**Project Deliverable F: Prototype I and Customer Feedback**

**University of Ottawa**

**GNG1103: Engineering Design**

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**Group 6**

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Abstract

The visual storytelling is the most important part of the simulation’s narrative, which is why the focus of our prototype was on building its blueprint for the surrounding environment. The prototype is based on a single-story home with a basement with assets and effects downloaded from Unity. The specific prototype focuses on the implementation of a seamless environment for both the kitchen and living room. The following document outlines feedback from the client meeting, other potential users, and other teams. It outlines the updated story, documentation for the prototyping process, updated critical components, and finally the plan for the next prototype.

# 1 Client Feedback Analysis

## 1.1 Original Idea

During the client meeting, our group presented three storyboards to the clients. Each of the storyboards suggested a different storyline for our simulation. “Benny?” was the storyline that our group had agreed was the best according to the clients' requests during the first meeting (immersive and educational). A brief description of “Benny?” follows:

1. The user is in their home while a tornado is occurring outside.
2. The user must find their dog, Benny.
3. While they search for their dog, some objects will appear, and they will be prompted to press them.
4. Upon pressing them, some information about the relationship between climate change and tornadoes will be shown on the screen.
5. Once the user finds their dog, they will go to safety in the basement and the scene will switch to the next day where they will go outside and see the aftermath of the tornado.

## 1.2 Client Feedback

After presenting our selected idea to the client, they gave us the following feedback:

* Use less text in your simulation.
* Incorporate some background noise.
* Connect more with the user by showing them more about the future of tornadoes.
* Show the user some real examples of tornadoes in the simulation (e.g. Include a newspaper with a past tornado).
* Give the user some context before the simulation.
* Find out if there is a difference in the users understanding of the issue before and after the simulation.
* Make the story only one scene, the scene inside the house.

## 1.3 Feedback Analysis

|  |  |
| --- | --- |
| **Client Feedback** | **Analysis** |
| * Use less text in your simulation. * Incorporate some background noise. * Show the user some real examples of tornados in the simulation (e.g. Include a newspaper with a past tornado). * Reduce the complexity of winding indoor pathways and use different sounds when scenes or events are triggered. | These points suggest that the simulation should be more immersive.   * The story should be told through visuals, interactions, and decisions, not text. * The user shouldn’t feel like they are reading a book or watching a documentary. * The simulation should feel real. The real examples would show the client that the content of the simulation could really happen to them. |
| * Connect more with the user by showing them more about the future of tornados. * Show the user some real examples of tornados in the simulation (e.g. Include a newspaper with a past tornado). | * These points suggest that the user should have a clear understanding of the effect of the issue on them personally. People care more about issues when it concerns them and their life. |
| * Give the user some context before the simulation. * Find out if there is a difference in the users understanding of the issue before and after the simulation. | * These points suggest that our team should collect data (the survey) before and after the simulation. * These points also suggest that the end goal of the simulation is to change the user's perspective on climate change |
| * Make the story only one scene, the scene inside the house. | * Suggests that our simulation should be simple. The client wants the message to be very clear. * Suggests that the time constraint is too tight to incorporate two scenes |

## 1.4 Application of Feedback

Using the feedback, our team modified “Benny?” A summary of the story follows:

1. The user must find their dog and get to the basements while a tornado occurs.
2. Once in the basement, the user can press on a calendar to see future basements, which will show them that the tornadoes are getting worse.
3. The user will also have the option to press the TV and see a short news broadcast describing the relationship between tornadoes and climate change.

# 2 Prototype I

## 2.1 Introduction

Before even testing buttons and secondary features, the first most important component of the simulation is the environment that the user is living in. The main goal of this prototype was to ensure that the packages downloaded from Unity were able to be properly implemented into the Unity platform, as well as the components being able to be seamlessly integrated for a realistic environment for the game to be played in.

Why: The goal of the prototype is to ensure that the environment of the user is convincing, immersive, and accurate to something possible. That all elements are scaled in a realistic way.

What: Uploading all of the household elements from the Unity Store and constructing a living room and kitchen complete with scaled versions of household objects.

When: The first prototype was completed on Saturday March 1st, 2025. The construction and testing of the prototype lasted about a day.

