Design Criteria and Target Specifications

Introduction

After meeting with the client and developing a concise list of needs according to the information gathered, the following document demonstrates how those needs have been interpreted into design criteria. Along with a list of constraints, an interpretation of functional and non-functional requirements and an analysis of similar solutions on the market (benchmarking), this information will help define the direction that our design will take. By ranking the needs of the client based on importance, it is possible to effectively analyse products currently on the market and determine what aspects of them may also work for our design. The goal of the following document is to aid in the definition of clear target specifications and to create a guide to be used throughout the design process.

Constraints

1. Length,width and height or size of Greenhouse(meters, ft).
2. Cost($).
3. Operating conditions: Temperature(c).
4. Operating conditions: does not require professional expertise.
5. Weight(lbs).

Needs relating to the structure:

The importance scale goes from 1-5 where 5 is the most important and 1 is the least important one.

Number	Need	Design Criteria	Criteria
A (3)	Materials that will keep out mice, bugs, and other animals	Material	Have mice proof material base cladding.
B (5)	Temperature inside the structure must be restricted within a certain domain to ensure proper growth of vegetation.	Material Electrical power distributions	Create a system that will measure the temperature inside the greenhouse and automatically turn on/off the heater and the fan (similar to the arduino lab done) Build the structure using insulating materials.

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C (4)	Must be self-sustaining (electricity)	Electrical power distributions	The greenhouse will be powered through solar panels bolted to the roof.
E (5)	Greenhouse is able to withstand the extreme temperatures without being damaged	Material Electrical power distribution Roof shape	As mentioned above, materials must be chosen that are appropriate to the climate in the area.
F (3)	Able to be easily taken apart, transported, then reconstructed.	Dimensions Collapsed volume (m^3)	Pieces of the structure do not exceed 2x8
G (3)	Ability to grow enough food to support up to 50 community members	Dimensions	Size: 8ftx6ftx6ft
H (1)	Takes into consideration cultural needs (for example, able to grow tobacco)	Aesthetics Variety of the crops	Be able to grow organic materials inside the greenhouse. Do not consider the use of insect repellents/ pesticides in the design.
I (3)	Some way of removing snow or minimizing snow buildup	Roof shape	Steep triangle roof, ladder
J (4)	Some way of providing water from	Piping Gutter system	Rain gutters, storage tank

	a nearby (on-site) source		
K (4)	Some way of providing the electricity necessary to run the system	Electrical power distributions	Solar energy, solar panels
L (3)	A long lasting structure that will require minimal repairs that the community members would be capable of doing themselves	Material	Use materials that are familiar to them, be able to repair the structure without the use of machines
M (4)	Inexpensive	Cost ($)	Use materials of low cost
N (2)	Easily used	Dimensions	- Make sure that the tank is within reach in order to be able to be easily cleaned. - Make sure that the plants are hung low enough so that a person with average height is able to have access to them.

Functional and nonfunctional requirements:

Functional:

- The interior must be able able to stay within a certain range of temperature to enable proper growth of plants

- Be able to keep any rodents or/and insects out of the structure (to protect the plants)
- Enable the plants to get enough sunlight.

Non functional:

- Aesthetics
- A reliable structure that will not require any particular expertise in assembly or repair.
- Experience minimal snow buildup.
- Easy assembly

Benchmarking:

Specifications	**Cedar Greenhouse**	**Twin Wall Greenhouse**	**RION 702471 greenhouse**
Company	Outdoor Living Today	Palram Hybrid	Echo grow
Materials	Red cedar Polycarbonate	Twin-wall Polycarbonate	PVC Resin Frame, Polycarbonate Panels
Dimensions	Height:1.09 m Width: 2.2m length : 1.2m	Width: 1.85 m Heights:2.08m Length:1.26 m	Width:2.04m Height:1.98 m Length: 3.87m
Price	3499.00	699.00	2677.56
Weight	850lb	Unknown	74 lbs
Picture			
Frame	Wood	Aluminum	Aluminum
Add ons	- Heat activate roof vents - 2 lower wall vents	- Galvanized steel base - Manual roof vent	- Manual roof vent

Target Specifications:

Dimensions Note: Structure must be broken down into maximum 4ft by 8ft panels and rebuilt
Height: 6-8 ft
Width: 4-6ft
Length: 6-8ft
Weight: Negligible (so long as it can be towed by the truck)
Cost: 250 Canadian Dollars

Conclusion

After organizing all of our available data (client interviews, similar products, target specifications, etc), we now have an excellent starting point for the development of our design. This document will be a reference point throughout the designing and prototyping processes, in order to ensure that our final product satisfies all of the client needs and stays within our target specifications. From the benchmarking process we have determined that costs will play a significant role in our design (as all comparable products exceed our budget considerably), and from the development of the design criteria we have a clear understanding of what the product will need to accomplish. This document also helped us to realize that more research needed to be conducted on mice (and how to protect our product from them), as well as solar panels (and how they will function within our product).