

Deliverable F – Prototype I and Customer Feedback

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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 second prototype, while also addressing adjustments based on input regarding the environment and storyline such as tweaking it so are target 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

Using the feedback we received from the client meeting, and the plan we had created in the last deliverable we have developed our first prototype. In this deliverable we have developed a test plan for the second prototype, focusing on communication, feasibility, analyzing critical subsystems or system integration, risk, uncertainty and the changes we will make to the VR environment and the story.

2 Client Meeting Results and Feedback

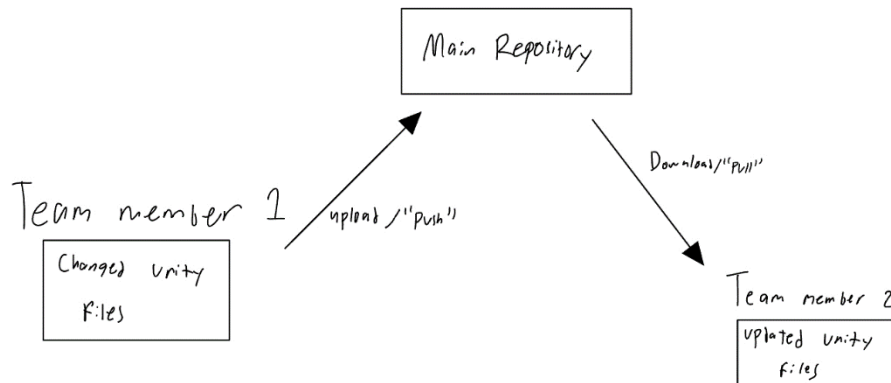
In developing the preliminary project ideas, various forms of feedback were received and used in modifying the project into an initial prototype, and further into developing a testing plan. The primary source of feedback derived from the second meeting with the client, in which the client was presented with the chosen global concept, consisting of all subsystems. Within this global concept, the storyline and a rough visual storyboard was used to aid in illustrating all project ideas, and what precisely is to be expected. Upon this presentation, the client communicated concerns with the VR environment complexity, elaborating that the two VR environment stories may be unrealistic granted the timeframe and beginner skillset of the team. Moreover, coupled with the VR environment complexity, the client expressed concerns surrounding the video complexity, as 10 scenes (camera cuts) were included in the storyboard, arising questions of what is realistic to complete within the timeframe. In terms of positive feedback, the client was satisfied with the robot design and technical adaptations presented, particularly the idea of the Cautious Housing facility. The client further expressed how the Cautious Housing Facility alone could be used to simplify the video and narrow the projects focus into one technical adaptation/VR environment.

Following the client meeting, the team deliberated on how to implement the feedback moving forward. In terms of the complexity of the VR environments, it was decided that considering the teams collective commitment to the project, the two VR environment would remain. However, instead of making two separate VR environments within Unity, the two environments would be connected within one Unity files but presented as two different environments in the video. This enabled the team to narrow the scale of the project, ensuring what was set to be done was feasible in the timeframe. In terms of video complexity, an updated storyboard is currently underway, which will strive to convey the intended message of the video in a much more concise manner. Additionally, following Prototype 1 testing, a better visual of what the project should look like will be attained, further aiding in establishing an updated storyboard.

3 Analysis of Critical Elements

Two key components vital to this design are GitHub and the VR environment. GitHub is crucial for collaborative work on Unity, allowing us to work on the design simultaneously. Without it, we'd be limited to one person working at a time, defeating the purpose of teamwork and being time-consuming. The illustration below demonstrates our collaborative process on GitHub, where a central repository lets team members upload changes. To access the latest version, team members can easily "pull" changes from the repository, enabling us to work on the Unity design together. The VR environment is equally essential, serving as the primary way to immerse users in the story and evoke emotions. The environment must have the right traits; otherwise, it would significantly reduce the design's effectiveness. In Section

4.2, the initial environment prototype is shown, still incomplete but possessing most of the desired traits. Surveys reveal that a realistic environment, showcasing adaptations people would make to stay safe from autonomous weapons, effectively immerses individuals in the story and triggers emotions like anger and fear.



4 Prototype I

In this section, we talk about the first prototype and everything it contains, such as the environment, the adaptation, the first scene in Unity, the script, the visuals and the audio. In each of these subsections, we will identify the advantages and disadvantages, basing our analysis on the results obtained in the various tests carried out. Following the third meeting with the customer, we'll adjust to deliver a better product.

