ENSE 805 Researching and Engineering Community Centered Software

Project report-out & lessons learned

Project Name: GroceryMind

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Table of contents

Business need/opportunity

- The global phenomenon of food discard produces negative economic along with environmental effects. Most residential properties struggle to handle their food supplies which creates two problems: they buy multiples unintentionally while ending up with spoiled food items before expiration. Excessive food waste due to this practice produces negative effects on SDG 12 whose goal is Responsible Consumption & Production.

- Users can create optimized shopping lists through GroceryMind which combines digital food inventory tracking with built-in reminder systems that prevent them from buying duplicate items. The system enables users to track their food inventory more intelligently compared to paper-based lists along with basic notes because it supports waste reduction by helping customers adopt sustainable shopping habits.

- The present time demands smart grocery management which became crucial because of increasing food expenses and global sustainability needs. The food management system GroceryMind serves households both economically and environmentally by enhancing their purchasing process.

Reflections on Project Planning

UN SDG Goals

Our team has selected Sustainable Development Goal 12: Responsible Consumption and Production because it focuses on building sustainable consumption and production patterns. Through its effective management system GroceryMind assists users to minimize grocery waste. People from the "Growing & Restless" demographic segment are showing readiness for modern tools that will facilitate their tasks.

The SDG 12 partnership enables our application to drive global sustainability through effective waste reduction and monetary savings for users. The solution serves two purposes: waste reduction and community-based education regarding responsible consumption behaviours. SDG 12 regulates efficient resource management because it brings dual benefits by preserving the environment while supporting economic growth.

Key Finding: Community characteristics and technology configuration inventory

We conducted research to determine GroceryMind user needs together with behavioural patterns and technology preferences because we wanted our project to support UN SDG 12 – Responsible Consumption and Production. We used the Community Characteristics & Orientation analysis and the Technology Configuration Inventory as our main tools to accomplish this task. The frameworks allowed us to receive better comprehension about what the community currently uses technologically together with their readiness and required features for new digital solutions.

Specific analysis demonstrated that the user group belongs to the "Growing & Restless" segment of the life-cycle within the community. Users who already use basic to-do lists together with calendar apps for grocery management now look for smarter integrated solutions to minimize food waste. The life-cycle stage reveals user preparedness to accept innovative solutions which provide automation together with simplicity along with sustainability features. The key features of GroceryMind originated from these generated insights which incorporated automated expiry alerts alongside food inventory management capabilities and a shared intelligent shopping mechanism for effective grocery management alongside waste reduction.

Opinion of the processes and documentation

The course processes together with documentation provided useful methods to develop project planning. The project group previously paid minimum attention to programming requirements. The exercises in this course enabled our team to focus more on how our tool could suit the needs of our intended community. The absence of such documentation would have led us to create another standard To-Do list application instead of GroceryMind. Included examples would serve as better guidance for project documentation and thought generation according to our preference. We managed to understand the documentation, yet it required us to spend time to interpret its specific requests.

North star & Carryover customers:

North Star Customer:

- Individual Household Users. These users represent the core target audience for GroceryMind. They are the everyday consumers who:
  - Purchase groceries for personal or family use
  - Struggle with remembering expiry dates
  - Often discard unused food due to poor tracking
  - Want to save money and reduce waste but lack a smart system to do so

Carryover Customers:

- Small Food Businesses (e.g., Restaurants and Cafes): These customers were identified as secondary users during our community research. While not the primary focus of the initial MVP, they represent an important group with shared interests:
  - Reducing ingredient spoilage
  - Managing inventory efficiently
  - Optimizing stock purchasing

WHY (Purpose):

Our goal is to reduce food waste and enhance sustainable consumption which supports the implementation of SDG 12. All food waste stems from both household and small business activities. Addressing these business requirements provides methods to resolve a worldwide concern through specific local solutions.

HOW (Process):

The GroceryMind application delivers digital tools which include inventory management and expiry alert capabilities and collaborative shopping list integration. The system merges basic operations into an easy-to-use integrated format.