## 2.2 Prototyping Process

**Step 1:** Check sharing permissions so that all members can work simultaneously.

**Results:** Discovered that repositories can be shared with one another, but projects cannot be actively synced, and not all members are able to be added to the free plan at the same time, meaning we all could not work on it together regardless. Reached out to Unity to ask about working simultaneously but was sent a link with a new tutorial. Upon inspection, the team decided it would be easier to have members work on components individually and then come back together when it was finished to put it all together.

**Step 2:** Create a drawing of the theorized floorplan of the home, and use this as a guide for the actual construction of the home (testing method: discussion and feedback)

**Results:** Discovered that the floorplan should work for the first floor of the home (the basement is just one room, so it does not require a floorplan) based on simplicity of the room, layout, and style (the user should not get too hung up while making their way to the back of the house looking for Benny, it should be quick so that they can move on to the next stage of the simulation)

**Step 3:** Download and import elements from Unity to ensure that all packages can be put into the software

**Results:** Successfully uploaded the house elements (walls, furniture, flooring, staircases, etc.) from [Low Poly Cartoon House Interiors | 3D Interior | Unity Asset Store.](https://assetstore.unity.com/packages/3d/props/interior/low-poly-cartoon-house-interiors-167425) Imported them into the software and successfully created the floorplan two rooms of the house (small scale prototype for large scale final environment).

**Step 4:** Compare the theorized model of the floorplan to the executed model and look at the simulation from the theorized view of the user.

**Results:** Successfully created a realistic version of the setting for the user to be immersed in. Successfully uploaded the elements and put them together in a convincing way. Used the camera settings to place the camera at the approximate height of the user and looked at proportions of the rooms and elements to confirm realism. (Passed)

## 2.3 Figures and Visuals

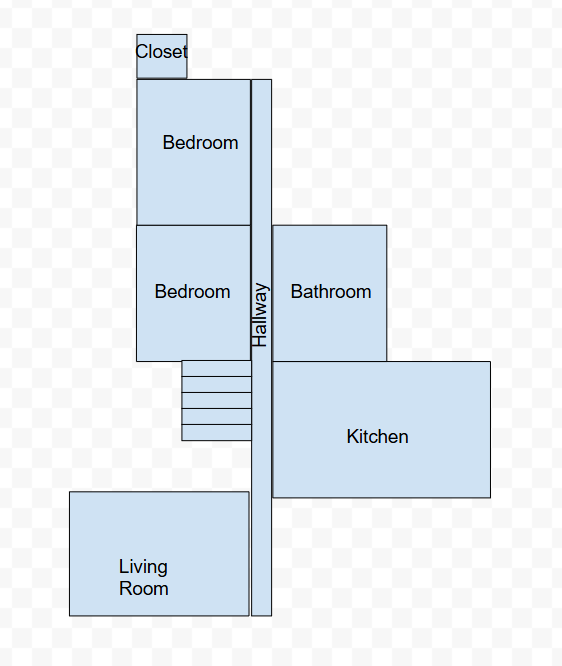


Fig 1. The initial floor plan of the drawing pre-synthesis. The user would begin in the living room and work their way backwards to where Benny is hiding in the back left corner of the closet.

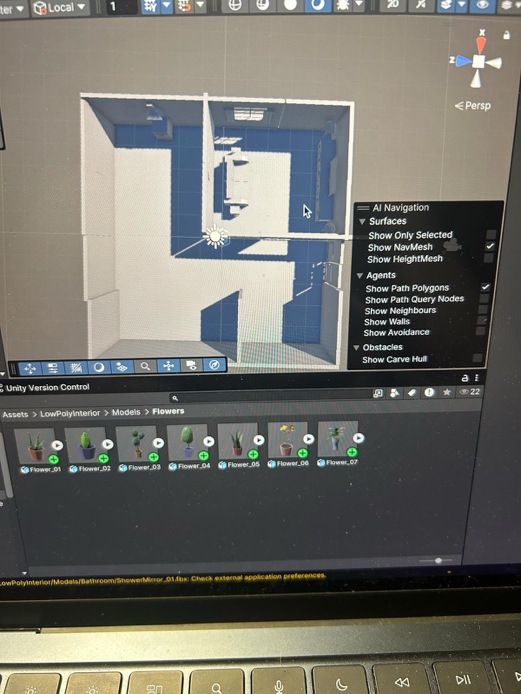


Fig 2. The constructed test floorplan of the kitchen (left) and living room (top right), with the hallway to be placed afterward. This floor plan may be used and adapted instead of the drawing above, depending on which one is easier for the user to navigate, as well as which one simulates reality more than the other.