4.1 Results

4.1.1 Overview

For our first design, we created a prototype that has two main areas to tell the story of the protagonist that had his life change because of autonomous weapons.

The main scenario follows a kid in his new environment since he and his family lose their wealth. In the video, you'll see poorly maintained buildings on the street and precarious housing where new arrivals find shelter to sleep and eat. We are aiming to make the simulation as impactful as possible to be sure the decision-makers think of what could happen to the world including themselves.

We have done a lot of testing to make sure each subsection has everything the client needs and wants. For example, conduct a survey for the storyline to know what emotions people felt when reading it, what they thought the theme was and who they thought the targeted audience of this project was. The current task is to finalize the VR experience by adding all the audio and the accessibility. Plus, we must develop and incorporate more adaptations in the environment since it's a major part of the project.

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>	What to know what they are feeling	Google forms survey	We are going asked them to describe their emotions after they finished the script	Still in progress since we end the survey on March 5 th	Green	“I felt bad for the kid.” “It’ll be sad if we live in a world like this”
	What the theme is		We are going to asked what the theme is			Green
	the targeted audience		We are going to ask them		Red	“I think it’s the public in general” “The rich families or the upper class.”
<i>Environment</i>	Is it realistic?	Observation	Ask people to tell us what they think of the environment	Completed	Yellow	I love how it looks, especially the cautious housing but it’s a little empty. Why are there no buildings in good shape?
	Do they feel fear/ are obnoxious?	Observation	Ask what they feel looking at the environment	Completed	Yellow	It’s not enough scary because it’s not dark, but I love it That has potential, but too much light
<i>Bilingualism</i>	Could a person who speaks only French understand	Transcript Review	We are going to ask a person who’s only speaks French ask him/her to read the text and then we’ll explain what we were trying to say	Completed	Green	“After you explained to me the story, I didn’t find any difference between what you said and what I read” (translated from French to English for the document)
<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	Not conduct yet plan on doing it on March 4th	N/A	N/A

			explain how it felt (the length, the audio, the light, etc.)			
	Is the VR experience simple/ intuitive.	User Feedback	At the end of the experience, we will ask them to rate the simplicity	Not conduct yet plan on doing it on March 4 th	N/A	N/A
<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	Not conduct yet plan on doing it on March 4 th	N/A	N/A

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

4.2 Environment

The whole prototype's environment was created using Unity. In this prototype, we have created two environments, cautious housing and a street/small town. Even if in the second meeting the client was sure of our idea, thinking it'd be too much work, we decided to work a little more to show them how we plan to do it so we can know if they love the idea. The following screenshots are what we have until now.

