our software product, its parameters and goals. This document describes the project's target audience and its user interface, hardware and software requirements. It defines how our client, team and audience see the product and its functionality.

### 1.2 Scope

The *Salvos* game project is a learning tool created to help improve the awareness among the children in age group from 6 to 10 years. The product will be an interactive multi-platform game. The Application will be released both as a native Windows desktop application and an Android based app. The main objective of the game is to spread awareness among children as the frequency of landslides in the Himalayan region of northeast India is high. At the end of the game, students will be given feedback based on their game scores. The game will focus on the teaching of both- prevention (pre-disaster stage) and survival during the landslide. The game will focus on learning through visualization and simulation. The game scoring will be based on the activity player performs and its correctness according to scientifically proven ways.

### 1.3 Definitions, Acronyms, and Abbreviations

This subsection should provide the definitions of all terms, acronyms, and abbreviations required to properly interpret the SRS. This information may be provided by reference to one or more appendixes in the SRS or by reference to other documents.

OS	Operating System
CPU	Central Processing Unit
GUI	Graphical User Interface
Unity3d	Game Engine for game development
DX	DirectX

SP	Service Pack
SSE	Streaming SIMD Extensions
Character	The player will play the game as some character having name as given by user.
Mission	Level of the game focusing on consolidation of one concept. This is in the form of task.
Stars	Scores given at the end of each level (maximum number 3)
Soil Erosion	<b>Soil erosion</b> is <b>defined</b> as the wearing of topsoil. Topsoil is the top layer of <b>soil</b> and is the most fertile because it contains the most organic, nutrient-rich materials
Health Bar	There will be a bar representing current health status of the person. It will decrease with time denoting deterioration of health.
Money bags	Awards kept as a distraction for player.

## 1.4 References

- Dr. Neelima Satyam, Department of Civil Engineering, IIT Indore
- Dr. Abhishek Srivastav, Department of Computer Science & Engineering, IIT Indore
- **Project Repository:** <https://github.com/Niranjan-J/Group-H-Project-4/>
- **Overview of Game Design:** [https://github.com/Niranjan-J/Group-H-Project-4/blob/master/Documentation/Game\\_design.md](https://github.com/Niranjan-J/Group-H-Project-4/blob/master/Documentation/Game_design.md)
- **Literature on Landslides:** <https://github.com/Niranjan-J/Group-H-Project-4/blob/master/Documentation/literature.md>
- **Game development:** <https://unity3d.com/>

## 1.5 Overview

This document is designed to provide information to both the client and the technical designers of the software. Section one is a brief overview of the product, including definitions and references. The definitions section is intended to assist the technical designers as well as the client in clarifying the terms used throughout the document. Section two is a general description of the product requirements from a user's perspective. This section includes information such as functional and data requirements, general constraints, and assumptions. Section three is a detailed requirements specification targeted to technical designers. Specific requirements and expectations regarding the components of the product are given in this portion of the SRS document.

## 2. General Description

### 2.1 Product Perspective

The game is interactive and comes as native desktop application for Windows and as an app for Android. The program requires an internet connection only for downloading the application.

The game can run offline. The game aids teaching through simulation, providing tutorials, hints, video clips and promoting competitive learning by offering *stars* for good scores. This encourages learning through understanding of the concept. The focus is on teaching concepts that have a research level scientific understanding to the children. Simulation will provide an effective way of visualization and also enhances the user experience.

### 2.2 Product Functions

- The Player has to start as per the game storyline.
- As he/she moves ahead in the game, it is quite essential for him/her to pass maximum modules to satisfy the aim of the game (i.e. to maximize the score and health and to minimize the distractions).
- Game score, health, distraction and time must be displayed all the time at the top of the game.
- The Environment of the game must be an attractive setting in the lap of nature.

### 2.3 User Characteristics

The target clients for our software are the children of the age group from 6 to 10. These students are in the process of learning how to tackle the problem of landslides both during the disaster and the pre-disaster stages. Moreover, these students (as well as the teacher) are assumed to have basic computer and Internet skills that will enable them to use this software. For the mobile app, they are assumed to know how to operate a mobile phone. The game will request the user to enter his/her username and a character will be assigned to them. The game will be played through this character.

