Department of Computer Science and Engineering
The University of Texas at Arlington

Team VR-X

Virtual Reality Xplorer

Team Members:
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Chris Otterbine

Late Updated: 12/4/2013 8:56:05 AM
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<td>21</td>
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<td>11 Procurement Management Plan</td>
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<td>11.1 Purpose of the Procurement Management Plan</td>
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<tr>
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<td>12.1 Purpose of Closeout Report</td>
<td>24</td>
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<tr>
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</table>
1 General Organization

1.1 Project Manager

The project manager/team leader of Team VR-X is currently Osuvaldo Ramos. One of Osuvaldo Ramos’ responsibilities is managing every team member’s tasks through a team organization website known as Assembla. Not only does this help Osuvaldo keep track of the progress of each member but this allows him to get the earned value from each task. He also takes note of every detail that occurs throughout team meetings.

Osuvaldo is a computer scientist who has proficient skills in programming, task managing and social interaction.

1.2 Project Oversight

This section will list how Team VR-X regulates project control/management. This includes both internal controls (within the team) as well as external controls (outside feedback).

1.2.1 Internal Controls

- **Assembla:** Assembla is a website created for the purpose of team organization. The team leader assigns a team member a task (generally related to the completion of a certain goal). Tasks are open by default and when the task is completed, the team member notes the amount of time spent (this value is essentially the earned value for the task) and then closes the task. This allows Osuvaldo to update the Microsoft Project Plan and also assists in filling out the Individual Status Reports.

- **Team Meetings:** Team meetings are on Tuesdays and Thursdays at 7:00 P.M. in the Senior Design Lab. If necessary, more team meetings will be scheduled. At team meetings we assign parts of a deliverable (if needed) as well as discuss the progress towards completion of the current deliverable. One particular aspect that we occasionally talk about during team meetings is anticipating future events. This mostly covers anything that we need to prepare ourselves for.

- **Communication:** An addendum to “Team Meetings”, we have a quick meeting after every class for a swift progress update. Communication is also held through e-mails and phone texts. For e-mails, we also forward them to other team members as to inform them further.
1.2.2 External Controls

- **Team Status Reports:** Team status reports are ways for the team to receive feedback from Mr.O’Dell. This also allows the entire team to evaluate the progress of some of our deliverables. When presenting, it also helps to receive feedback from other groups.

- **Individual Status Reports:** Individual status reports are assignments that evaluate the progress each team member is making towards the deliverable. Mr.O’Dell reads through these status reports to see how each team member is doing.

### 1.3 Roles and Responsibilities

<table>
<thead>
<tr>
<th>Project Member</th>
<th>Role(s)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mike O’Dell</td>
<td>Overseer/Team Supervisor</td>
<td>Oversees the team’s progress.</td>
</tr>
<tr>
<td>Lorri Newson</td>
<td>Sponsor</td>
<td>Helps with the parameters and scope of the overall project.</td>
</tr>
<tr>
<td>Osuvaldo Ramos</td>
<td>Team Leader</td>
<td>Assigns tasks, notes details, updates Microsoft Project Plan.</td>
</tr>
<tr>
<td>Chris Otterbine</td>
<td>File Manager/Integration Lead</td>
<td>Merges together the individual files and is in contact with the sponsor.</td>
</tr>
<tr>
<td>Sukuya Nakhaima</td>
<td>Hardware Manager</td>
<td>In charge of hardware researching/software.</td>
</tr>
<tr>
<td>Joseph Onwuchekwa</td>
<td>Software Manager/Graphics Lead</td>
<td>Researches computer graphics software.</td>
</tr>
</tbody>
</table>

### 1.4 Project Constraints

This project will contain numerous constraints.

- This project is subjected to be finished in under 9 months.

- We need to be proficient in computer graphics before Senior Design I ends.
• The Oculus Rift Development Kit is needed to even start the project.
• The amount of software we need may be limited by the budget allotted to us.

1.5 Project Assumptions

• We will receive the Oculus Rift in time as well as in good condition.
• All team members will become well versed in computer graphics before Senior Design I ends.
• The software we initially purchase will suffice.

1.6 Preliminary Schedule and Cost Estimates

All schedules and costs so far are for Senior Design I.