Figure 1-Streets

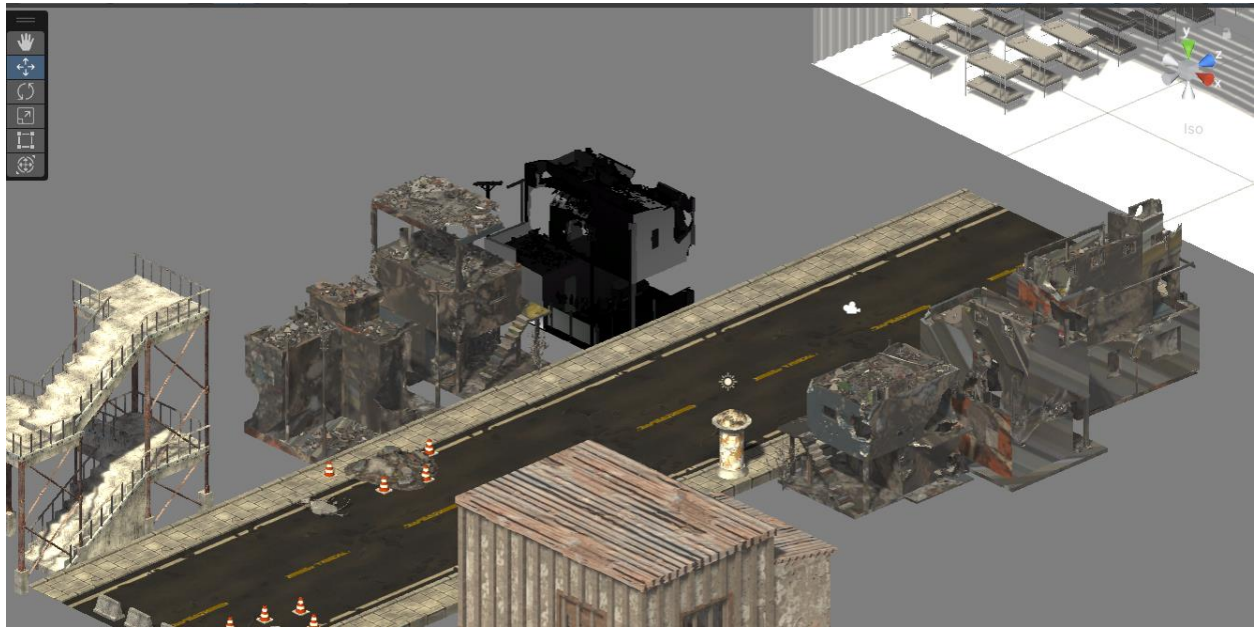
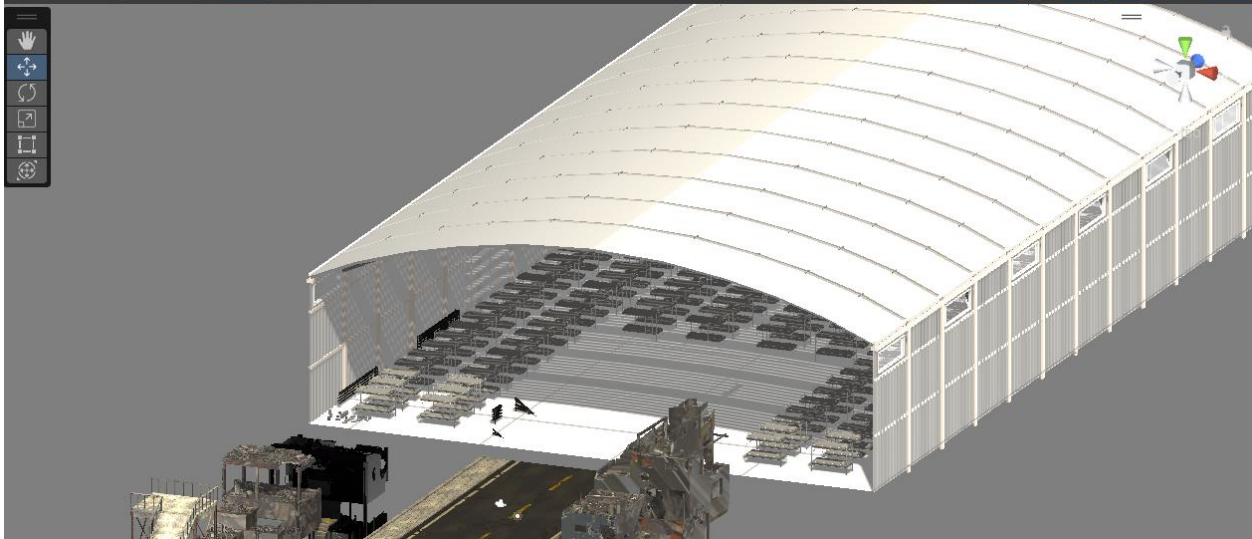


Figure 2-Cautious Housing



With our first prototype we reached our main objective that is to create a realistic environment, but the only remark we got was that it wasn't too scary since it's not dark. The second remark we got was regarding cautious housing. Some people said that there wasn't much in there and thought we should add posters and a darker aspect.

4.3 Storyline

With the data gathered with our survey, we know that the storyline for our first prototype meets almost all of our expectations. It's the case since we pass two out of three tests. First, we succeeded at making the audience feel empathy and compassion towards the kid since many comments were saying they felt bad for the kid because of how sad his life has become. The survey also shows that the theme of our story is clear and straightforward, with most respondents understanding that the story drives the evolution of autonomous weapons. The only part of our story that was a little vague was the audience we were targeting. Most people who responded to the survey thought we were aiming for a broad audience, but a few people came closer to what we were looking for by stating that it was a high-income family. We need to make a few changes to ensure that diplomats feel targeted when they view the video.

4.4 Storyline Elements

With our current prototype, we've created the basis for the two main environments that the protagonist and user will traverse during the video and virtual experience, but there are still a few elements that need to be added.

