NEEDS IDENTIFICATION AND PROBLEM STATEMENT

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Table of content

Identifying needs

Our team was assigned to design and create a modular and expandable greenhouse with a hydroponics system for a client. Before the design process began, specific user needs and preferences were required. This information was acquired during a client meeting on Wednesday, January 25th. This document will outline and organize the user needs that were acquired in the client meeting to specify constraints on subsequent steps in the design-making process and ensure the final product meets client demands.

Our client is a head chef at a restaurant as well as a coordinator of a program for indigenous kids. She possesses several properties for plants growing in different locations in the north of Ottawa. She, along with a team of farmers, grows and harvests the ingredients they feed to their community. She came up with the idea of implementing greenhouses on her terrains to boost the growth of crops as well as to show indigenous kids how those plants are grown and what they are used for.

The client desires the greenhouse to include flower pots to grow crops. It must be user-friendly and easy to maintain since there is only one maintenance person. Additionally, it must be accessible for a height of 5’ to 5' 5 " and there must not be any low panes of glass for the safety of children. Plastic would make a good manufacturing material, but glass (plexiglass) is also an option, making it sturdy enough to withstand weather conditions in Ottawa. The greenhouse must not allow access to animals that can enter and eat the crops. It needs to be modular and expandable since there is always a possibility of it being transferred to a different location. The greenhouse needs to be open to a variety of different crops rather than being specialized for a specific crop type. Lastly, it must contain a failsafe hydroponic system. On a more visual side, our client commented that she would not mind the greenhouse having the shape of an igloo.

There are some needs specific to each location. For the client’s house, there is a need for hydroponics since the client is barely around. Preference to automated systems for watering because the client leaves for long periods of time and there are size constraints. The farm location would have around 3-12 workers at a time, therefore the size needs to be enough for them to move around conveniently. The client desires a rain barrel in both locations. For the school location, a grow wall is needed and the greenhouse should have enough space inside for the kids to walk around in and have plant beds at low heights for the kids to access.

We are assigned the task of designing the structure of a greenhouse that will meet the criteria specified by our client. This structure will be designed in the MakerLab and 3D printed at the MakerSpace in the STEM complex. The budget to finance this project will be

provided by our professor. Future meetings with our client will take place to show the progress of our project and to receive feedback on the design prototypes.

To sum up, during this term we will work on designing the structure of the greenhouse, aiming to fulfill as many needs and specifications as possible within our budget and time.

List of Prioritized Needs

1. Simple and Easy Maintenance
2. Modular and Expandable
3. Hydroponics System
4. Animal Resistant
5. Weather Resistant
6. Non-Plastic Material
7. Low Cost
8. Safe for Children
9. Easy access for persons 5’0” to 5’5”

Research and User Benchmarking

Specifications (down) Greenhouse Name (right)	Wayfair	Delightful Yard	Reno
Simple and Easy Maintenance (5)	Yes	Yes, “maintenance free”	Yes. However, has the least amount of space, less people will be able to enter at a time
Modular and Expandable (4)	Not likely. Based on the design, there may be room to disassemble and expand	No	No
Hydroponics System (4)	Watering system	No	No
Animal Resistant (3)	Yes	Yes	Yes
Weather Resistant (3)	Can hold up to 15 lb/ft^2 of snow, wind resistance of 52 mph, mounting/anchor system	Can hold up to 15 lb/ft^2 of snow, wind resistance of 56 mph	Yes
Non-Plastic Material (3)	Polycarbonate	Polycarbonate	Polycarbonate

Low Cost (2)	$903.99	$1299.00	$1143
Safe for Children (2)	0.16mm panes with large surface area	0.7mm panes, small surface area, with diagonal supports	Diagonal supports
Easy Access (for 5'0 to 5'5") (1)	6.17' W x 8.17' D x 6.25' H	6' W x 7' H x 8' D	6.2-ft D x 6.3-ft W x 6.6-ft H, might be crowded

User Benchmarking Resources:

Wayfair 6.17' W x 8.17' D Heavy Duty Greenhouse
https://www.wayfair.ca/outdoor/pdp/julys-song-617-w-x-817-d-heavy-duty-greenhouse-blys1004.html
Hybrid polycarbonate greenhouse 6 x 8 ft grey frame
https://delightfulyard.com/products/hybrid-polycarbonate-greenhouse-6-x-8-ft-grey-frame-palram-canopia?currency=CAD&variant=40665818202261&utm_medium=cpc&utm_source=google&utm_campaign=Google%20Shopping#specifications
Reno outsunny 6.2-ft L x 6.3-ft W x 6.6-ft H greenhouse
https://www.renodepot.com/en/outsunny-62-ft-l-x-63-ft-w-x-66-ft-h-greenhouse-845-058-330928760?viewStore=76050&cm_mmc=organic_search-_-google-_-gmb-_-instore&utm_medium=organic_search&utm_source=google&utm_campaign=gmb&utm_content=instore