### 2.4 General Constraints

The minimum software and hardware requirements are as follows:

#### Desktop:

- OS: Windows XP SP2+.
- Graphics card: DX9 (shader model 3.0) or DX11 with feature level 9.3 capabilities.
- CPU: SSE2 instruction set support.

#### Android:

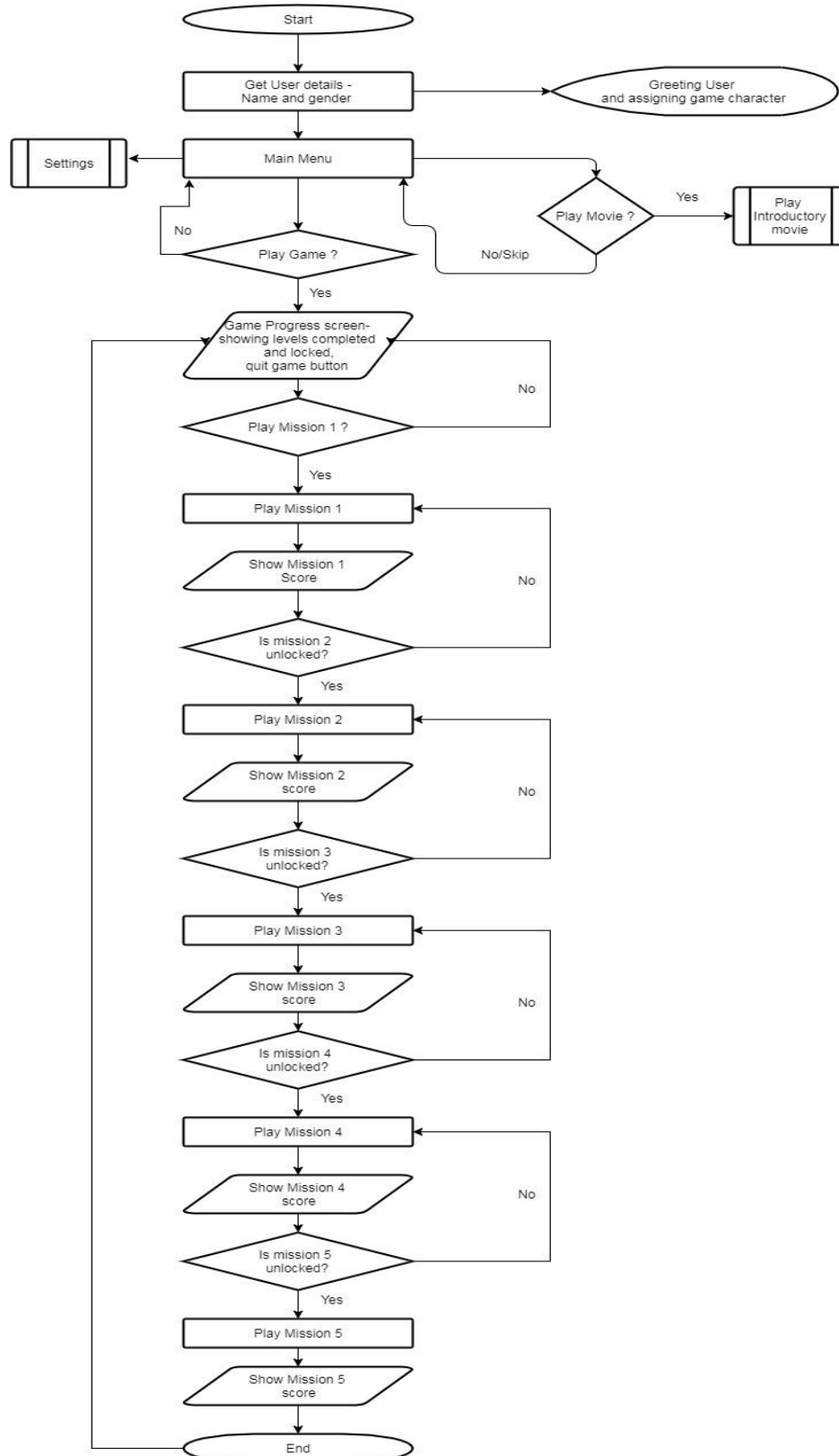
- OS 4.1 or later; ARMv7 CPU with NEON support or Atom CPU; OpenGL ES 2.0 or later.

This program will run offline on any computer or a mobile phone that satisfies the above-mentioned requirements.