<table>
<thead>
<tr>
<th>Project Milestone</th>
<th>Due Date</th>
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</thead>
<tbody>
<tr>
<td>Project Charter (Rough Draft)</td>
<td>10/16/2013</td>
</tr>
<tr>
<td>Baseline System Requirements Specification</td>
<td>Checkpoint (SRS Gate Review Passed)</td>
</tr>
<tr>
<td>Project Plan Reviews</td>
<td>10/23/2013</td>
</tr>
<tr>
<td>Gate Reviews</td>
<td>10/30/2013</td>
</tr>
<tr>
<td>Architectural Design</td>
<td>Checkpoint (Requirements Review Passed)</td>
</tr>
<tr>
<td>Architectural Design Specification</td>
<td>12/2/2013</td>
</tr>
<tr>
<td>Baseline Project Charter</td>
<td>12/4/2013</td>
</tr>
<tr>
<td>Baseline Microsoft Project File</td>
<td>12/4/2013</td>
</tr>
</tbody>
</table>

-------------------------------------- Fill in Cost Values --------------------------------------

Needs better estimation to be completed.
2 Scope Statement

The Virtual Reality XPlorer sets out to provide an educational and entertaining experience through virtual reality as to allow the user to gain more “sensory” knowledge.

The hardware component of this system accommodates the Oculus Rift, a piece of hardware needed for virtual reality, an Xbox 360 controller for lateral movement and a wireless headset for user freedom.

The user interface will feature a menu for selecting options such as new, save, quit, etc. When the user is given the opportunity to interact with the environment and objects, the software switches to a HUD (Heads-Up Display) to relay informative feedback to the user.

This product is designed for 5th and 6th graders, although the system is informative to all ages.
3 Cost Management Plan

3.1 Introduction
This section will cover the approach Team VR-X intends to use in order to manage the cost and budget needed for the success of the project. The cost is divided into two sections, which are the Financial/Material cost and the Labor cost. Both the Financial and Labor cost have been properly exhibited in the Cost Analysis and Schedule Analysis subsections of the SRS respectively, so the Cost Management Plan will be developed using references from the SRS to ensure proper planning. The Project plan will also be considered as an aid for adequate management of the Labor cost which is primarily monitored by the team leader and secondarily managed by other team members.

3.2 Financial Costs
A table will be provided below this subsection to view the expected cost and the actual cost of the material needed for the project. The expected costs are the estimated prices of the material needed for the project, while the actual costs are the actual prices of the materials during the purchase of the material. Team VR-X has been awarded the total sum of $800 to cover all expenditures needed for the project. This amount will be enough to cover all required cost which is highlighted in the table below.

Figure 3.2 Expected cost and Actual Cost of material

<table>
<thead>
<tr>
<th>Materials</th>
<th>Expected Cost</th>
<th>Actual Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oculus Rift</td>
<td>$300</td>
<td>$300</td>
</tr>
<tr>
<td>XBOX controller</td>
<td>$60</td>
<td>–</td>
</tr>
<tr>
<td>Wireless Headset</td>
<td>$100</td>
<td>–</td>
</tr>
<tr>
<td>Gaming Software (still Researching)</td>
<td>Free or $100</td>
<td>–</td>
</tr>
<tr>
<td>CD</td>
<td>$1</td>
<td>–</td>
</tr>
<tr>
<td>Modeling and Audio tools (still Researching)</td>
<td>Free</td>
<td>–</td>
</tr>
<tr>
<td>Total</td>
<td>$460-$560</td>
<td>$300</td>
</tr>
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</table>
3.3 Labor Cost

This subsection depicts the manner in which man hours will be managed to complete all tasks during the life span of the project. Team VR-X is limited to 2000 man hours to complete all necessary tasks needed for the project. Team leader, Osuvaldo Ramos was able to properly manage the required man hours needed from every team member in relation to the project over the course of both semesters. He was able to derive an estimate of 12 person hours per member on a weekly basis which was based on the amount of current assigned tasks and our individual work/school schedule. He was also responsible for the team's schedule analysis in which he utilized estimation tools and techniques such as Jones First Order and COCOMO II to effectively estimate the calendar months to needed to ensure the total completion of the project. The estimations are provided below. The estimations suggest that the project will be completed within the given period of time.

**Figure 3.3 Schedule Analysis**

<table>
<thead>
<tr>
<th>Estimation Technique</th>
<th>Best Case</th>
<th>Average Case</th>
<th>Worst Case</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jones First Order</td>
<td>6.67 months</td>
<td>7.72 months</td>
<td>8.94 months</td>
</tr>
<tr>
<td>COCOMO II</td>
<td>7.1 months</td>
<td>–</td>
<td>8 months</td>
</tr>
</tbody>
</table>
4 Earned Value Management

To track and manage earned value Team VR-X will use the freely available Tickets tool from Assembla.com. Tickets (or Work Items) are created and assigned on the VR-X project page. Each member is responsible for updating their tickets with the number of hours worked and closing the ticket when the task is complete. Each ticket corresponds to a task in the MS Project file. The project manager will update the worked hours in the MS Project file reported by each team member on Assembla.

