GNG 1103

Deliverable C: Design Criteria

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February 7th, 2021

1. Introduction

This deliverable outlines our plan to create a working mobile application with our client, Mitch Bouchard, based on his interpreted needs statements in Deliverable B. From this deliverable, design criteria are outlined to distinguish all of the application's constraints and functional/non-functional requirements. A benchmarking investigation is utilized to recognize ideal model objective determinations dependent on the characterized measurements. We further benchmark these objective determinations against competitive apps in the market based on the criteria and determine the app/product that is most similar to the client's ideal solution. In this way, we will create a product that improves on previous attempts at a mobile recycling application.

2. Design Criteria

For the development of the application, it was required to go into more depth of the performance of the application. Firstly, we translated our client's needs into design criteria we could use to benchmark both our current product and similar, previously-attempted products. Table 1 shows each client need and its interpreted design criteria. On table 2, we further organized each interpreted criteria as either a functional or non-functional requirement and detailed plausible constraints on the final product with appropriate units. Finally, we ranked each design criteria and constraints from 1-5 based on their implied importance to the client outlined in Deliverable B.

Table 1 - Interpreted Design Criteria Based on Client Needs

#	Need	Design Criteria
1	The product provides an operation tutorial and the user-interface is clear and easy to navigate.	-Provides a clear and concise tutorial -Navigation and user-interface are user-friendly
2	Usable on multiple platforms (IOS & Android) without any major hardware requirements. Appeals to a diverse range of age groups.	-Compatible with different operating systems (IOS & Android) -Compatible with older devices -Hardware requirements
3	Users of the product do not need to make purchases to utilize the product.	-Cost ($)
4	The product automates as many processes as possible.	-Navigation and user-interface are user-friendly -Utilizes camera features to facilitate recycling

5	The product is able to identify waste items and the proper method of disposing of them.	-Ability to accurately identify a waste item (% of time) -Outputs proper recycling method for waste item
6	The product gives the user the information necessary for dealing with recyclable items that cannot be placed in bins.	-Provides information about locations and methods for disposing of irregular recyclable items
7	The product directs the user to the correct waste bin after identifying the disposal method of an item.	-Identifies which bin to use for a recycling method
8	The product should be able to identify the presence of contaminants and adjust the recycling procedure accordingly.	-Adjusts recycling method for contaminants
9	The product can track efficacy and provide data relating to the amount and correctness of user recycling.	-Tracks how much user is recycling
10	The product focuses on the universal aspects of recycling across municipalities to enable use in different locations.	-Multi-language -Usable in different places (not limited to municipality/city/town)

Table 2 - Interpreted Design criteria with Units and Importance

#	Design Criteria	Units	Importance (1_{least}-5_{most})
Functional Requirements			
1	Compatible with common operating systems (IOS & Android)	Y/N	5
2	Uses camera features to facilitate recycling	Y/N	4
3	Ability to accurately identify a waste items	% of the time	5
4	Outputs recycling method for a waste item	Y/N	5
5	Provides information about locations for disposal of irregular recyclable items	Y/N	4

6	Identifies which bin to use for different recycling methods	Y/N	5
7	Adjusts recycling method for contaminants	Y/N	3
Constraints			
1	Cost	($)	4
2	Storage	MB	2
3	Device Requirements	Model OS	4
4	Display Size	Screen Size (Inches Diagonally)	3
5	Capture and Display resolution (Resolution Device Records At 1080p)	Pixels	4
Non-Functional Requirements			
1	User-friendly navigation and interface	Y/N	5
2	Clear and concise tutorial	Y/N	4
3	Multi-language	# of languages	2
4	Usable in different places (not limited to municipality/city/town)	Y/N	3
5	Tracks how much user is recycling	# of Items user indicates they recycled	2

3. Benchmarking

Products were researched in order to receive a better understanding of the competition in the market to produce the application. Three applications were selected: Junker, TOwaste, and Recycle Nation. After benchmarking these applications, it was concluded that Junker was the best representation of the application that we wish to develop because it fulfilled more specifications.

A benchmark's ability to meet a specification is evaluated on a scale of 1-3 where 3 (green) meets the specification, 2 (yellow) partially meets the specification, 1 (red) does not meet the specification.