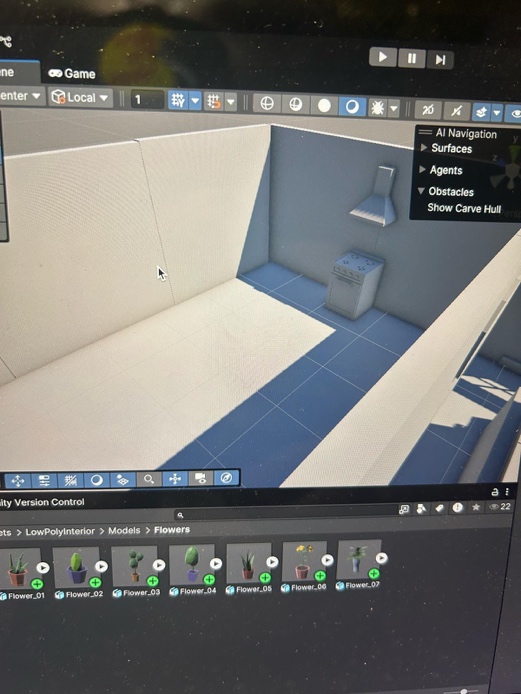


Fig 3. The very first iteration of the kitchen, with a tile floor and spots designated for appliances.



Fig 4. The very first iteration of the living room, with a wooden floor and spots designated for furniture. A couch, window, lamp, and television are depicted. Some of these features will later be used as buttons for providing new context for the simulation.

# 3 Critical Components

The following critical components should be included in upcoming prototypes, as well as the current one (indicated with \*\* if applicable). Most of these components are the bare minimum for the simulation to run properly, so they must be addressed in upcoming prototypes.

## 3.1 Survey Components

1. 3 questions
2. Spectrum-based answers
3. Methods of analysis following data collection

## 3.2 Simulation Components

1. Walking barriers to prevent users from moving through walls and doing unrealistic actions
2. Usable buttons on Benny, and the calendar for scene switches and interactive elements
3. A complete house environment consisting of a living room, two bedrooms, a kitchen, and a basement. \*\*
4. A soundscape of winds, ambient household noise, as well as emergency alert noises
5. An exit menu with adjustable settings (if possible)
6. Closed captions where necessary
7. The contextual banner at the beginning to set the scene
8. Toggle-able languages for English and French

## 3.3 Functioning/Tech Components

1. Usable controls from the joysticks without needing users to move around in real life
2. No teleportation
3. Head-tracking to line up the user’s view with the simulation
4. Adjustable volume and brightness for accessibility

# 4 External Feedback from Potential Users/Clients

## 4.1 Lab Feedback

During the lab that took place this past week, we received feedback from various teams and TA’s regarding our storyline and development process. The TA’s suggested removing the bottles from the BOM and making them instead in another platform, while also suggesting implementing background music to move away from uncomfortable silence in the background of the simulation. This feedback will be used through music incorporation and an updated BOM (see below)

Other teams suggested implementing NPCs to help provide the context in the tornado shelter basement. They believed that these extra characters would be an easy way to provide information to the user. While this feedback may be true, and other characters may provide a fresh context angle, our group has decided to try and avoid this route, since another person in the simulation may compromise some of the realism of the simulation and might also show similarities to people that exist in real life. To avoid any ethical dilemmas, we have decided to move away from having people in the simulation. That being said, this may be helpful when we decide whether or not to have a phone call from a friend, since the principle remains the same without having another person in the basement with the user.

## 4.2 Other Feedback from Potential Users

One potential user suggested intensifying wind sounds and using flickering lights to remind the user that time is running out and to encourage them to move forward. They believed these audiovisual cues would be a good way to emphasize a sense of urgency and immersion. The feedback is true, and enhancing sound and lighting effects can indeed provide a fresh layer of realism. He also suggested including a subtle countdown cue when heading to the Bunny or basement, which helps players to identify interactive elements using visual cues rather than extensive text or dialogue. After reviewing the simplified model we built in Unity, he suggested reducing the complexity of winding indoor pathways and using different sounds when scenes or events are triggered. This goal is to emphasize the need for players to act quickly, preventing them from spending too much time in irrelevant areas and thereby advancing the main storyline more effectively. Lastly, he mentioned that if time permits, we could consider adding a brief VR operation or controller usage tutorial before the experience begins to make it easier for newcomers, as there is a learning curve with VR interaction. However, this is not mandatory.

