The Polymorphs

Project Milestone 3: System Prototype and Evaluation Plan

Plot-to-Plate

Team Members: Anna Galeano, Princess Lee Ellerbe, Shrinidhi Kulkarni, Louis Godfrey

Usability Specification

Qualitative Benchmark Tasks

For our qualitative benchmark tasks, the goal is to see how people actually feel using the interface, not just whether they can complete tasks, but how natural, confusing, or satisfying each step feels. These tasks focus on real scenarios that someone using our app would actually do, so we can see how intuitive the layout actually is in practice.

Task 1 - Create a Garden

- Users will create a new garden with their size of choice and description. This will help us see how easy it is for someone new to understand what a "plot" is and how the layout works without extra help.
  What we're looking for: Do they understand what to do right away? Do they get stuck figuring out where to click? Does the interface make sense on its own?

Task 2 - Claim Garden Plots

- Users will claim three open plots. This checks whether the color system (green = available, red = yours, gray = unavailable, yellow = taken) is clear and if the claiming process feels quick and straightforward.
  What we're looking for: Can they tell which plots are available? Do they understand how to claim them? Do they seem confident or confused during the process?

Task 3 - Post On The Community Forum

- Users will make a post offering a dozen tomatoes ready for pickup with a picture included. This task tests how comfortable they feel finding the forum, creating a post, and uploading images about what they're giving away.
  What we're looking for: Does the nav bar feel intuitive. Does the posting process feel simple? Are they sure their post actually went through?

Task 4 - View Profile

- Users will open their profile to check their gardens, recent activity, community contributions, and their posts. This task helps us see if the profile page clearly communicates what the user has done so far and if it feels personal and rewarding to use.
  What we're looking for: Do they understand what each section represents? Can they easily find their garden list and posts? Does the layout feel organized and make sense? Does it motivate them to keep contributing to the community?

Task 5 - Navigation Flow

- Users will move from the homepage, to the community page, to the gardens and then to their profile. This helps us check how natural it feels to move between sections and whether users can find their way without getting lost.
  What we're looking for: Is it confusing to find a page. Does the navigation feel smooth?

Qualitative Data Collected

To evaluate the usability and overall user experience of **Plot-to-Plate**, we will collect qualitative data focusing on participants' thoughts, feelings, and behaviors during and after their interaction with the prototype. This data will help us identify design strengths, areas of confusion, and opportunities for improvement.

Types of Qualitative Data

1. **Observational Notes:**
   We will observe how participants navigate the interface — noting hesitation, confusion, or repeated actions. For example, if a user struggles to find the "Create Post" button or spends extra time reading instructions, that indicates unclear navigation or labeling.

2. **Think-Aloud Protocol:**
   Participants will be asked to verbalize their thought process while

completing tasks (e.g., “I’m trying to find where to post my extra produce”). This will give insight into their mental models and what parts of the interface are intuitive or confusing.

3. **Post-Task Interview / Debrief Questions:**
   After completing the benchmark tasks, we will ask open-ended questions such as:
   - “What part of the app did you find easiest or most enjoyable to use?”
   - “What part of the interface felt confusing or unnecessary?”
   - “How confident do you feel that your posts reached the right audience?”
   - “What features would make this experience more engaging or useful for you?”
4. **User Satisfaction and Engagement Feedback:**
   We will collect subjective feedback about how rewarding or motivating users found the donation streak feature, and whether gamification elements (like tracking streaks) actually encourage continued participation.
5. **Error or Frustration Logs:**
   Any moments of visible frustration, repeated misclicks, or abandonment of a task will be recorded with notes about what likely caused it.

Specifications

The usability specifications define what we expect from users interacting with the system and how we’ll know the design is working as intended. These include both qualitative and quantitative expectations to help us evaluate how well users can complete core tasks like creating gardens, posting on the forum, and managing their profiles.

Learnability
New users should be able to figure out how to navigate the main features (community, gardens, profile) within the first few minutes of use, without needing external help.

- A first time user should understand what each page is within 1 minute of exploring.
- Users should be able to successfully complete their first task (creating a garden or posting on the forum) in under 2 minutes.
- Users should express that the interface feels “simple,” “clear” or “easy to figure out.”

Efficiency
Returning users should be able to perform routine actions quickly once they’re familiar with the layout.

