Mystery Plant

Behavior Change through Game Design

Process Book — HCID 511 Ideation Studio

Brandon Caruso

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overview

With the prompt to initiate behavior change through a gamified application or mobile game, the team focused on gardening as a behavior that promotes pro-environmental behavior. From brainstorming and secondary research to ideation and initial prototyping, a solution was crafted to allow young adults in urban centers to adopt gardening.

We named our solution Mystery Plant, a mobile game that at its core is about growing real plants in the real world. The game supports the player through the journey by providing knowledge and explaining the skills necessary to grow plants. Mystery Plant also gives the player a chance to engage with others in the local gardening community.

Here we examine the process and methods used to create, communicate, and support the decisions behind Mystery Plant.

meet the team

All team members imparted their skills and talents to contribute to the creation of Mystery Plant. Since this was an academic project, team roles were fluid from week to week. We found it important that everyone gain experience doing each method and participating in all aspects of the process. This was a powerful way to make sure all team members were engaged and learning.

Brandon Caruso

Graduating with a degree in Software Engineering, I bring to any team a set of technical skills and concrete process driven mindset to developing software solutions. While many engineers are focused on efficiency and optimization, I have always been more focused on the ways in which the user interacts with the functionality, why these solutions are needed, and the experience they create for the user. I believe that it is important that we create effective human focused, technology based solutions that fit appropriately within the user's everyday life and help them better experience and enjoy life. I enjoy collaborating with others to create unique, creative, and enjoyable experiences.

B Denotes work done by Brandon.

Kankan Meng

I hold a MA degree in East Asian Studies from Yale University focusing on interactive space design and accessibility. I received my BA degree in English Literature from Nanjing University. With a mixed background in calligraphy, visual sociology and new media, I have interned at several media outlets like The New York Times and design consultancies. I gravitated towards HCI design because I am fascinated by the social value and enchanting subtlety of design. My interest lies within how to apply elegant design solutions to unravel difficulties in the real world.

K Denotes work done by Kankan.

Edward Roberts

With a background in carbon fiber and polymer nanofiber research, I joined the MHCI+D program to move into a design space that focuses on the human experience. I could not be happier I joined this master's program; the design process is challenging and I am learning from brilliant people everyday. The future is always full of pleasant surprises, but when I graduate, I hope to start a career in UX and interface design.

E Denotes work done by Edward.

Process

Iterative Convergent and Divergent Thinking

process

Though creativity is thought to be spontaneous and free, there are structured approaches to identifying, understanding, and solving problems. Mystery Plant is a product of a clear established process, which helps organize thought, allow for exploration and creativity, and provides progress through solidifying and supporting ideas. The process our team adopted can be seen as periodic and cyclical.

The ability to transition between convergent and divergent thinking is a critical aspect of this approach. The flexibility of the framework allows reference to the past and even allows for further understanding of the problem at any stage of the design process.

One can break the model into three phases, problem finding, problem understanding, and problem solving. Many focus on the final phase, however, it is critical to identify the a clear problem and to fully understand that problem to inform solutions. This process shows the teams ability to explore, while still having the discipline to regain focus to promote progress.