4.1 Measuring Earned Value

Team VR-X will be using the Earned Value Method to manage the cost of the project. The Earned Value Method consists of the following components:

- **Budgeted Cost of Work Scheduled** (BCWS) – This is the amount of person-hours that have been planned for at a certain point in time.
- **Budgeted Cost of Work Performed** (BCWP) – This value is the amount of person-hours that have actually been performed at a point in time.
- **Actual Cost of Work Performed** (ACWP) – The amount of person-hours that have actually been spent at a point in time.

Team VR-X will be allocating the earned value at the end of the task. This means that the earned value for a single task will be 0 person-hours until the task is complete at which point the earned value is equal to the planned value or BCWS.

4.2 Performance Indices

Team VR-X will use two performance indices to monitor progress and improve the work and scheduling estimation accuracy of future tasks. The two indices are as follows:

- **Cost Performance Index** – \( CPI = \frac{BCWP}{ACWP} \)
- **Schedule Performance Index** – \( SPI = \frac{BCWP}{BCWS} \)

The CPI indicates how much the actual cost varies from the planned cost and will help the team improve the work estimations.

The SPI indicates how much of the work has been completed on time and will also help the team improve scheduling estimations.
5 Scope Management Plan

This section is dedicated to creating a strategy to reinforce the scope of the project. This will aid us in reducing risk or anticipating risk during the development of the project.

- Sources of the project that will help control the scope of the project are the Microsoft Project Plan, electronic communication, and Team VR-X. Microsoft Project Plan especially allows us to see the timeline of the projects and utilize accurate estimations.

- Reducing feature creep is an important step any team needs to consider. The following are methods that will reduce/eliminate power creep specified for the project Virtual Reality XPlorer.
  
  1. Explaining exactly what the project entails to the sponsor will reduce the amount of features that will be implemented later. The sponsor may even suggest ideas that reduce the scope of the project and thus less work.

  2. Later during the semester the team will generate a list of features that will be rated appropriately. Higher ranks will require more priority.

  3. Before a feature is implemented, estimation will be utilized to determine the feature’s worth.

  4. Critical features currently established at the moment are a working environment at minimum specifications, a functional interface, and responsive controls. Different types of environments, additional planned content, and online functionality are features put aside and will be considered if time permits us.
# 6 Work Breakdown Structure

The work breakdown structure (WBS) is divided into two categories for Senior Design I (Phase 1) and Senior Design II (Phase 2). Each deliverable is listed under its respective phase and is broken down into the different drafts of each document. Each draft may have sub-tasks added to them as the team discovers what changes must be made to the document. Other tasks are listed under a category in each phase (e.g. Research). All team meetings are listed under the deliverable or category that meeting was about. A single meeting may be divided between different deliverables or categories and will show up in the plan as different meetings occurring on the same day.

