Deliverable C:

Design Criteria and Target Specifications

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1.0 Introduction

This deliverable will be focusing on the design criterias for our project, which is based one the needs identification deliverable. We will point out the functional and non-functional criterias of our augmented reality application as well as a benchmark for different programs that could be used to complete the design. At the end of this deliverable, we'll have a better understanding of our target specifications.

2.0 Design Criteria

The following table shows each design criteria and their corresponding interpreted need. Each criteria can be described as either a functional or non-functional criteria. Functional criterias correspond to the basic behavior of our system while a non-functional criteria specifies *how* the system should work. (Reliability, usability are examples of non-functional characteristics)

Legend: *#5 - Blue; #4 - Green; #3 - Yellow; #2 - Red*

Interpreted Need	Design Criteria	Functional / Non-functional
The software allows the user to view 3D models of a building in AR	Image Resolution (DPI)	Functional
The software can handle complex designs	Lots of Memory (GB) Reliability Robustness Maintainability	Functional
The software is extremely affordable	Cost ($)	Non-functional

The software can be used by anyone regardless of technical expertise	Usability	Non-functional
The software is compatible with most mobile devices	Operating system (IOS and Android) Screen sizes (cm) Portability	Functional
The software is compatible with tablets and iPads	Operating system (IOS and Android) Screen sizes (cm) Portability	Functional
The software can be used without a VR headset or remote control	Phone-Only Functionality	Non-functional
The software works on-sight	Blueprints & Mapping	Non-functional
The software allows the user to view a design that has been developed without changing it	View-Only (with annotations)	Functional
The software's AR allows the user to overlay the virtual on top of reality	Phone-Only Functionality	Functional
The software captures the entire building from outside	OS compatibility	Functional
The software allows the user to select any specific room within the building	Usability	Functional
The software integrates with multiple disciplines ranging from architectural to mechanical, structural, and electrical	Reliability Robustness	Functional

The software contains 2D documentation	Memory Space Usability	Functional
The software represents the 3D models in first-person perspective	OS compatibility	Functional
The software is developed for a single user	Login System Integrity	Functional
The software is also suited for multiple users	Login System Integrity	Functional
The software allows the user to click on any specific object and learn about its characteristics	Engagement	Functional
The software allows the user to create annotations within the model	Engagement	Functional
The software works off-line	Reliability	Functional
The software gives the user the option to view a model remotely	Remote Viewing Mode	Functional

