
MicroBreeze

Spatially-Informed Homesteading Solutions

Team Red - Feasibility

CS 410 Fall 2023

Department of Computer Science

Norfolk VA, 23529-0162



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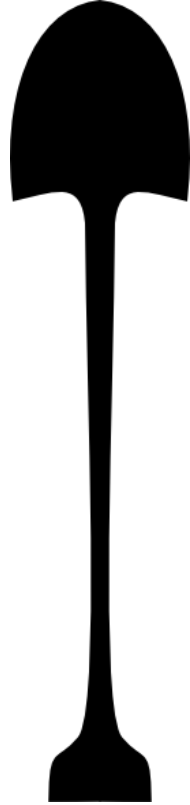
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The Team



Hunter Hindmarsh
Undergraduate Researcher



Nicholas Van Tol
Undergraduate Researcher



Chance Sadler
Undergraduate Researcher



Dima Bochkarev
Undergraduate Researcher



Ashley Barasebwa
Undergraduate Researcher



Holadem Siladin
Undergraduate Researcher

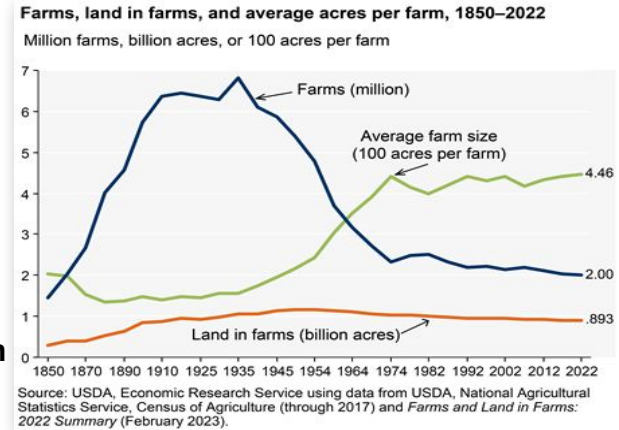
What is Homesteading?

- Homesteading emphasizes self-sufficiency; individuals or families produce much of what they need.
- Activities include farming and gardening and involve growing fruits and vegetables.
- Homesteaders prioritize independent food production, reducing reliance on external sources like grocery stores.
- The goal is to achieve independence and self-reliance in daily life.



Farming Decline

- Local farms are disappearing at an alarming rate
- From 2007 to 2022, the number of farms fell from **2.2 million to 2 million**[2]
- The disappearance of farms contributes to a disappearance of local food
- **6.2 million** acres will be converted for uncultivable urban uses and **12 million** acres to low-density residential uses by 2040[3]



[1]

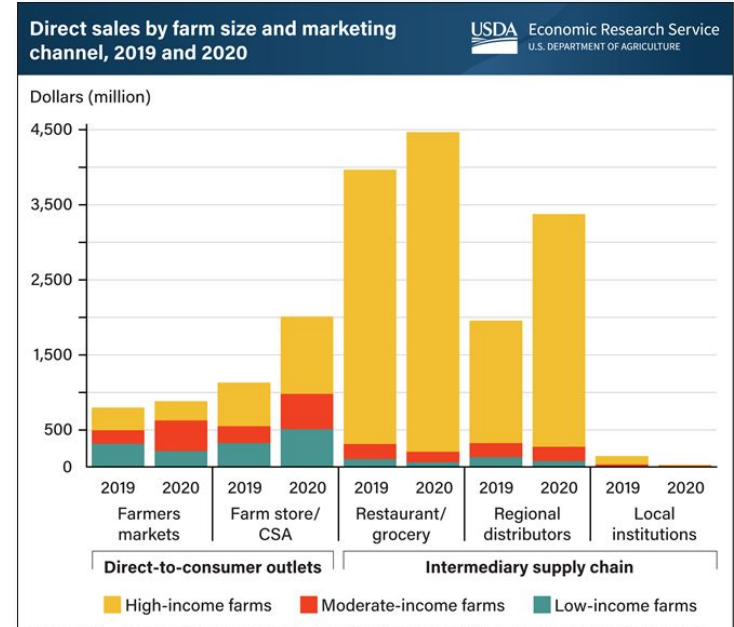
[1]<https://bit.ly/3Q1OoLW>

[2]<https://bit.ly/492JTJC>

[3]<https://bit.ly/3M3yAHd>

Farm Produce Journey

- Out of the 2 million farms, only **7% sold directly to consumers**[1]
- Spinach loses 90% of vitamin C in a day [2]
- Through intermediaries can take days to weeks [2]
- Some food is **stored for weeks to months** before seeing the shelves at a grocery store [3]



[1]<https://bit.ly/406OGpp>

[2]<https://bit.ly/3Fp2YIs>

[3]<https://bit.ly/3M7vvpS>



Timeframe for Fresh Produce

Crop	Apples	Carrots	Tomato	Lettuce
Harvest to table	6-12 months	1-9 months	1 to 6 weeks	1-4 weeks
Garden to table	INSTANT			

