

Deliverable C: Design Criteria and Target Specifications

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Introduction

As our project evolves, our group needs to obtain a deeper comprehension of the client's requirements to successfully deliver their message. While initial independent research served to establish a foundational understanding of the concept, it lacked the precision offered by direct instructions from the client. Therefore, after a successful meeting with our client where our group managed to ask all important questions, the group was able to map out our design criteria and specifications thanks to the needs we identified from our meeting. This face-to-face interaction unveiled nuanced expectations and unspoken desires that couldn't be gleaned from any other form of research.

In the following document, all the needs that were identified by our client are listed, and according to those needs, functional requirements, non functional requirements, and constraints were devised according to the groupings of those needs. Then, our requirements will be benchmarked according to the projects of other groups we found of MakerRepo and then with other general VR experiences found online. Lastly, we will list all our target specifications and write a reflection on where we are, along with our next steps.

Table 1 | Needs Identification Table

Listing the needs for a project is important for setting project goals, aligning the team, and guiding decision-making in respect to what the requirements are (functional, non functional), and what kind of constraints there may be. It ensures a shared understanding of user expectations, performance standards, and project limitations, leading to the development of a final product that meets the goal at hand.

Therefore, the following table was used as reference to develop these criteria.

#	Need	Design Criteria
1	A short and simple VR experience that will be put into a video format	<ul style="list-style-type: none">- Effective storytelling to convey the narrative clearly.- Design a small VR environment for a concise experience.
2	Focuses on the cons of having autonomous weapons	<ul style="list-style-type: none">- Effective storytelling to communicate the dangers.

		- Proper VR demonstration of the risks associated with autonomous weapons.
3	Focus on the storytelling over intractability	- Prioritize effective storytelling to engage the audience.
4	Generic location (preferably not too big and does not need to be a city)	- Generic Environment - No harmful stereotypes & prejudices
5	Focus on quality over quantity	- Prioritize quality of the environment and assets over quantity.
6	Do not focus on gory aspects, a bit of blood is fine	- Avoidance of Gory Content
7	Focus on human behavior adaptability (for instance, how they would resist attacks)	- Effective storytelling
8	Autonomous weapons that specifically target humans (can perfectly distinguish between humans and other living beings)	- Effective storytelling
9	Must emphasize the importance of regulating autonomous weapons	- Effective storytelling to underscore the need for regulation.
10	The experience will focus on how autonomous weapons have affected daily life	- Effective storytelling
11	The main points of the experience must fit into a 1-minute video	- 1 Minute Time Constraint
12	\$50 cost limit for buying assets	- Ensure all assets fit within the \$50 budget.
13	Story must be easily understandable	- Effective storytelling
14	Accessible to those with sensory issues	- Design the experience to be accessible to individuals with sensory issues.
15	The problem must be clearly understood by the customer watching it	- Prioritize effective storytelling for clear communication and assume the audience has relatively moderate background knowledge.

16	Avoid Copyright	- Copyright Compliance
17	Safe for parliament	- Safe for Parliamentary Viewing
18	No harmful stereotypes & prejudices	- Generic Environment - No harmful stereotypes & prejudices
19	Assume the audience has little knowledge of problem	- Effective storytelling
20	Balance emotionality with information	- Effective storytelling
21	Properly represent the values of the client - do not say unrelated or incorrect opinions on behalf of the client.	- Ensure that the storytelling aligns with the client's values and avoids unrelated or incorrect opinions.

Table 2 | Prioritized List of Criteria, including Functional & Non-Functional Requirements, and Constraints

The function of the project is to deliver an effective persuasive message to an audience of the danger of autonomous weapons through Virtual Reality. This will be done through emotional and informative storytelling on a software platform called Unity.

Metrics and methods to test these categories will be listed in the page below [Table 2].