### 2.5 Assumptions and Dependencies

It is assumed that the player is age group in between 6 to 10 without any prior knowledge on landslides. He/she should know how to operate a computer. It is assumed that the game is properly installed on the device. The device must satisfy all the above-mentioned requirements.

## 2.6 Flowchart for Game flow





## 2.7 Details of the Game Sequences

### The Main Screen:

- The main screen appears when the application is started.
- The buttons on the main screen include “Play Game”, “Settings” and a button for playing an introductory movie clip.
- The Introductory movie clip will be an Informative video and the player has an option to watch it.
- The Settings include Volume and Music controls along with a “change player details” option.
- A “Quit” button will be available for player to quit the game.

### Game Progress Screen:

- The screen will display 5 Missions:
  - 3 missions for pre-disaster stage
  - 2 missions for during disaster stage
- The missions will be displayed in the form of a path.
- Only the first mission is unlocked if the user is playing game for the first time and further levels are locked. If player has already made progress in the game, it will be stored and the progress screen will display unlocked levels accordingly.
- Score will be in the form of stars. If a level is completed, its score will be displayed on the screen.
- Tutorial will be given after completion each mission. The completion of mission will be based on whether the stars gathered are above minimum requirement for that mission. This will encourage player to perform better in the mission.
- If a wrong action is taken, then the message “Mission Failed” appears and Hints will be displayed to help the player.

### Mission 1: Planting the trees

- This will be a 3D mission.
- It will contain a mountainous terrain having six different mountains with different slopes.
- The task will be planting trees on mountains. The mountains will come in the set of two, after each set player needs to walk towards next set.
- Player must choose the best mountain to plant trees that is the one which is more prone to landslides.
- The player needs to drag and drop to plant the trees.
- Different types of trees are shown based on the type of their root system.
- The Hint will remain same after every gameplay.
- [HINT: "Steep terrains are more prone to landslides."]
- Scoring criteria:

- Three sets - one star for each set.
- Next level will be unlocked only after gaining three stars.
- More stars will be awarded for planting more trees having fibrous roots.

### **Mission 2: Redirection of water flow**

- The mission will be in 2D and the top view of terrain will be shown.
- The task will be splitting of a stream in such a way that soil erosion is reduced.
- There will be multiple places where Player must go during the mission.
- Obstacles like other mountains and houses will be there on the terrain.
- Scoring criteria:
  - Based on the time taken by the player.

### **Mission 3: Land use zoning**

- 2D mission.
- Player will be given houses- hospital, school, etc., roads, walls. He needs to use them all.
- Plan the town accordingly.
- Terrain will be divided as a grid.
- Each object will require certain number of blocks.
- Scoring criteria:
  - Lesser the overlapping with the landslide prone area, higher the score.
  - Positioning of different buildings will be an important aspect.

### **Mission 4: Evacuation**

- This will be a 3D mission.
- A Landslide is happening, and the player needs to evacuate.
- The Player is in a house with many rooms.
- There will be very few doors to escape. Other doors will be jammed.
- One window is safe for jumping otherwise mission failed.
- Money bags and 1 Health kit.
- Call emergency services.
- Scoring criteria:
  - Based on the time taken by the player.
  - More stars are awarded if no money bags are taken.

### **Mission 5: Rescue camp**

- This will be a 3D mission. The set up will be a relief medical camp for the survivors.
- The player will have to prioritize according to health bar status of the people.
- Functionalities performed by the player:
  - Walking to the patient.
  - Saving the life by providing medical help.
  - Navigation to survivors will be provided by the game.

- Scoring criteria:
  - Based on the time and number of people rescued.

### 3. Specific Requirements

#### 3.1 External Interface Requirements

##### 3.1.1 User Interfaces

We will have to provide a 3D video interface to the user so that he can get himself immersed into the game. A first player controller, hence, would be the best suited for the game.

##### 3.1.2 Hardware and Software Interfaces

To play the game, we will facilitate the users to use their keyboard, touchpad, mouse or joystick to input the commands and real-time effects of the input will be reflected in the game. The user should have a good graphics card installed on his/her machine. Basically, mouse shall be used to change rotate the screen and arrow keys to move in the respective directions.