- Claiming plots or creating a forum post should take under 1 minute.
- The navigation between pages should feel direct and require no more than two clicks to reach any major feature.
- Buttons and links should respond instantly and lead to expected results.

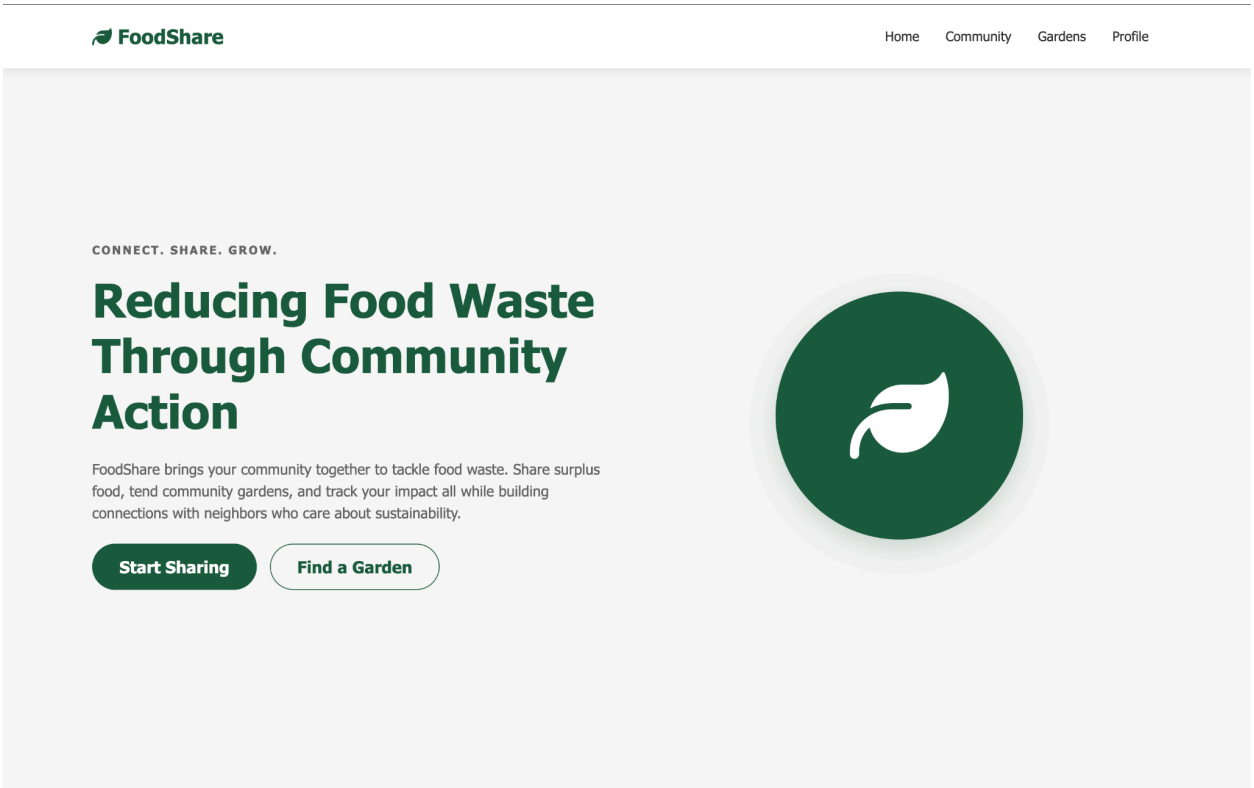
Success Criteria
The system will be considered usable if:

- Users complete all benchmark tasks within target time limits and with minimal confusion.
- Observations show that users navigate, create, and share content smoothly without repeated errors.

The Design

Description

Our features consist of three main elements: the community donation forum, the profile, and the gardens information page. All are accessible above the fold.