[1]

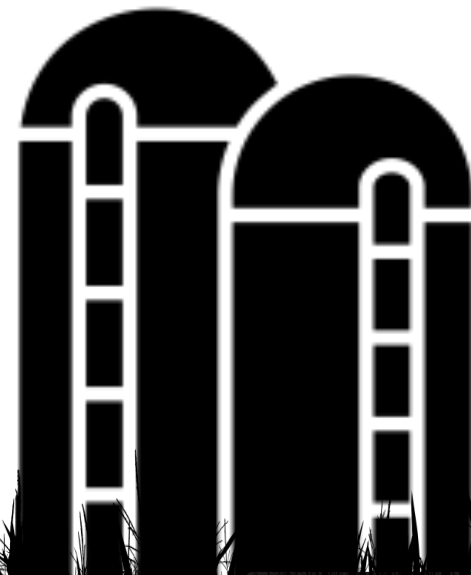
[1]<https://bit.ly/3M7vvpS>



Private Gardening Rise

- Gardening has seen a significant uptick, with a **35% increase** since 2021[1]
- **55%** of American households now participate in gardening activities[1]
- Only **20% of gardeners** use a mobile app as a source for information [1]
- Fewer than **1 in 5** gardeners are gardening to produce their own food[2]
- **15%** of the world's food is grown in urban areas[3]

[1]<https://bit.ly/3M9vOAx> [2]<https://bit.ly/3ZZNHHD> [3]<https://bit.ly/3tNuiNS>



Small Scale Production

- It requires **2 lbs** of strawberries to make **5 cups** of jam
- It requires **13-14 lbs** of grapes to make **1 gallon** of wine
- It takes **13 lbs** of oranges to produce **1 gallon** of orange juice
- About **540** peanuts are needed to make **12 ounces** of peanut butter (National Peanut Board, 2023)



Problem Statement

Knowledge gaps, crop yields, and spatial correlation of external factors impact the ability to create products from homesteading.

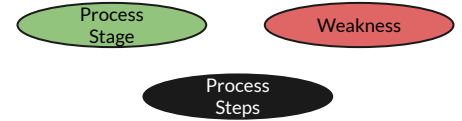
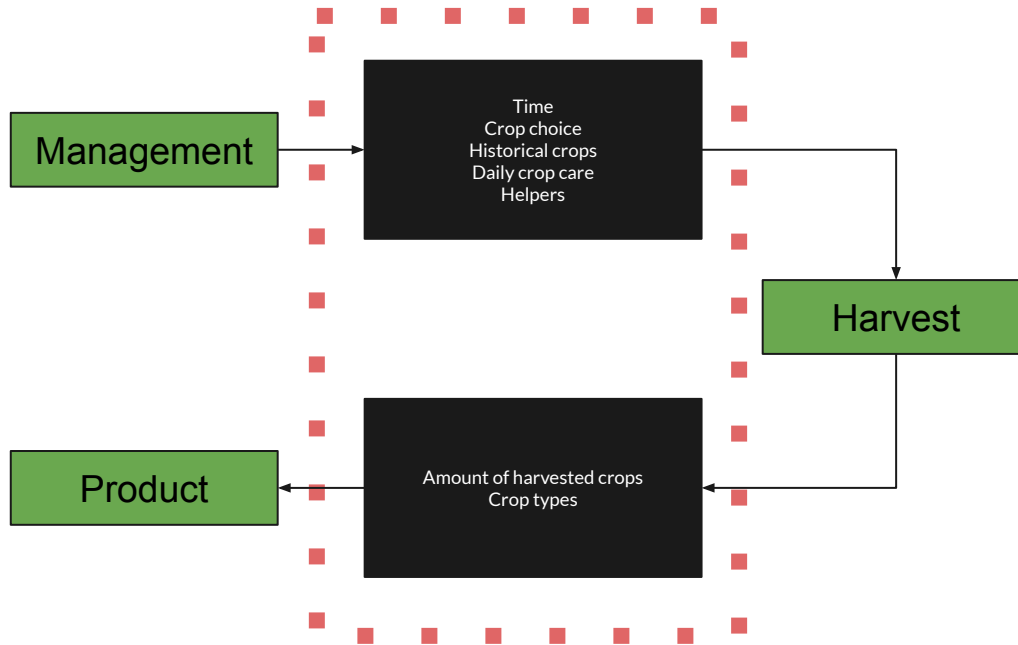