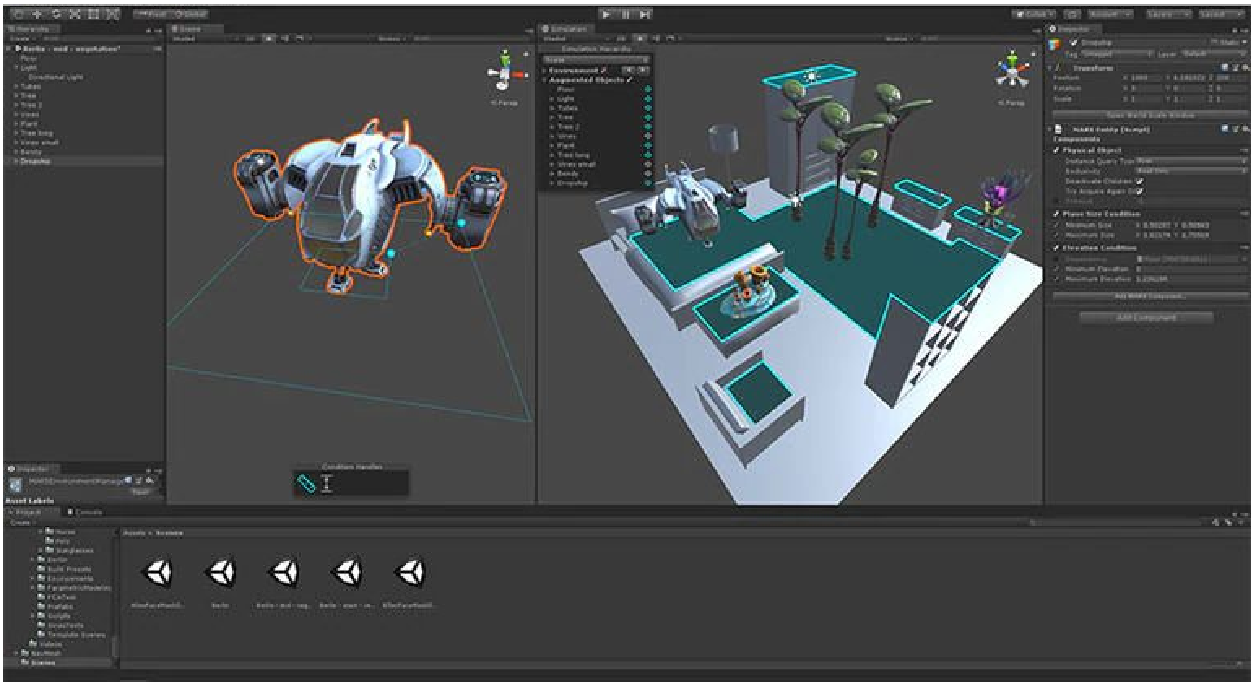
2.1 Constraints

The constraints established a set of important considerations that must be taken into account when producing the final solution. As the project is one of small-scale, a critical element to take into consideration is the cost budget of $100 that plays a role in any project-related purchases. The size of the application should be reasonable as the average cell phone has 3GB of DRAM (Dedicated Random Access Memory), as a result, a large app can limit the efficiency of the product. It is also important to decide whether buildings will be split into room or floor compartments as loading the entirety of the building would require a heavy memory capacity on the device. Additionally, the application is limited to phone-only compatibility as per the client's request. We are on a strict schedule as deliverables are submitted weekly, therefore, a time constraint must be considered to develop an efficient application.

3.0 Benchmarking

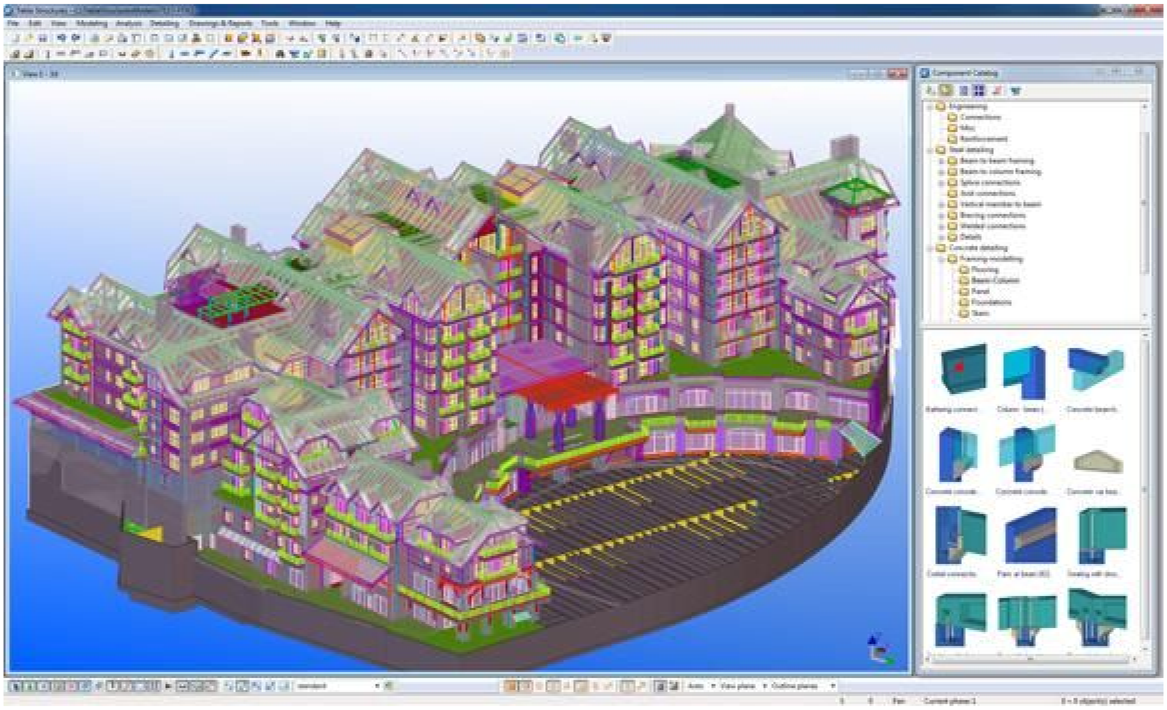
3.1 Unity

Unity is a crossed platform software that is mostly used for the production of video games. However, they allow you to create apps for industrial usage such as construction. With their amazing graphics features, it would allow us to create realistic designs with high precision. As of 2018, Unity had been used to create approximately half of the mobile games on the market and 60 percent of augmented reality and virtual reality content. The following is a sample image that shows whatUnity looks like during design procedure.