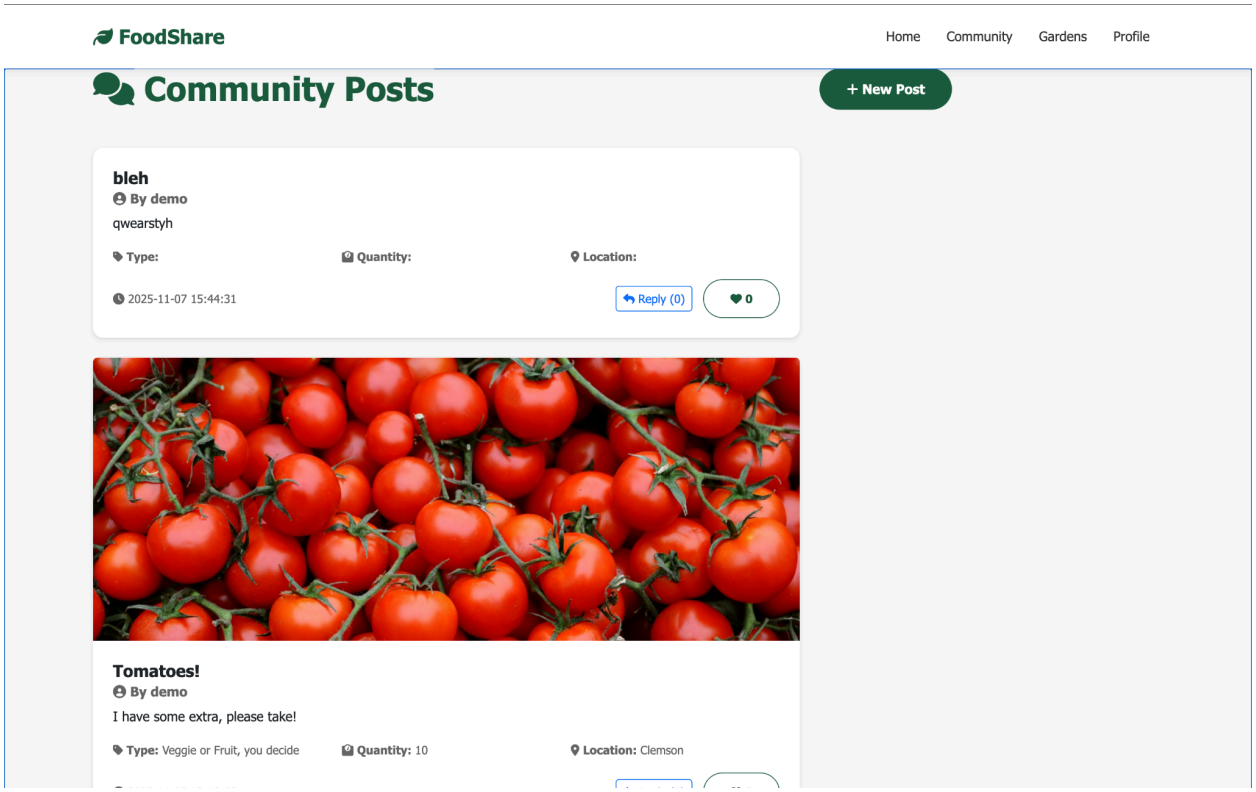
These all provide an immersive and engaging experience for the user promoting the reduction of food waste.

The community donation forum being the most impactful feature allows the user to post on the forum within the app advertising extra food they'd like to give away from their garden or home. The profile allows the user to see their activity and gardens they've tended. The gardens feature allows people to easily view the details of a garden and most importantly if there is a gardener needed for the plot.

Main Features Breakdown

1. Community Donation Forum

Users can post surplus food from their gardens or homes that they don't want to go to waste. Whether it's too many tomatoes from a backyard garden or groceries they bought but won't eat in time, people post it on the forum for neighbors to claim.