Functional Requirements	Non-Functional Requirements	Unique Constraints
Proper VR demonstration of the Danger of Autonomous Weapons	Avoidance of Gory Content <i>- The video should imply gore rather than explicitly showing it</i>	Asset Budget <i>- \$50 dollar group budget</i>
Effective Storytelling <i>- Focus on Human Behavior Adaptability</i> <i>- Must emphasize the importance of regulating autonomous weapons</i> <i>- The experience will focus on how autonomous weapons have affected daily life</i>	Accessibility and Sensory Considerations <i>- Ensure that the video is accessible to anybody with sensory issues</i>	Copyright Compliance <i>- Ensure video can be shared and played anywhere in the world</i>

<p><i>- Problem must be clearly understood by the customer without rewatching</i></p>		
<p>Functional & Interactive VR world <i>- User is able to walk in environment</i> <i>-360 degree vision.</i> <i>- VR environment simulates the world accurately without bugs</i></p>	<p>Generic Environment <i>- Avoid recognizable settings and situations to avoid allusion</i></p>	<p>Safe for Parliamentary Viewing <i>- Ensure video is appropriate for any parliamentary setting</i></p>
<p>Quality of environment & assets over quantity (Small VR World) <i>- Focus on the quality of the game to ensure the project is done on time and is easier for the audience to follow</i></p>	<p>No harmful stereotypes & prejudices</p>	<p>Time Constraints <i>- Video must be a minute long</i> <i>- Project is due in less than 2 months</i></p>

Functional Requirements

Focus on the Cons of Autonomous Weapons:

The VR experience must prominently showcase the negative consequences of autonomous weapons. By doing this, we can portray their potential for indiscriminate harm and ethical implications.

- Metric: 50% VR experience dedicated to showing the brutality of autonomous weapons.
- Measure the level of user engagement by analyzing the duration users spend within the VR experience during the testing phase. Higher engagement suggests that the negative consequences are effectively portrayed.
- Assess the participants' knowledge of the cons of autonomous weapons before and after the VR experience. An increase in knowledge indicates that the content was successfully conveyed.

Storytelling Over Interactivity:

Prioritize immersive storytelling elements over interactive features to ensure a cohesive and engaging narrative experience – showcasing human responses to attacks from autonomous weapons, showcasing strategies for resistance and adaptation and how autonomous weapons have affected daily life.

- Metric: Viewer engagement level measured through feedback surveys run after the creation of our prototypes
- Assess the emotional impact of the story by measuring user reactions and responses during key storytelling moments. Strong emotional engagement can indicate the effectiveness of the narrative.
- Test users' comprehension of the narrative by assessing their understanding of key plot points and character motivations. A higher level of comprehension suggests successful storytelling.
- Conduct focus group discussions to gather qualitative insights into how users perceive the prioritization of storytelling over interactivity. This can provide nuanced feedback on the balance achieved.

Functional VR world

Provide human responses to attacks from autonomous weapons, showcasing strategies for resistance and adaptation.

- Metric: Effectiveness of portraying human adaptability and resilience in simulated scenarios.
- Evaluate user experience through feedback and observation to confirm that walking movement feels natural and does not cause discomfort.
- Measure the effectiveness of interactive features by assessing user engagement and feedback on their ability to interact with objects in the virtual world.
- Gather feedback from users with different abilities to confirm that the VR environment accommodates diverse needs and is inclusive.
- Collect feedback on the overall usability, clarity of instructions, and ease of navigation to identify areas for improvement.

Quality Over Quantity:

Emphasize high-quality visuals and narrative depth over the length of the VR experience to maximize impact within the trailer

- Metric: Visual fidelity and narrative complexity relative to time constraints.
- Evaluate the visual fidelity of the VR experience by assessing the resolution, texture quality, lighting, and overall graphics. Use user feedback and expert evaluations to gauge perceived visual quality.
- Conduct thorough testing to identify and address any visual or narrative inconsistencies – measure user satisfaction with the overall polish and attention to detail.
- Evaluate the effectiveness of cinematic elements, such as camera angles, transitions, and scene composition, through user feedback.
- Assess the impact of sound design on the overall immersive quality.
- Measure user engagement by analyzing the time spent within the VR experience in a spectrum of smaller more detailed space, to larger spaces with less detail. Track user interactions, and assess overall user satisfaction to determine the sweet spot on this spectrum.