Problem Characteristics

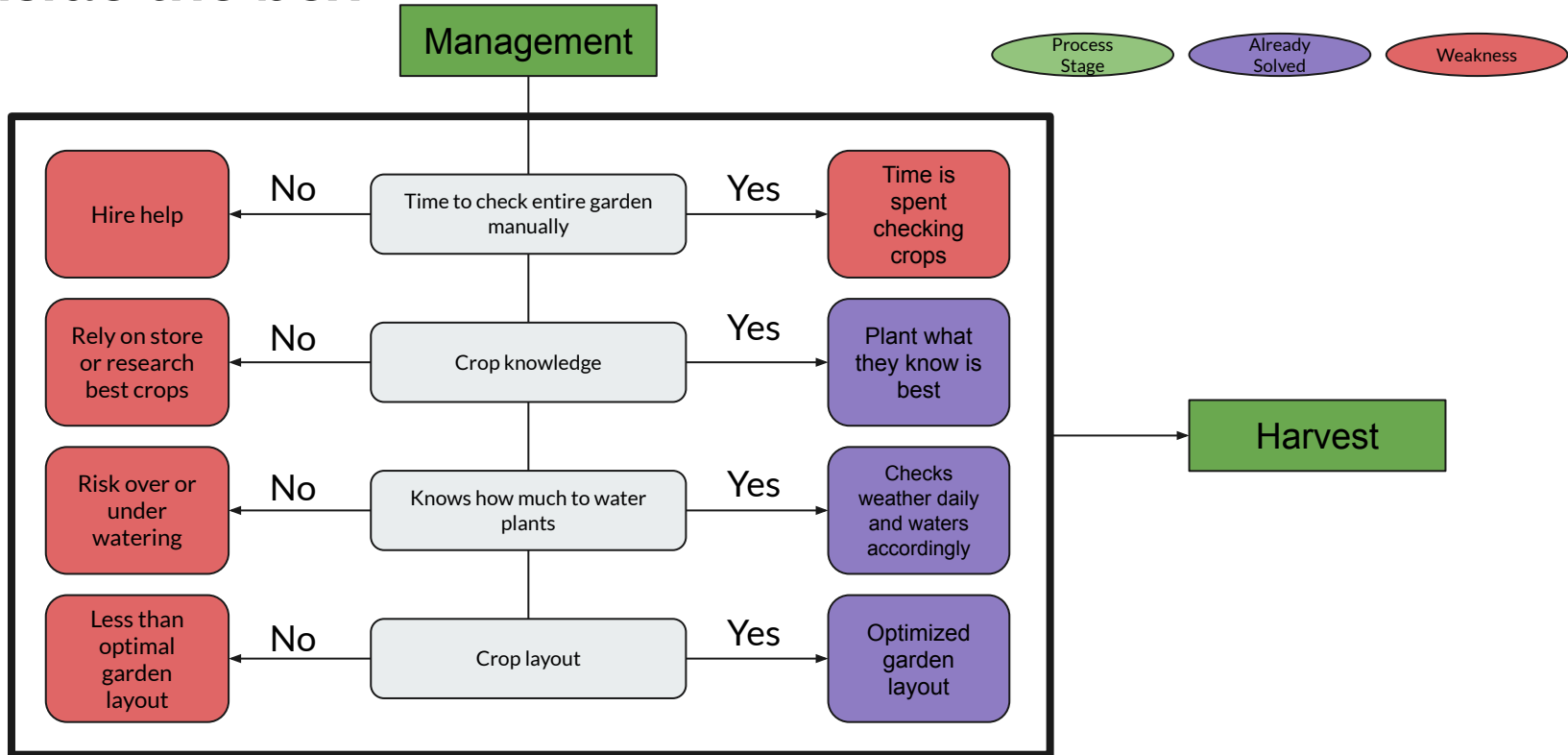
- Homesteader helpers often lack engaging social features, limiting community building and idea sharing
- Homesteaders struggle due to knowledge deficiencies in best practices
- Challenges include crop selection and water management
- Unpredictable planting results from insufficient information and resource inefficiency
- Manual Crop Inspection is ineffective, time consuming, and labour intensive.