Table 3 -Technical Benchmarking

Specification	**Importance (1-5)**	**Benchmarks**		
		Junker	TOwaste	Recycle Nation
Compatible with common operating systems (IOS & Android)	5	Y	Y	Y
Uses camera features to facilitate recycling	4	Y	N	N
Ability to accurately identify a waste items	5	Y (With Camera- 50% Accurate)	Y (search bar)	Y (With search bar - 100%)
Outputs recycling method for a waste item	5	Y	Y	Y
Provides information about locations for disposal of irregular recyclable items	4	Y (Only specific to the municipality)	Yes (only mentions locations, not what can be recycled at them)	Y
Identifies which bin to use for different recycling methods	5	Y	Yes (relies only on bin color)	Y
Adjusts recycling method for contaminants	3	N	Y	N
Cost	3	Free	Free	Free

Storage	2	57.9 MB (Android) 215.2 MB (IOS)	6.6 MB (IOS) 22.99 MB (IOS)	32 M (Android) 42.3 MB (IOS)
Device Requirements	4	IOS 11.0+ Android: Varies on the device	IOS 10.3+ Android 4.4+	iOS 11+ Android 6.0+
Display Size	3	Adjustable to Screen Size	Adjustable to Screen Size	Adjustable to Most Screen Sizes (Except Large Ones)
Capture and Display Resolution	4	Y	N/A (does not use camera)	N/A (does not use camera)
User-friendly navigation and interface	5	Y	Y	Y
Clear tutorial	4	Y (brief)	Y (brief)	Y (brief)
Multi-language	2	Y	N (only english)	N (only english)
Usable in multiple places	3	Y	N (only Toronto)	Y
Tracks how much user is recycling	2	N	N	N
Total Score (Out of 189)		**164**	146	155

4. Target specification

Target specifications were decided upon after having benchmarked similar products. The table below lists the ideal value for a specification as well as an acceptable value should the ideal value not be obtainable for whatever reason. The specifications outlined below describe what should be present in the final product.

Table 4 - Ideal and acceptable target specifications

#	Design Specifications	Relation (=, <, >)	Ideal Value	Acceptable Value	Units	Verification
Functional Requirements						
1	Compatible with common operating systems (IOS & Android)	=	Any operating system	IOS & Android	N/A	Test
2	Uses camera features to facilitate recycling	=	Yes	Yes	N/A	Test
3	Ability to accurately identify waste items	>=	100	95	%	Test
4	Outputs recycling method for a waste item	=	Yes	Yes	N/A	Test
5	Provides information about locations for disposal of irregular recyclable items	=	Yes (gives specific nearby locations)	Yes (explains how to find locations)	N/A	Test
6	Identifies which bin to use for different recycling methods	=	Yes	Yes	N/A	Test
7	Adjusts recycling method for contaminants	=	Yes (automatically)	Yes	N/A	Test
Constraints						
1	Cost	=	0	0	$	Estimate, final check
2	Storage	<	200	1000	MB	Test
3	Device Requirements	<	Any Device	IOS 12.0+ Android 5 .0+	OS	Test
4	Display Size	=	Any	5.7-6.7	in	Test
5	Capture & display resolution	=	4000 60	1080 30	Pixels fps	Test

Non-Functional Requirements						
1	User-friendly navigation and interface	=	Yes	Yes	N/A	Test
2	Clear and concise tutorial	=	Yes	Yes	N/A	Test
3	Multi-language	=	Any language	English & French	N/A	Test
4	Usable in different places (not limited to municipality/city/town)	=	Anywhere	Only University of Ottawa	N/A	Test
5	Tracks how much user is recycling	=	Yes	No	N/A	Test

5. Conclusion

The market for this kind of product is restricted and is not exceptionally competitive. In this deliverable, we dissected the requirements of the customer and translated each need into an interpreted design criteria. Then, we designated each as criteria as either practical or non-useful and determined plausible limitations in the app's development. Intensive examination considered an exceptionally far-reaching benchmarking of contending platforms, which will permit us to combine the qualities of various items into an enhanced final product. The item will contend with items offered by Junker, TOwaste and Recycle Nation. Through benchmarking, it was inferred that Junker had the more wanted particulars, scoring an aggregate of 164 points, and hence will be utilized as the principle reference for the advancement of the application. This data is summarized in a target specification table, which will be essential to assessing the task all through its turn of events. It traces each necessity with significant and ideal measures to meet and the techniques by which this will be checked. The entirety of the above assisted us with characterizing what is required of us, what we need to do, and how we need to do it.

6. References

- City of Toronto. (2019, September 18). Towaste app. Retrieved February 07, 2021, from https://www.toronto.ca/services-payments/recycling-organics-garbage/towaste-app/
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- RecycleNation. (n.d.). Recyclenation. Retrieved February 07, 2021, from https://recyclenation.com/