uOttawa

University of Ottawa

GNG 1103: Engineering Design

Deliverable D: Conceptual Design

Project Group C12

Group members:

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1. Introduction

This deliverable identifies and explains the various subsystems involved in the development of our application. By referencing these subsystems and the design criteria from Deliverable C, 3 global concepts were developed. The global concepts were then compared in order to determine the ideal solution to the client, Mr Bouchard's dilemma. The final global concept will later be presented to Mr Bouchard in order to identify which features will need modifications.

2. Individual Subsystems

Melissa

1. Scanning Feature
    1.1. Granted access to the user's mobile camera, the application will be able to identify the item intended for disposal.
    1.2. Once an item has been scanned, a window will open on the user's screen where item specific recycling information will be listed.
        1.2.1. The information listed for regular recyclables will be the corresponding bin, any specific instructions prior to recycling such as washing or removing a part, as well as information about what this item will be used for post recycling.
        1.2.2. The information listed for special recyclables will be location and hours of operation of the facilities equipped for recycling these items as well as information regarding the importance of properly recycling them.

2. Colour identifier
    2.1. A colour scheme will be implemented for recyclable items and their coordinating disposal bins/locations. For instance, water bottles will have a blue icon next to their recycling information.
        2.1.1. The colour references will allow users to find their desired information quickly and efficiently.
    2.2. For those who are colour blind, the shape of the coloured recycling icons will be different. This renders the app equality as efficient for everyone.
    2.3. Items that require special disposal will have a yellow star icon next to their information. The user will be provided with local facilities equipped to dispose of the given item.

3. FAQ
    3.1. A question mark icon will be located at the top right of the main page. By pressing the icon, users will be directed to the application's website where there will be tutorial videos and additional support
    3.2. In addition to the frequently asked questions, there will be a location for the users to submit their own questions or concerns which will be addressed and posted shortly after

4. Bilingual
    4.1. In order to make the application accessible to users around the world, it will eventually be available in as many languages as possible.
        4.1.1. English and French will be the first ones.

5. Log in screen
    5.1. People have the option to create an account or continue without one
        5.1.1. Ages 10-14 may not have the appropriate information to create an account thus by having the ability to skip this options, they may also participate
    5.2. Accounts can be created with an email or via other social media platforms such as Facebook
        5.2.1. By creating an account, users can record their recycling habits
        5.2.2. Users that link their account to Facebook will be able to share their recycling accomplishments and goals

Cole

1. Game feature
    1.1. Has an entertainment feature that keeps users interested in recycling
        1.1.1. Could be a Pokémon style collect them all feature
            1.1.1.1. Encourages users to recycle everything by letting them unlock new achievements and icons
            1.1.1.2. Have a feature that the more you recycle the better you progress in the game

2. Incentives
    2.1. In game leaderboards for most items recycled and other stats
    2.2. Cash rewards for in app competitions
        2.2.1. Cash rewards will be rare and small at first but hopefully with growing interest in the app the rewards will increase.

3. Tutorial
    3.1. Walks the user through how the app works, demonstrates how each feature functions.
    3.2. Easy to access tutorial that allows the user to return to it if needed.
        3.2.1. Tutorial can be skipped if user chooses to

Scott

1. Supplementary Information
    1.1. *Upcycling potential:* Prompt the user with recommendations for another purpose for the targeted object, such converting a plastic container into a planter or flowerpot.
    1.2. *Recycling potential:* Prompt the user with the possible fate from recycling the targeted object. Provide information on what comes about the object—what products and uses may be made by recycling aluminum, for example.
    1.3. *Updates:* Display or link articles—either scientific or layperson news—and latest trends (infographics) and perhaps amusing anecdotes.

2. Facility Locator
    2.1. *Recycling:* Provide the user with the nearest locations for where to send recyclables, given the submission of a residential address. The facility could be privately run or through a governmental service.
        2.1.1. The facility's location could be displayed directly on the screen of the app.
        2.1.2. Or the app merely links to the web address of the facility.
        2.1.3. Alternatively, the app could link with whatever map app is on the phone and display there the location of the facility.
        2.1.4. For financial prospects, priority in the listing of the facilities may stem from which company or agency partners with the app or sponsors it.

