Université d'Ottawa University of Ottawa

uOttawa

L'Université canadienne
Canada's university

GNG2101[D] - Introduction to Product Development and Management

Needs, Problem Statement, Metrics, Benchmarking and Target Specifications

Project Deliverable B

Group 2.4
January 23rd, 2022

Mike Sheppard, 300166172
Shambhavi Asthana, 300144663
Grace Buchardt, 300236838
Jacob Troop, 300186278

Table of Contents

1. Introduction

The clients for this project are the Tetra Society of North America and their focus is on providing innovative solutions for people with disabilities so they can overcome environmental barriers, have greater independence, improved quality of life, and experience more inclusion. The first client meeting provided plenty of information about the client's needs and the importance of the various aspects of the tablet holder. In order to meet the needs of the client, we must provide a prototype for a tablet holder that attaches to a wheelchair tray. The prototype must accommodate users with a large range of physical and be accessible for users with a very limited range of motion. In this deliverable, our group was able to take the information given to us by the client during meet 1 and use it to create a list of interpreted needs, a problem statement and a list of metrics. We then had to benchmark to further our understanding and be able to create target specifications.

2. Client Statements and Observations

- Company is a mobility clinic: wide variety of applications
- Assumption: yes the client has used a tablet holder and found it unsatisfactory
- The user is able to play games on the tablet
- Really limited: client said "can't reach far enough to use the tablet", so they want it closer to themselves for easier access to the screen
- Type of wheelchair: generalized. Should be compatible with most, if not all, wheelchairs
- Tablet could have case potentially, or not
- Stored usually in the case on the back - could be more accessible (usually need a caregiver to pull it out and install it on the wheelchair)
- All electrical components need to be on/in the wheelchair tray: no loose wires or mechanisms hanging out
- Power source must be independent of the wheelchair and should last around a day. Power will only be used when the client has to raise/lower the tablet from its hidden position. *Client will answer approximately how many times someone would need to perform the action.*
- Used mainly indoors
- Tray of the team's choice is purchased by the client, not a part of the given budget
- Usually trays for children (in schools, for example)
- The user should not have to reach for tablet holder
- Ability to fit largest tablet possible (client says the mechanism can be adjusted to change size, so while it would be nice to account for, it's not necessary)
- The tablet holder's height and angle should be adjustable, preferably automated in some way

- Be cautious of clearance space. *Client will give us approximate measurements.*
- The mechanism should all be internal. Nothing outside the tray
- Client highlighted maximum flexibility, versatility and reliability along with the use of the simplest mechanisms possible

3. Interpreted Needs, Requirements & Constraints

3.1 Interpreted Needs

Need	Group	Interpreted need	Priority
1	Wide variety of users	The tablet holder can be used by anyone in a wheelchair who is able to use their arms and hands	5
2	Ability to move	Some users' range of motion is constricted causing them to not have the ability to reach the tablet. The tablet holder will be able to move.	5
3	Easy to access	Tablet holder is easy for users to access with a simple push of a button	5
4	Type of wheelchairs	This device will be able to work on any type of wheelchair	5
5	Location	Ability to be used mainly indoors and sometimes outdoors	4
6	Material	Water resistance, stain proof, durable, light weight	5
7	Tablet size	Will be able to fit all tablet sizes	5
8	Hidden wires	Wires must not be visible (inside the tray)	4
9	Ability to be adjusted	The tablet holder will be able to rotate, move up and down, and forward and backwards	4
10	Power source	Will be independent from wheelchair and has the ability to last a day	5
11	Storage	Ability to be stored with the tray on the back of wheelchair	4
12	Cost	The tablet holder affordable the majority of users	5

13	Color	The tablet holder can come in any color	1
14	Thickness of tablet holder	The tablet holder should have clearance space from users legs when not in use	5

3.2 Requirements and Constraints

Functional requirements:

- Accommodate all tablet sizes
- Easy storage with wheelchair tray
- Easily accessible - preferably electronic or automated (for potentially limited movement)
- Adjustable height and angle
- Independent power source
- Must not take up table space

Non-functional requirements:

- Aesthetics (visual)
- Outdoor use

Constraints:

- Cost ($100, not including tray)
- All mechanisms or electrical components must be internal (hidden)
- Tablet must not be far from the user
- Clearance space below the tray is limited and must be taken into account

4. Problem Statement

The goal is to design a tablet holder that can be attached to a wheelchair tray. The product must be flexible, versatile, reliable and above all else, accessible.