## 6.1 Microsoft Project Plan

<table>
<thead>
<tr>
<th>WBS</th>
<th>Task Name</th>
<th>Date Assigned</th>
<th>Date Due</th>
<th>Total Planned Work</th>
<th>Planned Resources Used</th>
<th>Resource Initials</th>
<th>Planned Cost</th>
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<tr>
<td>1</td>
<td>Phase 1 (Senior Design 1)</td>
<td>Thu 9/12/13</td>
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<td>234.75 hrs</td>
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<td>Tue 9/24/13</td>
<td>Wed 11/20/13</td>
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<td>145.25</td>
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<td>1.1.1</td>
<td>First Draft (0.1)</td>
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<td>1.1.2</td>
<td>First Draft Revisions (0.2)</td>
<td>Wed 10/9/13</td>
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<td>1.1.3</td>
<td>Gate Review Draft (1.0)</td>
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<td>4 C,J,O,S</td>
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<tr>
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<td>10/16/13 Thu 10/31/13</td>
<td>10/22/13 Tue 12/3/13</td>
<td>2 hrs</td>
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<td>Other Team SRS Gate Review</td>
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<td>Thu 10/31/13</td>
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<td>Individual/Team SRS Review</td>
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<td>Mon 10/28/13 Th 10/31/13</td>
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<td>1.5</td>
<td>Architecture Design Specification</td>
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<td>Mon 1/20/14</td>
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<td>Mon 1/20/14</td>
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<td>4 C,J,O,S</td>
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<td>Research</td>
<td>Thu 10/10/13 Thu 10/10/13</td>
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<td>50.5 hrs</td>
<td>4 C,J,O,S</td>
<td>2</td>
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</tr>
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<td>1.6.2</td>
<td>Tools for 3D Modeling and Texturing</td>
<td>Thu 10/10/13</td>
<td>Wed 11/6/13</td>
<td>8 hrs</td>
<td>1 J</td>
<td>8</td>
<td></td>
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<tr>
<td>1.6.3</td>
<td>Game Development Lifecycle</td>
<td>Thu 10/10/13 Thu 10/10/13</td>
<td>Wed 11/6/13 Wed 11/6/13</td>
<td>8 hrs</td>
<td>1 C</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>1.6.4</td>
<td>How-To: Create Educational Video Games</td>
<td>Thu 10/10/13 Thu 10/10/13</td>
<td>Wed 11/6/13 Wed 11/6/13</td>
<td>8 hrs</td>
<td>1 C</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>1.6.5</td>
<td>Xbox Controller Integration</td>
<td>Thu 10/10/13</td>
<td>Wed 11/6/13</td>
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<td>1 C</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>1.6.6</td>
<td>User Friendliness with Oculus Rift</td>
<td>Thu 10/10/13 Thu 10/10/13</td>
<td>Wed 11/6/13 Wed 11/6/13</td>
<td>4 hrs</td>
<td>1 O</td>
<td>4</td>
<td></td>
</tr>
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<td>1.6.7</td>
<td>Game Engine</td>
<td>Thu 10/10/13 Thu 10/10/13</td>
<td>Wed 11/6/13 Wed 11/6/13</td>
<td>4 hrs</td>
<td>1 S</td>
<td>10</td>
<td></td>
</tr>
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<td>How-To: Minimize Motion Sickness with Oculus Rift</td>
<td>Thu 10/10/13 Thu 10/10/13</td>
<td>Wed 11/6/13 Wed 11/6/13</td>
<td>4 hrs</td>
<td>1 S</td>
<td>4</td>
<td></td>
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<tr>
<td>1.6.9</td>
<td>How-To: Create and Use Audio Resources</td>
<td>Thu 10/10/13 Thu 10/10/13</td>
<td>Wed 11/6/13 Wed 11/6/13</td>
<td>8 hrs</td>
<td>1 J</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>1.7</td>
<td>Status Reports</td>
<td>Thu 9/12/13 Thu 11/14/13</td>
<td>Thu 9/12/13 Thu 11/14/13</td>
<td>4 hrs</td>
<td>4</td>
<td>16</td>
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<td>1.7.1</td>
<td>Status Report Meeting for 9/13</td>
<td>Thu 9/12/13 Thu 9/12/13</td>
<td>1 hr</td>
<td>4 C,J,O,S</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.7.2</td>
<td>Status Report Meeting</td>
<td>Fri 9/27/13 Fri 9/27/13</td>
<td>1 hr</td>
<td>4 C,J,O,S</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Section</td>
<td>Description</td>
<td>Start Date</td>
<td>End Date</td>
<td>Duration</td>
<td>Assigned</td>
<td>Unit</td>
<td></td>
</tr>
<tr>
<td>---------</td>
<td>--------------------------------------------------</td>
<td>------------</td>
<td>----------</td>
<td>----------</td>
<td>----------</td>
<td>------</td>
<td></td>
</tr>
<tr>
<td>1.7.3</td>
<td>Status Report Meeting for 10/18</td>
<td>Thu 10/17/13</td>
<td>Thu 10/17/13</td>
<td>1 hr</td>
<td>C,J,O,S</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>1.7.4</td>
<td>Status Report Meeting for 11/15</td>
<td>Thu 11/14/13</td>
<td>Thu 11/14/13</td>
<td>1 hr</td>
<td>C,J,O,S</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Phase 2 (Senior Design 2)</td>
<td>Mon 1/13/14</td>
<td>Fri 5/2/14</td>
<td>247 hrs</td>
<td>C,J,O,S</td>
<td>988</td>
<td></td>
</tr>
<tr>
<td>2.1</td>
<td>Detailed Design</td>
<td>Mon 1/22/14</td>
<td>Mon 2/10/14</td>
<td>62 hrs</td>
<td>C,J,O,S</td>
<td>248</td>
<td></td>
</tr>
<tr>
<td>2.2</td>
<td>Test Plan</td>
<td>Wed 2/26/14</td>
<td>Wed 3/19/14</td>
<td>32 hrs</td>
<td>C,J,O,S</td>
<td>128</td>
<td></td>
</tr>
<tr>
<td>2.2.1</td>
<td>First Draft (0.1)</td>
<td>Wed 2/26/14</td>
<td>Wed 3/19/14</td>
<td>32 hrs</td>
<td>C,J,O,S</td>
<td>128</td>
<td></td>
</tr>
<tr>
<td>2.2.2</td>
<td>Baseline (1.0)</td>
<td>Mon 3/24/14</td>
<td>Mon 3/31/14</td>
<td>12 hrs</td>
<td>C,J,O,S</td>
<td>48</td>
<td></td>
</tr>
<tr>
<td>2.3</td>
<td>Prototype</td>
<td>Mon 1/13/14</td>
<td>Fri 5/2/14</td>
<td>125 hrs</td>
<td>C,J,O,S</td>
<td>500</td>
<td></td>
</tr>
<tr>
<td>2.3.1</td>
<td>Prototype Preview</td>
<td>Mon 1/13/14</td>
<td>Tue 4/8/14</td>
<td>85 hrs</td>
<td>C,J,O,S</td>
<td>340</td>
<td></td>
</tr>
<tr>
<td>2.3.2</td>
<td>Final Prototype</td>
<td>Tue 4/8/14</td>
<td>Fri 5/2/14</td>
<td>40 hrs</td>
<td>C,J,O,S</td>
<td>160</td>
<td></td>
</tr>
<tr>
<td>2.4</td>
<td>Status Reports</td>
<td>Wed 1/22/14</td>
<td>Wed 4/23/14</td>
<td>2 hrs</td>
<td>C,J,O,S</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>2.4.1</td>
<td>Meeting for 1/24</td>
<td>Wed 1/22/14</td>
<td>Wed 1/22/14</td>
<td>1 hr</td>
<td>C,J,O,S</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>2.4.2</td>
<td>Meeting for 4/25</td>
<td>Wed 4/23/14</td>
<td>Wed 4/23/14</td>
<td>1 hr</td>
<td>C,J,O,S</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>
# 7 Quality Management Plan