    2.2. *Garbage:* Provide the user with the nearest locations for where to dump garbage, pending the submission of an address—either conveyed by a postal code or city. The facilities mentioned could be privately run or through a governmental service.
        2.2.1. The facility's location could be displayed directly on the screen of the app.
        2.2.2. Or the app merely links to the web address of the facility.
        2.2.3. Alternatively, the app could link with whatever map app is on the phone and display there the location of the facility.

3. Facility Information
    3.1. Display for the user the hours of operation of a recycling or garbage facility.
        3.1.1. Express the information upon request in a search bar.
        3.1.2. Alternatively, provide the information in the form of a directory.
            3.1.2.1. Link to the web address of the facility.
            3.1.2.2. Or display the information directly on the screen of the app.
    3.2. Display for the user the restrictions and limited capacity of the selected facility.
        3.2.1. Notify the user when the facility is unfortunately at full capacity.
        3.2.2. Show which materials are accepted by the facility and at what quantity—the maximum number of bins for one pickup or delivery.
    3.3. Display the expected arrival of the collection vehicle at a selected address.

4. Global Concepts

Global Concept #1

Our app will be the only app you'll ever need to keep the earth clean. With numerous features such as our item scanner and facility locator you'll be able to recycle everything in your life properly and efficiently! Not only that, users will want to recycle more and new things thanks to our Pokémon inspired recycle it all game! Featuring leaderboards and prizes for users that perform well everyone will want to try their best to keep the world clean.

When users open our app for the first time an aesthetically pleasing welcome screen will greet them. New users will have the opportunity to sign up and returning users will be directed straight to the home page.

After new users sign up a pop up will ask them if they'd like to take the tutorial. Users who choose to skip will be directed to the Home Screen. The tutorial will consist of a short Powerpoint style walk through that'll demonstrate the capabilities of our application. The tutorial should not take more than 5-10 minutes to complete.

The Home Screen will look like the Snapchat Home Screen. An open camera with icons at the bottom that allow the user to navigate the app. Users have the option to edit the Home Screen to open to what they'd like. This screen will include the item scanner function.

The item scanner is a program that allows you to take photos of items and the application will identify said item and give you all the information needed to properly recycle that item. (plus maybe a fun fact?) The item scanner will also have a colour code feature that allows users to quickly identify where certain items go.

Users will also have access to our recycling facility locator which shows them all the nearby facilities and what can be recycled there up to a 50 kilometer radius. On top of that users will also be able to view facility hours and information.

We have a news and articles feature for users who want to learn more about what's going on in the recycling world as well as any relevant information about recycling in their neighbourhood. A search bar will also be present for users to find any items or information they need.

The Game feature will be a pokemon go style game. Users will be able to scan recyclable items to "capture" them and doing so will give them characters and points. If users recycle an item multiple times that character will level up accordingly. Characters can then take on challenges and other users to receive points which unlocks new things within the game. Users can also compete for a spot on the local and global leaderboards.

This is where the rewards section comes in. Users who choose to play the game feature will be able to unlock new costumes for their characters as well as other cosmetic items that can be

used in the application. (Different backgrounds, Different profile pictures, special effects, etc.) hopefully we can bring the app to a point where we can offer cash rewards for challenges within the app, such as competition to recycle the most things in a certain time period, but right now that is wishful thinking.

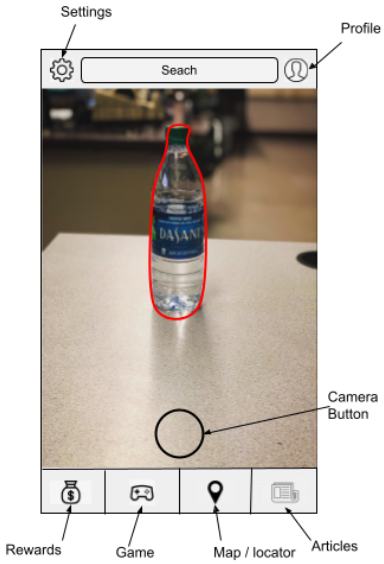

Figure 1 - Concept 1

Global Concept #2

This concept is similar to the first concept but it places a larger emphasis on the game aspect of the application. The item identification and recycling facility locator will be incorporated. The user will be able to increase in the game standings with the accumulation of points.