WHAT (Product):

A smart food management solution – GroceryMind – that allows users to:

- Track grocery items and expiry dates
- Receive automated reminders
- Share and plan smart shopping lists with others

Assumptions, Constraints, and Emerging Picture

Assumptions:

- People want a single unified system than having to use several different applications.
- Users have a desire to cut down food waste because they will embrace tools which streamline this task.
- Users will benefit from system-based automation which includes expiration alert functions and grocery recommendation features together with planning features for upcoming meals.
- The current users of to-do lists and notes demonstrate their readiness to accept an advanced system that operates similarly to their current tools.

Constraints:

- The app's users exist with different internet speeds because they depend on mobile data with limited bandwidth or use slow network connections.
- Users have a short amount of available time for interaction because features need to have quick access and straightforward setup requirements.
- The platform serves users with different levels of technical experience who range between experts in technology and novices with complicated applications.
- Individuals show resistance toward giving up their traditional methods of store list writing and fundamental reminder systems.

Emerging Picture:

The drafted emerging picture shows the community accepts new digital tools yet that success solely depends on usability together with integration and accessibility. Users expect a platform to combine usability with real-life limitations along with minimal interface complexity to provide meaningful sustainable reductions in food waste.

Technology Stack, Minimum Viable Products (MVPs), Prototypes

Technology Stack & MVPs

- Frontend: React / React Native
- Backend: Node.js
- Database: MongoDB
- Notification System: Expo Push notifications

MVP Features:

- MVP 1: GroceryMind Registration/Login page
- MVP-1: Home Screen (Frontend)
- MVP-1: Backend Code Structure
- MVP-1: Backend Connectivity and Database Schema
- MVP 2: Expiry Notification System
- MVP-2: Enhance UI for Home Screen
- MVP-2: Add Member & Profile Page
- MVP 3: Smart Shopping List
- MVP-3: Meal Suggestions

