



Refill.Me

No Waste, No Haste - Package-Free

Prototype

By Team Iron
Old Dominion University
CS 410
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Image source:
<https://www.pexels.com/photo/person-holding-orange-fruits-in-white-net-3737624/>





At a Glance

Meet the Team.....	3	User Stories - Stores.....	15
Problem Statement.....	4	User Stories - Administrators.....	16
Problem Characteristics.....	5	User Stories - Testers.....	17
Current Process Flow.....	6	Software/Hardware Tools.....	18
Solution Statement.....	7	Development Tools.....	19
Solution Characteristics.....	8	Sprint Breakdowns.....	20-21
Solution Process Flow.....	9	Risk Matrices.....	22-24
MFCD.....	10	Key Points.....	25
RWP vs Prototype.....	11-13	References.....	26
User Stories - Shoppers.....	14		

Image source:
<https://pixnio.com/food-and-drink/ingredients-market-boxes-colours-foodfruit-vegetable-grocery/>

Meet the Team



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Problem Statement

Mainstream grocery shopping damages our ecosystem through packaging waste from cans, glass, cardboard, and plastic.

Shoppers who are interested in reducing their environmental impact and would like to do package-free shopping lack detailed information such as product and price listings of loose products that are available in their neighborhood.

These shoppers need a tool that provides relevant and accessible information to make sustainable shopping less intimidating.



Problem Characteristics

Lack of Information

zero or little knowledge about where package-free stores are located

lack of knowledge about stores' package-free offerings

lack of transparency regarding prices of loose products

Shoppers' Struggle

frustrated by unnecessary, wasteful packaging

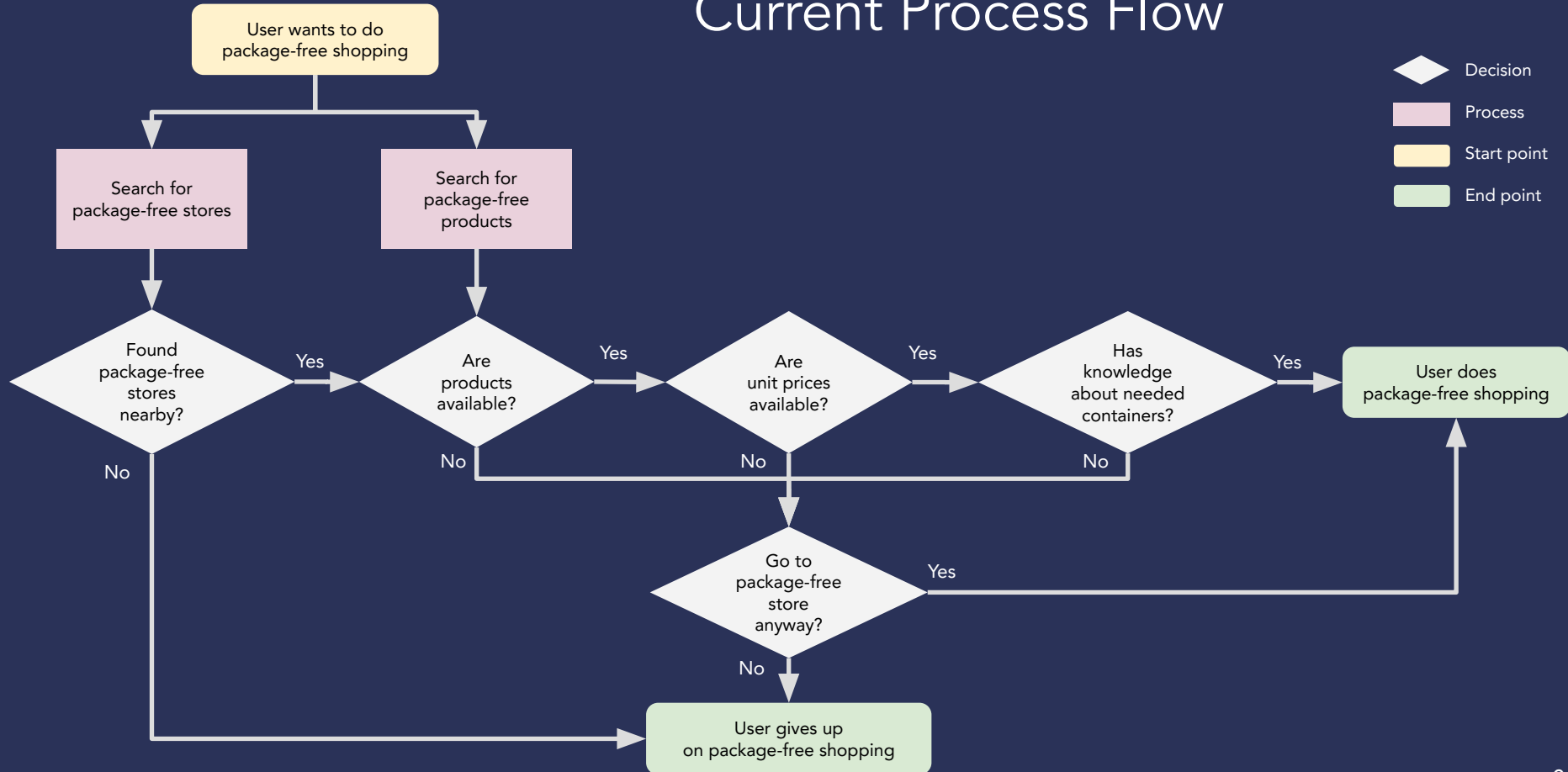
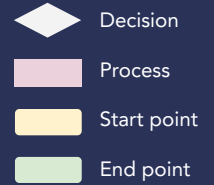
tiresome and difficult to search for package-free stores and products

