

Deliverable F – Prototype II and Customer Feedback

University of Ottawa

GNG 1103: Engineering Design

March 12, 2024

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Abstract

In this deliverable, we refine our design criteria, bill of materials, and target specifications, updating them to meet our project's evolving needs. We showcase the progress of our initial prototype by providing screenshots and highlighting the feedback we have received, driving further enhancements to our VR experience. Additionally, we outline a strategic plan for testing and developing our third and final prototype, while also addressing adjustments based on input regarding the environment and storyline such as tweaking it so are targeted audience can easily relate, to adjust the lighting to make it environment darker and adding posters, so the cautious housing does not seem so empty

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1-Introduction

We've incorporated the feedback from the client meeting into our first prototype. In this deliverable, we present our second prototype. Building on the plan outlined in the previous deliverable for testing the second prototype, we've gathered analytical, numerical, and experimental data. We've also updated our Bill of Materials and target specifications. Using the outline from lecture 11, we'll outline the testing plan for prototype III, which will be our final iteration before design day.

2-Prototype I and Feedback

Following the third client meeting/pitch presentation, little negative feedback in regard to the first prototype was received. During the presentation the feedback received from the second client meeting was explicitly addressed, either within the VR environment, or within the plans for the second prototype. The elements of the prototype of which will remain and those that changed due to the previous feedback were highlighted, enabling the group to demonstrate the progress made from the last meeting. Specifically concerns surrounding the project's complexity were addressed through simplification of both the storyline and VR environments, of which further manifest into simplification of the video and interactive VR experience. Furthermore, the ethical concern explored within the project was highlighted during the presentation, which was a point of criticism for proceeding group presentations. In general, in addressing past concerns, and outlining a clear future plan, the group received only positive feedback from the client and no further questioning. It is to be noted that the lack of constructive criticism and further questioning, may be due to the strict time limit given for each presentation, such that if there was more time, the client likely would have had more feedback.

Moving forward, the lack of feedback from the client is both positive and negative. It is a positive thing, as it indicates there are no major red flags surrounding the project that need to be addressed. However, in receiving no feedback it is difficult to benchmark future prototype testing, as aside from minor outside feedbacks, project idea input derives primarily from group members, which poses the risk of utilizing "group mentality". In other words, it is difficult to identify areas of improvement without client feedback. That being said, in receiving little client feedback, the group will be required to seek feedback from other sources, such as the PM, TA's and instructors.

