

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

Group 25

Submitted by:
Francois Richard
Ersan Shimshek
Devin Capaldi
Jerry Nguyen

Abstract

For disabled people going out is a very tiring experience. One of the things that make going out a tiring experience, is the lack of available change tables for older people. This is the issue the client asks to be solved. This report details the initial design process. In it, the client's statements are taken and processed into prioritized needs. These needs are then developed into metrics to be used to measure the success of potential ideas. It was found that the main focus for the design of the portable change table is that the table needs to be compact, portable, and lightweight. Also detailed in this paper is Benchmarking that was done about similar products on the market. Important ideas were able to be taken from this as we got an idea of the average pricing as well as the average weight for these types of products.

Table of Contents

	Page #
1.0 Client Statements	3
2.0 Interpreted Needs (Translated Needs)	4
3.0 Customer Needs	5
4.0 Problem Statement	7
5.0 Metrics	8
6.0 Benchmarking	9
7.0 Target Specifications	10
8.0 Reflection	11
9.0 Reference	12

List of Tables

	Page #
Table 1.1 List of client statements.	3
Table 2.1 List of interpreted needs.	4
Table 3.1 List of customer needs.	5
Table 5.1 A list of focused metrics for the product.	8
Table 6.1 Benchmarking of similar and related products.	9

1.0 Client Statements

During the interview the client was asked a list of questions about what they would like from the project and about the problem the project is designed for. The table below is a list of the relevant answers they gave us.

Table 1.1 List of client statements.

Client Statements
"Something under a hundred would be nice"
"Easy to carry and not too bulky. I kinda envisioned—you know how camping chairs fold out—maybe some kind of feature like that or something like patio lounge chairs that fold up into like a tri-fold. So do it like that or fold the way a camping chair folds."
"The more compact the better, but not more than like 10 pounds. Something you could carry with one hand. I don't know like 5 to 7 pounds"
"about two feet by ... five feet long" "about 24 to 30 inches high"
"A privacy curtain would be ideal"
"He's 16 now I would imagine he's probably gonna grow at least a little bit more, so...some flexibility for it to be longer would be good and be able to tolerate a bit more weight"
"It might need to be a little bit height adjustable but I don't know if that's feasible""about 24 to 30 inches high"
"We go out day camping in the summer months so that's a spot where it would come in handy"
"some way to allow caregivers to easily turn him on his side...like slippery fabrics...it doesn't have to be built in to the change table"
"not the only caregiver"
"something...like some kind of belt, even like Velcro, around the waist"
"It does not need to be [cushioned] as long as it's not poking him"
"really quick not more than a minute" (in regards to set up time)

2.0 Interpreted Needs (Translated Needs)

A list of answers and statements were recorded from the client interview. The table below shows a list of translated interpreted needs, that cuts down to the important specific information needed.

Table 2.1 List of interpreted needs.

Interpreted Needs
Desired cost, under \$100
Looking for a foldable and easy to carry table with similar features to a camp or patio lounge chair
Approximately 5 lbs to 7 lbs and no more than 10 pounds. Easy to carry with one hand. Compact.
Dimensions of device (full size open) approximately 2' by 5',
Something to block off the person being changed from sight
Needs to support more than 100 lbs
Device needs to be approximately 24" to 30" high, height adjustability would be preferred
The device should work in an accessible bathroom or outside
Smooth/glossy fabric either attached or attachable to the top of the device
Adjustable height for caregivers' comfort
Some kind of thing that is able to secure the user
Comfort is a priority
Quick to set up

3.0 Customer Needs

During the interview, the client provided his/her needs for this specific portable change table. The table below shows the translated and prioritized needs for the customer that the team obtained from the interview.

(Note: for “Importance” ranking, 5 is the most important and 1 is the least)

Table 3.1 List of customer needs.

#	Customer’s Needs	Importance
1	The change table is compact	5
2	The change table is portable	5
3	The change table is Durable	5
4	The change table is made of Non-stick material	3
5	The change table is made of Comfortable material	3
6	The change table supports a 16 year old boy (support a weight of 100 pounds)	5
7	The change table is big enough to support person (minimum of 5ft long and 2ft wide)	5
8	The change table is lightweight (a maximum of 10 pounds)	5
9	The change table is cheap (a maximum of \$100)	1
10	The change table can provide privacy	1
11	The change table can be set up quickly (1 minute is the max)	2
12	The change table can be cleaned/sanitized easily	3
13	The change table is ergonomic for user	3
14	The change table is usable multiple environments	4

Important Reasoning

- #1 Client should be able to hold the product in a simple and comfortable fashion. Or should be able to fit in a car or a bag.
- #2 Client needs to be able to easily carry the product anywhere. Because the user plans to take the product with him/her.
- #3 The change table should be able to withstand the user's weight and not fail under loading, which could result in injury. Additionally, any kind of abrupt movement should not break the product
- #4 The material should not cause the user discomfort and should not ruin the user's clothing. However, this is a secondary priority.
- #5 The user should be able to rest on comfortable material, however this is not as important as long as the job is done and the user has changed quickly.
- #6 The weight parameter is important because the change table must be able to undergo the user's full body weight without breakage.
- #7 The table has to be big enough so that the user could rest head to toes without and with sufficient leg room. This is important because caregivers might have issues changing the user.
- #8 The client should be able to carry the product anywhere, this is very important because the client might need to cover large distances.
- #9 Although the price is relatively important, it does not fluctuate greatly and the product still remains relatively affordable.
- #10 Although the privacy of the user is important, it is not a priority as the user could easily find a secluded area for usage.
- #11 The one minute assemble might be too quick, a larger time will not affect the quality of the product, especially if the deviation is only a few minutes.
- #12 The table might be in constant use, which could result in dirt, stains or sweat remaining on the product surface. This could lead to the product releasing unpleasant odors and being unhygienic in general. However since the user is atop the product for a short period of time, it is not such a big issue.
- #13 The product should have a design that is user friendly, that easily assembles and is mechanically functionable.
- #14 The product could be used indoors or outdoors and in any kind of whether therefore it should be able to stand on any kind of terrain and should not be ruined under climate conditions.