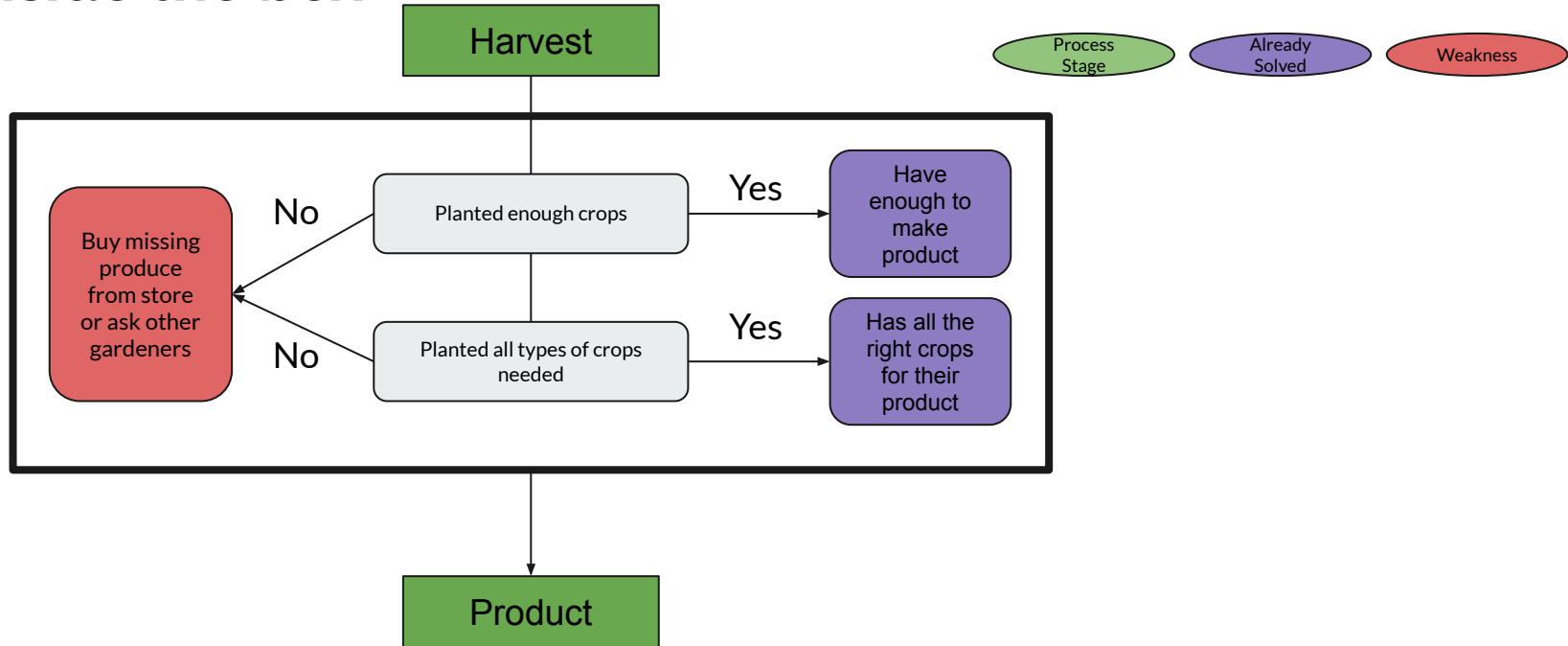
Current Process Flow



Inside the box



Inside the box

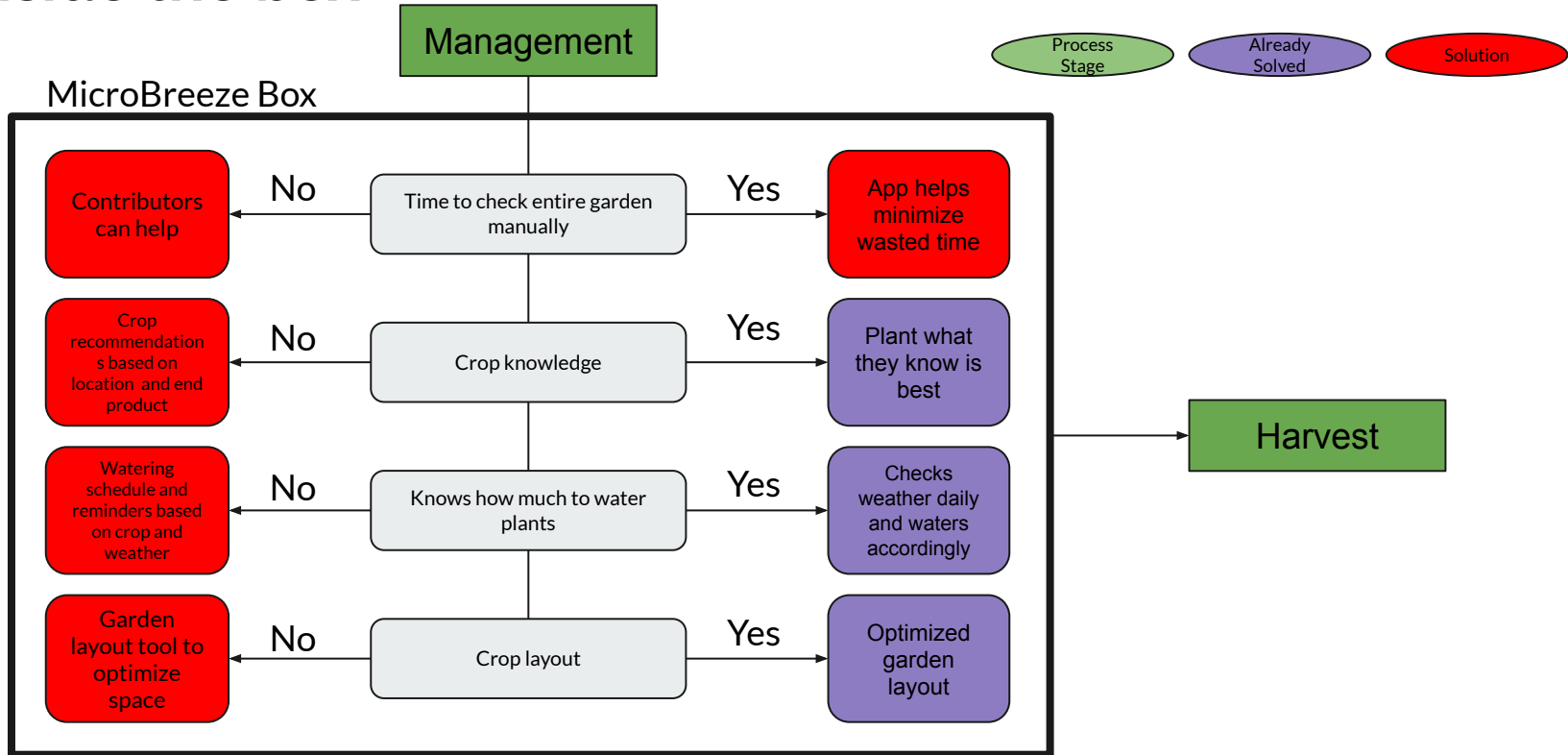


Solution Characteristics

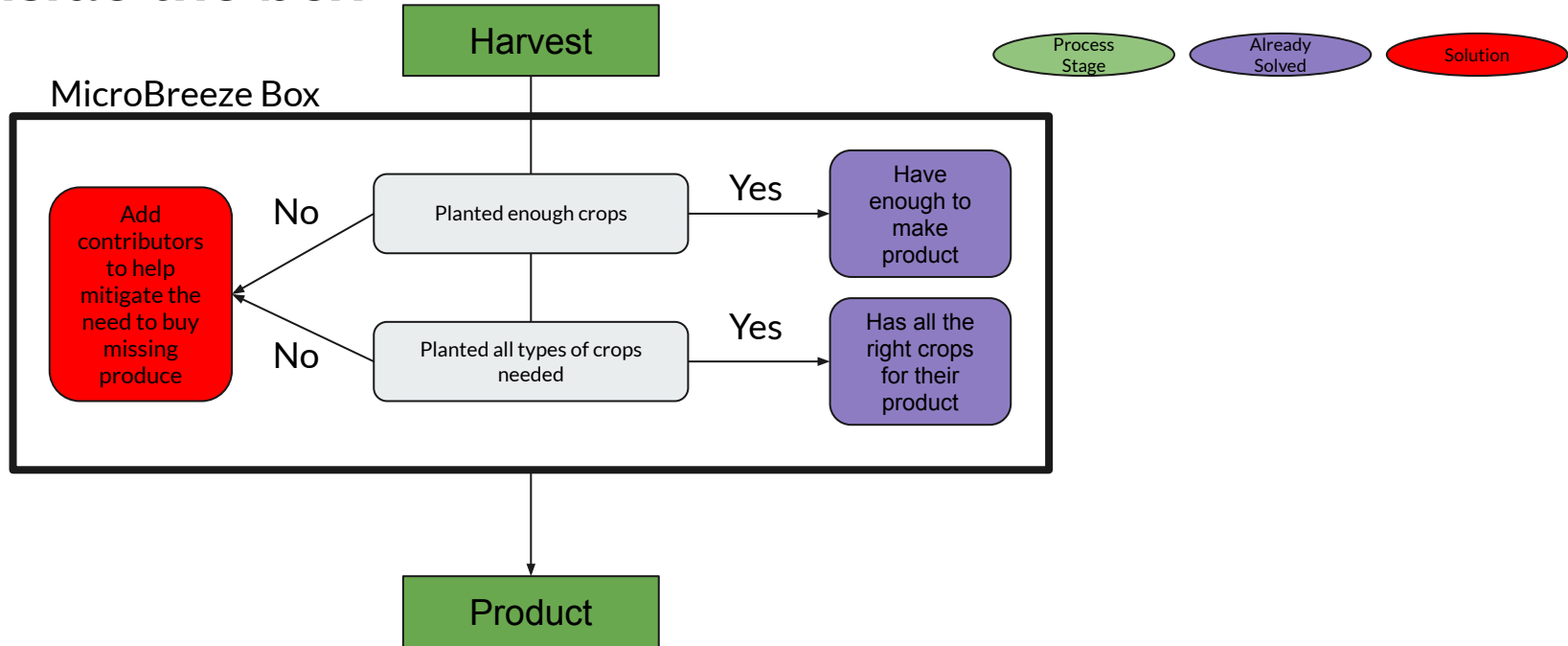
- An app that promotes collaborative product planning, combining harvests for shared products and community involvement
- Homesteaders share gardening progress, fostering a sense of community and knowledge sharing
- The app tracks factors like crop type and maturity, predicting growth potential and harvest times.
- Homesteaders can remotely manage the farm, improving efficiency and responsiveness