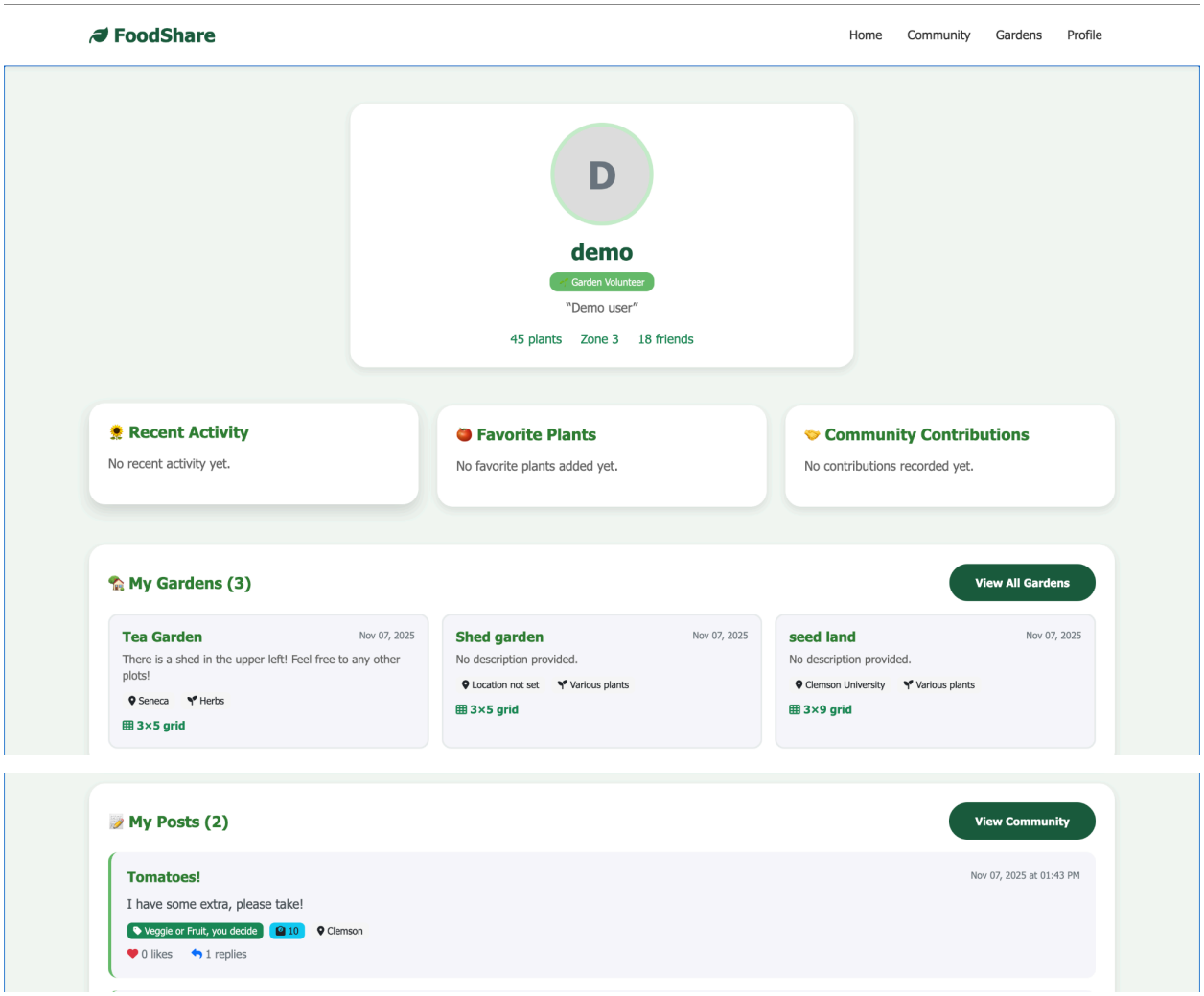
Posts show up in a feed with descriptions and images so people can browse what's available in their area. When someone sees something they want they can claim it and arrange pickup. This keeps perfectly good food out of landfills while building connections between community members who might not otherwise meet.

How Users Interact With It:

- Browse the community feed to see what's available nearby
- Create new posts with descriptions and pickup details when they have surplus food
- Claim items they need from other people's posts by replying

2. User Profile

The profile allows the user to see their activity and gardens they've tended. This keeps the website personalized and food waste down.



The profile shows the user's basic info like username (demo) and status (Garden Volunteer). Below that there's two main sections; Posts and Gardens.

The posts section displays all the food donations the user has made through the forum. For new users it says "No posts yet" but once they start sharing food it all shows up here as a history of their impact.

The Gardens section shows all the community gardens the user is part of. You can see cards for gardens like "Tea Garden" and a favorite “seed land” where they have plots or help tend. Each garden card shows what's growing there and basic info.