lack of knowledge about containers to use

Missing Hub

existing apps offer limited features that are only somewhat useful for package-free shoppers, as opposed to many apps supporting mainstream grocery shopping

Current Process Flow



Our Solution: Refill.Me

Refill.Me is an encompassing information-hub in the form of a mobile phone application that provides relevant, practical and up-to-date information regarding package-free shopping.

Refill.Me helps novice package-free shoppers throughout their transition into package-free shopping and supports experienced shoppers to keep up their eco-friendly shopping habits.

By using Refill.Me, package-free shoppers save time and support local businesses, while reducing packaging waste.



Legend

Fully addressed
Partially addressed

Solution Characteristics

Plenty of Information

exhaustive listing of nearby supermarkets with bulk section, package-free stores, and farmers' markets

product listings with unit prices

Shoppers' Delight

easy search by product or by stores

information about containers provided in the Container Guide, and by the smart container recommendation feature

shopping list makes shopping easy to plan

reward system, Reward.Me to collect points and enjoy discounts

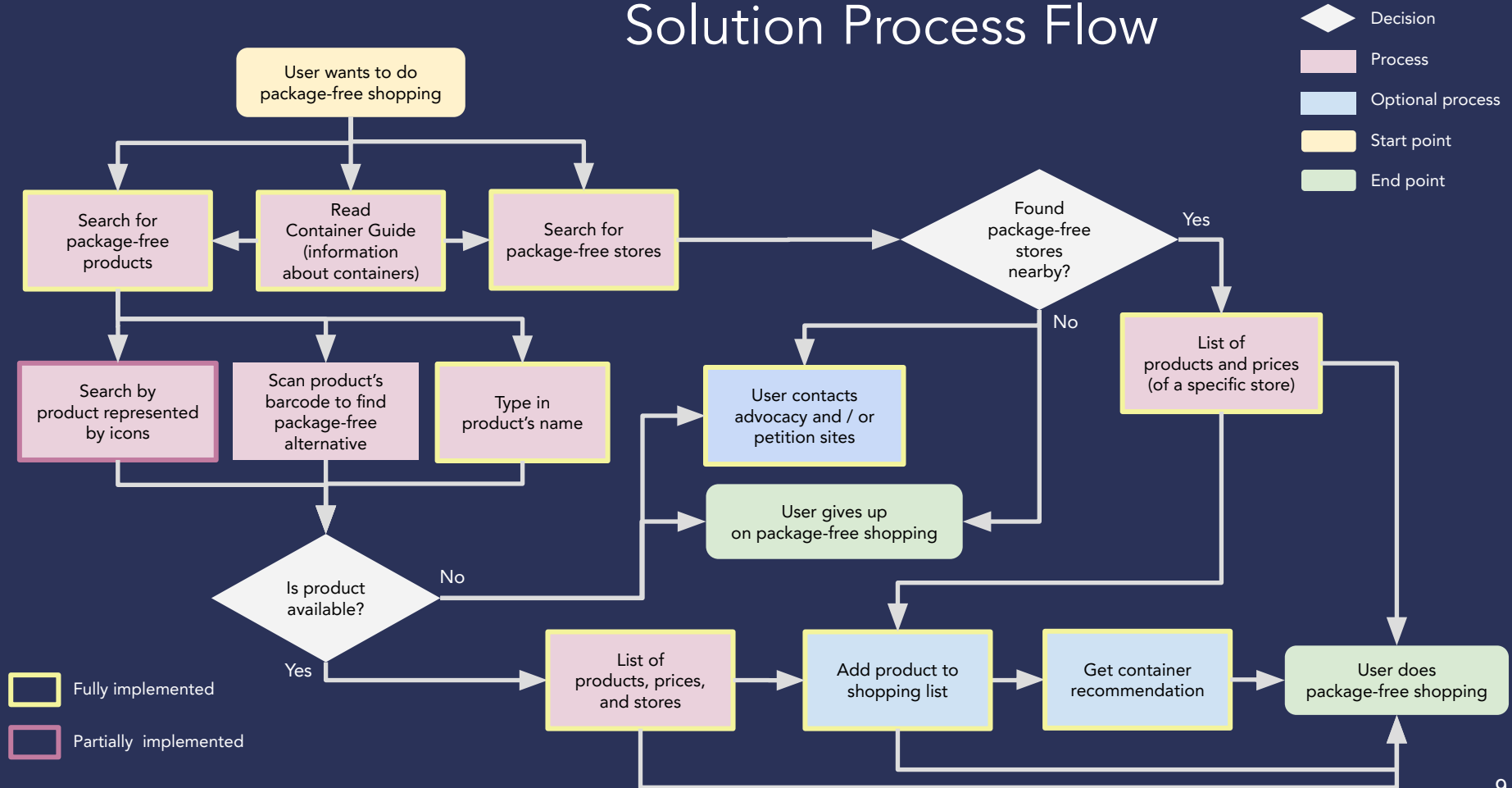
Resource Hub

a convenient app for both new and experienced package-free shoppers

collect shoppers' search information to improve stores' product offerings

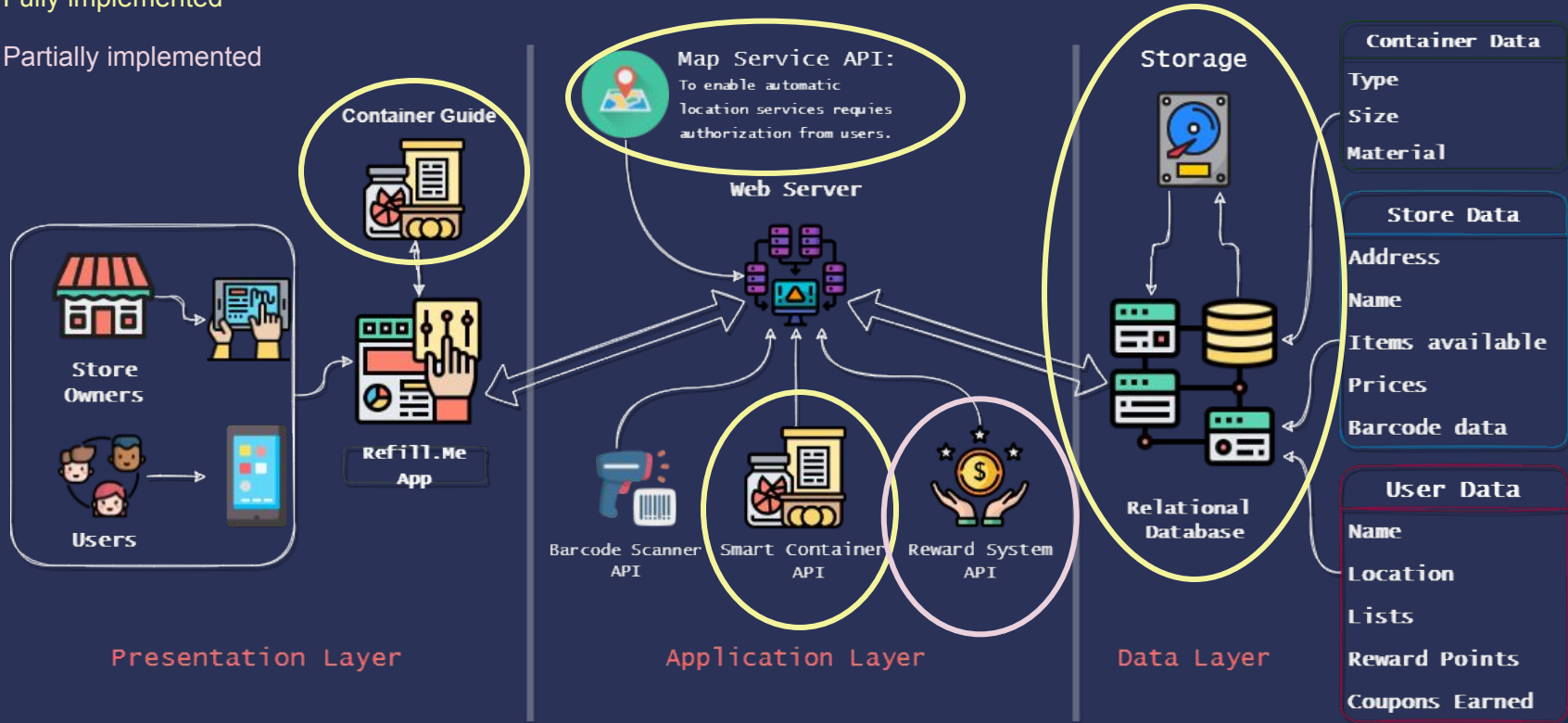
use crowdsourcing to increase data accuracy