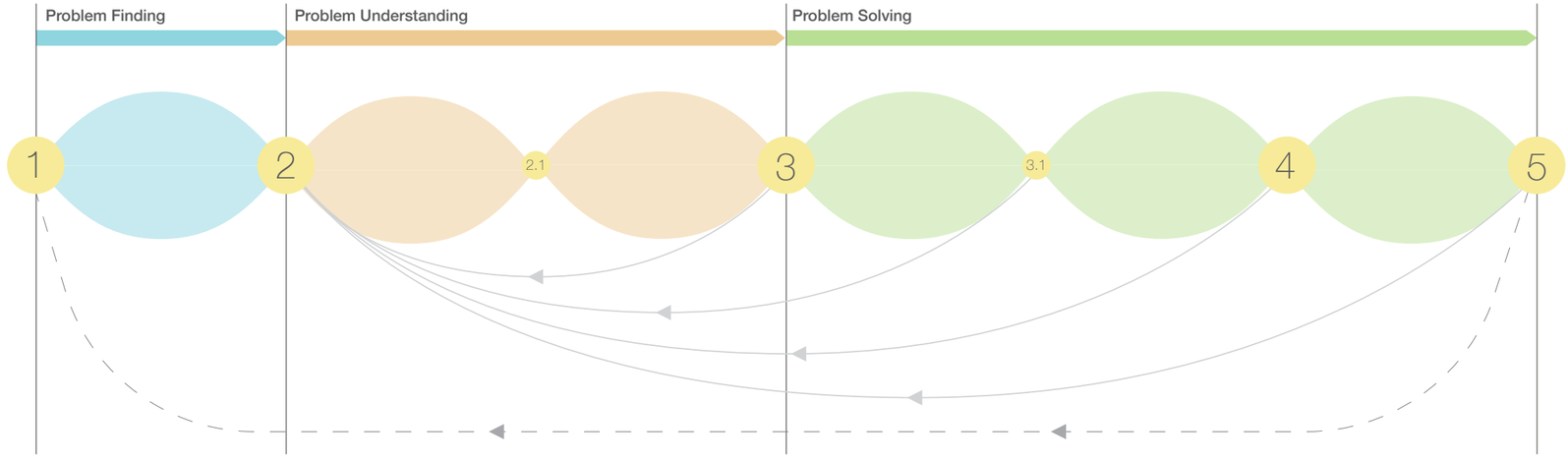


Figure 1 | **Design Process**

Shows the flow from each phase and the ability to revisit phases in the process. Convergence and divergence of thought is shown between major milestones in the process. Iteration is also shown.

1 | Identify Problem

The team brainstormed areas for behavior change. Through several methods, like voting and utilizing the Six Hats approach, the team identify pro-environmental behavior as our general topic.

2 | General Understanding

The team explored, through secondary research, the areas of behavior change, behavior change related to pro-environmental behavior, game design, and gamification. This establish a solid foundation for understanding the problem space. Using our general understanding of pro-environmental behavior, three specific behaviors were identify to concentrate our research in the next stage; community gardening, promoting biodiversity, and bicycling.

2.1 | Concentrated Understanding

The team researched the behaviors associated with pro-environmental behavior and explore specifically pervasive games. After completing the research, the team created a mind map which was used to identify specific behaviors associated with our general themes that could be adopted, eliminated, or changed. We selected community gardening as a main theme and through our research identified an audience for our game.

3 | Ideation

The team generated ideas for using a game or gamified mobile application to eliminated, adopt, or change behaviors identified in research. Team members generated several ideas in time ideation sessions, brain dump activities, and action verb exercises. Out of the several ideas, three concepts were selected for initial refinement and further ideation.

3.1 | Selecting Promising Ideas

Each concept was ideated on further, looking at viability, desirability and feasibility. Taking the three concepts, the team used a weighted matrix to compare the concepts to criteria identified in our research, one concept was selected. This concept would become Mystery Plant.

4 | Elaborated and Refined a Single Concept

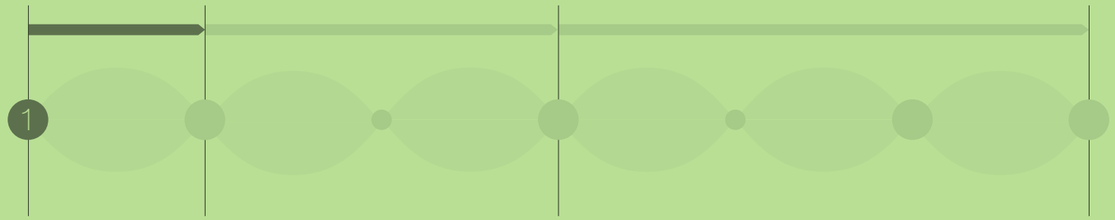
The team focused on the Mystery Plant idea and created a user flow, concept sketches, and a storyboard to help explain the concept in greater detail.