#### 3.2 Functional Requirements

##### 3.2.1 Overview of Functional Requirements

The *Salvos* game will have the following functional components:

1. An introductory movie to set up the storyline.
2. The main menu, including a brief help and settings section
3. A series of missions (testing survival skills and awareness) that sequentially form a storyline related to the introduction.
4. The missions will be in the form of a path where the next mission is unlocked only after the completion of the previous mission
5. The Player's score is calculated at the end of every mission and is in the form of stars. He/she can get a maximum of 3 stars.
6. During the gameplay, the user also has an option to quit.

In between or at the end of each mission, the user has an option to retry the game.

##### 3.2.2 Template for Describing Functional Requirements

This section describes the template that is used to describe each of the functional components of the *Salvos* game specified in section 2.3.

Purpose	A description of the functional requirement and its reason(s).
Inputs	Which inputs; in what form/format will input arrive; from what sources input will be derived, legal domains of each input element.

Processing	Describes the outcome rather than the implementation; includes any validity checks on the data, the exact timing of each operation (if needed), how to handle unexpected or abnormal situations.
Outputs	The form, shape, destination, and volume of the output; output timing; range of parameters in the output; a unit measure of the output; process by which the output is stored or destroyed; process for handling error messages produced as output.

### 3.2.3 Introductory Movie

Purpose	A short movie to set up the storyline of the game and provide information to help the user about landslides
Inputs	If the user clicks the introductory movie button, the movie will start. If the user clicks the SKIP button while in this component, they will skip the movie and proceed to the main menu.
Processing	Upon selecting this component, the introductory movie will start playing. If the SKIP button is pressed, this component will terminate the movie and forward the user to the main menu component. Otherwise, the movie will continue to its completion and the user will be moved to the main menu.
Outputs	A movie is displayed on the screen.

### 3.2.4 Main Menu

Purpose	A menu that displays a brief section offering various options such as PLAY GAME, SETTINGS, QUIT, INTRODUCTORY MOVIE.
Inputs	The user can click on the corresponding button to perform that function
Processing	This component will stay until the user selects an option. After the selection, the user will be forwarded to the game sequence component, depending on the button selected.
Outputs	This component will output the selection function.

### 3.2.5 Game Sequence

Purpose	A series of five missions, which sequentially form a storyline related to the introduction.
Inputs	The inputs are different for each mission.
Processing	This component will display a mission, and then wait until the user completes it. If the user completes the mission with 3 stars, the component will move to the next mission. The user will be given hints if

	he/she is unable to complete a mission. A RESTART option is also provided if the player fails the mission. After completing all 5 missions, they will be directed to the ending scene component.
Outputs	This component will output plot-based missions that are customizable by the game administrator and offer feedback to the user based on their performance on individual missions.

### 3.2.6 Ending Scene

Purpose	A screen offering a conclusion to the game's plot based on performance at certain critical points in the game sequence, where the user's score is displayed, and the user is given a chance to exit or return to the main menu or try again.
Inputs	The user can select either to end the game or return to the main menu or try again via clicks.
Processing	This component will wait until the user selects either to return to the main menu or to exit the game. After receiving the user's input, the component will act accordingly.
Outputs	The user's overall score is displayed, as well as a conclusion.

## 3.3 Non-Functional Requirements

### 3.3.1 Performance

All the modules should be in a single game and should be followed by a single story or theme of the game. Different tasks in the game require the above-mentioned parameters. Responses should be added by mouse or keyboard and a log file should be generated having the score information.

### 3.3.2 Availability

The game should be of distributable over PCs and Android devices. Since we are publishing it on the web, it will be accessible and available for download.

### 3.3.3 Security

The game will be entirely offline. So, there are no threats to user privacy and from potential hackers.

#### **3.3.4 Maintainability**

Collaboration using version control systems like Git and storage of the code on the cloud of GitHub and proper comments and description for every code will ensure that a new programmer who gets to work or improve this very piece of code faces minimal hurdles. A proper documentation for every module shall be included.

#### **3.3.5 Portability**

All the laptop/PC machines that possess Windows XP SP2 or versions newer than that are capable to run this product.

### **3.4 Design Constraints**

The outdated assets of unity in the unpaid version might be a constraint but it shall be compensated by making the modules more interactive and user-friendly to drag the player more into the story of the game.

### **3.5 Other Logical Requirements**

The literature provided by Dr. Neelima Satyam are being used to design the game plan as per scientific research.