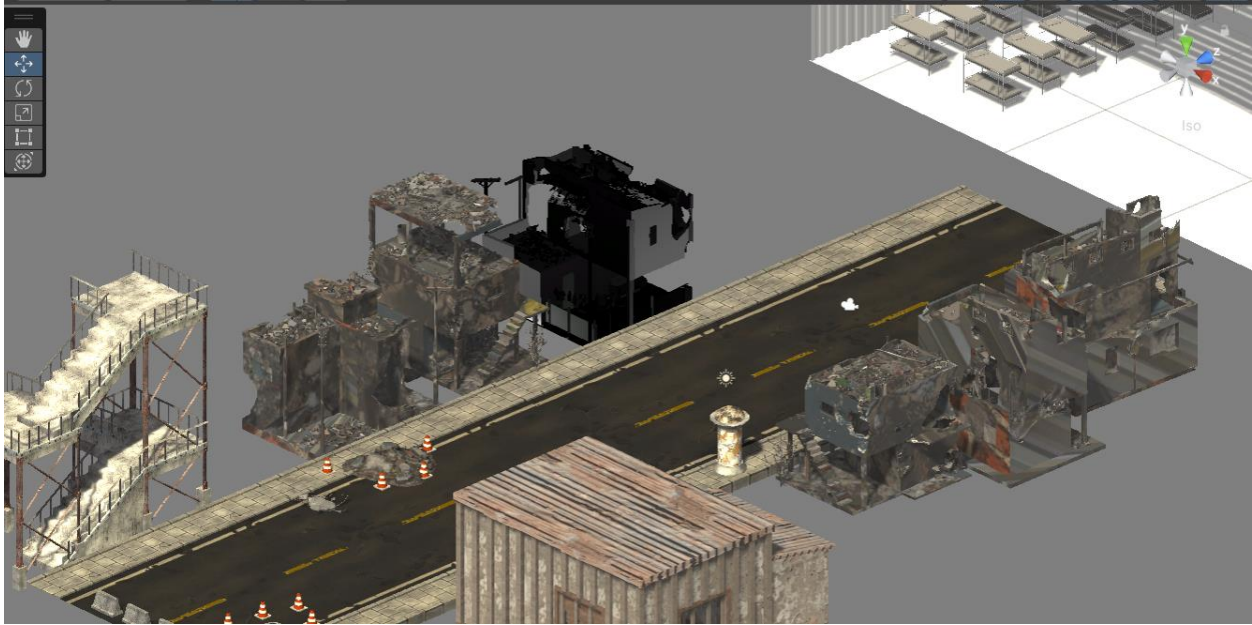


Figure 1 - Street

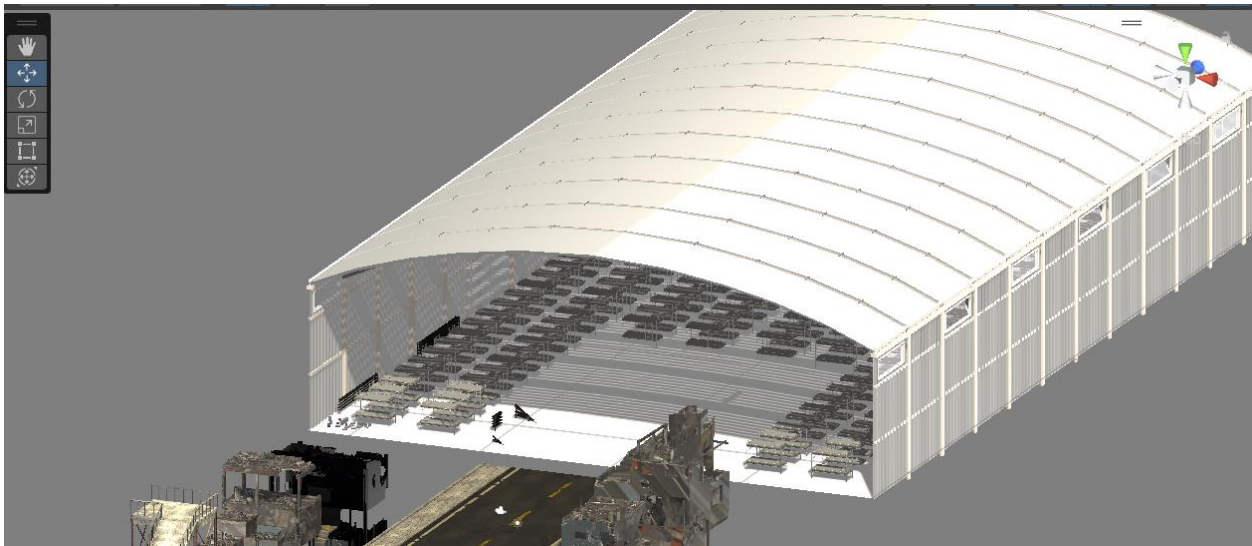


Figure 2-Cautious Housing

3-Prototype II

After incorporating valuable feedback from both the client and users, particularly students in GNG 1103, we have made strategic adjustments to our initial prototype and purchased assets that enhance the overall design. The client emphasized the need for simplification, pointing out that our original prototype was overly complex. In response, we streamlined our approach, opting to create a storefront rather than a fully interactive store. Through testing, we discovered that this change had minimal impact