Non-Functional Requirements

Avoidance of Gory Content:

Ensure that the VR experience avoids excessive violence or gore while still conveying the seriousness of the subject matter.

- Metric: Absence of explicit or gratuitous violence compared to thematic relevance.
- Collect user feedback on the perceived age-appropriateness of the VR experience and monitor any age-related content restrictions.
- Measure user emotional responses and engagement to determine the effectiveness of conveying the seriousness of the subject matter without resorting to gory content.
- Collect feedback on user comfort levels during and after the VR experience, ensuring that users do not feel unnecessarily disturbed by the content.

Accessibility and Sensory Considerations:

Design the VR experience to be accessible to viewers with sensory issues, incorporating features such as adjustable brightness and sound levels.

- Metric: Compatibility with accessibility standards and user feedback on sensory comfort.
- Conduct usability testing with users who have visual impairments to validate the effectiveness of color contrast in improving visibility and usability.
- Assess user feedback on the clarity and accuracy of closed captioning (if needed). If not, ensure that users with hearing impairments can effectively follow the narrative and whether music or ambient noise drowns out important sounds.

Generic Environment/No stereotypes

- Assess the uniqueness of the environment by conducting user surveys or evaluations. For instance, ask users, “could you easily recognize or associate the VR environment with a specific real-world setting?” A lower recognition rate indicates a more generic environment.

- Implement a rating system where users can provide feedback on the cultural sensitivity of the VR environment.
- Conduct user testing with participants from different cultural backgrounds and demographics.

Constraints:

Asset Budget:

Adhere to a strict budget limit of \$50 for purchasing assets, including models, textures, and sound effects.

- Metric: Total expenditure on assets compared to the allocated budget.
- Establish a system for tracking expenses related to asset purchases and regularly update and review the budget tracker to monitor expenditures and ensure they remain within the \$50 limit.
- Confirm whether assets that the group wants are truly necessary by consulting with users and gaining their opinions on the matter.
- Track the utilization of free or low-cost alternatives and assess their quality and compatibility with the project.

Copyright Compliance:

Ensure all assets used in the VR experience are either original creations or properly licensed to avoid copyright infringement.

- Metric: 100% of all audio files will be downloaded from Non-Copyright databases.
- Maintain a record of licensing costs incurred during the development process, confirming that these costs are accounted for within the project budget.
- Maintain records of all communications and agreements (screenshots, order numbers) with asset providers, confirming that necessary clearances are obtained before asset integration.

Safe for Parliamentary Viewing:

Ensure that the content of the VR experience is suitable for parliamentary audiences, free from harmful stereotypes, prejudices, or offensive material.

- Metric: Compliance with parliamentary viewing standards and absence of objectionable content.
- Implement a checklist or assessment tool made by law students or online suggestions to confirm that stereotypes and prejudices are actively avoided.
- Conduct content reviews by third-party users to ensure that the language used in the VR experience is respectful and aligns with parliamentary communication standards.

- Collect survey responses from a diverse group of participants to assess public perception and confirm that the content is considered suitable for parliamentary audiences.

1-Minute Time Constraints

- Conduct user testing to assess the flow of the VR experience within the specified time frame. Adjust pacing based on user feedback to meet the constraint.
- Evaluate the script's conciseness and clarity through script readings and user feedback. Confirm that the core message is effectively communicated.
- Assess user comprehension of key points through feedback and testing.
- Assess user feedback on the simultaneous presentation of elements and confirm that it enhances the overall efficiency of the VR experience.

Part 2. Benchmarking

Perform Technical Benchmarking (Research already-existing products that satisfy one or many needs in the project) and update user benchmarking information (user perceptions of these similar products)

The best way to benchmark for our needs is to examine the previous submissions of groups on MakerRepo and examine how they deliver on the requirements listed by our group.

