# Project Deliverable C:
# Design Criteria and Target Specifications  GNG 1103 – Engineering

Design Faculty of Engineering – University of Ottawa
Section B4, Group B6

1) Madison Bailey: 8684569
2) Ajay Mundi: 300022379
3) Fiona Chau: 300132210
4) Nabil Yonis: 0300135662
5) Bora Baskaya: 300143759
6) Andy Jin:

Introduction:

The various needs of the client need to be broken down by their respective design criteria in order to better understand how to solve each individual need. Program configurability refers to the programs ability to incorporate various video files and display them in an organized manner. For example, the program needs to be able to store multiple versions of the same video and display the one specifically chose whether it be french subtitles or english subtitles. Controller utilization refers to the program ability to incorporate the VR controller to help the user better maneuver through the videos. Hardware refers to specific hardware that must be accounted for, in our case that is the Oculus SDK. Online access refers to considerations that need to be made in order to make the videos available online.

Benchmarking allows the design team to better understand what is currently available in the market and how to make their specific product stand out amongst the crowd with a superior product. It also helps the team gain perspective on the typical prospective challenges associated in designing the product. In the case of this project, 4 approaches taken by different hospitals were analyzed with respect to hardware, utilization, accessibility, configurability, and base program specifications.

Finally, products constraints were analyzed to determine potential risk areas that could slow or halt progress on the project.

| # | Need | Design Criteria |
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| 1 | Easily accessible application with user-friendly menu and allows them to easily swap videos for other fields to use | Program Configurability |
| 2 | Program needs to be able to play 180 degree stereoscopic footage | Play two 180 degree stereoscopic video files, one in the left and one on the right |
| 3 | Headset's program can be used by client and patient interchangeably | Controller Utilization |
| 4 | Include option for age friendly menu options, positioning prompts | Program Configurability |
| 5 | Hardware: oculus SDK – oculus quest headset | Hardware |
| 6 | Bilingual Interface | Program Configurability |
| 7 | Customizable Configuration | Program Configurability |
| 8 | Pause, play, rewind, and forward controls | Controller Utilization |
| 9 | Realistic simulation in VR that is not intimidating to use | Controller Utilization<br>Program Configurability |
| 10 | Ability to add subtitles | Program Configurability |
| 11 | Accessible program that can be shared with patients family/general public | Online Access |

| Benchmarking | | | | |
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| | Sick Kids Hospitals | Sunnybrook Hospitals | Stanford Children's Health | Surgical Theater (Benioff Hospital) |
| Hardware | Google Cardboard/Oculus/HTC vive | Oculus | Oculus | HTC VIVE |
| Utilization | Introduces children to the operation/x-ray rooms, as well as treatments. Asks as a "tour" of their future | Management of stress and anxiety during their treatment sections. | Shows the procedures of treatments to patients and medical staff. | Shows children and their families the surgery process that the child will be undergoing to help explain the |

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| | treatment. | | | process. |
| Accessibility | General tour depending on what treatment the patient is undergoing, typically not shared with people other than child to ease anxiety in child. | General walkthrough of procedure depending on what treatment the patient is undergoing, and available to patients in study | Patient can control the virtual atmosphere(specific to patient and their treatment) | Specific to patient, and their treatment (such as surgery), not shared to educate, only educates immediate family/ parents. |
| Configurability | Unknown, program is mainly used for educational purposes to comfort children | Unknown program mainly used to ease the fears of children's for upcoming treatments and surgeries | Unknown program mainly used for patients and medical staff to show the details of illness and the treatment | Unknown, mainly used to show surgery procedure, control is given to doctors to zoom in and move around. |
| Base Program | 360 degree videos for virtual tours | 360 degree videos for virtual tours | 360 degree videos and simulations of illness and treatment procedure | 360 degree simulation of procedure (simulates body part to show surgery) |

| Design Criteria and Constraints | |
|---|---|
| Functional Requirements | Specific Hardware Usage<br>- Run on the oculus SDK – oculus quest headsets<br>Product Useability<br>- Program design is simple and fluid<br>- Easy to use for doctors and patients<br>Program Configurability<br>- Play two 180 degree stereoscopic video files, one in the left and one on the right<br>- Ability to upload/create new simulations<br>- Ability to add subtitles |

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| | - Ability to add prompts<br>Controller Utilization<br>- Ability to choose which simulation to run<br>- Ability for user to pause, play, rewind, and forward simulation<br>- Ability for user turn subtitles on/off<br>- Exit |
| Non-functional Requirements | Aesthetics of menu<br>- Include option for age friendly menu options, positioning |
| Constraints | Difficulty of programming high-level programs and functional operations |

Lifelong Learning:

Our group has three major gaps in knowledge relating to this project. The first gap is that given most of our group are in first year, we have not worked on a project of scale before. As a group we must apply the knowledge and skills we learned in the course and labs to complete the project efficiently. Another gap in our knowledge is that we are all new to the world of programming. We need to program within our limits, use the tools provided to us, and make an effort to learn the languages used to flesh our programs. The final gap in our knowledge is that none of us have worked in a hospital environment before. Identifying key needs from the client will allow us to design a suitable project for the course.

Conclusion:

The main needs of the client were separated into program configurability, hardware, controller utilization, and online access. Now that the needs have been classified, we know what must be taken into account when designing each function. This will both simplify the conceptual design and provide a skeleton that will be used to develop a detailed and accurate design. Benchmarking provided us with insight into how to tackle this task whilst also showing room to improve upon what has already been done and make our product stand out.

References:

Roehr, Bob, et al. “Virtual Reality Is Making Medical Care for Kids Less Scary and Painful.” Leapsmag, 25 Sept. 2019, https://leapsmag.com/virtual-reality-is-making-medical-care-for-kids-less-scary-and-painful/.

The Hospital for Sick Children. *Helping Sick Kids Have a More Positive Hospital Experience*, The Hospital for Sick Children, 24 Mar. 2017, http://www.sickkids.ca/AboutSickKids/Newsroom/Past-News/2017/helping-sickkids-positive-hospital-experience.html.

https://www.stanfordchildrens.org/en/innovation/virtual-reality

https://healthier.stanfordchildrens.org/en/stanford-virtual-heart-oculus-connect-4/?source=vrheart-banner

http://health.sunnybrook.ca/sunnyview/virtual-reality-health-care-hospital/