Solution Process Flow



Major Functional Component Diagram

- Fully implemented
- Partially implemented



Real World Product vs Prototype

Features for Shoppers

Feature	Real World Product	Prototype
Account Creation	Fully implemented	Fully implemented
Store Search	Fully implemented	Fully implemented
Product Search		
Search by Icon	Fully implemented	Partially implemented
Scan product's barcode	Fully implemented	
Enter product's name	Fully implemented	Fully implemented
Container Guide	Fully implemented	Fully implemented
Container Recommendation	Fully implemented	Fully implemented

Real World Product vs Prototype

Features for Shoppers (contd.)

Feature	Real World Product	Prototype
Shopping List	Fully implemented	Fully implemented
Reward.Me		
Collect reward points	Fully implemented	Fully implemented
Receive coupons	Fully implemented	
Crowdsourcing		
Suggested edits for products and prices	Fully implemented	Fully implemented
Store rating	Fully implemented	Partially implemented
Connect shoppers to advocacy and petition sites	Fully implemented	Fully implemented

Real World Product vs Prototype

Features for Store owners

Feature	Real World Product	Prototype
Product and Price Dashboard	Fully implemented	Fully implemented
Reward Point Conversion Dashboard	Fully implemented	Fully implemented
Coupon Dashboard	Fully implemented	
Store Rating Dashboard	Fully implemented	Partially implemented
Search Information Dashboard	Fully implemented	Partially implemented

User Stories - Shoppers

Legend

Fully addressed

Partially addressed

As a package-free shopper, I want to...

- ❖ avoid purchasing products with wasteful product packaging so that I can help the environment.
- ❖ find nearby package-free stores so that I can do package-free shopping.
- ❖ learn about containers that I could use for package-free shopping so that I will know about the containers that I can use for package-free shopping.
- ❖ know what type of containers I will need to bring with me so that I will know what kind of containers I should bring with me when doing package-free shopping.
- ❖ know how many containers I will need to bring with me so that I can do package-free shopping.
- ❖ search for specific package-free products near me in a quick and efficient way so that I will know what products are available package-free in my area.
- ❖ scan the barcode of a product so that I can find package-free alternatives for it.
- ❖ type in a product's name and search for it so that I will know what products are available package-free in my area.
- ❖ know the unit prices of products so that I will have information about the prices of products in advance.
- ❖ create a shopping list so that I will not forget anything that I would like to buy.
- ❖ have an overview of my reward points, and coupons I received, and their expiration date so that I can use them in time.
- ❖ redeem my reward points at the stores so that I can get some benefits.
- ❖ upload my receipts so that I can receive reward points for them.
- ❖ report new / closed stores, new products, or products that are not available anymore, or prices that changed so that I can help others with up-to-date information.
- ❖ rate stores so that I can provide some feedback about their services.
- ❖ provide feedback about the functionalities and the usage of the app so that the app will be optimized according to my needs.

