

# **Project Deliverable C - Design Criteria and Target Specifications**

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## Introduction

The Client, Hanan Anis, has expressed the need for a library of Virtual Reality (VR) tools to assist with Equity, Diversity, and Inclusion (EDI) training at the University of Ottawa. In the previous deliverable, a list of interpreted need statements was developed based on the first client meeting and the following problem statement was formulated: A need exists for an immersive, interactive, engaging, and accessible virtual reality experience that fosters diversity and inclusion by imparting another's point of view on users, allowing for them to accurately imagine and reflect on what it is like to be different from everyone else.

The focus of this deliverable is to use the interpreted need statements to define a list of comprehensive design criteria, perform technical benchmarking, determine target specifications, and reflect on how the client meeting impacted the development of these criteria and specifications. By developing a precise description of what the product must be and researching comparable products on the market, the project team will have the tools required to create a competitively superior VR experience for EDI training.

## Client Meeting Reflection and Needs Prioritization

The client meeting was the project team's first opportunity to hear what the client had in mind for the product. Along with the client, several members of marginalised groups were in attendance. Most of the meeting consisted of these members detailing their experiences with racism, sexism, and general intolerance and bigotry from society. This was helpful in determining how to design the learning experience that will be the core of the product.

Through this meeting, the team learned that showing the perspective of marginalised peoples would be vital in highlighting inappropriate behaviours and showing the consequences of them. Thus, design criteria in this realm were ranked with high importance. Likewise, design criteria focusing on empathy, diversity, and inclusion were ranked highly, as they are central to what the client wants in a product.

Little time was spent discussing the product at the meeting. Many of the needs and design criteria regarding the specific implementation of the experience had to be parsed from the initial letter from the client or assumed by the product team. As they were not specifically mentioned by the client during the meeting, in most cases these were ranked as lower priorities.

## Design Criteria

Based on the interpreted needs and priorities from deliverable B, the project team was created a list of design criteria. These criteria were split into functional requirements, non-functional requirements, and constraints. Metrics were added for each functional requirement to measure the success of future prototypes and products.

### Functional Requirements

Criteria	Corresponding Need and Priority (1-5)	Metrics (If Applicable)	
Level of Interactivity	The experience is interactive [3].	5	Significant amount of meaningful user interaction
		4	Fair amount of meaningful user interaction
		3	Minimal amount of meaningful user interaction
		2	Minimal amount of non-meaningful user interaction
		1	No user interaction
Relatability to marginalized groups	The experience focuses on one	5	Experience meaningfully addresses challenges universally faced by all marginalized groups

	or more of these issues: race, gender, creed, religion, disability, others [4].	4	Experience meaningfully addresses challenges faced by multiple marginalized groups
		3	Experience meaningfully addresses challenges faced by one marginalized group
		2	Experience briefly touches on challenges faced by marginalized groups
		1	Experience does not touch on any challenges faced by marginalized groups
Effectiveness of fostering diversity and inclusion	The experience fosters diversity and inclusion [5].	5	User leaves the experience with a thorough understanding and respect for the challenges experienced by marginalized groups and can empathize with their struggles
		4	User leaves the experience with a new understanding of and respect for the challenges faced by marginalized groups
		3	User leaves the experience with a respect for the challenges faced by marginalized groups
		2	User leaves the experience with less respect for marginalized groups than when they entered
		1	User leaves the experience with animosity for marginalized groups
Effectiveness of empathy elicitation	The experience seeks to elicit empathy from those who do not face the issues associated with the subject matter of the experience [5].	5	Users leave the experience able to identify many of the challenges faced by marginalized groups, meet those challenges with empathy, and are committed to positive change
		4	Users leave the experience able to identify several of the challenges faced by marginalized groups and meet those challenges with empathy
		3	Users leave the experience able to identify a few of the challenges faced by marginalized groups, and recognizes the negative effects of those challenges
		2	User can recognize some of the challenges faced by marginalized groups, but faces those challenges with apathy
		1	User leaves the experience unable to recognize any of the challenges faced by marginalized groups
Change in POV	The experience imparts on the user another's POV [4].	Yes/No	
Conveyance of otherness	The experience conveys to the user what it is like to be different from everyone else [3].	5	User feels that they are different, feels marginalized as a result, and experiences significant challenges due to their otherness
		4	User feels different and feels marginalized
		3	User recognizes they are different and experiences minor challenges due to their otherness
		2	User recognizes they are different, but feels accepted and faces no challenges due to their otherness
		1	User feels like they are part of the popular societal group
Opportunities for reflection	The experience incorporates reflection in some way [3].	5	Experience is designed with thoughtful reflection in mind, and user is prompted to reflect multiple times within the experience
		4	Experience is designed with thoughtful reflection in mind, and user is prompted to reflect once within the experience.
		3	Guided reflection is prompted at the end of the experience
		2	User is prompted to reflect at the end of the experience
		1	Reflection is not incorporated into the experience, and unprompted
Level of immersion	The experience is immersive [3].	5	User feels completely immersed in the virtual world and their new identity
		4	User feels mostly immersed in the virtual world and their newly assigned identity, but is still reminded of the limitations of the virtual world