5. Metrics and Target Specifications

Requirement or Constraint	Description	Relations (<,>,=)	Specification
Accommodate all tablet sizes	The prototype must be scalable to fit all standard tablets but for our specific prototype it will be designed to fit a standard ipad	=	32.7 cm x 21.6 cm x 0.635 cm
Easy storage with wheelchair tray	Most wheelchairs have a bag or storage compartment attached to them for the tray and the tablet holder must also be able to fit inside it	<	60 cm x 55 cm x 4 cm
Easily accessible - preferably electronic or automated (for potentially limited movement)	The user may possibly have a very limited range of motion and therefore the tablet holder must allow the user easy seamless access to their tablet	N/A	N/A
Adjustable height and angle	The height and angle that the tablet is held at must be easily adjustable to the preference of the user and must remain in that position under reasonable applied force on the tablet	<	30 cm up, 180° in all directions
Independent power source	The tablet holder cannot rely on power provided from the wheelchair and must be capable of operating independently for at minimum an entire day without connection to an external power source	<	88Wh
Must not take up table space	The tray on a wheelchair is used for many different purposes and it is important to the user that neither the tablet or holder occupy tray space when not in use	<	60 cm x 55 cm
Aesthetics (visual)	Optimally the tablet holder would not be visible when not in use and when it use it should be aesthetically pleasing	N/A	N/A
Material	The holder should still be operational in	=	Soft plastic,

	an outdoor environment under common weather conditions (Rain, Snow, ect…), must be durable		Ethylene Vinyl Acetate, Aluminum handle
Weight	The tablet holder must be lightweight	>=	84.9 g
Cost	The cost of the tray will be covered by the client and not included in the budget	<	$100
All mechanisms or electrical components must be internal	This is important for safety reasons as well as simplifying weather proofing and improving overall appearance	N/A	N/A
Tablet must not be far from the user	All users must be able to reach the tablet even with very limited mobility, the tablet holder will be able to move forward and backwards	p1<=x<= p2	From center of tray; -27.5 cm <=x<= 27.5 cm
Clearance space below the tray is limited and must be taken into account	The device must be able to fit between the tray and the clients legs and the limited clearance must be accounted for in any motion from the device	>	10 cm
Easily cleaned and stain proof	The prototype must be able to withstand everyday wear and tear, be simple to clean and maintain and be made from stain resistant materials	N/A	N/A

6. Benchmarking

*We ranked each product according to which one would be the best in terms of our target specifications, this will help us determine which product we want ours to resemble the most. Hierarchy: green (best), orange, yellow, red (worst)

	Similar Products				
Specification &	**AboveTEK**	**Gooseneck Woleyi**	**Prop 'N go Slim**	**Atoptek**	**Gooseneck Lamicall**
Wide Variety of Users	Can fit variety of sizes, however is slightly loose	Can fit variety of sizes, secure	Holds tablet properly, but does not keep in place with movement	Holds tablet very well	Holds somewhat well
Easy to Move	Can adjust easily	Adjusts very easily	Not very adjustable	Not very adjustable	Somewhat adjustable
Material (Waterproof/ Stain proof/ lightweight)	No, slightly light	No, not light	No, not light	No, slightly light	No, not light
Can be stored easily	Yes	Yes	No	Yes	Yes
Power source	Wire is out Holder doesn't require charge	Wire is out Holder doesn't require charge	Wire is out Holder doesn't require charge	Wire is out Doesn't require charge	Wire is out holder doesn't require charge
Cost	$25.99	$38.99	$54.99	$25.88	$38.38

Picture					
					

Using the aforementioned ranking system, we have seen that the product we would like ours to resemble the most is *Gooseneck Woleyi*. This is something we will take into consideration when we reach the brainstorming stage.

7. Reflection and Conclusion

The client meeting was successful, and offered further insight on how to proceed with the project. Though the meeting was held with a representative for our client rather than the client themselves, we were able to gather important information, such as the range of motion of our client, our budget, what to design specifically, and where our goals should be.

The client meeting made our team aim less to design an entire device that includes the table and armature, but instead to aim for something that can move our client's tablet. The information we have yet to fully define would be the specifications on how much space our client needs for clearance space under the tray, and the amount of times someone would need to raise and lower the tablet.