User Stories - Stores

Legend

Fully addressed

Partially addressed

As a store owner/employee, I want to...

- ❖ efficiently edit / add / delete my store information, product listing, and prices so that the shoppers will see only up-to-date information regarding my store and products.
- ❖ see a preview of the data that I entered so that I can see what the shoppers will see in the app.
- ❖ see the store's site in the app from the user's view so that I can see what the shopper will see in the app.
- ❖ decide what products or services the users will get for a certain amount of reward points so that the shoppers can use their reward points.
- ❖ issue coupons to the shoppers for their reward points so that they will come to the store, and eventually buy other items, not just the one that the coupon is valid for.
- ❖ be able to accept the reward points and coupons earned by the shoppers so that they will come to my store and eventually buy other products too.
- ❖ receive reminders to update my information in the app so that I can provide up-to-date information to the shoppers.
- ❖ be notified in case any information is missing so that shoppers will find everything they need.
- ❖ be contacted when information about my store, my products, or my prices are reported by a user of the app so that I can verify it.
- ❖ be able to respond to store ratings so that I can provide my feedback regarding any comments or questions.
- ❖ receive information from the app regarding what products the users in my vicinity are searching for so that I can adjust my product offerings.

User Stories - Administrators

Legend

Fully addressed

Partially addressed

As an administrator, I want to...

- ◆ have access to all dashboards and user profiles so that I can make changes if needed.
- ◆ be able to add / update / delete accounts so that I can make changes if needed.
- ◆ have access to logs related to the app so that I can perform troubleshooting if needed.
- ◆ have data analytics tools so that I can see how the users of my app (both shoppers, and store owners) behave, what functionalities they use, etc.
- ◆ set up automatic notifications for the stores regarding updating their information and verifying crowdsourced data so that the app will always provide up-to-date information
- ◆ review information from the 'Contact Us' forms so that I can provide feedback regarding comments.
- ◆ respond to any questions posed in 'Contact Us' forms so that I can provide answers.
- ◆ perform necessary fixes and updates to the system so that the app will function as intended.
- ◆ use the best possible third party APIs, and if needed switch to a different API so that I can improve the app's performance.
- ◆ regularly do database data clean up so that I can improve efficiency and performance.
- ◆ be able to identify vulnerabilities in the app (for example, using DAST) so that I can improve the security of the app.

User Stories - Testers

As an tester, I want to...

- ◆ be able to create an account for a registered shopper or store owner so that I can check whether the account is properly created.
- ◆ search for stores so that I can test whether the search is working.
- ◆ search for product so that I can test whether products are listed properly.
- ◆ create a shopping list so that I can test whether store names and products are shown accurately.
- ◆ get the list of recommended containers so that I can test whether the app returns the needed number and types of containers.
- ◆ be able to add / modify / delete products in the Product & Price Dashboard so that I can test whether store owners will be able to add / modify / delete items.
- ◆ be able to add / modify / delete entries in the Reward Point Conversion Dashboard so that I can test whether store owners will be able to add / modify / delete entries.
- ◆ be able to run unit test so that I can make sure that all functionalities work as intended.
- ◆ be able to run integration tests so that I can make sure that all functionalities work as intended.
- ◆ be able to run security tests so that I can make sure that all functionalities work as intended.

Software / Hardware Tools

UI/UX (Front End)

- React Native + Expo
- Languages:
 - HTML
 - CSS
 - Javascript

Middleware (Back-End)

- API server (server for REST APIs)
- Application services
- Services for data management
- AWS Application Integration services

Databases (Back-End)

- MySQL
- AWS Data Management services
- Express

Testing

- Jest
- Mocha, Jenkins
- Gitlab CI/CD

Third Party Software

- Amazon Maps
- Barcode Scanner
- OCR
- Amazon Kinesis
- Tesseract 4
- Scrapy

Hardware

- Smartphone
- Tablet

Development Tools

	Web App (Front End)	Server (Backend)
Language	HTML/CSS/JavaScript	JavaScript
Architecture	React Native	Node.js
IDE	Visual Studio	Visual Studio
UI/UX	Mockup design tool	
Database	Amazon RDS for MySQL (free for 12 months and other benefits)	
Build Manager/ Issue Tracking/ Testing	Gitlab CI/CD (Continuous Integration/Delivery/Deployment)	

