

Project Deliverable B: Needs, Problem Statement, Metrics, Benchmarking and Target Specifications

GNG2101 [A03] – Professor Hanan Anis

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List of Acronyms

| Acronym | Word |
|----------------|-----------------------|
| OFP | Ottawa Foyers Partage |
| | |
| | |
| | |
| | |

1 Introduction

Team 2 interviewed Fran and the OFP, compiling an extensive list of client statements, which were in turn converted into needs and prioritized. Meeting with Fran and her support staff allowed the team to better empathize with their situation. Team 2 then devised the following problem statements in hopes of creating a focus for the project:

The client, Fran, requires a set of devices that can discreetly and effectively communicate, thus, notifying her support staff through voice activation. The device should be low maintenance and function over a variety of distances.

Based on the problem statement above, a list of metrics, specifications and benchmarked items were created, thus, orientating the team for the following weeks to come.

2 Client Needs, Need Prioritization and Problem Statement

2.1 Client Needs and Need Prioritization






Interviewing Fran and the OFP, allowed Team 2 to compile the clients statements as presented in **Table 1** below. Some main points from the discussion revealed that they had previously implemented a system consisting of a doorbell to solve the following problem: Due to Cerebral Palsy, at nighttime Fran is unable to project her voice in a manner that would effectively call the support staff. However, due to further issues with dexterity, the doorbell was found to be ineffective. And so, **Table 1** converts Fran and her staff’s statements into needs which are then ranked/prioritized in **Table 2**.

| Need Number | Client Statements | Needs |
|-------------|--|--|
| 1 | Has Cerebral Palsy, voice doesn't travel far, needed for nighttime | Device is sensitive to sound/voice, but is quiet |
| 2 | Need something for initial call | The device simply notifies the staff - no complicated commands |
| 3 | The staff don't have particular equipment | The device works independently of external equipment |
| 4 | Lives with other roommates | Device interacts solely with the client and her staff |
| 5 | Staff must be able to hear her, | The device effectively notifies the staff |
| 6 | No preferred Language, uses "help" and "hey" to signal for help. | The device recognizes the words "hey" and "help" |
| 7 | Prefers to have the notification system on the staff at night | The device is wearable and portable |
| 8 | One-night staff | The device can be operated by one person alone |
| 9 | Sounds are scary, lights are preferred | The device uses lights to notify clients |

| | | |
|----|--|--|
| 10 | No battery and charging. Wall outlet connection (For main device). | The device has to be plugged into the wall, limits any complications with battery and charging |
| 11 | Connection to the internet is fine | The device can be connected to the internet |
| 12 | Prefers notification by light and can't physically use button | Device needs a light so Fran can be noticed help is coming |
| 13 | Does Not require any work on the staff part (additional learning) | Device needs to be easy to use and multiple different workers come in and out |
| 14 | Tissue box size to fit on side table | The device is small, similar to a tissue box, and fits on a side table. |
| 15 | Wall mounted or on side table | Device needs to be size of tissue box if on side table, device on wall mount has to be light |
| 16 | Bright hot pink | Device is hot pink |

Table 1: Client Statements to Needs

Ranking system: The needs are ranked on a scale of one (1) to five (5). One (1) is denoted as the most important needs, while, five (5) is the least important of the needs. The ranks are also colour coded as follows:

1:  2:  3:  4:  5: .

Team 2 denoted the needs relevant to the functionality as or closer to one (1), because, those are the needs that affect how effective the device will be. For example, the keys used to operate the device must be “hey” or “help”, as the letter “h” makes a sound distinct to a crumble or moan. The two words were also specially requested for by Fran and the staff. Furthermore, since Fran’s safety may greatly depend on the device functioning, it is of the highest value and priority to the product’s design process. The needs ranked as five (5) relate more to the appearance and aesthetics of the product. For example, Fran mentioned that she wanted the device to be hot pink. Since,

colour can (typically) be chosen regardless of the particular design of the product, it was pushed to be lower on the list. **Table 2** contains the needs list ranked and color coded.