Drafted Prototypes:
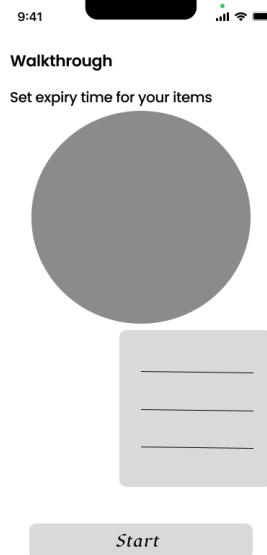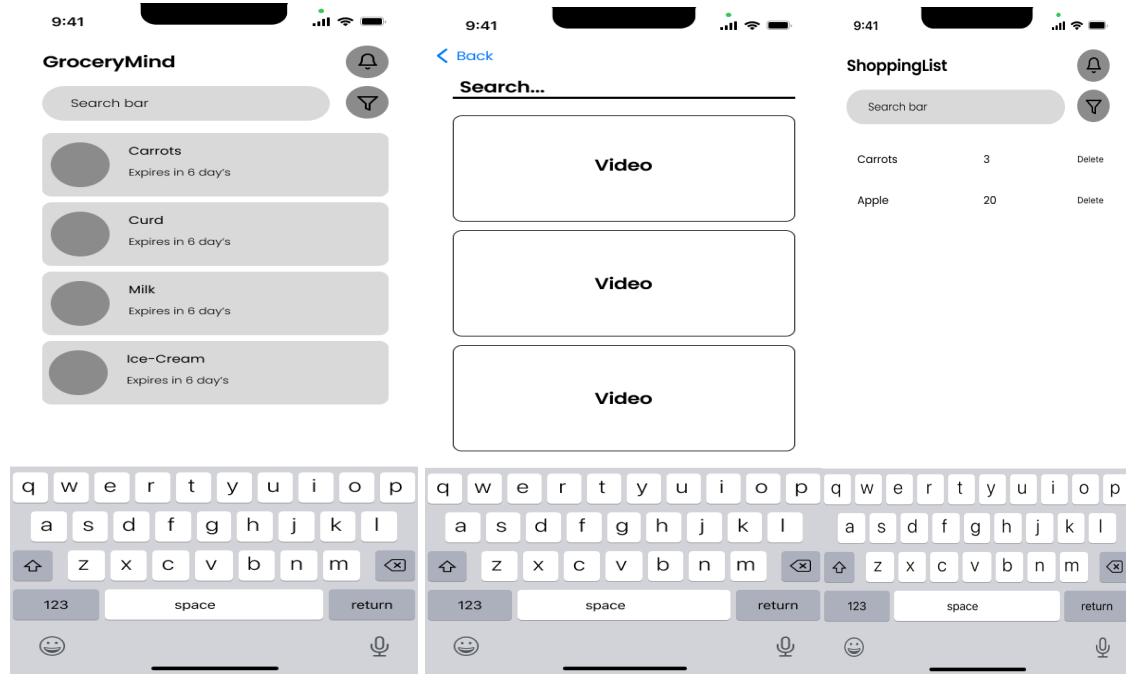
Fig1. Screenshots of Prototype
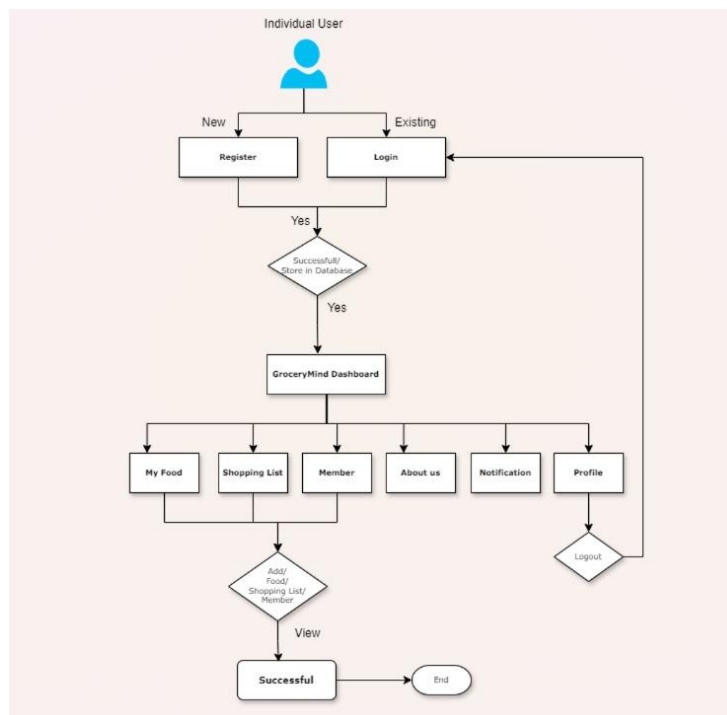
Fig 2. WorkFlow Diagram
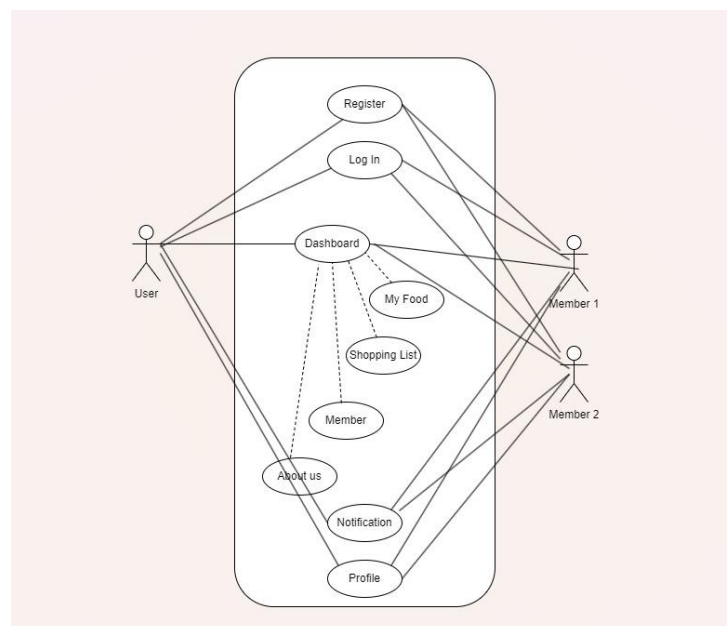
Fig 3. Use Case Diagram

Reflections on project results

What we created.

We created GroceryMind, a responsive, community-centered food inventory management application. It supports tracking grocery items, receiving expiry reminders, and creating smart shopping lists, with a focus on reducing household food waste—aligned with UN SDG 12: Responsible Consumption and Production.