## 7.1 Introduction

Quality management is a high priority agenda for Team VR-X, because our product could be viewed as a stepping stone into the future of game development. It is critical for us to achieve every major milestone while properly fulfilling every requirement. Team VR-X intends to conduct a series of tests to ensure hundred percent quality of the final product, which will cover the documentation, design, hardware and software phases.

## 7.2 Documentation

From the beginning of the project, Team VR-X has been practicing techniques to ensure proper documentation. We have been using documents acquired from the Senior Design document library as a guide to ensure total coverage of requirement. Documents are proof read by all team members to reduce grammatical errors. All major documents are divided between the four team members for editing and completion. Peer reviews are highly encouraged by Team VR-X in order to promote consistency. Subversion is the team’s current source control of choice, and documents are updated and integrated through this source control. Chris Otterbine is the lead integrator of all documents. Every team member must submit their section of the documents to him at least 3 days prior to the deadline if they haven’t committed their sections on the source control. Assembla is another tool Team VR-X uses to stay on track of the project requirements and deadlines. It serves as a reminder and a tracking medium through a “check-ticket” system for enabling proper completion of a task. It is managed by team leader Osuvaldo Ramos, who issues tickets and keeps records of completed tasks.

## 7.3 Design

Team VR-X is currently researching all appropriate design to aid in the drafting of the VR-X architecture and detailed design. The team has attained a well accredited book of game architectures from the engineering library to aid in the creation of the designs. Case studies included in the book will be used as a comparison medium for the quality of the VR-X design. Joseph Onwuchekwa and Chris Otterbine, the two software engineers of the team will be responsible for the research of appropriate design patterns if necessary for the project.
7.4 Software
Team VR-X comprises of talented programmers who will work diligently to produce efficient code. The team has listed some programming principals to assure the production of quality software.

- Source code must be well documented.
- Software must meet functional requirements.
- Software Testing must be scheduled regularly, such as unit testing or beta testing.
- Back-up of every program must be maintained to ensure future compilation of the source code. This will be managed by the subversion source control.
- Changes will also be maintained by the source control.

7.5 Hardware
Since the VR-X consist of one major hardware component (Oculus Rift), and two minor hardware components (wireless XBOX controller, and wireless headphones), adequate testing will be done on the Oculus Rift and XBOX controller to ensure mapping of the hardware to the software components.

7.6 Testing
Testing will be an essential part of the product development phase. Chris Otterbine will examine the software to decide if unit testing is necessary. Joseph Onwuchekwa will serve as the quality assurance lead till the completion of the final product. He will be responsible for conducting code reviews to meet quality standards. Team VR-X intends to conduct BETA testing with the help of our sponsor, by allowing the fifth graders to test the software under supervision.
8 Communications Plan

8.1 Internal Communication

8.1.1 Team Meetings
Team VR-X has two meetings per week scheduled on Tuesdays and Thursdays. Meetings will serve to plan future work, to make important group decisions, and to give the team a time to work together.