on the user experience and storyline while significantly saving time for our group and meeting the client's preference. Furthermore, it became evident during testing that users were not grasping the concept of the environment representing a city attacked by autonomous weapons. To address this, we plan to enhance the prototype by incorporating more adaptations such as blacked-out windows, masks, additional signs, and infrared glasses that emit light only detectable by cameras, disrupting the drones' ability to target civilians. Additionally, we are refining the narration to provide a clearer explanation of the situation. As we proceed with testing this refined prototype, we will closely monitor the impact of these changes on user understanding and the contextualization of the environment. To further simplify the prototype, we allocated 50% of our budget to purchase premade environments, allowing us to concentrate on refining adaptations and storyline elements rather than working over the construction of the entire environment from scratch. We hope that these modifications will address previous issues and bring to light any unforeseen challenges, ultimately delivering a more effective and engaging prototype.

4-Prototype II testing results

For our second prototype, we kept the basis of our first prototype, but adjusted our project to solve the problems we had previously encountered, such as the scenario and the environment, and completed the sub-section tests we hadn't had a chance to run, such as audio and the VR experience. In this section, we'll only talk about the changes we made and the results of those changes.

4.1 Results

4.1.1 Overview

We decided to keep the two original environments, the street and the cautious dwelling, as we received good feedback in the third meeting with the client, but instead of building the street ourselves, we decided to buy an asset to help us create a more hateful atmosphere for the audience.

The plot remained the same as described above, only the girl's background changed from a wealthy family to a diplomat's family, to make sure people understood the target audience. In this prototype, we've implemented the audio and finalized the VR experience that was missing from the previous prototype.

4.1.2 Prototype Plan Results

Table 1: Prototype 1 testing results

Test Objective (Why)	Goal (what we want to know)	Testing Method (How)	Observe/Record and Results (Analysis of method)	Progression of the task	Results	Commentary
<i>Storyline</i>	the targeted audience	Google survey	We are going to ask them who they who is the target audience	completed		<p>“Now it’s obvious that it’s the diplomat”</p> <p>“It’s the diplomats”</p>

<i>Environment</i>	Is it realistic?	Observation	Ask people to tell us what they think of the environment	Completed	Yellow	“The cautious housing is food, but you should add some posters outside”
	Do they feel fear/ are obnoxious?	Observation	Ask what they feel looking at the environment	Completed	Green	“The mood is more serious and obnoxious compared to the first one you show me”
<i>VR Experience</i>	did they have a good experience	User Feedback	We are going take a subject to do the full VR experience and he/she will explain how it felt (the length, the audio, the light, etc.)	completed	Yellow	“You should add interactions just walking around is kinda boring” “it’s nice that I got to explore the city. I love that freedom”
	Is the VR experience simple/ intuitive.	User Feedback	At the end of the experience, we will ask them to rate the simplicity	completed	Green	“Yeah, it was easy to navigate and know where to go next”
<i>Audio/sound/Music</i>	Is the audio/ sound/ music fit the mood	User Feedback	Ask to rate the audiovisual at the end of the video	completed	Green	“I love every sound that you guys have added I didn’t think you could add footsteps and synchronize it”

Legend: green=pass, yellow=modification needed, red=failed

4.2 Environment

Compared with our first prototype, the second we produced gave us better results. The main difference from the first prototype is the street. Given our budget, we bought an asset that allowed us to have not only good buildings, but also rain and city effects such as smoke coming out of the gutter.

As for the cautious habitat, to make it livelier, we added different types of posters and a section devoted to food. The posters place the user in the context of this dystopian world. Posters on food rationing, protests, the need to put on a mask to go out and reserves have been scattered throughout the cautious dwelling. As you can see from the table of test results and the figures above, the changes made to the environments were beneficial.

The cautious housing was already good and almost finished, but with our additions we received better feedback, especially for the added posters. We've had comments saying they feel bad for people living in this situation, and those are the exact thoughts and emotions we want everyone viewing to feel. Someone even highlighted an important remark by saying the following: "I like the fact that the posters are not the same. They have a different message, not only to say that robots are dangerous, but also for the things that are present in our daily lives. My favorite is the publicity of the supplies store posters which

remind me of the miss minutes in Loki". With this commentary, we agreed to add elements present in everyday life to reproduce the same feeling for all those who will watch.