Sprint Breakdown

*Each sprint represent 2 weeks

Sprint 0: Setup & Configure

- Setup the development environment
- Configure Trello board
- Integrate GitLab
- Configure Amazon RDS

Sprint 2: User Interfaces

- UI basic functionality
- Integrate frontend and backend
 - User profiles/logins
 - Define user roles
- Store search Functionality

Sprint 1: Framework

- Implement framework for Frontend/backend.
- Build Container Guide (mock data)
- Build Advocacy and Petition site

Sprint 3: Major Features

- Improve UI functionality
- Product search Functionality
 - Enter product's name
 - Search by icons
- Customized container recommendation

Sprint Breakdown

*Each sprint represent 2 weeks

Sprint 4: Feature Expansion

- Update UI
- Shopping List Functionality
- Product and Price dashboard
- Unit/Systems tests

Sprint 6: Wrap up Features

- Reward Point Conversion dashboard (if time permits)
- Improve/polish UI
- Performance testing
- Unit/Systems tests

Sprint 5: Mobile Integration

- Reward System
 - Collecting reward points
- Implement:
 - Amazon Maps API
- Integrate data analytics
- Unit/System tests

Sprint 7: Polish and Release

- Backup and recovery
- Unit / System tests
- Publish build (alpha/beta version)

Legend:

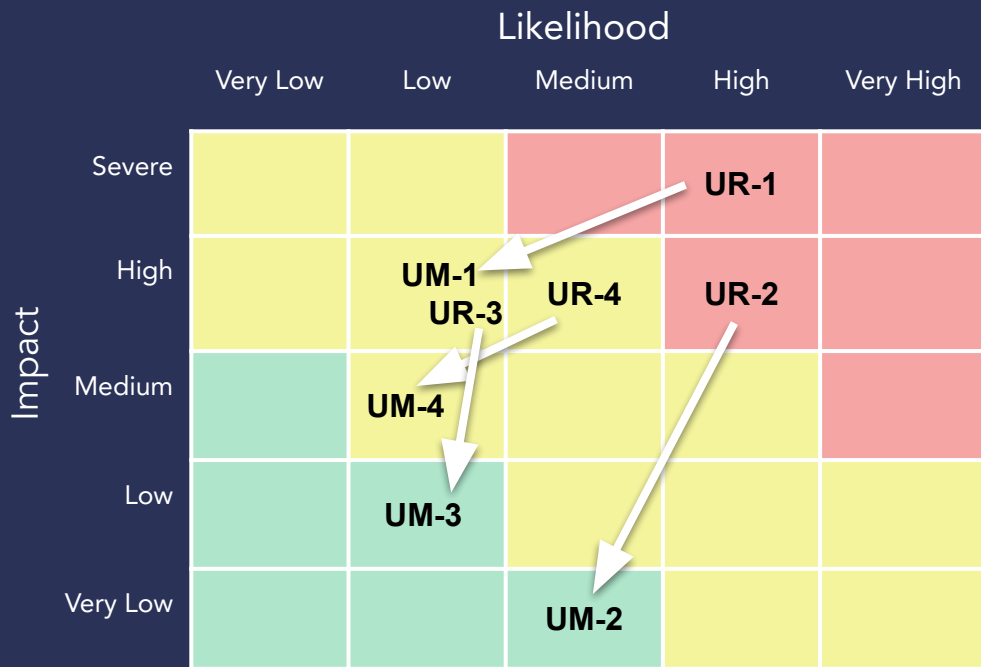


User Risk Matrix

Legend

Fully addressed

Partially addressed



Risks

- UR-1: Shopper has no package-free stores in their area
- UR-2: Shoppers are not familiar with needed containers
- UR-3: Shopper loses interest in the app
- UR-4: Shopper types in product name and app returns no product available

Mitigation

- UM-1: App connects shoppers to advocacy and petition sites
- UM-2: App provides 'Container Guide'
- UM-3: Product and price listing is constantly updated, reward system keeps shoppers engaged
- UM-4: App lists related products

Legend:



Customer Risk Matrix

Legend

Fully addressed

Partially addressed

Risks

CR-1: Stores cannot keep product/price information up-to-date

CR-2: Stores submit partial information

CR-3: Stores are unable to scan the barcode provided for the reward points for the user