Screenshots of core functionality
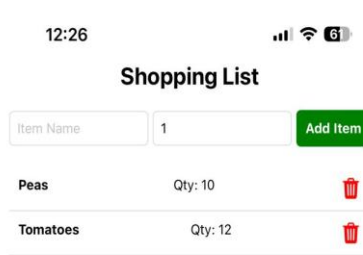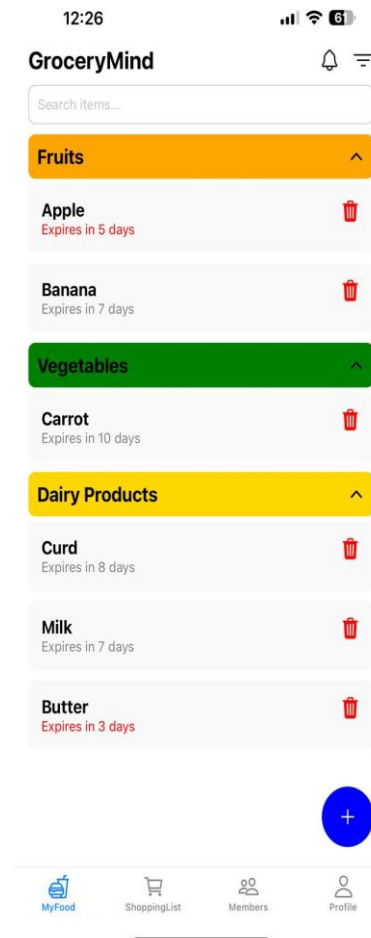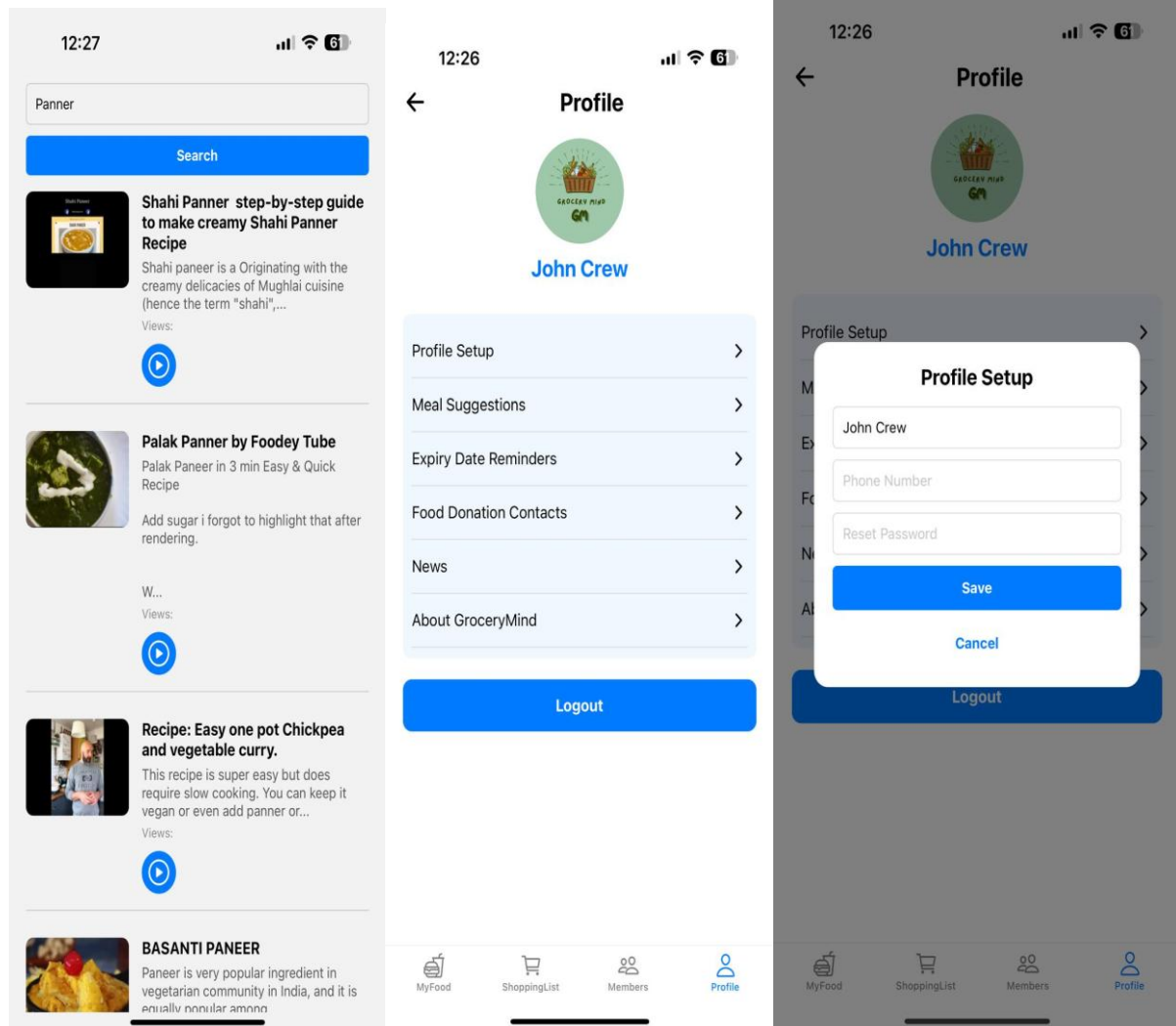
Fig 4. Screenshots of application