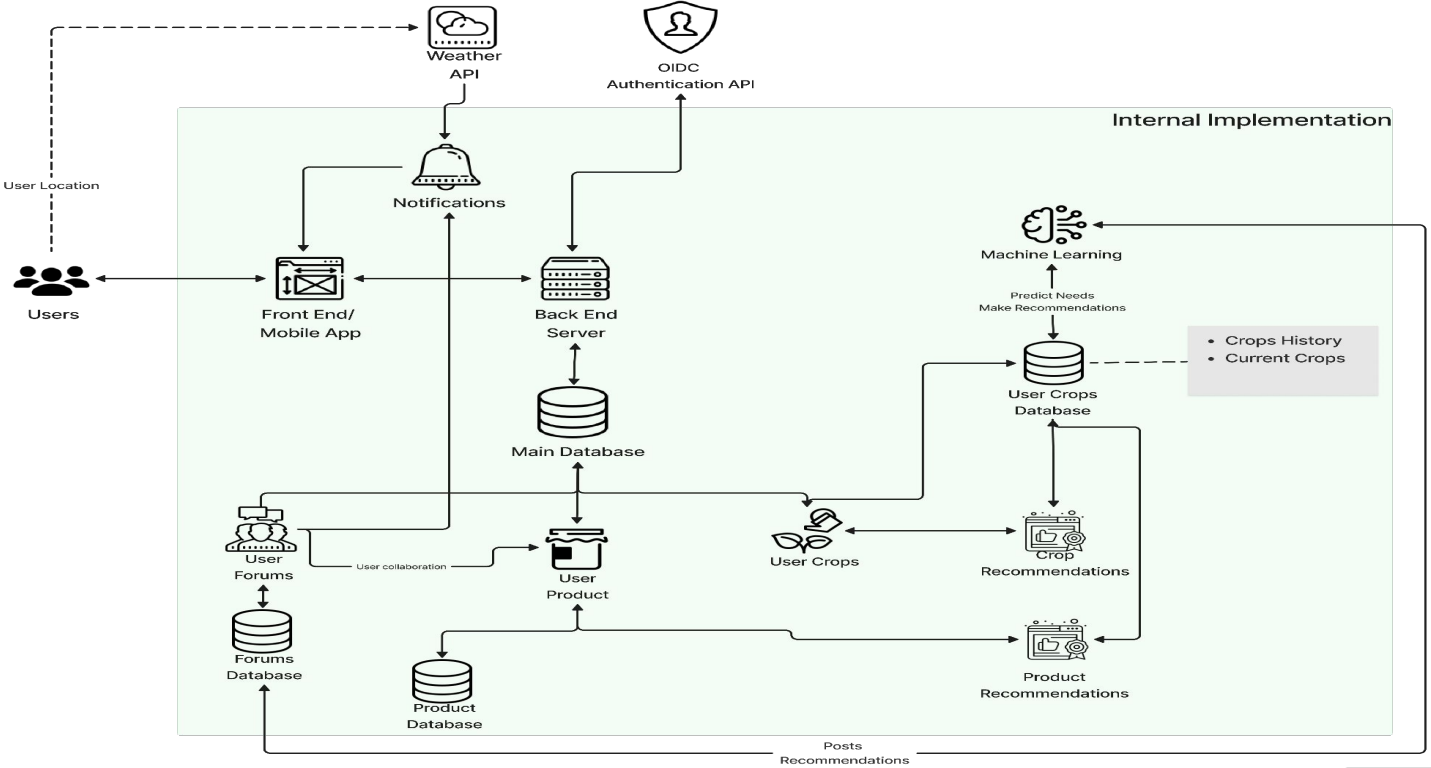
Inside the box



Inside the box



Major Functional Component Diagram



Competition Matrix

	MicroBreeze	SproutShare	Planta	GrowIt!	Plantsoon	Johnny's Selected Seeds: Growing Library
Plant Recommendation	Green	Green	Red	Green	Red	Green
Weather Monitoring	Green	Green	Green	Red	Green	Red
Planting Times	Green	Green	Red	Red	Red	Green
Disease Identification	Green	Green	Green	Green	Green	Red
Watering Notifications	Green	Green	Green	Red	Red	Red
Plant Identification	Red	Red	Green	Red	Green	Red
Journal	Green	Green	Green	Red	Red	Red
Forums	Green	Green	Red	Red	Red	Red
Produce Exchange	Red	Green	Red	Red	Red	Green
Layout Recommendation	Green	Red	Red	Red	Red	Red
Products Recommendations	Green	Red	Red	Red	Red	Red
Community Contributions	Green	Red	Red	Red	Red	Red
Tracking and Saving of Historical Data	Green	Red	Red	Red	Red	Red

Unique Features	Planting and Harvest Related Features
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What MicroBreeze Will and Will Not do

- MicroBreeze will recommend garden layout based on types of plants
- Use local weather to help with watering plants
- The app will recommend plants based on desired end products and climate conditions
- Use community insight to help users make better end products
- Keep a history of what users previously planted and when
- MicroBreeze will not handle any form of Plant ID activity to stay focused on its core objectives and priorities
- The app doesn't provide data or insights into market trends
- Will not have a feature for directly selling or marketing the harvested products to a broader audience
- Features for tracking expenses and revenue related to homesteading activities



Prospective Users

- Homesteaders benefit from the app, providing real-time insights for efficient farm management
- Community gardens optimize practices, increase productivity, and foster community involvement
- Educational institutions use the app for hands-on agricultural education and data analysis



Prospective Stakeholders

- Seed distributors align with app recommendations for customer success
- Agricultural consultants enhance advisory services with data-driven insights
- Environmental organizations promote sustainable farming practices through the app



Customer Risks

		Impact				
		Very Low	Low	Med	High	Very High
Probability	Very High					
	High			C1		
	Med					C2
	Low		C1			
	Very Low		C2			
	Very Low					

Risks:

C1: Users provide incorrect information

C2: Inaccurate location data can give false recommendations or misinformation.