8.1.2 Email
Email will be the medium for non-urgent communication. This format will also allow the team to keep a documented record of correspondence.

8.1.3 Text Messages
For more urgent communication needs the team will use text messages. This method will be used for information that needs to be distributed quickly and requires an immediate reply or acknowledgement.

8.1.4 Subversion
A subversion repository provided by Assembla.com will be used to maintain the documents and source code for the project.

8.2 External Communication

8.2.1 Sponsor Meetings
Team VR-X will meet with the sponsor in face-to-face meetings and most likely in the sponsor’s classroom.

8.2.2 Email
Email will also be used to communicate with the team sponsor. The team’s sponsor liason will be responsible for keeping the sponsor up to date with our progress and forwarding the sponsor’s communication to the team.
9 Change Management Plan

9.1 Purpose of Integrated Change Management Plan
When working on a project that has multiple stakeholders, changes are unavoidable. Changes may include modifying requirements, using different components, and anything else from the start of a project to the end of a project.

Team VR-X will work closely according to the plan but will also have a plan when changes are proposed. There will be flexibility to add, change, or modify parts of the project.

9.2 Roles and Responsibilities

9.2.1 Project Sponsor
Lorri Newsom is a 5th grade science teacher and is the primary sponsor for the Virtual Reality Xplorer. As an elementary school science teacher, she also represents a potential customer for the Virtual Reality Xplorer product. The most probable changes that she may propose would be changes to the requirements. Since she represents a potential customer, the requirement changes will be heavily considered.

9.2.2 Project Manager
The project manager will be responsible for managing any discrepancies between stakeholders when a change is proposed. If there is a split between stakeholders whether to accept or decline a change, the project manager will make the final decision.

9.2.3 Project Team
Any member of the team may suggest a change to the project. The change must be agreed upon by the majority of the team which includes the development team, sponsor, and other stakeholders.

9.2.4 Other Stakeholders
Other stakeholders may propose changes to the project as well. Other stakeholders that the Virtual Reality Xplorer may have would be technical sponsors. The most probable changes that they may propose would be to use different development tools or methods. Since they should have more expertise in the area of game development than Team VR-X, the implementation changes will be heavily considered.
9.3 Review and Approval Process

Changes can be proposed by any stakeholder, team member, or sponsor. When a change is proposed, that person will fill out the Change Proposal Document and send it to the project manager.

The project manager will bring up the change proposal at the next team meeting. The development team will discuss the need for the change and the feasibility of completing the change. The team will also contact any other stakeholders to get their input if needed. After all input is considered the team will vote on the accepting the change. If there is a tie the project manager will make the final decision.

9.4 Change Identification, Documentation, Implementation and Reporting

The Change Proposal Document will include three sections. The first section can be filled out by any stakeholder and includes the name of the proposer, the date, the type of change, and a description of the change. The second section will be filled out by a member of the development team and includes their name, the date it was received, what tools are affected, what documents are affected, what screens/modules/interactions/models are affected. The third section will be filled out by the same team member and include time estimates for analysis/design, coding, and testing.

The Change Proposal Document will be hosted on:
https://docs.google.com/forms/d/1VWpBoLbTcEJ0bGNXGX-S0t_28ol-eq_sEGzDP3mzi40/viewform

The submissions are tracked and recorded on a spreadsheet hosted on Google Docs as well.

After the team has accepted the change, a ticket will be created for it on Assembla. The Change Proposal Document will be attached to the ticket for reference. The ticket will be assigned to a team member to work on the change. The team member is responsible for updating all the documentation associated with the change. The project manager will also update the WBS to include the change. Time will be tracked through Assembla by the team member and updated in the WBS by the project manager.
Change Request

* Required

Name: *

Date: *

Today's Date

Type of Change *

Description of the Change *

Technical Analysis

To be filled out by development team member

Name:

Date Received:

Tools Affected

- Game Engine
- 3D Modeler
- Image Editor
- Software IDE
- Audio Editor

Documents Affected

- System Requirements Specification
- Project Charter
- Work Breakdown Structure
- System Architecture
# Time Analysis

## Document Modification

- **Hrs**
- **Mins**
- **Secs**

## Analysis/Design

- **Hrs**
- **Mins**
- **Secs**

## Coding

- **Hrs**
- **Mins**
- **Secs**

## Testing

- **Hrs**
- **Mins**
- **Secs**

Submit
10 Risk Management Plan

10.1 Purpose of Risk Management Plan
The purpose of this section is to identify the risks that pose a potential problem for the project and how to deal with those risks. This plan will be utilized by the entire team to identify, analyze, and prioritize any occurrence that would cause irregular progress. Since there is a strict time table for this project it is important to identify upfront the risks and have a plan to deal with, mitigate, or avoid them.