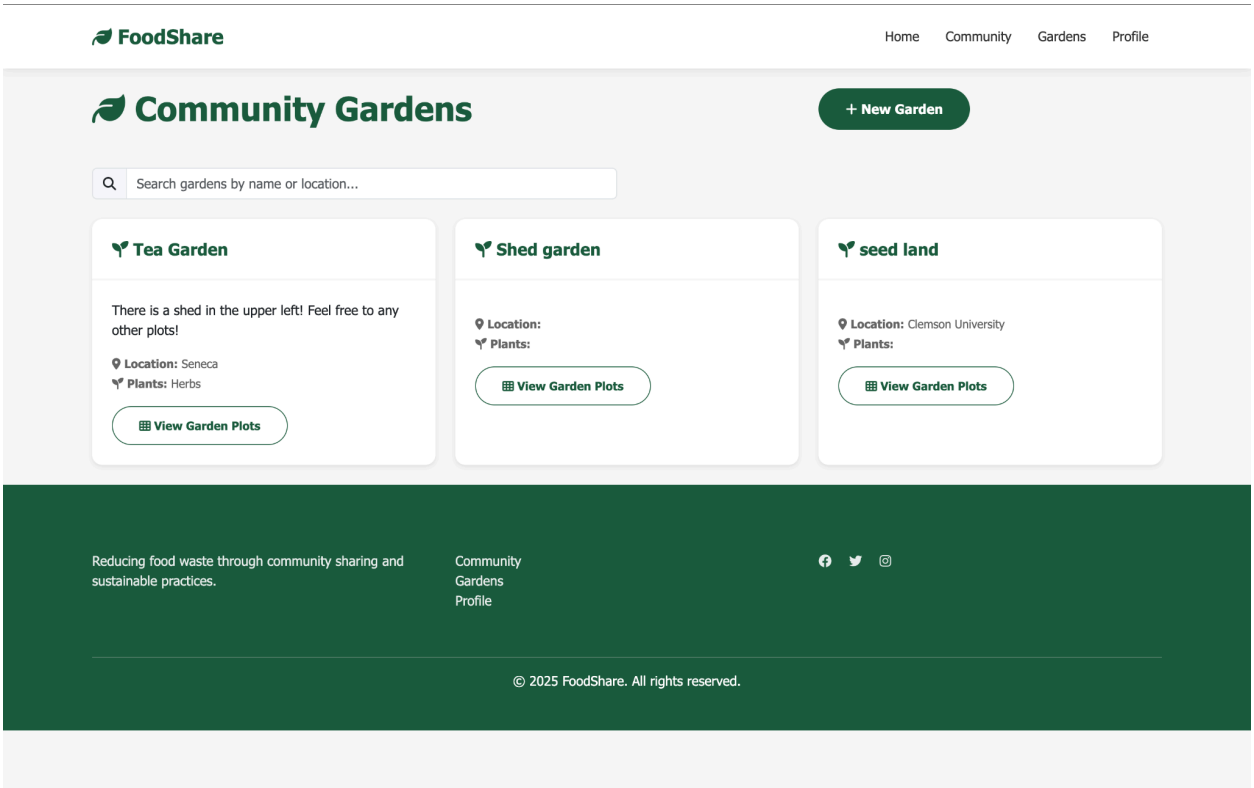
How Users Interact With It:

- Check their garden activity to see their progress
- View past food donations in the posts section

- Access their gardens quickly from the gardens section
- See their overall impact on food waste reduction

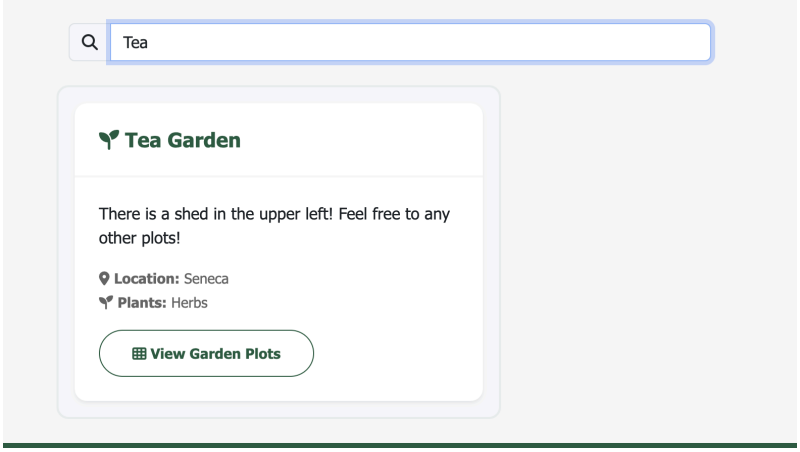
3. Gardens Information Page

The gardens page provides a space for a user to create a garden or claim a plot from an already existing garden encouraging community members to connect with their food.