Mitigations:

C1: Allow other users to rate advice helpful or unhelpful

C2: Require users to allow location sharing while using the app to gain access to location specific information

Security Risks

		Impact				
		Very Low	Low	Med	High	Very High
Probability	Very High					
	High					S1
	Med					S2
	Low			S1		
	Very Low			S2		
	Very Low					

Risks:

- S1: User data breach of location, emails, passwords.
- S2: Weak passwords made by users could make it vulnerable for unauthorized access.

Mitigations:

- S1: Encrypted user data
- S2: Strong password requirements or Google sign in

Technical Risks

		Impact				
		Very Low	Low	Med	High	Very High
Probability	Very High					
	High		T1		T2	T3
	Med					T4
	Low	T1	T2	T3		
	Very Low			T4		

Risks:

T1: Connection to other contributors can be lost.
T2: Connection can be lost to provide current weather data.

T3: Lose access to login API.

T4: Algorithm recommendations require prior data to make predictions

Mitigation:

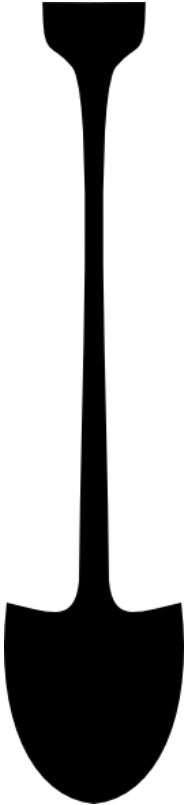
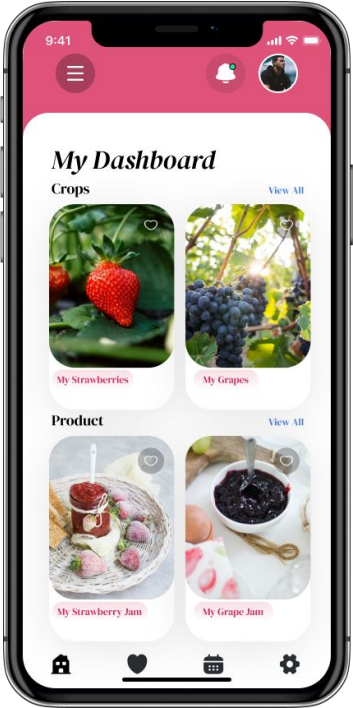
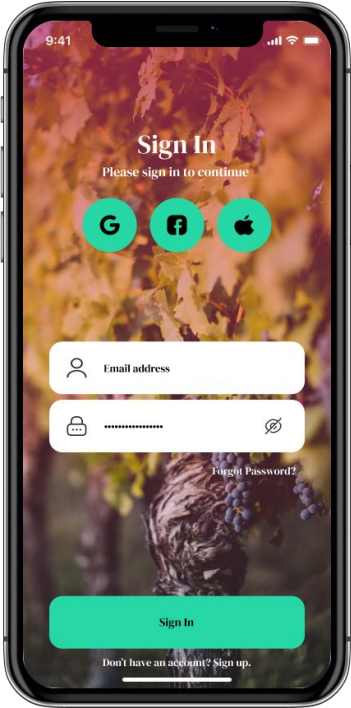
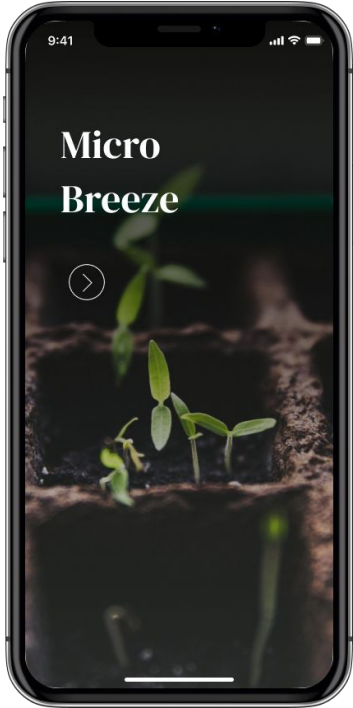
T1: Contributions will be saved to users profiles.

T2: Offline storage for recommendations that updates when connected to servers.

T3: Allow offline viewing.