Legend: 1: ■ 2: ■ 3: ■ 4: ■ 5: ■.

| Rank | Need |
|------|---|
| 1 | Device is sensitive to sound/voice, but is quiet |
| 1 | The device simply notifies the staff - no complicated commands |
| 1 | The device works independently of external equipment |
| 1 | The device effectively notifies the staff |
| 1 | The device recognizes the words “hey” and “help” |
| 1 | The device can be operated by one person alone |
| 1 | The device has to be plugged into the wall, limits any complications with battery and charging |
| 1 | Device needs to be easy to use and multiple different workers come in and out |
| 2 | Device interacts solely with the client and her staff |
| 2 | The device is wearable and portable |
| 2 | The device uses lights to notify clients |
| 2 | Device needs a light so Fran can be noticed help is coming |
| 3 | The device is small, similar to a tissue box, and fits on a side table. |
| 3 | Device is hot pink |
| 4 | Device needs to be the size of a tissue box if on a side table, device on wall mount has to be light in weight. |
| 5 | The device can be connected to the internet |

Table 2: Need Prioritization

2.1.1 Problem Statement

By analyzing the ranked needs in **Table 2**, Team 2 formulated the following problem statement:

The client, Fran, requires a set of devices that can discreetly and effectively communicate, thus, notifying her support staff through voice activation. The device should be low maintenance and function over a variety of distances.

3 Metrics

Based off of the needs described in **Table 2**, a list of metrics was compiled into **Table 3**. The metrics were chosen in a manner that would allow the Team to accurately quantify a given trait. For example, the unit chosen for mass/weight were different depending on the type of device, in other words, the lighter of the two were assigned grams whilst the other was denoted as kilograms. Speaking to Fran and her staff helped Team 2 consider factors that they would have normally overlooked, such as, the sound sensitivity and light indicator brightness.

| Metric Number | Metric | Unit |
|---------------|-----------------------------|------------------------|
| 1 | Total Mass (Main device) | kg |
| 2 | Total Volume (Main device) | cm ³ |
| 3 | Total Mass (Staff Device) | g |
| 4 | Total Volume (Staff Device) | mm ³ |
| 5 | Cost | CAD\$ |
| 6 | Power source (Main Device) | Amps, volts, kilowatts |
| 7 | Power source (Staff device) | Amps, volts, watts |
| 8 | Sound sensitivity | dB |
| 9 | Indicator sound volume | dB |
| 10 | Notification Duration | s |
| 11 | Light indicator brightness | cd |

Table 3: Metrics Table

Whilst, relating **Table 3** to the needs in **Table 1** it was found that not all of the needs had an associated metric. This was due to the nature of the need described by the client. For example, the client expressed that they would like the device to be hot pink in colour, because this is a need

that related to the aesthetics of the device, there was no quantifiable metric found for it. The metric assigned to each need can be found in **Table 4**.

Legend: 1: ■ 2: ■ 3: ■ 4: ■ 5: ■.

| Rank | Need | Metric | Units |
|------|---|--------|----------------------|
| 1 | Device is sensitive to sound/voice, but is quiet | 8 | dB |
| 1 | The device simply notifies the staff - no complicated commands | 9, 10 | dB, s |
| 1 | The device works independently of external equipment | | |
| 1 | The device effectively notifies the staff | 9, 10 | dB, s |
| 1 | The device recognizes the words “hey” and “help” | 8 | dB |
| 1 | The device can be operated by one person alone | | |
| 1 | The device has to be plugged into the wall, limits any complications with battery and charging | 6 | Amps, Volts, Kw |
| 1 | Device needs to be easy to use and multiple different workers come in and out | | |
| 2 | Device interacts solely with the client and her staff | 9 | dB |
| 2 | The device is wearable and portable | 3,4 | mm ³ , g |
| 2 | The device uses lights to notify clients | 11 | cd |
| 2 | Device needs a light so Fran can be noticed help is coming | 11 | cd |
| 3 | The device is small, similar to a tissue box, and fits on a side table. | 2 | cm ³ |
| 3 | Device is hot pink | | |
| 4 | Device needs to be the size of a tissue box if on a side table, device on wall mount has to be light in weight. | 1,2 | cm ³ , kg |
| 5 | The device can be connected to the internet | | |