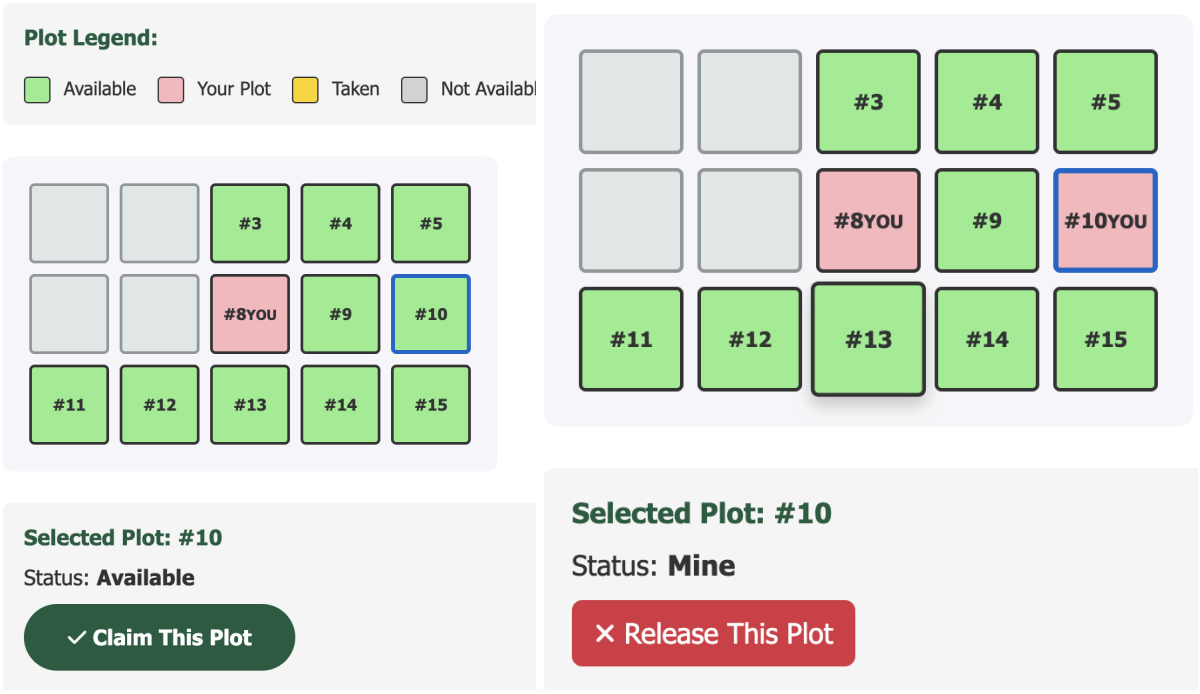
How Users Interact With It:

- Search for a garden



- Select View Garden Plots

- Select a Plot to Claim
    - Unclaim a plot if needed



Challenges/Missing Features

There were race conditions that lead to two inputs into the database and therefore duplicate gardens and posts when in development. This was resolved with input handling and we theorize that this was the case due to the debugger.

Improvements

Expanded Plot Attributes

Plots should contain additional metadata beyond simple availability status. Planned attributes include water access (proximity to irrigation), tool storage availability (nearby shed access), soil quality indicators, sun exposure levels (full sun versus partial shade), and historical planting data. These details enable gardeners to make informed decisions when selecting plots.

Join Garden Feature

When users claim a plot or volunteer to help with a garden, this relationship should automatically reflect on their profile in the Gardens section. Currently, this connection requires manual updating. We need a streamlined "join garden" workflow that allows users to request plot access, receive confirmation, and have it immediately appear on their profile with relevant details and specific plot attributes.

Garden Scale and Orientation

Garden layouts need scale indicators to communicate whether plots are 10x10 feet, 4x8 feet raised beds, or another configuration. Adding compass orientation would also provide valuable information about sun exposure patterns, which is essential for planning crop placement and maximizing growing success.

