Deliverable E

Project Schedule and Cost

Raphael Pinto, Jaeden Dulaney, Joey Weng, Janna Barkawi, Angelo Pool Rodriquez

February 16, 2025

Abstract

This report outlines the project schedule and cost estimation for the development of a simulation designed to raise awareness about climate change through virtual and augmented reality environments. The primary objective is to ensure a structured and efficient workflow that allows the team to iteratively develop three prototypes, refining the design to meet both educational and

emotional engagement goals. By detailing a comprehensive plan—including task breakdowns, responsibilities, risk management strategies, and cost estimation—this deliverable serves as a roadmap for achieving a functional and impactful final prototype. Additionally, this report provides an in-depth analysis of required materials, hardware, and software, ensuring feasibility within the allocated budget. A prototyping test plan is also included to systematically evaluate the functionality and effectiveness of each iteration. By maintaining a balance between scientific accuracy, technical feasibility, and emotional engagement, this project aims to deliver an immersive experience that not only informs but also inspires meaningful action on climate change.

Table of Contents

1.0 Introduction 4

2.0 Budget (Cost) 4

3.0 List of Equipment 5

4.0 Prototyping and Test Plan 5

5.0 User Interface 6

6.0 Schedule 7

7.0 List of Tasks..... 8

8.0 Risks 8

9.0 Conclusion 9

1.0 Introduction

The development of an immersive climate change simulation in virtual and augmented reality requires careful planning to ensure both technical feasibility and impactful user engagement. This deliverable focuses on the project's schedule and cost estimation, providing a structured plan for designing, prototyping, and testing the simulation. Given the complexity of integrating scientific accuracy, emotional engagement, and interactivity, a well-defined workflow is essential to manage resources effectively and meet project objectives. The story will follow the perspective of a bird soaring over the neighborhood of a child, witnessing the devastation caused by climate change. The bird lands on the windowsill of a young girl, watching as she reads a story about a world before climate change, a time when animals roamed freely and lived without fear. As the bird observes her reflection in the glass, the scene transitions to a lush forest where a park ranger hears the distant cries of distressed animals. Suddenly, a wildfire ignites, ravaging through the once-thriving land in flames.

This report details the necessary components, materials, and software required for each prototype phase, ensuring that development progresses within the allocated budget. It also outlines a risk management strategy to anticipate and mitigate potential challenges that could arise during the design and testing process. Furthermore, a prototyping test plan is included to assess the effectiveness of key features at each stage, ensuring iterative improvements lead to a fully functional final product.

2.0 Budget (Cost)

The table provides an estimation of each component to develop the simulation. It is provided as an estimate and not exact prices specific prices as costs vary based on the chosen application and whether certain components are developed in-house or outsourced, which incurs additional expenses.

Virtual reality platforms & development tools	$0 - $50 (Depending if any other applications will be used)
Prototyping Materials & Testing Equipment	Paper Sketching & Prototyping ($10 - $50) – Concept drawings
3D Assets	$0 - $100 (specified below)
Voice Recording & Narration	$0 - $50
Scene (effects) & Visual Enhancements	$0 - $50
Custom 3D Models	$0 - $50
Sound Effects & Audio Engineering	$0 - $20
Models	$0 - 50$ (expensive for high quality assets)

Voice Recording	$0 - $20 (depending on where it will be recorded and how it will be implemented)
Additional Resources (In case of any ideas)	$0 - $50

3.0 List of Equipment

→ **VR Hardware**
- ❖ VR Headset
- ❖ VR Controllers
- ❖ VR Compatible PC
- ❖ Computer for Video and Demonstration
- ❖ Audio Recording set up

→ **VR Software**
- ❖ Game Software (Unity, etc.)
- ❖ Texturing & Material Software (Adobe Substance, etc.)
- ❖ Coding Environment (Unity C#, Visual Studio)
- ❖ Digital Audio (Adobe Audition)
- ❖ 3D modeling (Export from on shape)

→ **External Resources**
- ❖ Storyboarding tools (Figma, Canva, Sketches)
- ❖ Drawing tools (brainstorming, scenes, etc.)
- ❖ Cardboard paper (User Manuel, background story, climate change effects)

4.0 Prototyping and Test Plan

Our two objectives for our testing plan are to communicate the concept developed in our storyboard through visualization and analyzing the integration of our different subsystems to reduce the risk of critical failure during the experience.

