**Deliverable Title:**

Deliverable C: Design Criteria and Target Specifications

**Group Members’ Name(s):**

Mustafa Warsame (300116411)

Youssef Yacout (300106440)

Rawan Al Sayed (300107944)

Shubham Ambalia (N/A)

Jackie Zhou (300197798)

**Date Deliverable Submitted:**

Saturday, Oct 9th, 2020

**Subject:**

GNG1103

University of Ottawa – Faculty of Engineering

**Table of Contents**

[**Introduction:** 3](#_Toc53247879)

[**Needs Statement and Design Criterion:** 3](#_Toc53247880)

[Table 1.0: Functional Needs Statement and Design Criterion 3](#_Toc53247881)

[Table 1.1: Non-Functional Needs Statement and Design Criterion 4](#_Toc53247882)

[**List of Metrics:** 4](#_Toc53247883)

[Table 2.0: List of metrics 4](#_Toc53247884)

[**Benchmarking:** 5](#_Toc53247885)

[Table 3.0: Properties of Benchmarking 5](#_Toc53247886)

[Table 3.1: Rankings and Results 5](#_Toc53247887)

[**Target Specifications:** 6](#_Toc53247888)

[Table 4.0: Functional Requirements 6](#_Toc53247889)

[Table 4.1 Non-Functional requirements 7](#_Toc53247890)

[Table 4.2 Design Constrains 7](#_Toc53247891)

[**Conclusion:** 7](#_Toc53247892)

# **Introduction:**

The goal of this deliverable is to identify the design requirements for the product,

centered on the client's interpretive needs. These needs will enable the design team to create an augmented reality application that will allow construction workers/engineers to learn more about their projects in a more immersive way. Design criteria produces a detailed description of what the product needs to be. The design criteria will be grouped into three separate categories which are Functional Requirement, Non-Functional Requirements, and Constraints.

# **Needs Statement and Design Criterion:**

## Table 1.0: Functional Needs Statement and Design Criterion

|  |  |  |  |
| --- | --- | --- | --- |
| **#** | **Needs Statement** | **Design Criterion** | **Importance** |
| **1** | The AR device makes it feel as if the building were there. | Allows for realism for the user | 5 |
| **2** | The interface teaches the user on how to use the device | Communication from the software to user | 5 |
| **3** | Lets the user view the dimensions of the building in 3D and 2D | Accuarate measurements | 4 |
| **4** | The interface prompt­s the user to do specific things (ie. click here to view this side of the building) | User communication | 3 |
| **5** | The interface should allow the user to pick between different languages | User Adaptability | 3 |
| **6** | The interface must allow the user to choose between the Mechanical, Electrical, etc view of the structure | Multiple viewing options | 4 |
| **7** | The interface must do what the user wants in the sense of viewing, controlling angles, etc. | Easy Communication between user and software | 5 |
| **8** | The interface should give exact measurements to prevent problems within the physical design | Provide safety | 5 |

## Table 1.1: Non-Functional Needs Statement and Design Criterion

|  |  |  |  |
| --- | --- | --- | --- |
| **#** | **Needs Statement** | **Design Criterion** | **Importance** |
| **1** | The interface is built for the use of any construction ­­­worker | User Adaptability | 4 |
| **2** | Compatible with IOS and Android devices | User-Compatibility | 5 |
| **3** | The interface must be easy to learn to allow the user with little technological knowledge to use. | User-friendliness | 5 |
| **4** | Can be used only on the project site | Safe from external uses | 1 |
| **5** | Can be used without connecting to the web | Accessible | 4 |
| **6** | Free of cost to all construction related workers | Affordable | 5 |
| **7** | Minimal technological requirements | Accessible | 4 |
| **8** | Platform can be viewed in both AR and VR interchangeably with a click of a button | User Convenience | 1 |

# **List of Metrics:**

## Table 2.0: List of metrics

|  |  |  |  |
| --- | --- | --- | --- |
| **#** | **The Metric** | **Unit** | **Importance**  **(Scale: 1-5)** |
| **1** | Average speed of AR simulation | Seconds (s) | 4 |
| **2** | Total cost | Canadian Dollars ($) | 1 |
| **3** | Minimal hardware requirements | RAM | 4 |
| **4** | RAM System | Gigabytes (GB) | 4 |
| **5** | Viewed without the web | N/A | 2 |
| **6** | Able to view dimensions | Centimeter (cm) | 3 |
| **7** | Accuracy | Bits | 3 |
| **8** | Can be viewed only at project site | N/A | 2 |
| **9** | Visualize buildings in 3D | N/A | 5 |
| **10** | Ability to view BIM (mechanical, electrical, structural, etc.) | N/A | 5 |