Information System

We need to implement contextual help throughout the application with tooltips and information buttons explaining key concepts. Examples include "What is a plot?", "How do donation streaks work?", and "What do the different plot colors mean?". This will reduce the learning curve for new users and improve overall usability.

User Authentication and Profiles

The application currently operates with a single hardcoded demo user. Implementing proper user authentication and personalized profiles is essential for scaling the platform. This would allow multiple users to maintain individual donation histories, garden memberships, and streak tracking.

Post Management

Once food from a donation post has been claimed or picked up, there is currently no mechanism to mark it as resolved or remove it from the feed. This creates feed clutter over time. We need to add "mark as complete" functionality and a deletion option for unclaimed posts that are no longer relevant.

Justifications

We chose Flask with Bootstrap and Flask-SQLAlchemy's ORM because this stack allowed us to rapidly prototype and iterate on our core features while maintaining a clean, responsive user interface. Flask's lightweight framework gave us the flexibility to quickly build and modify our API endpoints as we refined the data models for gardens, plots, and forum posts. Bootstrap enabled us to create a professional, mobile interface without spending excessive time on custom CSS, which was critical since our garden plot visualization required significant development focus. SQLite provided a simple, file based database that was perfect for prototyping, it required zero configuration and allowed us to quickly test different schema designs as we worked through the garden plot availability system.

This technology combination specifically enabled our most important feature: the interactive garden plot grid. Flask handled the backend logic for plot claiming and availability checking, Bootstrap's grid system provided the responsive layout foundation for our plot visualization, and SQLite's relational structure ensured data integrity when multiple users interact with the same garden. The race condition issues we encountered were resolved through proper request handling in Flask rather than complex database transactions, which validated that SQLite's simpler architecture was sufficient for our needs. Alternative stacks like React with Node.js would have introduced unnecessary complexity for a prototype focused on demonstrating core functionality, while WordPress or noncoding solutions lacked the flexibility needed for our custom garden plot interface.

Prototype Evaluation

Revisiting Tasks

To recap, the ultimate goal of Plot-to-Plate is to eliminate food waste on the consumer front. Plot-To-Plate is intended to be used by college students, young independently living adults, and busy families. In other cases, we can foresee our application being used by producers as well such as grocery stores, restaurants, vendors, farmers, and other producers. Our tasks identified in milestone 1 were largely overgeneralized and had yet to be catered to a specific sub problem or application. Revisiting these tasks with the context of our decisions since, we have narrowed down our task list and added a few new ones to create the following list.

1. Garden Management
    a. Create garden
    b. Recruit volunteers
    c. Plan garden layout
    d. Plant produce and kinds of plants
    e. Water plants
    f. Add fertilizer to plants
    g. Treat blight and other sicknesses when they infect produce
    h. Monitor growth progress of produce to determine if ready to sell
    i. Manage tools, equipment, and resources needed for operations
2. Sharing and Community
    a. Identify surplus
    b. Identify excess inventory
    c. Identify soon to expire items
    d. Assess personal consumption and capacity
    e. Post food for app users to obtain
    f. Create posts with item details
    g. Upload photos of produce
    h. Arrange pickup location and times for food exchange
    i. Communicate between parties partaking in garden care and food exchange
    j. Complete the transfer of items

3. Distribution and Growing of Goods
    a. Post surplus inventory
    b. Assess excess food quantities
    c. Create listing for obtaining food
    d. Negotiate price or terms of donation
    e. Manage growth logistics
    f. Track individual impact of food waste reduction
    g. Monitor reduction of food waste
    h. Measure Community Engagement
    i. Adjust strategies for distribution

Standards/Criteria

New users, when first loading Plot-to-Plate should be greeted with the opportunity to create an account. Creating an account should require a username of the user's choice, either a phone number or email address for communication purposes, and of course an account password. Upon creating an account, Plot-to-Plate should take the user to the main landing page. For returning users with accounts already, they should be able to click "Log In", enter the account credentials, then assuming they are correct be taken to the main landing page.