With the feedback we've received from the street, we know we're well on the way to achieving our goal. Indeed, everyone who looked at the street said it was what they expected and that it was much better than before thanks to the rain making it more obnoxious, which is a good thing. Although most of the comments were positive, some asked if we were going to add more people. That's why we started thinking about different ways of integrating people into the street.

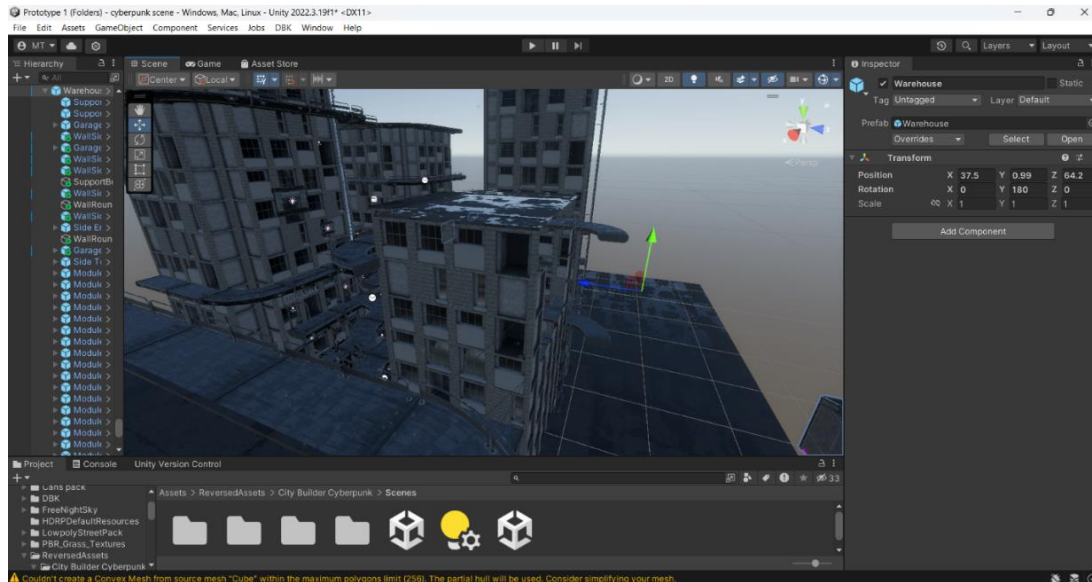


Figure 3-The street

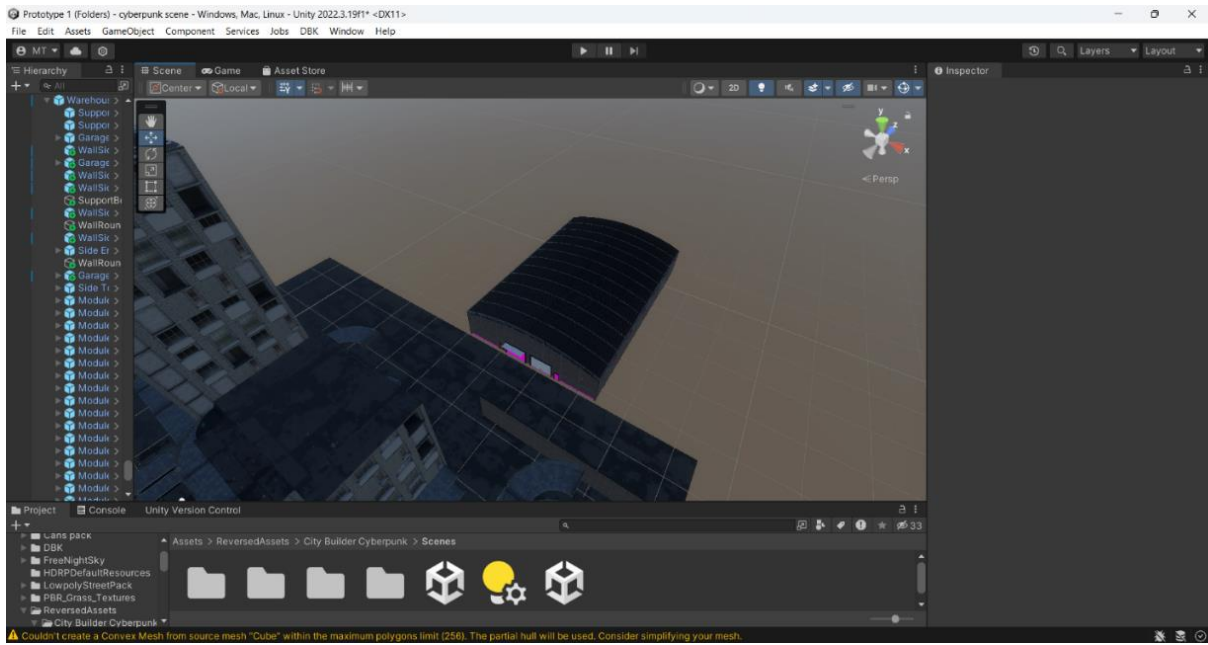


Figure 4- The cautious housing

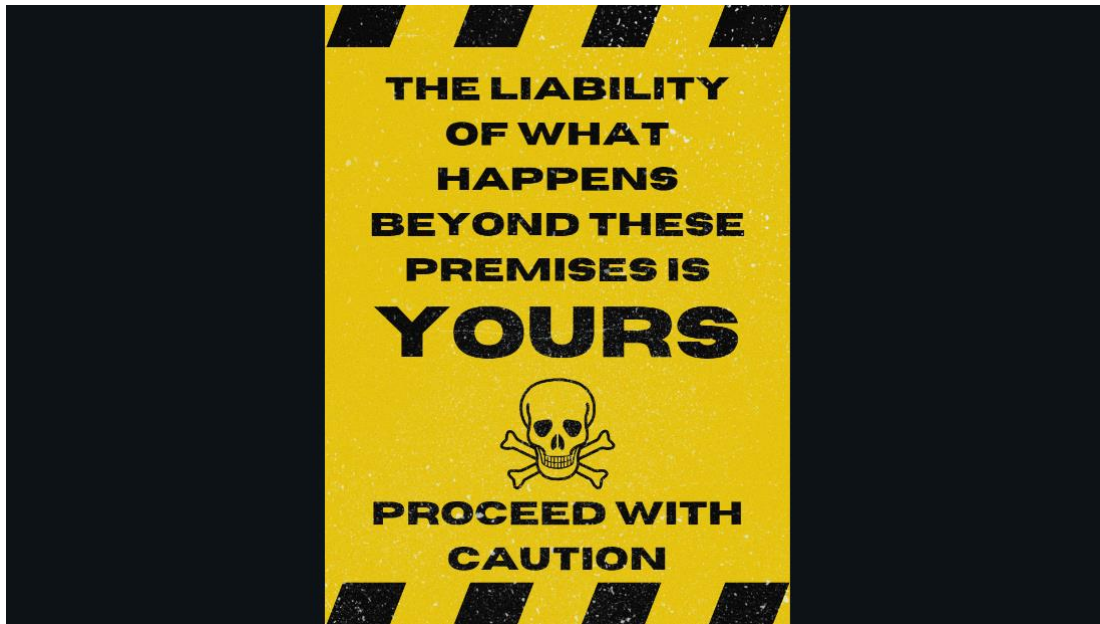


Figure 5 – Warning side before getting outside of the cautious housing



Figure 6 – Warning of the autonomous weapons



Figure 7 – Poster for the sale of faceless mask

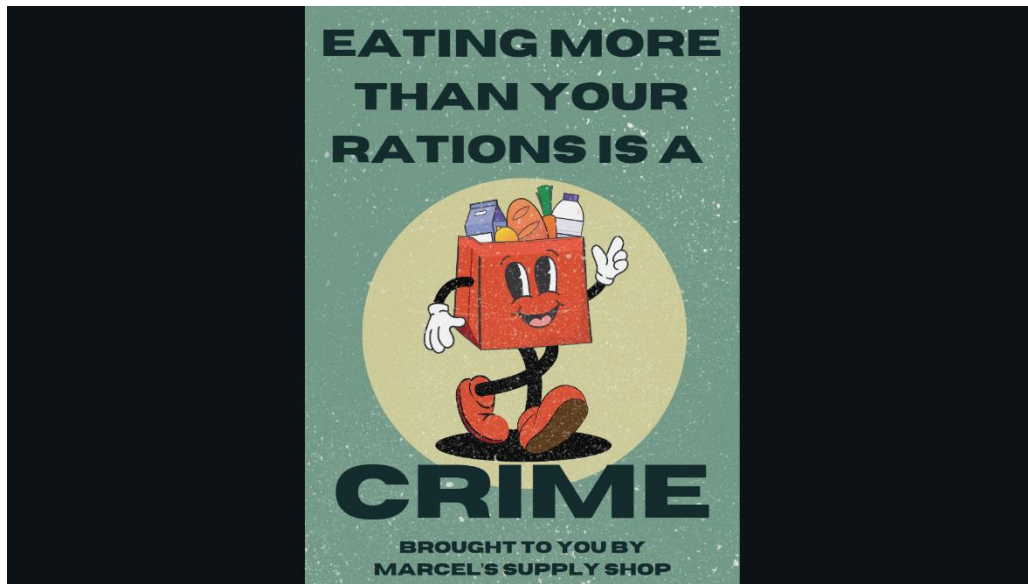


Figure 8- Publicity for the supply shop

4.3 Storyline

As the previous survey had failed to find the target audience, we decided to change the protagonist's background to that of a diplomat's family, to solve this problem. By redoing a survey with the modified story, people were able to find the target audience every time, and found the story clear to read, as people said: "The story hasn't changed much from the first one. It's still