Alignment of Final Product with Initial Vision

In our initial "Planning and Initialization" video, we envisioned a tool that would help users:

- Monitor food usage and expiry
- Reduce household waste
- Make informed shopping decisions
- Offer cross-platform availability (web & mobile)

The first plan almost materialized into reality. The fundamental features of item logging together with expiration alerts turned out successfully during development. The future system development includes adding advanced features like barcode scanning along with Food-based expiry suggestions and food donation functions although the current system base allows these capabilities to be integrated.

The MVP design retained the essential components which delivered an accessible system that created social impact for users while maintaining maximum simplicity.

Software Design Process and Connections to Lecture Concepts

We followed an iterative, community-centered design process, incorporating insights from ENSE 805 lectures:

Design Thinking & Community Orientation (L05, L06)

Our project conformed to the "Growing & Restless" community phase by using features for asynchronous participation together with individual tools and content-oriented design. The development work referenced Community Orientations (L05) and Technology Landscape Polarities (L06) for their participation/reification frameworks as we designed individual tools with group and asynchronous features.

Digital Habitats & Stewardship (L02, L04, L03)

Our team implemented the digital habitat design principles (L04) to unite multiple tools and features with valuable purposes. User needs received technical solutions through the project team who served in their role of technology stewards (L03) following the ORhiDeCy model's guidance.

Gamification Potential (L12)

While gamification lessons did not appear in the final MVP the team explored potential gamification elements during lectures. Reward points for reducing waste "Food Hero" badges for community food donations Leaderboards within family groups

Product Quality and Agile Principles (L11)

We integrated quality thinking into our design by focusing on user experience while establishing feedback mechanisms and utilizing principles of Total Quality Management that involved simplicity and performance together with usefulness. The application underwent regular examinations to optimize the user interface and user experience which conformed to PDCA (Plan–Do–Check–Act) actions explained in our lectures.

Creativity & Collaborative Production (L08, L10)

We drew our inspiration from the quote "Creativity is Queen" (L10) to develop an interface which was easy to use and visually simple. The collaborative production ladder (L08) served as our guide for creating the system through the stages of idea-sharing up to team-based system building.

Project Experience and Technology Implementation

How We Felt About the Project

The project delivered valuable results because it linked engineering practice to actual community requirements particularly within sustainable and consumer responsible frameworks.

Likes:

- It was rewarding for us to work on purposeful development that supported UN SDG 12 because it increased the value of our work.
- The implementation of React together with Node.js and MongoDB as our technology

stack fulfilled our project requirements including fast development and multiplatform capabilities.

Dislikes:

- The tech stack's notification system and database connection methods proved to be more intricate than expected that delayed their actual implementation period.
- Short development time prevented our team from building sophisticated features such as donation centre connections and barcode reading functions that would have elevated the value for users.

What went well during the project

- The team worked well together for both coordination and division of tasks. All participants properly recognized their responsibilities while operating with strong teamwork.
- The requirements gathering process established clear user stories which allowed us to set our priorities.
- The delivered Minimum Viable Product fulfilled the project timeline requirements while implementing essential functionalities which included expiry alerts together with inventory tracking system and grocery list sharing ability.
- The user interface design received positive responses from participants.
- The project used WBS together with community mapping documentation to prevent scope creep issues.