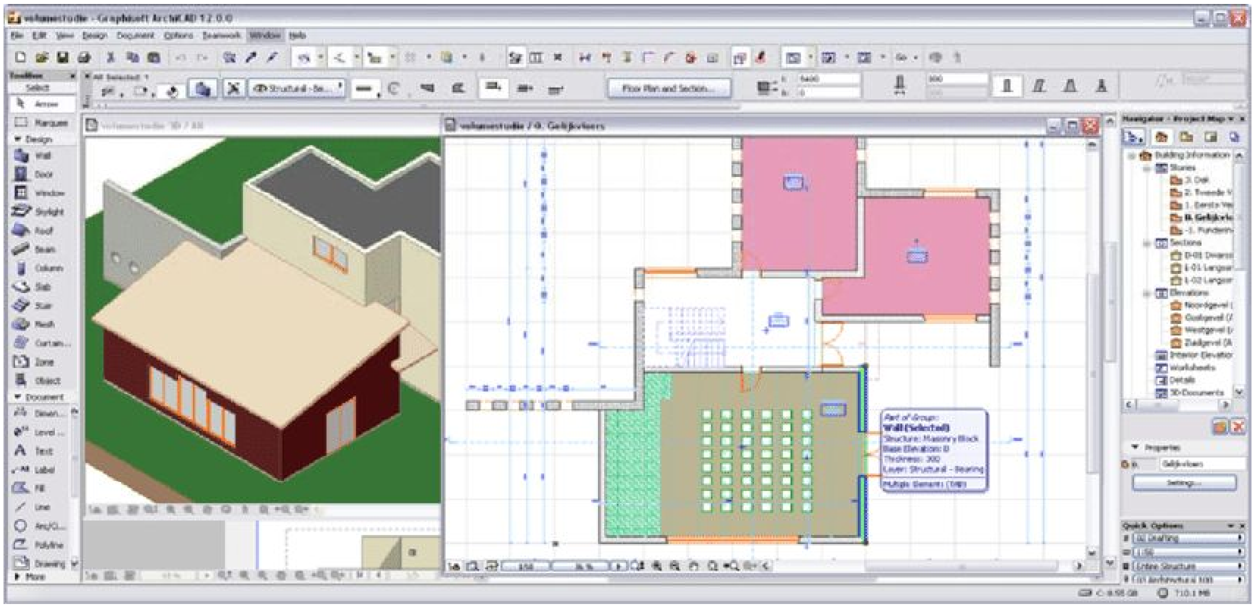
3.2 Tekla

Tekla Structures is a building information modeling software able to model structures with different kinds of building materials, which include steel, concrete, and glass. Tekla is a software that mostly specializes in industrial uses and is extremely simple to use. They also have partnered with trimble to create an easy to use phone application that allows different users to collaborate and view a 3D model of a project (trimble connect).



3.3 Archicad

ARCHICAD is an architectural BIM CAD software with 2D and 3D drafting, visualization and other building information modeling functions for architects Archicad is another popular product that is often used by industries to create precise designs of large infrastructures with photorealistic rendering. Just like Tekla, Archicad also provides a phone app that allows users to view a 3D model of their design remotely. (compatible with all devices or most at least)



The following table compares the benchmark of three popular programs that could be used for our project: Unity, Tekla and Archicad.

Criteria	Importance	Units	Unity	Tekla	Archicad
OS compatibility	5	Yes / No	Yes	Yes	Yes
Usability	5	1-5	5	5	5
Cost	4	$ CAD	Free	$6 000 annually	Free
Engagement	2	Yes / No	Yes	Yes	Yes
Phone-only functionality (For AR)	5	Yes / No	Yes	No - Only compatible with HoloLens for AR.	No
Reliability	3	1-5	5	3 - Allows the user to view different aspects of the project but since it works with the cloud, you need wifi to operate the latest version of files.	4

4.0 Conclusion

In summary, the realm of design criteria was inspected as we delved into the needs constructed from Deliverable B to extract the specific design criteria requirements. From the lecture component, it was learnt that the ideal method to approach design criteria is to establish three core categories: functional, non-functional, and constraints. Lastly, utilizing benchmarking, we were able to compare and contrast the competition platforms: Unity, Tekla, and Archicad, to use when it comes to constructing our application. Further, the design criteria deliverable has constructed a clear and concise scheme to approach the design concepts in detail for the next deliverable.

4.1 Client Meet Reflection

After the first client meet, we were able to develop a more precise idea of the targets and criteria of our project. We were provided with a detailed PowerPoint presentation that indicated the specific requirements that the client desired for the final solution. Additionally, from a short Q&A, we were able to extract answers to inquiries we had concerning particular technicalities such as what platform, movement with the application, and training tutorials. From this, we were able to branch off and communicate as a team to develop our design criteria and specifications. Further, the info provided from the client eased the process of understanding software technicalities and to comprehend particular features (both functional and non-functional) the client desired. For instance, on-site function, VR/AR capabilities, phone functionality, simplicity (i.e. no training), and aesthetics, are some of the many specifications we explored. Overall, the client meeting was the fundamental stepping stone to develop this deliverable in an ideal manner to further develop the ideal solution.