as simple as ever. The only difference is that I understand you want the story to appeal to diplomats. It's a good idea you had". With this result, we can conclude that our text is clear, concise and makes the audience feel emotions such as compassion.

4.4 Storyline Elements

In our second prototype, we finalized both environments and started adding details to the background to enhance the result. We started incorporating different types of signage, such as warnings about robots outside, which are going to be inside the cautious dwelling, as we felt this was exactly what was likely to happen in this context.

The only thing missing is the incorporation of adaptations. Right now, we have two adaptations that we know we're going to add, which are masks and coveralls. The masks and suits will be worn by anyone outside the cautious enclosure to hide their face from the autonomous weapons and divert their attention elsewhere. To incorporate these two adaptations, we scoured the asset store catalog, but couldn't find anything good. So, we decided to look for a way to incorporate our current mask and suit design into Unity.

4.5 VR experience

With this prototype, we were able to test the VR experience ourselves and by volunteers. For the VR experience, we had to check their overall experience, i.e. whether the light, audio and sound settings

were correct, whether they liked the interactions and whether they found it simple and intuitive, i.e. whether they understood where to go and didn't get lost when they strayed a little from the main route.

As for the overall experience, most liked it, but all made the same remark, saying that there was no interaction available and that they were content to just walk around the city. This is the case, since we haven't created a dialogue for each of the posters present in the cautious dwelling, and we haven't yet put any on the street. We're also planning to add a few NPCs (Non-Playable Characters) such as guards to enrich the experience.

As far as simplicity is concerned, the volunteers who completed the experiment all had the same opinion: the VR experience was simple and easy to live with. One comment reflects exactly what we're looking for: "It was easy to navigate this thing you've created. What I liked was that you don't have to follow a single line and you can explore a bit like in a video game, and when I did, I found my way without any problem. The only thing that is missing is the French subtitle in during the narrations since we wanted to make sure everything worked according to plan before adding this accessibility.