Factors that went into benchmarking:

- Existing VR Experiences, especially on [MakerRepo](#)
Analyze user feedback on VR simulations addressing social issues for insights
- How Educational VR Content could be
Evaluate educational [VR projects](#) to understand effective information delivery.
- How Effective Advocacy and Awareness Campaigns are in VR:
Study VR projects associated with advocacy to gauge emotional impact and messaging.
- Virtual Storytelling Best Practices:
Study successful virtual storytelling projects for insights on narrative structure. ([10 Examples](#))
- Effective communication
Conveying information in a realistic and immersive way. ([Example](#))

Values	Colours	#
High	Green	3
Average	Yellow	2
Low	Red	1

Killer Robots VR Project <i>Functional Requirements</i>	<u>Group A</u>	<u>Group B</u>	<u>Group C</u>	Importance
Proper VR demonstration of the Danger of Autonomous Weapons	The ruins of the cityscape that was built by the developers made clear the danger of AI weapons.	The effects of AI weapons mistaking common-day activities as dangerous acts highlighted the danger of these objects.	Video did not showcase the danger of AI robots at all in under a minute – focusing rather on the VR environment that did not reflect a world with dangerous AI weapons well.	5
Effective Storytelling <i>- Focus on Human Behavior Adaptability</i>	There was no clear storyline– the group showed off the destruction of AI weapons but did not have characters and a storyline to deliver the message through an emotional lens.	Good emotional impact by showing how AI can mistake a child’s water gun as a weapon.	There was no clear storyline Information was easily understood through the use of speech bubbles above characters.	5
Functional & Interactive VR world	360 degree vision. Environment was free to move in and interact with.	360 degree vision. Not interactive at all. VR Experience is purely a video with no freedom of movement.	360 degree vision. Environment was free to move in, and was able to interact with objects and dialogue.	5
Quality Over Quantity	Bad audio quality. Hard to focus on one thing at a time when the environment is too big to analyze in a minute.	Bad audio quality. Very unrealistic (Characters don’t mimic human movement).	The experience focused on one task at a time – making it easy to follow. Resolution of graphics and text was good and easy to read. Audio was immersive.	4
<i>Non-Functional Requirements</i>				
Avoidance of Gory Content	The world was full of destruction and gore.	No gore was explicit. Drama was implied.	No gore was explicit.	3
Accessibility and Sensory Considerations	Audio issues pose difficulties to those with sensory issues. The abundance of destruction may cause	Audio issues pose difficulties to those with sensory issues .	Clear audio. Clear visuals. Easy to follow.	2

	discomfort in easily disturbed audiences.			
Generic Environment/No stereotypes	Environment was generic and did not pose any possible stereotypes.	Environment was generic and did not pose any possible stereotypes.	Environment was generic and did not pose any possible stereotypes.	3

The following table benchmarks other popular Virtual Reality experiences to requirements/criteria that are appropriate to each miscellaneous project. For instance, the “Meet your Carbon Footprint” criteria doesn’t apply to the ‘Properly demonstrates the danger of AI weapons’, therefore, it is not on the list.

Miscellaneous VR Projects <i>Functional Requirements</i>	Meet your carbon Footprint (UN)	Home After War (Gayatri Parameswaran)	The Fight for Falluja (Ben C. Solomon)	Importance
Effective Storytelling	<ul style="list-style-type: none"> - Must emphasized the message of the intended purpose effectively - The experience was abstractly emotional but still informative - Problem was clearly understood by the customer without rewatching 	<ul style="list-style-type: none"> - Must emphasized the message of the intended purpose effectively - The experience was emotion and informative - Problem was clearly understood by the customer without rewatching 	<ul style="list-style-type: none"> - Must emphasized the message of the intended purpose effectively - The experience was emotion and informative - Problem was clearly understood by the customer without rewatching 	5
Functional & Interactive VR world	<ul style="list-style-type: none"> - 360 Vision - Interactive - Not Able to walk 	<ul style="list-style-type: none"> - 360 Vision - Interactive - Not Able to walk 	<ul style="list-style-type: none"> - 360 Vision - Interactive - Not Able to walk 	5
Quality Over Quantity	Stylized in a way that put the audience’s attention on too many things at once. Audio was clear. Resolution was good quality.	Audio was clear. Resolution was good quality. Story was paced well.	Audio was clear. Resolution was good quality. Story was paced well.	4