Users who would like to start up a garden within their community should be able to create a garden, determine an adequate initial layout of their garden, determine what the community will grow and where, and establish a line for people to claim ready to eat produce. From the main landing page, these users would first select the 'Garden' tab to be taken to the garden planning page. This page should display all gardens the user is currently involved in as well as ones they created. Users should be able to click 'Create Garden' to open a popup where garden layout can be set. Users should be able to initialize the overall available space, and place components such as plots, tool sheds, and water sources.

Users who are contributing to a garden will be able to claim plots for growing produce, and select the type of plant grown in their plots. They will first begin by going to the 'Garden' tab from the main landing page. They will click on the card with the garden's name to display a popup. This popup should display the garden's layout and show the user available plots for them to claim. Available plots are

displayed in green, claimed plots appear in grey, and plots that are held by the user appear in red and have their username within them. A user can click on an available plot to reserve it, and set the plants they plan to grow within them.

For users looking to exchange goods, Plot-to-Plate offers a community forum to post opportunities to give away grown goods. This forum is accessed through the 'Community' tab from the main landing page. On this page, users can see all posts related to gardens they are involved in. Each post has a title, a description, and can include pictures as well. The main goal of this page is for users to advertise goods grown in their plots that are ready for distribution. Users can use the forum to advertise goods and set up terms and a location for exchange.

The last tab in the Plot-to-Plate interface is the Profile tab. This tab displays the user's information and offers a means of updating it. In addition, it also displays statistics regarding a user's activity in the garden.

Evaluation

Plot to plate's ultimate goal is to offer a convenient means of creating and managing activity within a community garden, and offering a platform for users to exchange what they grow and limit the food wasted. Considering the standards and criteria above we will conduct the following tests to assess Plot-to-Plate's basic functionality.

A new user will be asked to first open up the application, then create an account with their information. The user will be timed from the moment they open the app, to the moment they arrive at the main landing page. A successful user creation page should allow the user to create an account within less than 2 minutes. The user will be asked about the information we collect and whether or not the user felt comfortable giving this information.

Next, we will ask the user to create a 5 plot by 5 plot garden with the following.

- A 2x2 shed
- A 2x2 plot growing heirloom tomatoes
- A 1x1 hose for watering

The user can place the components in a way that makes sense to them. We will observe the user's interactions to assess how easy it was for them to complete this task and how fast they complete it. The garden planning interface should be able to be used intuitively with minimal assistance. An optimal interface should allow the user to complete the task within less than two minutes. The user should also describe the process as easy to understand and make sense of.

Next, the user will be asked to claim three plots on a posted community garden. The garden will be called "County Garden" and will include the following.

- Will have 10x10 total plots available
- A 2x2 shed allocated in the top left corner of the garden.
- Three 2x2 plots have already been claimed.

The user can pick the plots they so choose. If this interface is a success, they should be able to complete this task within less than a minute without any help or intervention.

Finally, we will conduct a test of our forum page and ask the user to post a forum post advertising a dozen heirloom tomatoes ready for distribution. During the test, another user will be asked to view the same forum post, and request the product. The two users should be able to use the forum post to negotiate terms and set up a time and for the first user to pick up the tomatoes.

Feedback Response to Studio 3

During Friday's studio session we received the following feedback to integrate with our next version of Plot-to-Plate.

- Make an exit screen for viewing plot work. We currently just have a way to initialize and claim plots, but our current version lacks a way for users to see their interactions. Our next version should include a view of the garden after a user has saved an action such as claiming a plot.
- Make more values for plots. Our current garden interface allows for plots to be claimed, but what those plots can be is currently arbitrarily set by the user. We need to add a type attribute to each plot which allows a plot to be defined as one of the following:
    - A tool shed
    - A grow box with chosen plants

    - A water source
- Our interface needs to define the scale of gardens in tangible real world units.
- The garden interface currently offers no means of orientation(i.e. cardinal directions are never given and thus garden layout is abstract at best). Our next version of the garden UI should include a legend which defines four main cardinal directions
- For both garden layout and the forum posts, we should include information buttons which inform the user how to operate the page, and answer basic questions like, “What is a plot?”, “What are my streaks?”.
- Forum posts should be able to be deleted or marked as resolved to avoid confusion regarding expired product listings.
- The profiles page is currently unimplemented, and should have displayed a user’s information as well as streaks and community garden info.