Figure 9 – VR experience tests

4.6 Visual

For our second prototype, the city, for the asset store, and all the posters, transfer from canvas to unity, added to our scene are all good quality. The same goes for the audio and the sound, like the rain,

added to the scene. Everything that we have added makes the environment much more realistic. Once again, when switching between computers (MacBook and Windows) there are no rendering problems. We'll continue to monitor rendering as we finalize everything.

4.7 Audio/ sound/ music

We already have found all the audio when we finished our first prototype but didn't do the testing since we wanted to do it at the same time as the VR experience to put the audio in a context. The results were satisfactory since the sound that we incorporated immerges the volunteers in the experience. There is one volunteer that said the following: "There were sounds? I didn't notice since everything felt normal, and I just lived in the moment." Another one said: "It's just as if I received the water and I breathe at the same time as the sound that make me feel I was there."

5 Prototype III Test Plan

Prototype III will be more focused on the technical side of this design, such as incorporating sounds, visual effects, adaptations and scripts on Unity.

Test Objective (Why)	Goal (what we want to know)	Testing Method (How)	Observe/Record and Results (Analysis of method)	Estimated Test duration and start date (When)
Do we need to plan two different audio clips for the user experience and the video?	How/if the audio is going to be different between the user experience and the actual video.	We will add different sounds from different sites and test how they can be incorporated in Unity.	We will record which sources produce the best sounds and the ease of use.	This will start on March 11, and should be completed by March 20.
Does the user understand the storyline and adaptations?	If the addition of more adaptations and refined narration helps user understanding.	We will have users test the VR experience and ask questions on storyline and adaptations.	Record user answers to questions and any feedback they have.	This will start once the third prototype is complete and should take 45min.
Do different camera positions and speeds affect the user experience?	How should the camera be positioned on Unity to bring the best results.	We would have users walk in the environment at different camera heights and speeds.	Record what heights and speeds do the users like.	This will start after we have completed the test above and should also take 45min.
How do we incorporate the signs into Unity and should there a user be able to interact with them?	Does Unity have built-in features that enable us to easily incorporate signs that were created on third party websites and should these signs have an interactive feature.	We will do research on whether it is possible to import third party assets into Unity and whether we can apply scripts on these assets to survey if we should	Record what people say about being able to interact with the signs. Note the ease of implementation of these signs into Unity and what is the	This will be tested throughout the prototyping process and will take a while to completely understand. It should be done by March 20.

		allow some sort if intractability.	best most efficient way.	
What scripts need to be added on the camera, audios, visual effects, so that a user walking into the environment can trigger these codes?	How to write the scripts for camera movement, audio queues, and interactions from the user. Are these scripts different from one another?	We are actively doing research and learning how to write scripts on Unity.	We will note what the best way to incorporate scripts on Unity and record any websites that have prewritten scripts,	This will be tested throughout the prototyping process and will take a while to completely understand. It should be done by March 20.

6 Bills of Materials update

The following table includes the most recent compilation of the materials anticipated to be used in the VR environments. The items highlighted in green have already been implemented into the project, and the items highlighted in yellow are newly added to the list.

Table 3: Bill of Materials

Item no.	Description	Store	Price (CAD)	Link
#1	VIS – PBR Grass texture	Unity Asset store	FREE	https://assetstore.unity.com/packages/2d/textures-materials/floors/vis-pbr-grass-textures-198071
#2	Fence Gate Pack	Unity Asset store	\$4.99	https://assetstore.unity.com/packages/3d/environments/urban/fence-gate-pack-119711
#3	Abandoned Car	Unity Asset Store	\$4.99	https://assetstore.unity.com/packages/3d/environments/urban/abandoned-car-181912
#4	Streetlights Pack	Unity Asset Store	FREE	https://assetstore.unity.com/packages/3d/props/exterior/street-lights-pack-31644
#5	Garbage and Trash props	Unity Asset Store	\$9.90	https://assetstore.unity.com/packages/3d/props/industrial/garbage-and-trash-props-74482
#6	Garbage Heap The last	Unity Asset Store	FREE	https://assetstore.unity.com/packages/3d/environments/industrial/garbage-heap-the-last-70773
#7	Guard	Unity Asset Store	\$10	https://assetstore.unity.com/packages/3d/characters/humanoids/low-poly-soldiers-53612
#8	Bunks bed, Cautious Housing Utilities	Unity Asset Store	\$8	https://assetstore.unity.com/packages/3d/environments/urban/survive-nuclear-war-interior-35996