Part 3. Target Specifications

Determine Target Specifications (Numerical Value Ranges or a range of Values that will convey the products' attributes). This will aid in evaluating potential solution ideas and provide measurable design goals which can be fulfilled by the final solution.

Design Specifications	Relation =, <, or >	Value	Units	Verification Method
Functional Requirements				
Proper VR demonstration of the Danger of AI Weapons	=	100% of Audience Understand Dangers	% of people.	Continuous testing and user feedback during development
Effective Storytelling - Focus on Human Behavior Adaptability - Must emphasize the importance of regulating autonomous weapons - The experience will focus on how autonomous weapons have affected daily life - Problem must be clearly understood by the customer without rewatching	=	100% of Audience	% of people.	Continuous testing and user feedback during development
Functional & Interactive VR world - User is able to walk in environment -360 degree vision. - VR environment simulates the world accurately without bugs	=	Yes	N/A	Test
Quality of environment & assets over quantity (Small VR World) - Focus on the quality of the game to ensure the project is done on time and is easier for the audience to follow	>	75% of audience can follow easily	% of people.	Continuous testing and user feedback during development
Non-Functional Requirements				
Avoidance of Gory Content	=	No Gore	N/A	Continuous testing and user feedback during development
Accessibility and Sensory Considerations	=	No Issues	N/A	Consult Diverse Users at uOttawa
Generic Environment & no harmful	=	No	N/A	Consult Diverse

Stereotypes		Allusions		Users at uOttawa
<i>Constraints</i>				
\$50 Asset Budget	<	\$50	\$ CAD	Budgeting
Copyright Compliance	=	0 Copyright Issues	Copyright Claims	Continuous Checking and Verification
Safe for Parliamentary Viewing	=	100% safe	User feedback	Consult Law Student & Experienced Users at uOttawa
Time Constraints	<	1 minute long	Minutes	Continuous testing during development

Part 4. Design Reflection

Since the client meeting happened before we had our complete list of needs, nothing changed between Deliverable B and Deliverable C, and therefore, the development of our design criteria and specifications, when deciding on the relative importance of our criteria, was based on the information we got from the client meeting. However, the client meeting impacted many of our needs, with the exception of those that we had identified before the client meeting, from the information we got prior to the said meeting. The needs that were impacted are:

- Focus on the storytelling over intractability
- Generic location (preferably not too big and does not need to be a city)
- Do not focus on gory aspects, a bit of blood is fine
- Focus on human behavior adaptability (for instance, how they would resist attacks)
- Autonomous weapons that specifically target humans (can perfectly distinguish between humans and other living beings)
- \$50 cost limit for buying assets
- Accessible to those with sensory issues
- Avoid Copyright
- Safe for parliament
- No harmful stereotypes & prejudices
- Balance emotionality with information
- Assume the audience has little knowledge of problem
- Properly represent the values of the client - do not say unrelated or incorrect opinions on behalf of the client.

Conclusion

In summary, the product specifications and criteria have been established for seamless progression to the next phase of the project. While there may be minor intricacies that arise during implementation, with a clear and organized list of all requirements we must achieve, the group aims to reach these goals in a realistic time frame according to the verification methods, benchmarks, and resources listed above. As long as we adhere to the comprehensive plan outlined in this stage of the project, the group will be able to successfully implement from the blunders of the benchmarks, the verifications methods listed in the target specifications, and all the requirements to successfully carry out the wishes of our client.