# 5 Updates

## 5.1 Updated Target Specifications

This prototype does not yet affect the target specifications, so at this time they remain the same as stated in previous deliverables.

## 5.2 Updated Design

As stated above, the story design for the simulation has been adapted and updated. The design for the home has been updated as indicated above. The floorplan consists of a very simple hallway with rooms branching off on both the left and right sides to provide potential hiding places for Benny. The hallway is designed to be long enough to take some time for the user to get there, but the house is designed in a simple enough way that the user should be able to get to Benny in time to see the rest of the simulation play out in the basement. All of the details within the rooms (designed to provide context) will be indicated in a way that is obvious to the user to prevent time being wasted. The starting point for the arrangement of furniture in the kitchen and living room is indicated in the screenshots above.

## 5.3 Updated BOM

The following is an updated bill of materials for the simulation, sourced from the Unity Store. The yellow highlight indicates elements that have been included in the first prototype, while the red text indicates elements that have been removed from the BOM. The proximity noises are able to be implemented using tutorials, and the water bottles are to be made using a platform like Onshape or Solidworks and imported from these third-party sites, rather than being purchased from the Unity store.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Item No** | **Component** | **Importance level (1-4)** | **Quantity** | **Cost (Including Tax)** | **Unity Link** |
| 1 | House floorplan | 4 | 1 | $11.29 | [Low Poly Cartoon House Interiors | 3D Interior | Unity Asset Store](https://assetstore.unity.com/packages/3d/props/interior/low-poly-cartoon-house-interiors-167425) |
| 2 | Dog (Benny) | 4 | 1 | $11.30 (1 and 2)  Free | [dog Chihuahua | Characters | Unity Asset Store](https://assetstore.unity.com/packages/3d/characters/animals/mammals/dog-chihuahua-105073)  [Dog Beagle | Characters | Unity Asset Store](https://assetstore.unity.com/packages/3d/characters/animals/mammals/dog-beagle-70832)  [Animals FREE - Animated Low Poly 3D Models | 3D Animals | Unity Asset Store](https://assetstore.unity.com/packages/3d/characters/animals/animals-free-animated-low-poly-3d-models-260727) |
| 3 | Survival Kit Items | 3 | 1 | Free | [Item Pack: Survival | 3D Props | Unity Asset Store](https://assetstore.unity.com/packages/3d/props/item-pack-survival-131598) |
| 4 | Cell Phone | 2 | 1 | Free (both) | [[Free] Phone | 3D Props | Unity Asset Store](https://assetstore.unity.com/packages/3d/props/free-phone-181455)  [Low Poly Office Props - LITE | 3D Environments | Unity Asset Store](https://assetstore.unity.com/packages/3d/environments/low-poly-office-props-lite-131438) |
| 5 | Proximity Noise | 1 (only if tutorial cannot be used) | 1 | $5.65 | [Sound Proximity | Audio | Unity Asset Store](https://assetstore.unity.com/packages/tools/audio/sound-proximity-182591) |
| 6 | Trees/Shrubs | 3 | 1 | Free | [Polygon Trees | 3D Trees | Unity Asset Store](https://assetstore.unity.com/packages/3d/vegetation/trees/polygon-trees-224068) |
| 7 | Tornado | 4 | 1 | Free | [Ez Tornado | Environment | Unity Asset Store](https://assetstore.unity.com/packages/vfx/particles/environment/ez-tornado-203025) |
| 8 | Dark Weather Background | 3 | 1 | Free | [seasons/weather effects | Particles/Effects | Unity Asset Store](https://assetstore.unity.com/packages/tools/particles-effects/seasons-weather-effects-268820) |
| 9 | Household assets | 1 | 1 | Free | [Low Poly Food Lite | 3D Food | Unity Asset Store](https://assetstore.unity.com/packages/3d/props/food/low-poly-food-lite-258693) |
| 10 | Fonts | 1 | 1 | Free | [Retro Sprite Font and Icons | 2D Fonts | Unity Asset Store](https://assetstore.unity.com/packages/2d/fonts/retro-sprite-font-and-icons-39741)  [Fatality FPS Gaming Font | 2D Fonts | Unity Asset Store](https://assetstore.unity.com/packages/2d/fonts/fatality-fps-gaming-font-216954) |
| 11 | Return/Exit Menu | 2 | 1 | Free | [UltimateMenus | GUI Tools | Unity Asset Store](https://assetstore.unity.com/packages/tools/gui/ultimatemenus-71893)  [Settings & Options Menu Creator | GUI Tools | Unity Asset Store](https://assetstore.unity.com/packages/tools/gui/settings-options-menu-creator-268863) |
| 12 | Progress Bar | 1 | 1 | Free | [Progress Bars - Customizable and Extensible (Health Bars etc) | GUI Tools | Unity Asset Store](https://assetstore.unity.com/packages/tools/gui/progress-bars-customizable-and-extensible-health-bars-etc-268457) |
| 13 | Home Furniture | 2 | 1 | Free | [Furniture FREE - Low Poly 3D Models Pack | 3D Furniture | Unity Asset Store](https://assetstore.unity.com/packages/3d/props/furniture/furniture-free-low-poly-3d-models-pack-260522) |
| 14 | Water Jugs | 3 | 1 | $5.64 | [Water Bottle "19 Litre PET" | 3D Interior | Unity Asset Store](https://assetstore.unity.com/packages/3d/props/interior/water-bottle-19-litre-pet-211076) |
| 15 | Picture Frames | 1 | 1 | Free | [Picture Frames | 3D Furniture | Unity Asset Store](https://assetstore.unity.com/packages/3d/props/furniture/picture-frames-301169) |
| 16 | Pet Accessories | 1 | 1 | Free | [Small Kit 3D Stylized Petshop Asset | 3D Props | Unity Asset Store](https://assetstore.unity.com/packages/3d/props/small-kit-3d-stylized-petshop-asset-291990) |
| 17 | More survival supplies | 3 | 1 | Free | [Survival Kit Lite | 3D Tools | Unity Asset Store](https://assetstore.unity.com/packages/3d/props/tools/survival-kit-lite-92549) |
| 18 | Ambient noise | 2 | 1 | Free | [Thunderstorms SFX Pack | Audio Sound FX | Unity Asset Store](https://assetstore.unity.com/packages/audio/sound-fx/thunderstorms-sfx-pack-149736) |
|  | Total |  |  | $22.59 |  |