We plan on testing if the aesthetics of the simulation meet the standards of our team based on a Likert scale of 1 to 5 with a minimum passing requirement of a 3-point average across the team for each visual design implemented. These include individual assets, map arrangements, lighting and user interface style. For the time being, the passing requirement will remain a 3-point average to achieve a medium fidelity for our current visual prototype.

The second part of the test will aim to complete the objective of reducing the risk and uncertainty of loading a working 3D environment. A qualitative pass/fail analysis will be focused on the reliability of the following attributes necessary to meet our design criteria:

1. Assets URLs imported successfully
2. Shaders and textures imported as intended
3. Environment collisions simulated

4. Start menu prompt is functional

Due to the lack of hands-on VR equipment, our test can only measure the previously mentioned attributes, consequently reducing the fidelity of our prototype. Nevertheless, future tests in the coming weeks will test camera and hand controls, as well as the synchronization of events, increasing the fidelity of our prototypes. Additionally, new objectives will be set in terms of performance regarding the smoothness of the simulation based on the number of frames per second (FPS) rendered.

5.0 User Interface

A well-designed user interface (UI) is crucial for an intuitive, immersive, and engaging simulation experience. The goal is to ensure that users can seamlessly navigate through the simulation, interact with the environment, and experience an uninterrupted flow of storytelling.

Core UI Elements:

- Main Menu & Start Screen: The simulation will begin with a main menu interface that allows users to adjust settings, select their experience mode, and access an informational guide on climate change. The start screen will include an option to opt-out for users who may find the simulation distressing.

- Heads-Up Display (HUD): The HUD will provide users with contextual cues, including scene objectives, interaction prompts, and real-time environmental data. This will help users understand their role in the experience without overwhelming them with excessive on-screen elements.

- Interactive Objects & Controls: Throughout the simulation, users will have the ability to interact with the environment by selecting objects, triggering animations, and making choices that affect the progression of the experience. A clear UI guide will indicate which controls to use for different actions.

- Scene Transitions & Visual Feedback: To ensure smooth transitions between different scenes, visual cues such as fading, zooming, or natural environmental shifts (e.g., the bird flying between scenes) will be implemented. Additionally, real-time feedback will be given for user interactions to reinforce engagement.

- Navigation & Movement: The simulation will feature free-look navigation for immersive exploration. For VR users, motion tracking and hand gestures will be implemented, while non-VR users will navigate using a keyboard and mouse setup or a game controller for ease of use.
- Audio and Accessibility Features: Audio cues, narration by voice, and subtitle choices will be included in the user interface to provide full assurance of accessibility to all

classes of users, including people with auditory or visual disabilities. Audio settings may be altered by users to make their experience tailored to their preferences.