10.2 Roles and Responsibilities
- **Project Sponsor**: Lorri Newsom will be informed on potential risks and how the team plans to handle them. She will also be responsible for providing any insight to risks involving education.
- **Project Manager**: The project manager is responsible for knowing the risk management plan. The project manager keeps the team on track and on task and must know what actions to take when a particular risk arises.
- **Project Team**: The project team is also responsible for knowing the risk management plan. Any team member is responsible for communicating to the rest of the team when a risk arises.
- **Project Stakeholders**: External project stakeholders include Paul Sassman and any other stakeholders. Since Paul has technical knowledge of the project, he can provide input on risks that the team may have overlooked.
- **Risk Manager**: The risk manager is responsible for leading the development of the risk management plan. This involves planning which risks pose a greater threat to the project and what action to take against these risks.

10.3 Risk Identification
The entire team will contribute to identifying risks during the risk identification phase. All risks found will be documented and analyzed for probability, time lost, risk exposure, and resolution. The risks will also be prioritized by which ones pose the greatest threat to the completion of the project.

10.4 Risk Triggers
Risk triggers are events or performance characteristics that warn of the occurrence of risk events. Some of the triggers include:
- Delay in receiving the Oculus Rift
- Schedule slips
- Software components not integrating
- Procrastination
- Unfamiliarity with tools

10.5 Risk Analysis

The following table identifies risks and determines its effect on the completion of the project. The table displays the probability of a risk being triggered and outlines the time lost during the implementation phase.

<table>
<thead>
<tr>
<th>Risk</th>
<th>Probability (%)</th>
<th>Time Lost (Days)</th>
<th>Time / Risk Exposure (Days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oculus Rift unreliable</td>
<td>20</td>
<td>7</td>
<td>1.4</td>
</tr>
<tr>
<td>Unable to integrate Xbox controller</td>
<td>50</td>
<td>14</td>
<td>7</td>
</tr>
<tr>
<td>Audience unavailable for user testing</td>
<td>10</td>
<td>7</td>
<td>.7</td>
</tr>
<tr>
<td>Inability to create models</td>
<td>70</td>
<td>21</td>
<td>14.7</td>
</tr>
<tr>
<td>Learning curve is greater than expected</td>
<td>75</td>
<td>28</td>
<td>21</td>
</tr>
</tbody>
</table>

10.6 Risk Severity

The following table shows the severity of each risk. This includes the priority of the risk, the resolution for the risk, and what triggers the risk.

<table>
<thead>
<tr>
<th>Risk</th>
<th>Priority</th>
<th>Resolution</th>
<th>Triggers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oculus Rift unreliable</td>
<td>Low</td>
<td>Utilize Paul’s Oculus Rift</td>
<td>Oculus Rift does not arrive on time or becomes damaged</td>
</tr>
<tr>
<td>Unable to integrate Xbox controller</td>
<td>Medium</td>
<td>Switch to using keyboard and mouse</td>
<td>The game engine is not compatible with the Xbox controller</td>
</tr>
</tbody>
</table>
### Audience unavailable for user

<table>
<thead>
<tr>
<th>Risk</th>
<th>Probability</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>Test ourselves, find a similar audience to test</td>
<td>Sponsor’s students are not allowed to test</td>
</tr>
<tr>
<td>High</td>
<td>Utilize free or open source models</td>
<td>Schedule slips</td>
</tr>
<tr>
<td>High</td>
<td>Eliminate requirements to gain more time</td>
<td>Schedule slips</td>
</tr>
</tbody>
</table>

### 10.7 Risk Response Planning

The team will conduct research that will help ease the development/implementation stage of the project. The outcome of the team’s research is to discover which tools are best suited for the project. This will greatly reduce the probability of a risk occurring. The research will also assist the team in discovering additional risks that may have been overlooked previously.

### 10.8 Risk Documentation and Reporting

Team VR-X will keep a spreadsheet in a Google Drive location. The spreadsheet will contain the priority, probability, days lost, time/risk exposure, resolution, and trigger. The spreadsheet will be accessed by a form that will allow team members to modify it.