## 6 Prototype II Plan

The table below describes the plan for the next prototype of the simulation, which focuses more on scene switches, and buttons.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ***Test Objective***  ***(Why)*** | ***What is being figured out***  ***(What)*** | ***Testing Method (How)*** | ***Attributes to Observe / Record*** | ***Duration (When/How Long)*** |
| ***Test VR system compatibility*** | ***If the software runs on the headset*** | By connecting it to the Oculus Quest | ***Check controller positions and movements*** | ***Long enough to ensure satisfaction*** |
| ***Test for scene switches*** | ***If the scenes can switch after pressing virtual button*** | By pressing the virtual button and seeing if any errors are found | ***Check Environment*** | ***Until Debugging is complete*** |
| ***Test for surround sound*** | ***If dog barking is triggered by player proximity*** | By having someone test using oculus quest | ***Check proximity noises*** | ***Until satisfactory*** |
| ***Test for Phone on hand*** | ***Test if click of button brings phone up to player hand*** | Using oculus quest and hand controller | ***Check if phone plays programs according to scene*** | ***Until the phone brings up the right script during the right scene*** |

The stopping criteria for the above will be a pass or fail system. We will be able to move on to the next component once the button works properly. Since these components are critical to the function of the project, we must make sure they work before moving onto the next components.

# Conclusion

The first prototype established a continuous environment combining the kitchen and living room, laying the groundwork for integrating the storyline and key interactive elements. After communicating with the client and potential users, the team refined the original “Benny?” concept by reducing textual content, placing more emphasis on audio and visual immersion, and focusing on a single scene to enhance both realism and educational value. In support of this goal—helping users more intuitively understand the impact of climate change on tornadoes—the team retained a before-and-after survey to quantify how the simulation affects user awareness. We updated the design criteria and will move forward on the next prototype which will focus on developing VR capabilities.