The user will have the option to create an account or to skip this step. This option aids in the globalization of the application because it creates a feeling of inclusion and allows younger teenages to participate without having an email address. Below is an example of the main screen.

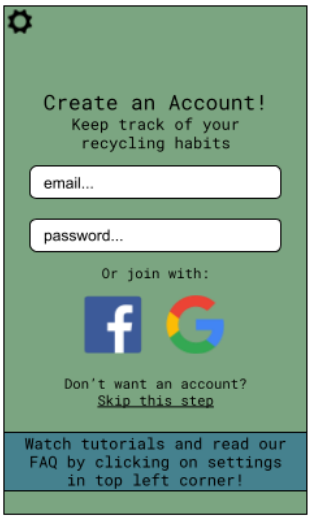

Figure 2 - Concept 2

The game will create a virtual world seen through the lens of the user's camera. While the screen will display what is seen through the camera's lens, it will also prompt icons which can be collected once a certain level has been achieved. In order to increase in levels, the user must complete goals set by the game. The goals will include but are not limited to reading articles suggested by the application, using reusable water bottles, completing and succeeding in game quizzes, scanning in recyclable items and dropping off special recyclables to the suggested locations. The user will be able to access the goals by clicking the icon in the bottom right corner. Below is a representation of the goal section of the application.

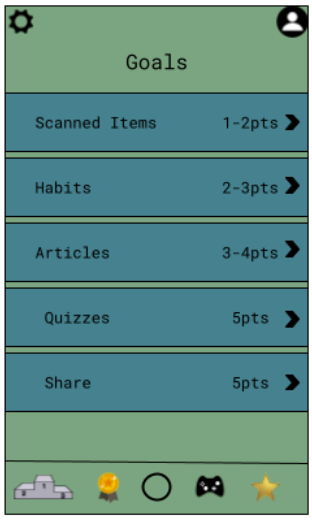

Figure 3 - Concept 2

The rewards accumulated for each goal will be allocated different amounts of points. For instance, scanning an item would earn the user fewer rewards than succeeding in a quiz. The quizzes will be categorized based on various recycling habits and recycling facts. The articles will include but are not limited to worldly recycling habits and new innovations in the recycling industry.

Like in the first global concept, the application will prompt item specific recycling information when that given item is scanned. The user will be responsible for the proper disposal of the item. Items that require special recycling instructions will have recycling facility locators. Below are two examples of the item information; regular items and special items respectively.

By using a game platform the users will form a sense of dedication and will be learning at the same time. The access to articles and quizzes will not cost the user. As mentioned previously, the user will be able to share their progress on social media which will market the product.

Global Concept #3

The interface for the app, upon which the user may either marvel or dismiss, is vital to the communication between the user and function. An app, while wonderfully functional, can befall into obscurity by the cruelty of appearance. A seemingly ugly interface may distract users and discourage potential users. Beauty is as important as function: A gift inside an aesthetically pleasing chest will surely appeal more than that same gift inside a moldy, old cardboard box.

For instance, the desktop screen of Windows 8, in substituting a start menu grid for the beloved start menu button, triggered a backlash among a very vocal public and, in turn, prompted the update of Windows 8.1 on which included the missing feature—and it also likely triggered the quicker release of Windows 10. While the grid fulfilled the same functions as the button, its appearance was apparently inferior and thus, like a wart on a portrait, blindsided any interest that could be found in Windows 8.

The suggested interface for the recycling app is as a button, as a pressable feature added to the camera. Once the app is downloaded, an icon will appear in the upper left corner of the screen whenever the camera function of the smartphone is selected. The button shall be of a most minor size, as though to be simultaneously noticeable yet undistracting. With the app as a fixed feature on the camera, the user will have a greater success in remembering the app.

The following four images display the functionality of the app in different scenarios—and then a legend to elaborate in description the symbols that appear.