### 10.9 Risk Control

Team VR-X will discuss risks once a week during the weekly meeting. Any potential risks identified by a member of the team will be documented on the risk spreadsheet. Any new risks will be discussed, documented, and communicated to the sponsor. The entire team will collaborate to come up with a resolution for new risks.
11 Procurement Management Plan

11.1 Purpose of the Procurement Management Plan

The Procurement Management Plan is an essential part of the management plan because it clearly depicts the roles and responsibility of each party associated with the project in order to result in a successful project. It accentuates the degree of necessity of services required from third-party organization in order to assist the team in completing the project. This section also analyzes the timely purchase and usage of required materials necessary to develop the product, and alternative solutions to complete the same project in a timely fashion.

11.2 Roles and Responsibilities

- **Project Sponsor:** Lorri Newsom a 5th grade science teacher is the project sponsor. She will provide and recommend necessary requirements such as TEKS curriculum to meet the educational standards of Texas Elementary 5th and 6th grade science curriculum.

- **Technical Sponsor/Project co-Sponsor:** Paul Sassaman will be the technical sponsor for the project. He is easily reachable and does have experience with both the hardware and software components needed for the project. He will also supply the Oculus Rift if the purchased one is not available during development.

- **Project Manager:** Osvaldo Ramos is the appointed project manager who will be responsible for keeping records of the purchased materials and budget management of future purchases. He will also serve as the COTR, submitting any request to the CEO, Mr. O’Dell.

- **Project Team:** There will be a combined effort from every team member regarding the necessary items to be purchased. Team members will be responsible for the research of the required components and integration of these components. Final decision regarding the purchase of an item must be discussed and approved by every team member before submission to the CEO.

- **Project Stakeholders:** All individuals related to the use of the VR-X are considered potential stakeholder including 5th graders at Asa Low Intermediate. Our sponsor Lorri Newsom has invited us to take input from the kids at her classroom. She has also encouraged us to conduct Beta testing in her classroom with proper approval from the students’ parents.
11.3 Required Project Procurements and Timing

The procurement phase has already begun because of the purchase of the Oculus Rift, which is a fairly new technology. Most members of team VR-X have no experience with this device, so it is essential for the team to conduct intense research regarding the compatibility of this device with potential game engines as soon as the device is within the team’s possession. Other devices such as Wireless headphones and XBOX controller might be delayed to the implementation and development phase which is likely to be next semester. The team can provide substitute components of the required materials for research and compatibility testing till then. If the Oculus Rift does not arrive in time for testing and research, Team VR-X intends to borrow our technical sponsor’s device for research.

11.4 Description of Items/ Services to be acquired

A list of required components is listed below to ensure the completion of the project within the deadline.

- Oculus Rift
- Wireless XBOX controller
- Wireless Headphones
- Gaming Software
12 Project Closeout Report

12.1 Purpose of Closeout Report

A closeout report will be generated at the end of the project. The purpose of this report is to ensure that all personnel, contract, administrative, and financial issues are resolved, documents are archived, and lessons learned are captured.

12.2 Administrative Closure

12.2.1 Were the objectives of the project met?

The team will review the final product and compare it to the requirements that were outlined in the original System Requirements Specification document. All requirements that were accomplished and not accomplished will be documented and the team will reflect on their work over the course of the two semesters.

12.2.2 Archiving Project Artifacts

All documents that the team collaborated on will be stored on the Subversion repository that was created when the project started. Each team member may also keep a local copy of the repository if they desire. Meeting agendas and comments about each work item (AKA tickets on Assembla) will be stored on the VR-X Assembla project page for as long as Assembla exists or wishes to host the VR-X project.

A list of the possible documents that will be stored follows:

- Design documents (SRS, Project Charter, etc.)
- Microsoft Project plan
- Test plans
- Source Code
- User manual
- Change Requests
- Meeting notes
- Work item comments

12.2.3 Lessons Learned

When the project is complete the team will come together and discuss any lessons learned. The team will reflect on what could have been done differently to achieve a better outcome and identify what decisions or actions caused schedule slips or cost overruns.
12.2.4 Plans for Post Implementation Review (PIR)
A review will be conducted at the end of the project. The team will evaluate the project using the proposed quality analysis plan. Each team member will also individually evaluate the project and assure that every requirement was met.

12.2.5 Final Customer Acceptance
The team will present the finished product to the sponsor, Lorri Newsom, and she will ultimately decide if it is acceptable or not.

12.2.6 Final Project Performance Report
Team VR-X will generate a final project performance report to evaluate and summarize the project scope management, schedule performance, cost performance, quality achievements, and risk containment performance. The team will discuss schedule and cost variances and reflect on the two semesters the team worked together.