Table 4: Need Prioritization and Related Metrics

4 Benchmarking

4.1 BoomER Emergency Response System

The BoomerAlert medical alert system is a hands-free, two-way voice communicator pendant (worn around the neck or as a wristband), that is also water-resistant such that it can be worn in the shower or bath. It is designed to detect falls using motion sensors and proprietary algorithms. The boomer alert pendant is free, but the system has a monthly operating fee of \$69.99



Figure 1: Boomer Alert Device

4.2 SecurMEDIC

SecurMEDIC is a 24-hour alarm monitoring system consisting of, a two-way voice communicator and an emergency button with an optional fall detection system. The fall detection system uses sensors to detect a fall and contact help. Pushing the emergency button gives you a live link to a 24-hour monitoring centre, the monitoring centre will also contact preselected contacts depending on the specific situation. Without the fall detection system, SecurMEDIC costs

\$188.88 to purchase and has a monthly monitoring fee of \$24.88. With the fall detection system, it costs \$238.88 to purchase and has a monthly monitoring fee of \$30.88.



Figure 2: SecurMEDIC Device

4.3 Philips Lifeline

Philips offers a variety of options:

The first system is the HomeSafe. This system works using a pendant that can be worn around the wrist or as a necklace, and an in-home communicator. After pressing the button on the pendant, the in-home communicator contacts a monitoring centre. Next, they also offer HomeSafe with an additional AutoAlert system, that allows for automatic fall detection. The Phillips HomeSafe costs \$29.95 a month and has a \$50 activation fee, the Phillips HomeSafe with AutoAlert costs \$44.95 a month and has a \$50 activation fee.



Figure 3: Philips HomeSafe (left) and Philips HomeSafe with AutoAlert (right)

Lastly, there is the GoSafe which is a pendant that allows for family, friends, or caregivers to keep track of the user's location, as well as, having fall detection and a 2-way voice communicator. The Philips GoSafe costs \$49.95 a month and has a \$99.95 activation fee.



Figure 4: Philips GoSafe

4.4 Doorbell

Initially, Fran used to use a doorbell, that had been mounted to her bed, to notify her staff for assistance. This is no longer an option as Fran's mobility and dexterity has decreased.

5 Specifications

Unfortunately, Team 2 was unable to find any metrics, such as, dimension or weight from benchmarking. However, based on the clients' needs and the team's pre-existing knowledge the following specifications were determined. As the team develops the product, they will need to adjust the list in-order to design the most effective device.

Device Type: Night Call Bell (Main device)
 Device Style: Wall mount
 Dimensions: Height = 1", Width = 2", Length = 2"
 Weight: 125g - 250g
 Colour: Pink
 Power: 110V

Device Type: Night Call Bell (Staff device)
 Device Style: Clip on
 Dimensions: Height = 0.25", Width = 1"; Length = 1"
 Weight: 30g - 50g
 Colour: Pink (or any)
 Power: Rechargeable

| Metric number | Metric | Unit | Values |
|---------------|-----------------------------|--------------------|-------------------|
| 1 | Total Mass (Main device) | kg | 0.25 - 0.50 |
| 2 | Total Volume (Main device) | cm ³ | 65.5 |
| 3 | Total Mass (Staff Device) | g | 30 - 50 |
| 4 | Total Volume (Staff Device) | cm ³ | 4 |
| 5 | Cost | CAD (\$) | 100 |
| 6 | Power source (Main Device) | Amps, volts, watts | 15, 110-120, 1800 |
| 7 | Power source (Staff device) | Amps, volts, watts | 15, 110-120, 5 |
| 8 | Sound sensitivity | dB | 30 |
| 9 | Indicator sound volume | dB | 60 |
| 10 | Notification Duration | s | 30 |
| 11 | Light indicator brightness | cd | 110 |

Table 5: Metrics and Specifications

6 Conclusion

The meeting with Fran and the OFP provided team 2 with the insight needed to finalize the standards needed for the product. They expressed their concerns to the team, highlighting that due to her Cerebral Palsy, Fran has difficulty projecting her voice at nighttime. Team 2 then converted their statements to needs. The needs were then ranked, as seen in **Table 2**. The top concerns were that the device be voice activated and a light to indicate that help is coming. Meeting with Fran and her caretakers allowed the team to establish a firm understanding of how to begin developing the device.

7 Bibliography

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