CR-4: Holiday hours are not updated

Mitigation

CM-1: Remind stores weekly to update product/price information

CM-2: Provide a template/form for store owners to follow

CM-3: Generate new barcode for the shopper

CM-4: Automated reminder for stores to update their holiday hours

Likelihood

Very Low Low Medium High Very High

Very High

CR-3

CR-1

High

CR-2

Medium

CM-1

CM-2

CR-4

Low

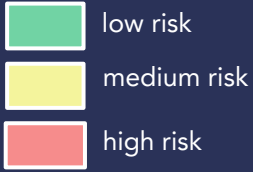
CM-3

CM-4

Very Low

Impact

Legend:

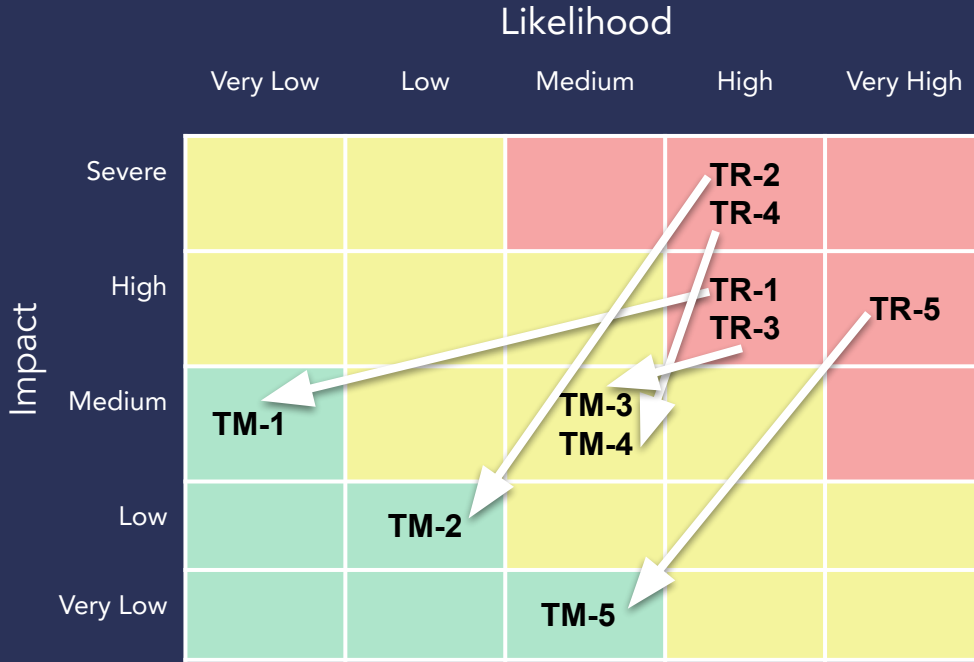


Technical Risk Matrix

Risks

Legend

Fully addressed
Partially addressed



TR-1: Receipt upload fails because the OCR cannot process the data
TR-2: App lists wrong product or wrong price
TR-3: Credentials/data compromised
TR-4: API integration comes with technical complexities
TR-5: Mapping feature fails

Mitigation

TM-1: Allow user to manually enter the data
TM-2: App updates data every 4-8 hrs with automated scheduled script; error log for developers to track
TM-3: Use good cybersecurity practices
TM-4: Studying API documentation, using an API Integration Platform
TM-5: An offline map of the closest 5 stores to the user will be saved

Key Points

Refill.Me provides
*the service of connecting people
with the nearest package-free stores.*

A comprehensive tool for

- ❖ novice shoppers who want to transition into package-free shopping
- ❖ experienced package-free shoppers who want to keep up their shopping habits
- ❖ package-free stores to attract shoppers



Image source:
https://commons.wikimedia.org/wiki/File:USDA_is_working_hard_to_expand_access_to_farmers%E2%80%99_markets_for_those_participating_in_the_Supplemental_Nutrition_Assistance_Program_%28SNAP%29.jpg

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Thank you

Image source:
https://commons.wikimedia.org/wiki/File:USDA_is_working_hard_to_expand_access_to_farmers%E2%80%99_markets_for_those_participating_in_the_Supplemental_Nutrition_Assistance_Program_%28SNAP%29.jpg



Q & A

Any questions?

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