5 | Initial Prototyping

The team created a comprehensive interaction flow to display the refined concept. The interaction flow helped identify key points in the application to wireframe and create high fidelity interface mock-ups. A final storyline was established for a simple demo.

Problem Finding

Initial Brainstorm



determining focus area

Using a mobile game or gamified application to promote behavior change was the goal of this project. When the team first received this prompt, it was decided that a focus was need. The team needed to identify a problem area in which we could research more effectively. This was done through a simple brainstorming session. The team employed many methods to identify areas for behavior change using the behaviors generated from this session.

The team started by brainstorming different behaviors and grouped them into common problem areas or themes. These common themes were then narrowed down using a variety of methods. One of these themes became our lens for research. The team started with a simple three choice vote. Each team member voted for the theme that showed the most promise, the most intriguing, and made sure to keep in mind feasibility, viability, and desirability.

Through the vote, the team narrowed down to two problem areas, pro-environmental behavior and activism. This is were the team employed a second technique to quickly examine these two areas to choose a focus. Using Edward de Bono's Six Thinking Hats, each theme was examined under each the hats. After completing this exercise, it became clear that the team was considering pro-environmental behavior as our general focus.

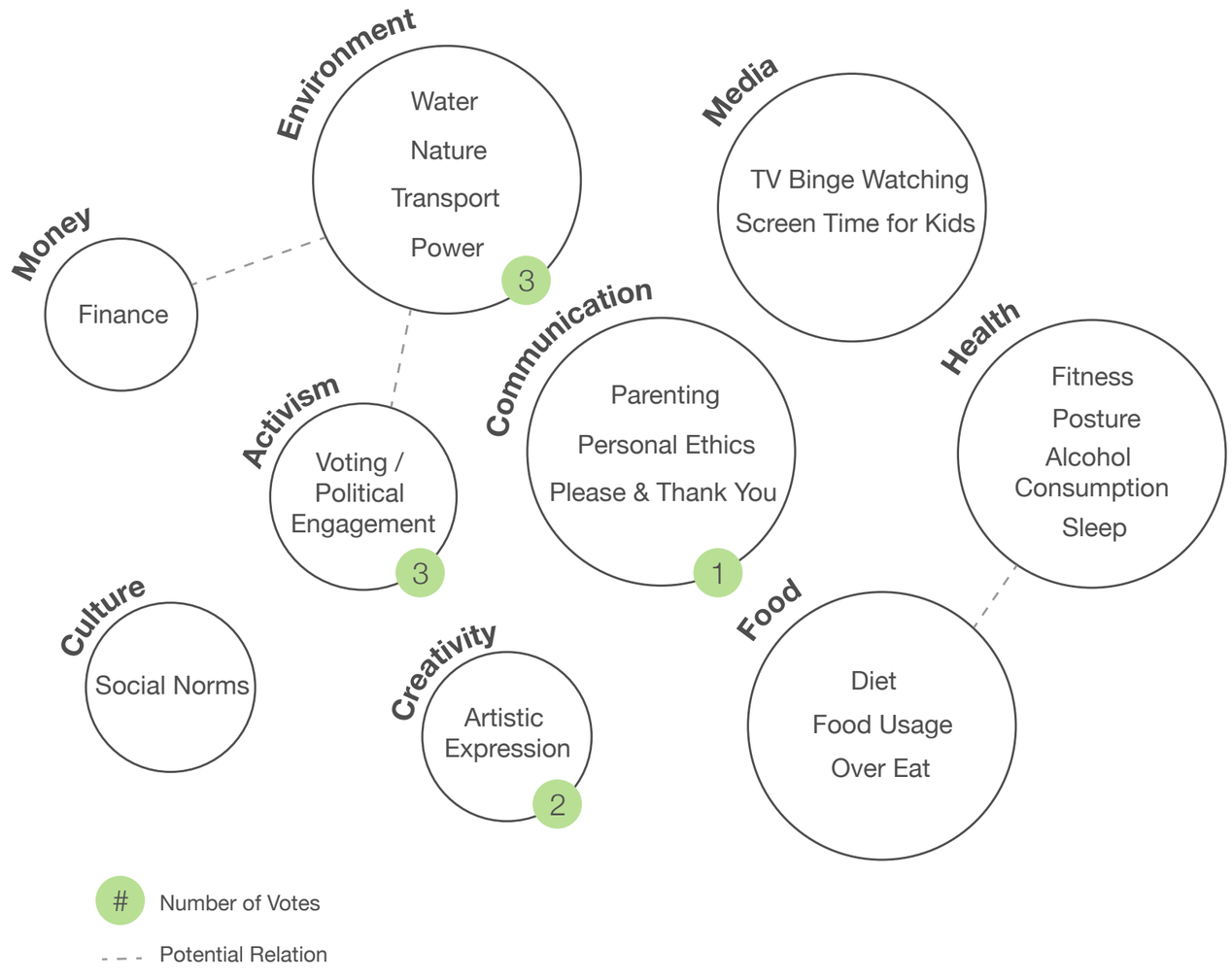


Figure 2 | **Finding Focus**

Different areas to explore that have associated behaviors that can be change, adopted, or eliminated.

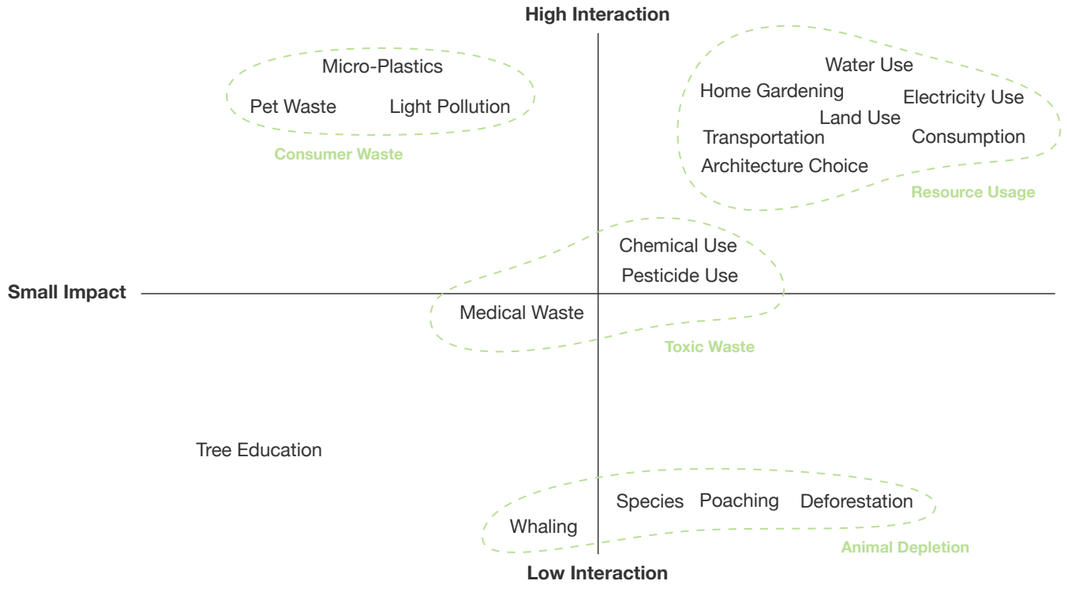


Figure 3 | **Impact vs Interaction - 2x2 Matrix**

Pro-Environmental behaviors mapped by impact on world and personal interaction with behavior.