#9	Wall Graffiti	SketchFab	FREE	https://sketchfab.com/3d-models/cc0-decal-graffiti-textures-69a07e3d256e4b0490ac49e99ac57896
#10	Street Pack	Unity Asset Store	FREE	https://assetstore.unity.com/packages/3d/environments/urban/low-poly-street-pack-67475
#11	Outdoors bunker with observatory	Unity Asset Store	10\$	Outdoors bunker with observatory 3D Props Unity Asset Store
#12	Sad walk	Mixamo	FREE	Mixamo
#13	Free cans pack	Unity Asset Store	FREE	Free Cans pack 3D Props Unity Asset Store
#14	Unity	Unity	Free	https://unity.com/
#15	Computer	N/A	N/A	N/A
#16	GitHub	GitHub	Free	https://github.com/
#17	Modular Warehouse	Unity Asset Store	4.99	https://assetstore.unity.com/packages/3d/environments/modular-warehouse-231449
#18	shelf	Unity Asset Store	Free	Shelf 3D Interior Unity Asset Store
#19	Modular city pack	Unity Asset Store	19.99	https://assetstore.unity.com/packages/3d/environments/sci-fi/city-builder-cyberpunk-182821

7 Target Specifications

Table 3: Updated Target Specifications

- Green: Signifies the successful completion of target specifications.
- Yellow: Indicates specifications anticipated to be met.
- Red: Highlights specifications that are currently off track.
- White: Denotes specifications that have not yet been addressed in the prototype.

Design Specification	Relation (<, >, =)	Target Value	Units	Verification
FUNCTIONAL				

VR Environments	=	2	# of Scenes	Measure
One minute video	=	60	Seconds	Measure
Technical adaptations	=	Yes	N/A	N/A
Visual elements	=	Yes	N/A	N/A
Auditory elements	=	60-70	Decibels	Measure
Avoid use of autonomous robots in video	=	None	N/A	N/A
Evoke empathy		10	1-10	Testing
Evoke anger	>	7	1-10	Testing
Evoke urgency	>	9	1-10	Testing
NONFUNCTIONAL				
Video narration	=	Yes	N/A	N/A
Complexity of concepts	=	Yes	N/A	N/A
Reaction time	>	Yes	Seconds	Measure
Attention Span	>	Yes	Seconds	Measure
CONSTRAINTS				
Avoid graphic content	=	4	1-10	Testing
Generic background	=	Yes	N/A	Testing
Avoid geographical identifiers	=	None	N/A	N/A
Cost	<	50	\$ (CDN)	Measure

8 Conclusion

Significant progress was achieved with the second prototype, showcasing various innovative features like interactive posters and functional movement mechanisms. Valuable user feedback led to strategic adjustments to our initial design, simplifying it based on client input and integrating additional features such as blacked-out windows and infrared glasses to improve user comprehension. The next milestone will prioritize the technical aspects of the design, including the integration of sounds, visual effects, adaptations, and scripts on Unity, while adhering to the Prototype III test plan outlined in this phase. Overall, our project is advancing smoothly, making significant strides towards completing a comprehensive VR simulation.

9 Trello

<https://trello.com/invite/b/D5G8Kyy9/ATTI483a5cf8b8e5dda1785f6f92c7e6056eD9705434/gng-1103-group-3>