The first matter is the theme of the scene. As we saw with our results, our storyline instills the targeted emotions, like compassion for the kid, but not the environment. It's indeed the case since many mention that they didn't feel scared or had any obnoxious feeling when they looked at the scene. When asked the reason some people said that the background wasn't dark like in horror movies and others were saying the following: "it doesn't feel like a city with people in it. It's more like a ghost town than a city." The way we interpret this is that we need to add life to our scene with fog, lights, trash can, food, etc.

The second matter is the absence of adaptations. In this prototype, we don't see any adaptations taken by civilization. We are simply presenting buildings which are good, but not enough. Adaptations was one of

the needs that the client emphasizes on, so we must put as much as possible to convey our clients' needs and to have options if the client does not approve one of them.

4.5 VR experience

During the experiment, the user will be able to move around using a joystick on the controller. We'll use the XR toolkit and the locomotion feature to move the character around. To keep things simple and ensure that the user doesn't get lost during the experience, we'll guide his progress through VR using arrows and other methods. We plan to add interactive objects such as posters that the user can select and which will be followed by a description of the object, but we don't intend to include dynamic elements as we feel this would be too complicated to incorporate and unnecessary. Finally, narration will be in English throughout the experience, but there will be French subtitles so that everyone can understand. We haven't yet tested our VR experience as mentioned in the table above, since we've scheduled the test for the 4th of March.

4.6 Visual

For this first prototype, we used several small packs such as damaged houses, the street, and cautious dwellings that were available on Unity's asset store. All the selected packages are of good quality, which is essential to make the environment realistic. When we looked at the prototype on our laptops (4 Windows and 1 MacBook), we didn't see any differences and the quality was the same, which means there are no rendering problems. We'll continue to monitor rendering as more elements are added to the environment.

4.7 Audio/ sound/ music

Although we didn't do the test for this section, we found everything we needed to make the experience as immersive as possible. For the audio, we'll be using narration from the child and some civilians. We've uploaded several sounds to make the simulation as realistic as possible. We've uploaded cricket sounds, footsteps as the user walks, background conversations as we approach a group of people, and even the sound of air conditioning. As for the music, we opted for a piano soundtrack to create a sense of discomfort and ensure that the audience felt the same emotions as the protagonist.

5 Prototype II Test Plan

The objective for the second prototype is to test what didn't work out with the first prototype and test new solutions that we thought would be a great addition to the project.

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)
Will the theme/message of the video reach the target audience?	The targeted audience	Google forms survey	Ask if they can identify the audience targeted	When: March Duration: one week
Does the video make sense?	Effective storytelling	Google forms survey	Observe narration and VR Environnement context convey message	When: March 4 th Duration: one week

Does the VR environment make sense?	User accessibility	Google forms survey	Does user navigation within the VR space run smoothly?	When: March 4 th Duration: A week
User Experience	Good VR experience	User experience	We will ask users to rate their experience	When: March 7 th Duration: 5 hours
VR functionalities	Cater to random people's knowledge	Google forms survey	We will ask if the VR functions are working and intuitive to use	When: March 4 th Duration: A week
Audio/sound/music	Does it fit the mood	User Feedback	Ask to rate the audio used during the video/VR experience	When: March 4 th Duration: 1 hour

6 Bills of Materials

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

7 Target Specifications

Following the completion of Prototype I, we have revised our target specifications to reflect our progress accurately. In Table 3, we present the design criteria categorized into those that have been achieved, those currently in progress, and those yet to be addressed. This updated table is a tracking tool, allowing us to monitor our advancements and identify areas requiring further attention.

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

In conclusion, the development of autonomous killer robots necessitates a meticulous consideration of the civilian environment. Through rigorous testing and adherence to design criteria, we successfully crafted an environment that not only met client expectations but also functioned seamlessly. The feedback gathered highlighted the emotional impact and immersion achieved, validating the prototype's effectiveness. Moving forward, our attention turns to enhancing the user experience through virtual reality (VR) capabilities in Prototype II. This evolution is pivotal for fostering immersive engagement, crucial for simulating the realities of living amidst AI-driven warfare. As we embark on this phase, we remain committed to soliciting and integrating user feedback to refine and perfect the VR experience. Reflecting on the results of Prototype I, modifications are underway to address areas flagged for improvement, ensuring that subsequent iterations meet the highest standards. By prioritizing realism, emotional resonance, and intuitive design, we aim to create an environment that not only informs but deeply resonates with users, effectively conveying the gravity of the subject matter. As we progress, our

commitment to innovation and user-centric design remains unwavering, driving us towards the realization of a compelling and impactful simulation.

9 Trello

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