What not went well during the project

- Several phases within development process required longer time periods than initially projected.
- The number of user feedback sessions alongside usability tests got restricted because we ran out of testing time.
- Food donation functionality along with barcode scanning as well as food-based expiry alerts were part of the future scope that we could not integrate into the minimum viable product.

What would you do the same on future projects?

- Structured documentation tools including Project Scope Statement together with Stakeholder Analysis and Technology Configuration Inventory provided us with better direction.
- Products with a strong Minimum Viable Product (MVP) focus in mind enabled us to prevent excessive development through establishing key foundational functionalities.
- The project alignment to a United Nations Sustainable Development Goal provided us direction while ensuring we chose purposeful design decisions.

What would you do differently on future projects?

- User testing conducted earlier would have allowed UI/UX to better absorb user feedback for more effective design.

- As part of future planning developers should allocate extra time for integrations since push notification implementation along with database integration proved harder than anticipated.

Future Work

- **Barcode Scanning & Open Food Facts Integration:** The system will integrate barcodes to enable users with an automated inventory entry protocol. The barcode scanning feature enables users to bring products into inventory with automatic data input that eliminates lengthy manual entry.
- **Partnerships and Integrations:** The platform will identify local community food partners to develop food donation features within the mobile app for users to donate additional food products. Through integration the system will help decrease wasted food while helping the community.
- **Food-Based Expiry Suggestions:** Food-Based Expiry Suggestions will provide recommendations for meals and product utilization that approaches expiration dates. The application includes a feature detection system which finds expiry-sensitive food items before offering suitable recipe recommendations. The application features will cut down food waste because users will consume perishable items before their expiration dates.

General Reflections on the Class & Project Experience

1. Prior Awareness of UN SDGs in Software Development

- The UN Sustainable Development Goals (SDGs) were entirely unknown to us before starting ENSE 805. The course revealed to us an organized system showing how technology relates to sustainable development. The knowledge of SDG 12—Responsible Consumption and Production helped us understand how GroceryMind can directly support waste reduction and mindful consumption. Our project received strategic direction when we gained this knowledge which established practical real-world value for our work.

- Through this course we transitioned from a technical method of problem-solving to designing solutions that focus on community requirements. According to our course information we discovered that software applications need to match how users behave and fulfill genuine needs to be popular. Basic grocery tracking tools are already in use yet fail to provide features which combat food waste. The company established its core functionality to focus on expiry alerts and inventory tracking and shared lists for users within its platform. Building with purpose became the lesson of ENSE 805 which helped students utilize technology to serve their local communities as well as worldwide purposes.

2. Initial Consideration of UN SDGs in Past Projects

- We did not make SDGs a part of our software development process before starting ENSE 805. Our team concentrated primarily on features and user interface design rather than other aspects. Our knowledge-sharing website from ENSE 871 helped support SDG 4 (Quality Education) through its collaborative features even though the original goal was different.

- This course has taught us to view software development from a new perspective while making us more alert to software solutions that help fulfill worldwide sustainability goals. Our future goal involves deliberately matching our ongoing projects to the SDGs to achieve both professional value and social effects.

3. Understanding Engineering Responsibility Through the UN SDGs

- The UN SDG education has expanded our comprehension of engineering work which extends past basic technical competence. ENSE 805 introduced us to new insights about user needs which mostly ignored societal and environmental factors in our previous approach to design. Through the SDGs we obtained a structure to understand the impact of our professional efforts on world problems linked to sustainability alongside equity and responsible choices.

- Our work on GroceryMind revealed that we aimed to solve the worldwide food waste problem through our application development. The experience taught us to become more mindful of ethics which inspired us to develop solutions that would benefit society in the long term. The SDGs help direct our planning and motivate us to take on projects that combine technology benefits with community effect.

4. Engineering Our Solution in Alignment with the Selected UN SDG

- The development of GroceryMind for SDG 12 integration contained elements from technical aspects as well as elements from social concerns. We initially wanted to make a helpful app but then recognized that reducing food waste needed an in-depth comprehension of user conduct together with community traditions particularly in the "Growing & Restless" community in Regina. Our understanding of user needs enabled us to develop features which seamlessly integrated into customers' daily operations through smart shopping lists and inventory system tracking combined with expiration date alerts.