User Flow and Experience

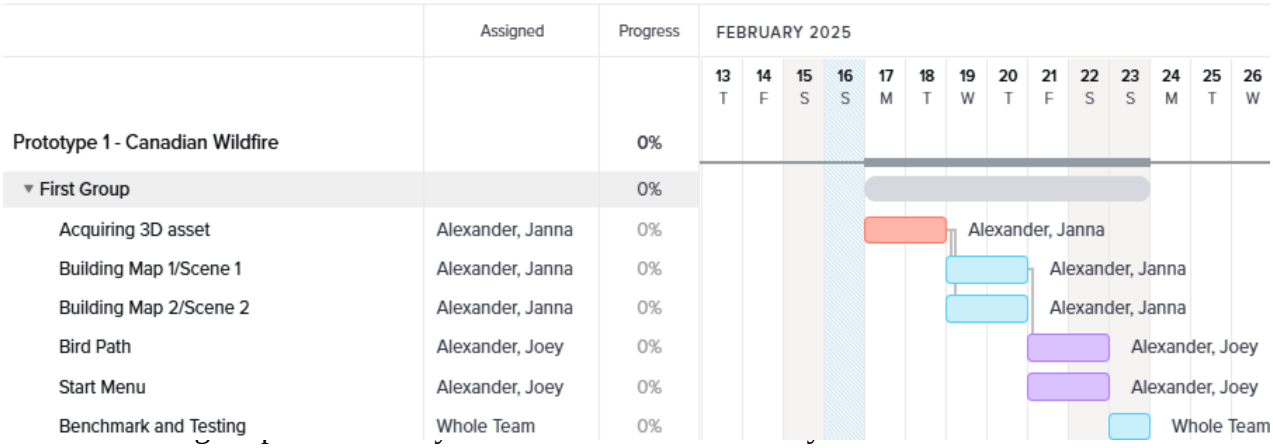
- Introduction to Simulation → Setting settings by user and launching of simulation.
- Introduction to Setting → Backstory narration to set context of story.
- Interaction and Exploration → Interacting with and moving through vital aspects of experience.
- Points of Decision-Making → Decision by user that affects experience in general.
- Conclusion and Aftermath → Final part wraps experience together to make user reflect on consequences of global warming.

With these user interface features integrated together, the simulation shall provide integrated and immersive user experience focusing on educational as well as emotional aspects of story while allowing interactivity and user-friendliness.

6.0 Schedule

The schedule of our first prototype will proceed as follows: 3D asset acquisition will be done by Tuesday February 18th. Both maps where the cabin resides and where the ranger wanders around will be completed by Wednesday February 20th. These maps will be in different scenes. By Saturday February 22nd, the starting screen with a start prompt will be prototyped. If the schedule allows it, we will add scripting for the path of the bird's flight by the end of the week on Sunday February 23rd. On Sunday February 23rd, some tests technical benchmarks will be conducted.

The following Gantt chart will visualize the schedule for better communication.



- Building Map 2/Scene 2 by Janna and Alexander / 2 days
- Scripting Bird Path by Joey and Alexander / 2 days
- Start Menu with Warning by Joey and Alexander / 2 days
- Benchmark and Testing by the Whole Team / 1 day

Future Prototype Iteration Tasks

- Enabling User Interaction with Environment (LOOK, MOVE & GRAB) by Joey, Raphael and Alexander / 5 days
- Running and Synchronising Audio Subsystem by Janna and Jayden / 4 days

8.0 Risks

Since the team lacks the VR headset on hand during February 16th to the 23rd, some unexpected bugs or lack of features could occur which we will not be able to test for on the 23rd. Nevertheless, the team can still mitigate some issues and increase the fidelity of the prototype by completing some tests on current subsystems like the start menu interface, the loading of assets and their correct arrangement on the map, and finally, the accurate scripting of the path of the bird. These are all risks that could induce a critical point of failure on design day.

Risk Ranking System:

(Most to Least)

1. **Technical Risks:** Bugs, Certain VR platforms, game engines, or tools may be incompatible, causing integration issues.

2. **Simulation Time Range:** Simulation might be too long; cut off scenes

3. **Sound Issues:** Ensure sounds are on time, not cutting off or bugging out

4. **Budget Risks:** Budget exceeds expectations, the project might face financial constraints, leading to resource cutbacks or delays.

5. **Less time than Anticipated:** Begin prototypes and testing early to not exceed time constraints

9.0 Conclusion

To conclude, the deliverable aims to establish a clear path toward the successful completion of a compelling and educational climate change simulation, fostering greater awareness and engagement among users. Planning out the details of the project will facilitate the delivery of the product, allowing the clients to understand the process of this simulation. Through highlighting the before and after, from initial prototyping to final testing, and detailing the necessary hardware, software, and resources, the final project can begin development.

The simulation will include 3D assets, sounds, and a narrative to guide the user through the simulation experience. The simulation not only will offer an educational experience but will allow the user to immerse themselves in the storyline, provoking emotion and empathy.

The risk management strategies outlined will help anticipate and address potential challenges, while the budget estimates and task allocations will ensure the project stays on schedule and within its defined time range.