T4: Data sets can be supplemented by prior years experts

Plan Your Plant: Main Menu Mockups



Crop Menu Mockups



View All: Crops



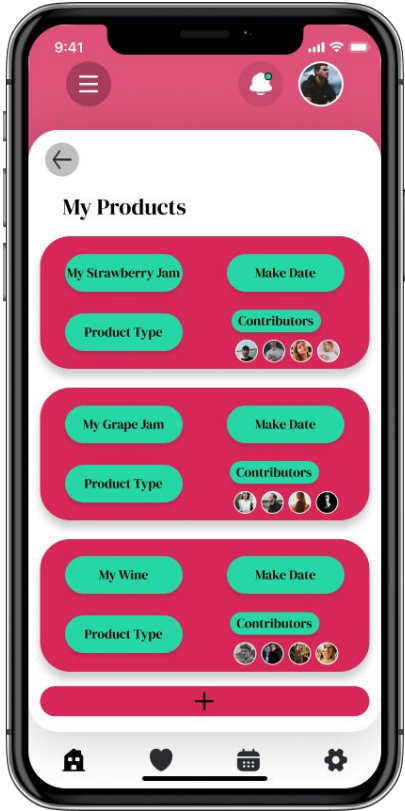
Detailed Crop Menu



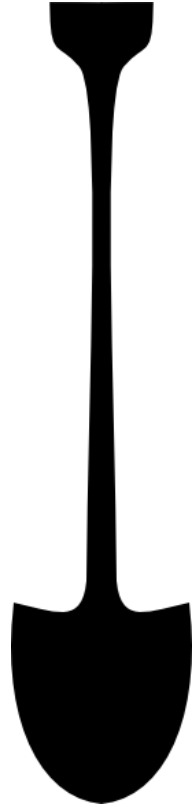
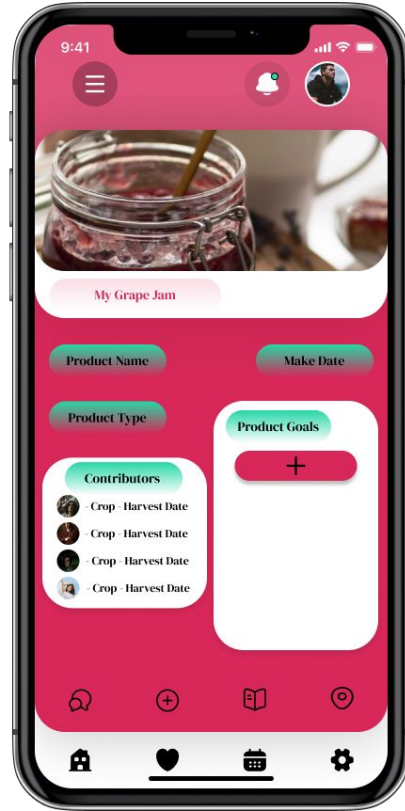
Product Menus Mockups



View All: Products



Detailed Product Menu



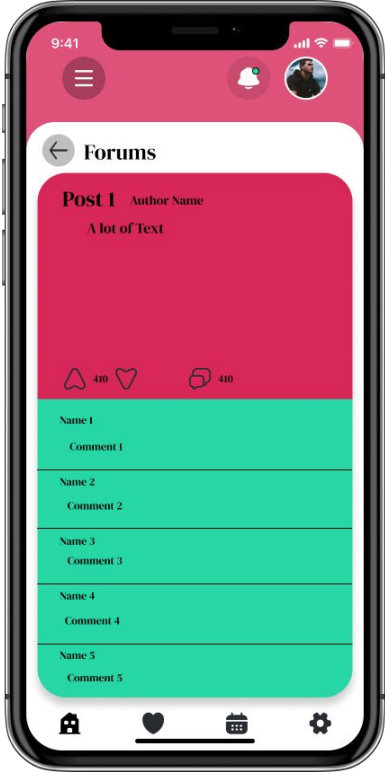
Forum Mockups



Forum

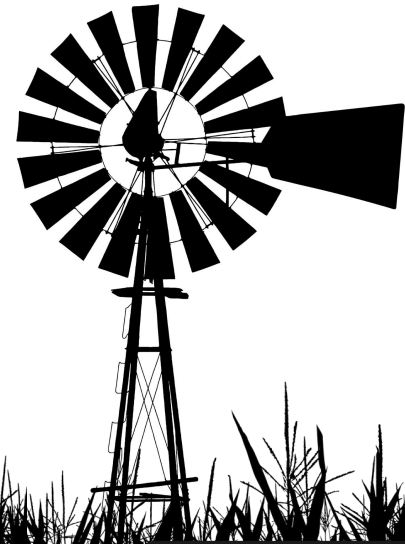


Forum Post



Summary

MicroBreeze aims to provide a solution for anyone interested in producing food at home. From planting the crop to creating a product, MicroBreeze provides a way to connect you with fellow enthusiasts. Allowing you to not only get predictive management of your crop, but also allowing you to invite each other as contributors. Helping to make at home food production a *Breeze*.



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