		3	User feels immersed in the virtual world, and takes to their newly assigned identity; user is keenly aware of the limitations of their virtual world
		2	User feels mildly immersed in the virtual world, and is aware they have been assigned a new identity
		1	User does not feel immersed at all in the virtual world, and does not feel as though they are assuming a new identity
Ease of use	The experience has a low barrier to entry (ease of use; adaptation to VR) [4]	5	Experience controls are intuitive, and users require no facilitator training to complete the experience. Within a few seconds the user is acclimated to the unfamiliar environment and its controls. Nausea is not induced in users.
		4	Experience controls are intuitive, and users require minimal training from the facilitator to complete the experience. Within a couple minutes users are acclimated to the unfamiliar environment and its controls. Nausea is induced in only the most sensitive of users
		3	Experience controls are unintuitive, but users only require minimal training from the facilitator to complete the experience. Users are acclimated to the unfamiliar environment in less than 5 minutes. Nausea is induced in those new to VR
		2	Users require some training from the facilitator, and a considerable amount of warmup time. Nausea is induced in all but those experienced with VR.
		1	Users require a significant amount of training from the facilitator and a significant amount of time to become accustomed to the unfamiliar environment. Experience induces nausea in most users
Level of user engagement	The experience is engaging [3].	5	Experience captures the attention and focus of the users and never loses it
		4	Experience captures the attention and focus of the user, and mostly holds it
		3	Experience captures the attention of the user, but user's attention and focus wanders occasionally.
		2	Experience occasionally captures the attention of the user but has a challenging time holding it.
		1	Experience does not hold the attention or focus of the user.
Accessibility	The experience is considerate of those with various disabilities [1].	Yes/No	

Table 1: Summary of Functional Requirements and Metrics (if Applicable)

#### Non-Functional Requirements

- Ease of deployment (Priority: 2)

#### Constraints

- Cost: No more than \$50 (Priority: 2)
- Incorporation of VR (Priority: 5)

## Technical Benchmarking

Once the design criteria were completed, the project team was able to move onto technical benchmarking, which involved researching existing products to see the relative advantages and disadvantages of current EDI training experiences. The three options researched were Axon Virtual Reality Empathy Training, the Canadian Centre for

Diversity and Inclusion (CCDI)'s eLearning Module, and Equal Reality. Axon and Equal Reality are VR experiences meant for first responder and workplace training respectively, while CCDI's eLearning module are a set of web-based courses available for all. A summary of these experiences is given in the table below:

VR Experience Specifications	Axon Virtual Reality Empathy Training	CCDI eLearning	Equal Reality
<b>Level of Interactivity</b>	Users can choose different dialogue options, different perspectives	Interactive through practical scenarios, tips, and quizzes	Users can choose different dialogue options, different perspectives
<b>Relatability to Marginalized Groups</b>	Primarily focuses on mental health issues, but also randomizes features such as race and gender in each scenario for bias prevention	Addresses challenges universally faced by marginalized groups	Focuses on race, gender, disability, and cultural inclusion, and bystander intervention in the workplace
<b>Effectiveness of fostering diversity and inclusion</b>	Users experience the same situation from multiple perspectives	Users explore various kinds of biases, and can apply different approaches to minimize these effects	Users experience the same situation from multiple perspectives to find the best outcome and address non-inclusive behaviour
<b>Effectiveness of empathy elicitation</b>	Users put themselves in the shoes of both the first responder and the person in crisis, reinforcing crisis intervention training principles	Practical scenarios are given, focusing on diversity and inclusion fundamentals, managing bias in hiring, and unconscious bias.	Focuses on empathy, awareness, and behaviour practice. Users are aware of changes they can make to find the most inclusive outcome
<b>Change in POV</b>	Yes	No	Yes
<b>Conveyance of otherness</b>	Prior to the experience, users are made aware of the mental health issues being presented	None, since this experience does not put the user in the shoes of another directly	Users are told to look in a mirror prior to the experience to see who they are
<b>Opportunities for reflection</b>	None	Opportunity for reflection given at the end of the experience	Opportunity for reflection given at the end of the experience, with users being given their performance statistics
<b>Level of immersion</b>	High, but some limitations are known (users cannot move around on their own)	No immersion due to no virtual world	High
<b>Ease of Use</b>	Robust training platform is easy to use. Headset only.	Website design is user friendly, easy to navigate	Made for Oculus Quest, but can be ran with or without a headset
<b>Level of User Engagement</b>	Experiences are ~10 minutes each	Course lasts about 30 minutes	Includes 3 experiences of ~5 minutes each
<b>Accessibility</b>	Not mentioned	100% accessible (compliant with web accessibility guidelines)	Designed with visually and physically impaired users in mind