- The fundamental difficulty arose from reconciling product development with pragmatic approach. Our objective involved creating an effective tool which would promote sustainable behavior patterns. The app development included user testing and design enhancements while adding educational features to educate users about food waste. Through this project we learned engineering skills by combining technology with practical impacts while establishing sustainable measures.

5. Future Perspectives on the UN SDGs in Software Engineering

- Future engineers should adopt the UN SDGs because these goals serve as an essential framework to produce beneficial outcomes. The SDGs motivate engineers to phase out constraints while forcing them to make their technical approaches serve true-world problems. We should expand our thinking toward sustainability combined with equity and social advancement while working from a framework perspective.

- The selection of most appropriate Sustainable Development Goals for each project promotes responsible and concentrated design since they do not equally match every goal. Through the SDGs people need to develop innovative solutions that integrate ethical principles with technological development. Through the SDGs engineers have an important framework to use their skills for creating a sustainable planet that benefits everyone.

6. Balancing Customer Needs with UN SDG-Driven Development

Ideally, it should be a balance of both. While customer requests are essential, especially in a "Growing & Restless" environment where people are actively seeking solutions, the UN SDGs can provide a broader ethical and sustainable framework for decision-making.

- Here's how we can approach it:

1. **Prioritize customer needs:** Our task will be to deliver solutions which adhere to customer requirements.

2. **Identify SDG alignment:** Projects should undergo analysis to determine their potential support for SDGs although they might not maintain direct links to these goals.

3. **Educate and influence:** Available opportunities allow us to instruct customers about sustainable advantages and help them choose solutions which support the UN SDGs.

4. **Seek innovative solutions:** Innovative solutions should be sought after to create products which address customer demands together with achieving global sustainability targets.

- A business approach that exclusively focuses on customer demands without observing the SDGs can produce short-term solutions with adverse lasting effects. SDG-focused enterprises that neglect customer needs may develop impractical solutions while organizations which strictly follow SDGs without attending to customer demands may create unwanted solutions.
- Therefore, we should strive for a balanced approach that integrates customer feedback with a commitment to ethical and sustainable practices, guided by the UN SDGs.

7. Applying UN SDG Principles in Future Engineering Work

The knowledge of UN SDGs will integrate itself into our future engineering solution designs. The examination of SDGs transformed our mental perspective while providing a systematic method for conducting ethical and sustainable decision-making. Specifically:

- **Inspiration:** Two key benefits emerge from the SDGs which stimulate us to identify projects that resolve major global problems

- **Design decisions:** Our designs will evaluate the environmental and social together with economic consequences to ensure SDG alignment

- **Innovation:** he company constantly seeks innovations which create solutions which fulfil customer requirements and contribute to building a world that is sustainable and equitable.

- Knowing that we are also in a growing and restless environment it is very important as engineers to make the community reflect and self-design for the new functionality to its tool configuration.

8. Influence of UN SDG Awareness on Future Career Decisions

The knowledge from UN SDGs will play an important role when choosing our future career directions. We recognized after this lesson our dedication should combine career-based technical software engineering development with personal values which lead to world-driven impact, Specifically:

- **Job selection:** Our job search will exclusively focus on organizations which make sustainability together with social responsibility their core commitment.

- **Project focus:** The project selection process will focus on identifying solutions for critical worldwide issues while supporting SDG objectives.

- **Skills development:** Our team will systematically develop abilities as well as specialized knowledge to generate sustainable and equitable solutions. The pursuit of further education about environmental science together with social entrepreneurship represents some of our focus areas.

The community expansion and rising dissatisfaction demands us to first evaluate and structure the new tool configuration features designed by the community members.

9. Additional Comments on the GroceryMind Project:

The GroceryMind initiative provided a valuable educational experience which expanded our comprehension of software engineering solutions for worldwide problems.

Successful growth of GroceryMind depends on constant user interaction along with continuous application development due to our "Growing and Restless" community. Through user feedback collection and implementing new features and creating a community network GroceryMind will continue its path toward being an essential tool for reducing food waste while supporting responsible consumption. The team believes that GroceryMind demonstrates outstanding potential to create positive change across Regina along with its surrounding area and further regions.