# **Benchmarking:**

## Table 3.0: Properties of Benchmarking

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Importance** | **Unity** | **Houzz** | **Augment** |
| **Cost** | 3 | Free | Free | Free |
| **Device usage** | 2 | Computer, Handheld devices | Computer, Handheld device, Headset | Computer, Handheld devices |
| **Virtual Interaction/Movement** | 4 | Handheld controls to move/view dimensions | Hands on device to move/rotate view | Handheld controls to move/view dimensions |
| **Application Stability/Immersion** | 2 | Weak stability, high jitters, low pixel ratio and at times disconnections | Exceptional stability, high jitters, average pixel ratio and often disconnections | High stability, low jitter, high pixel ratio and rare disconnections |
| **User friendly** | 4 | Yes | No | Yes |
| **Compatibility for different platforms** | 4 | iOS, android, windows, ps4, and 21 others | iOS, android, etc. | iOS, android, etc. |
| **Energy Consumption** | 2 | Low | High | High |

## Table 3.1: Rankings and Results

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Importance** | **Unity** | **Houzz** | **Augment** |
| **Cost** | 2 | 5 | 5 | 5 |
| **Device usage** | 3 | 4 | 3 | 2 |
| **Virtual Interaction/Movement** | 3 | 3 | 2 | 3 |
| **Application Stability/Immersion** | 1 | 3 | 5 | 5 |
| **User friendly** | 5 | 5 | 2 | 4 |
| **Compatibility for different platforms** | 4 | 5 | 4 | 4 |
| **Energy Consumption** | 2 | 4 | 2 | 2 |
| **Total** |  | 87 | 60 | 70 |

Therefore, after finishing the benchmarking, Unity is the beset software to look up to. It is also clear that the quality of our product must be high, and the price cannot be unreasonably high since all the softwares compared are free and successfully viewed AR to their users.

# **Target Specifications:**

## Table 4.0: Functional Requirements

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **#** | **Functionality** | **Unit** | **Importance**  **(Scale: 1-5)** | **Accuracy Value** |
| **1** | AR simulation accuracy speed | Time (s) | 5 | <1 |
| **2** | Accuracy of the dimensions of construction, mechanical, and electrical components | Centimeter (cm) | 5 | <1 |
| **3** | Checklist for all goals achieved by user | Pop-Up statement for completion | 3 | 90% |
| **4** | Accuracy of miscellaneous objects such as guides, labels, etc. | Centimeter (cm) | 4 | <5 |
| **5** | Clarity of learning goals, instruction, and guidelines | Checklist of all objects | 4 | 90% |
| **6** | All Construction, mechanical, and electrical components should comply with CCA color coding and naming | Visual Conformance | 4 | 100% |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **#** | **Metric** | **Unit** | **Importance**  **(Scale: 1-5)** | **Min Value** | **Max**  **Value** |
| **1** | Phone compatibility | IOS/Android | 4 | Yes | Yes |
| **2** | Total Tutorial time | Minu­­tes | 3 | 60 | 90 |
| **3** | English/French | N/A | 3 | Yes | No |

## Table 4.1 Non-Functional requirements

## Table 4.2 Design Constrains

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **#** | **Metric** | **Unit** | **Importance**  **(Scale: 1-5)** | **Min Value** | **Max**  **Value** |
| **1\*** | Total Cost | CAD $$ | 3 | 0 | 100 |
| **2\*** | To be used while standing for safety reasons | N/A | 5 | Yes | Yes |
| **3** | Free to use - Open Source | N/A | 3 | Yes | Yes |
| **4** | No interactions | N/A | 5 | Yes | Yes |

\*Our budget for the course is $100 and we cannot exceed the budget given.

\*The client was very specific the user should not be able to interact with elements inside the platform.

# **Conclusion:**

In conclusion, the functional and non-functional needs of the customer have been defined and given relative priority. In addition, non-functional needs are defined as marginally more essential than functional needs but are still needed for benchmarking purposes. From Table 3.0, it is observed that the highest score was 87, therefore we will need to score higher to meet all the requirements of the project.