Table 2: Technical Benchmarking of Current EDI Training Experiences

A quantified and prioritized scale of the three EDI training experiences was then created using a scale of 1-5 with 1 being low importance/impact and 5 being high importance/impact, based on the priorities and metrics outlined in table 1. Equal reality has the highest total score, which suggests that it is the experience that the project team should compare our product to going forward.

VR Experience Specifications	Importance	Axon VR Empathy Training	CCDI eLearning	Equal Reality
Level of Interactivity	3	4	3	4
Relatability to Marginalized Groups	4	4	5	5
Effectiveness of fostering diversity and inclusion	5	5	3	4
Effectiveness of empathy elicitation	5	5	3	4
Change in POV	4	5	1	5

Conveyance of otherness	<b>3</b>	5	1	4
Opportunities for reflection	<b>3</b>	2	3	4
Level of immersion	<b>3</b>	4	1	5
Ease of Use	<b>4</b>	4	5	4
Level of User Engagement	<b>3</b>	5	3	5
Accessibility	<b>1</b>	1	5	5
	<b>Total</b>	<b>163</b>	<b>112</b>	<b>167</b>

Table 3: Quantifying and Prioritizing Specifications based on Identified User Needs

## Target Specifications

After the list of design criteria and technical benchmarking were completed, the project team then moved to setting target specifications based on the ideal and acceptable values we wish to achieve in this project. The values are based on the metrics outlined in table 1.

Design Specification	Relation (=, < or >)	Ideal Value	Acceptable Value	Units	Verification Method
<b>Functional Requirements</b>					
Level of Interactivity	=	5	4	N/A	Analysis
Relatability to marginalized groups	=	5	3	N/A	Analysis
Effectiveness of fostering diversity and inclusion	<	5	3	N/A	Analysis
Effectiveness of empathy elicitation	<	5	4	N/A	Analysis
Change in POV	<	Yes	Yes	N/A	Test
Conveyance of otherness	>	5	3	N/A	Analysis
Opportunities for reflection	=	5	2	N/A	Analysis
Level of immersion	=	5	3	N/A	Test
Ease of use	<	5	3	N/A	Test
Level of user engagement	>	5	3	N/A	Estimate, check
Accessibility	>	100% Accessible	Accessible to most	N/A	Test
<b>Constraints</b>					
Cost	=	Free	No more than \$50	\$CAD	Estimate, check
Incorporation of VR	=	Yes	Yes	N/A	Final check
<b>Non-Functional Requirements</b>					
Ease of deployment	>	Users can easily access the device	Most users can easily access the device	N/A	Test

Table 4: Target Specifications

## Conclusion

This deliverable completes the define step in the design thinking process. A set of design criteria was developed based on the user needs, outlining key functional requirements, non-functional requirements, and constraints. Through the technical benchmarking process, competitors' products were observed to identify the relative advantages and disadvantages of current EDI training options and through this, a set of target specifications for the product was created. These criteria and target specifications set guidelines for the project team to follow to successfully move forward in the project as we begin to develop conceptual designs for the VR experience.

## References

- [1] Axon, "Axon launches Virtual Reality Suicide Empathy Training for Law Enforcement," *Axon Launches Virtual Reality Suicide Empathy Training for Law Enforcement*, 17-Sep-2019. [Online]. Available: <https://www.prnewswire.com/news-releases/axon-launches-virtual-reality-suicide-empathy-training-for-law-enforcement-300919315.html>. [Accessed: 05-Feb-2022].
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- [3] "CCDI - eLearning," *English*. [Online]. Available: <https://ccdi.ca/consulting/learning-solutions/elearning/>. [Accessed: 05-Feb-2022].
- [4] "Diversity inclusion training in virtual reality," *Equal Reality*, 10-Sep-2021. [Online]. Available: <https://www.equalreality.com/>. [Accessed: 05-Feb-2022].
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