Project Deliverable C: **Design Criteria and Target Specifications**
GNG 1103 - Engineering Design

Introduction

After our client meeting with Tali Cahill, a nurse who works with opioid users at the Sandy Hill Community Center, our intentions for the project became clearer and we were able to put together a list of needs for our project users. The goal is to now translate these needs into design criteria that will be able to be applied to our prototypes/final product. We also have to establish our initial constraints, as well as some functional and non-functional requirements for our products. Lastly, we will evaluate the products that are already on the market or that have been made to set standards for our product and be able to overdo these existing products in terms of quality.

Initial Constraints

- Weight (lbs)
- Cost ($)
- Long battery life (lasts at least a day)
- Size (cm ・ cm ・ cm)
- Operating Conditions (°C and weather)
- Prototyping time

Requirements

Functional Requirements

- Efficiency (has to react in less than 1 minutes)
- Doesn’t depend on someone other than the user
- Transportable
- Contacts help
- Accurately detects an overdose
- Can effectively read blood oxygen

Non-Functional Requirements

- Aesthetically pleasing
- Product life (years)
- Failsafe (cancelling function)
- Discreet
- Customizable
- Comfortable

	Identified Need	Rank	Design Criteria	Criteria
1	Durable	3	Waterproof and not easily broken	-Has to hold up through everyday activities
2	User-Friendly	3	Can connect to apple and android phones	-The device should be compatible with other devices
3	Affordable	4	Costs less than $100	-Relatively cheap cost -Not too expensive for the average person
4	Discreet	4	Not noticeable and does not interfere with everyday tasks	-Must not be bulky, or very noticeable -Device cannot get in the way during common tasks
5	Accurate	5	Detects overdose and does not go off when there is no overdose	-Must function when a person is having an overdose -Must not call for help when a person isn't having an overdose
6	Response Time	5	Reacts to overdose within 1 minutes	-Must respond quickly
7	Automated	3	Updates information without prompt	-Must update information to the app
8	Failsafe	5	Has cancelling option	-Must be able to be cancelled if an overdose is not happening
9	Aesthetically Pleasing	4	Pleasing to the eye	-Must be able to wear everyday -Won't be bulky

10	Measures Respiratory Rate	2	Measures users respiratory rate	-Must measure respiratory rate to ensure proper breathing
11	Customizable	2	User can enter personal stats	-Must be able to be customized to the users specific needs
12	Battery Life	5	Can last at least 24 hours	-Must be able to last multiple days without having to be charged
13	Blood-Oxygen Level	5	Constantly measures blood oxygen levels	-Must measure blood-oxygen-level to ensure the functionality of the device
14	Administer Naloxone	2	Administers Naloxone	-Must provide the user with extra time for medical attention to reach them
15	GPS	4	Sends GPS location of the user to authorities upon activation	-Must send location for medical attention to reach them

Benchmarking

Criteria Category	Oxalert Epo	Carnegie Mellon University	Vancouver
Image		 (in prototype but resembles smartwatch)	
Everyday wear	No	Yes	No
Durability	Not stated	Same as smartwatch	Fragile
Reaction	Arouses them to breath	Triggers alarm, administers naloxone and contacts authorities	Alerts authorities

Response time	Immediate	30 seconds	Not stated
Administers Naloxone	No	Yes	No
Price	$1,000	Not stated	Less than Naloxone

For now, the best existing product seems to be the watch that was designed by Carnegie Mellon University.

Our Technical Specifications:

- **Price:** 100$ CAD
- **Dimensions:** not decided yet but small (discreet)
- **Durability:** battery life for at least a whole day
- **Production Time:** approximately two months
- **Reaction Time:** under 30 seconds

Discussion

We realize that it will be very challenging to satisfy every criterion that is related to our customer needs. That is why we want to establish a priority system, where we will satisfy our criteria depending on the need's importance (see Deliverable B: Needs Identification). We have also noticed, with the benchmarking, that the products that already exist are pretty similar: they're all hand/wrist-based devices. We want to do something different and less invasive, but just as effective.

Conclusion

One of the biggest challenges we will face is that we will have to acquire all of the technical skills (coding, circuits, etc.) to be able to make a well functioning prototype. We hope to overcome this challenge by educating and learning about these skills early on and do a lot of research to find resources that can help us through our self-learning process. With the establishment of our design criteria, we now have a clearer idea of what our product will be and what criteria we will prioritize when designing our product.