4.0 Problem Statement

People with physical disabilities that prevent mobility can often have issues with changing themselves. Design a portable change table that is compact, lightweight, ergonomic and provides privacy that can be used by a caregiver to assist a person with mobility issues in changing themselves. The design can be used both indoors and outdoors.

5.0 Metrics

A list of metrics is crucial for the process of designing a product. The team conducted the client and came up with a table of metric values below that contains each metric address, and whether they are functional/non-functional or constraint.





Table 5.1 A list of focused metrics for the product.

Metric	Unit	Need	Functionality/ Constraint
Weight	Pounds (lb), Kilogram (kg)	8, 2	Constraint
Height	Feet (ft), Metric (m)	13	Functional
Size of Table Top Width	Feet (ft), Metric (m)	7	Functional
Size of Table Top Length	Feet (ft), Metric (m)	7	Functional
Collapsible	Percentage (%)	1, 2	Functional
Set up Time	Minutes (mins), Seconds (s)	11	Non-Functional
Cushioned	Binary	13, 4, 5	Non-Functional
Water Resistance/Proof	Binary	12, 14	Non-Functional
Weight Supportive	Pounds (lb)	6	Functional
Cost	Dollars (\$)	9	Constraint

6.0 Benchmarking

To gather more information for the design, the team consulted other similar products from different companies that may or may not serve all the customer's needs. Below is the table of other similar products with their information.

Table 6.1 Benchmarking of similar and related products.

Product	Cost To Make	Material Used	Size Availability	Weight	Transportable	Assembly
Armedica Hi-Lo Changing Table 	2330 USD (average price based on size)	Metal with padded side rails	Small: 25"x60" Medium: 25"x72" Large: 30"x76" Ex Wide: 34"x76" Ex Lrg: 40"x76"	450 lbs	Yes	Collapsible (Wheel access)
Rifton Hygiene Support Station 	3270 USD	Metal with rubber padding	46"-86"	250 lbs	Yes	Could be disassembled
Extra Large Portable Folding Comfort 	109.99 CAD	Metal with Polyester	210-72 cm	23.37 lbs	Yes	Collapsible
Smirthwaite Easi-Lift Shower Stretcher - Adjustable Height 67"L 	4,140.00 CAD	Stainless steel w/ vinyl cover	26 1/4" W x 3 1/4" D	440 lbs	No	Wall mounted

7.0 Target Specifications

However, the purpose of requiring a specific design also comes with unique specifications from the client. Since the patient has his/her height, weight, and problems, the products found above may not solve, but can also create other difficulties for both the client and the patient. Therefore, below is a table of target specifications created to sum up all the measurements, components that are required from the customer.

Table 7.1 A list of target specifications both ideal and marginally acceptable values.

Metric	Unit	Ideal Value	Marginally Acceptable Values	Reasoning
Weight	lb	=<10	<27	From the client statements, the ideal would be less than 10 pounds. Looking at other projects, a leeway was set at about 27 pounds as that's slightly more than the weight of the cot the client recommended.
Cost	\$	=80	=<100	Hard limit is 100, ideally below that
Height	in	24 to 30	=24	The table needs to be at least 24, but being able to be adjustable or a bit higher would be preferred
Size of Table Top Width	ft	=2	=2	Hard limit set at 2 ft as anything smaller would be impossible to fit on.
Size of Table Top Length	ft	5 to 7	=5	5' is the minimum since that's the clients height, but more would be preferred since client is young and growing
Collapsible	%	75	50	
Set up Time	s	<60	<180	Client wanted set up to take under a minute, up to 3 is acceptable
Cushioned	binary	Pass	fail	Client wanted some kind of cushioning, however, that was just a preference
Water Resistance	binary	pass	pass	Waterproof material is required.
Weight Supportive	lb	<100	=100	Needs to support at least 100 pounds as that's the weight of user, however being able to support more is preferred

8.0 Reflection

This interview was impactful. The meeting essentially determined the entire direction of the project. From this meeting, a list of customer needs was obtained, which was then translated into a problem statement and benchmarking was able to be performed. It also determined what the team's focus was going to be for the rest of the design process, which is mainly on compactness and comfort for the user.

9.0 Reference

1. <https://max-ability.com/product/armedica-changing-table/?c=aacf2d960ac3>
2. <https://www.rehabmart.com/product/rifton-hygiene-support-station1-26387.html>
3. <https://www.canadiantire.ca/en/pdp/woods-extra-large-portable-folding-comfort-camping-cot-blue-0765536p.html#srp>
4. <https://www.flaghouse.ca/Daily-Living/Bathing-Showering/Smirthwaite-Easi-Lift-Shower-Stretcher---Adjustable-Height-67-L.axd>