Figure 4 - Scenario 1: Function OFF

Figure 5 - Scenario 2: Function ON; Object UNKNOWN

Figure 6 - Scenario 3: Function ON; Object REJECTED

Figure 7 - Scenario 4: Function ON; Object APPROVED

Legend for Symbols

Blue filled-in recycling icon, in upper left corner

- Indicates the function of the app is not in use, for an inactive but present status
- If the icon is pressed, the function of the app will become active

White filled-in recycling icon with a blue background, in upper left corner

- Indicates the function of the app is in use
- If the icon is pressed, the function of the app will become inactive

Blue bordered circle with translucent blue filling, in center of screen

- Represents the targeted zone for the application of the function
- The app will not register any object outside of the circle
- The circle can expand or shrink with touch manipulation

Green question mark, in center of the blue circle

- Indicates that no object is found for the app to regard
- The targeted zone (the circle) has no relevant object found inside it
- The icon is not a button; pressing the green question mark will yield no action

Red dimension sign (askew cross), in center of the blue circle

- Indicates that the object in view is of no recyclable merit
- The object is garbage
- The icon is not a button; pressing the red dimension sign will yield no action

Blue checkmark, in center of the blue circle

- Indicates that the object in view is of recyclable merit
- The object is recyclable
- The icon is not a button; pressing the blue checkmark will yield no action

White exclamation mark, in bottom right corner

- Prompted once an recyclable object is in view
- If the icon is pressed, more information will be provided on the recyclable object
- Possible methods to convey the additional information:
    - The screen of the app is opened, switching from the screen of the camera
    - Or a text line (or two) appears with minimal information on the object
        - Like “Place in Blue Bin” or “Place in Black Bin”
    - Or a combination of the two previous suggestions

5. Global Concepts Compared

Table 1 - Comparison between the three global concepts and the design specification from Deliverable C

Design Specification	**Importance (5>1)**	**Global Concept 1**	**Global Concept 2**	**Global Concept 3**
User friendliness and visual aesthetic	5	2	1	3
Geographically accessible to everyone, everywhere	4	3	3	3
Available on various platforms (website, IOS and Android)	4	2	2	2
>95% accurate	5	3	3	3
Easy to use item identification feature	3	3	3	3
Items are accurately colour coded based on how to recycle them	2	3	3	3
Makes recycling entertaining	2	3	3	1
Identifies correct recycling bin	3	3	3	3
Recycling facility locator	3	3	3	3
Provides information on recycling facilities (Hours of operation, location…)	3	3	3	3
Offers users rewards for constant recycling	2	3	3	2
Supplementary information for user (articles)	2	3	3	3
Cost of application	3	3	3	3
Available languages	4	3	3	3
Total		126	121	125

6. Final Global Concept

For our final global concept we decided to combine Global Concept #1 with Global Concept #3. We believe doing so will allow us to create the best possible application. Our App will start off with a standard title screen that allows users to sign up and go through the tutorial. After finishing the setup our app will open into the home screen as talked about in Global Concept #1. The application will still feature everything previously mentioned in Concept #1, such as the item scanner, facility locator, in app game, supplementary articles, as well as the rewards page. Where it differs is outside of the main application.

As mentioned in Global Concept #3 our application will also install a widget onto the camera application. This will act as the item scanner meaning users will not have to open the app to scan items. When activated this widget will use the colour codes of the region the user is in to quickly and efficiently show where the item can be recycled. When items are scanned an icon will pop up in the bottom of the screen that the user can click on to give additional information as a quick pop up. The pop up will also contain a button that will allow the user to access the application.

By combining these two concepts we believe that our application will bring in the best possible experience for any and all users.

7. Conclusion

Brainstormed ideas have risen in this group of students, like daisies after a rain shower. In this document, the prospects of a recycling app are disassembled as subsystems and assembled as overall conceptual designs. Each group member has suggested variations on design, to then find acceptance or adjustment upon the scrutiny of the other members. A compromise is ultimately the victor, combining the most appealing ideas of all members, to best meet the desires and needs of Mr. Bouchard.