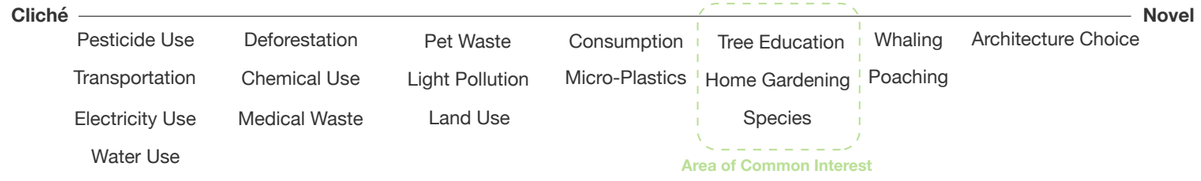


Figure 4 | **Cliché vs Novel - Behaviors to Change**

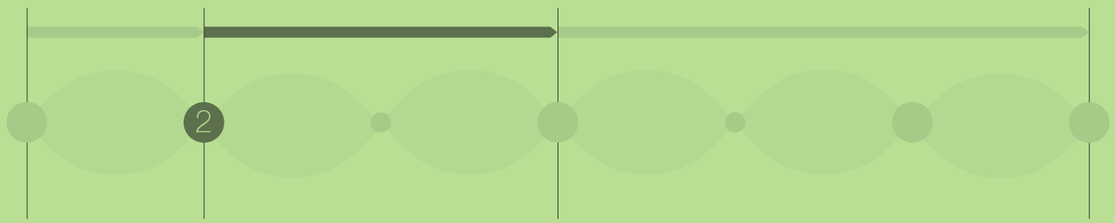
An attempt to identify behaviors that are not normally addressed.

exploring potential behaviors

The team quickly brainstormed specific pro-environmental behaviors. Though a little early in the process in retrospect, these specific behaviors were revisited in the future of the project. The team decided to evaluate some of these behaviors. Using a 2x2 Matrix comparing impact on the larger world with personal interaction with the behavior, themes like consumer waste, resource usage, animal depletion, and toxic waste emerged. We also tried to measure originality. This method was helpful, but has little rigor due to the subjectivity of scale. The team tried to define the terms “cliché” and “novel” to address any differing views. Overall, a more specific scale would have been better in this case. One such scale might be looking at direct personal impact versus indirect personal impact. Better still, a competitive analysis would be better to see what games already exist, if any, to change some of the behaviors. It was clear after, however, that pro-environmental behavior change was full of opportunity. In fact, you can see that home gardening and species awareness were identified as an area of interest early on. A variation on these themes would eventually structure our second round of focused research. With pro-environmental behavior selected, the team moved into the secondary research stage.

Problem Understanding

Secondary Research



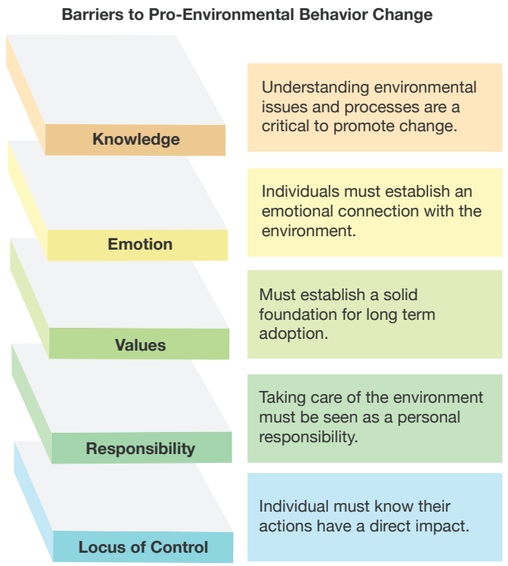


Figure 5 | **Barriers to Adopting Pro-Environmental Behavior**
(Zollmus et al., 2002)

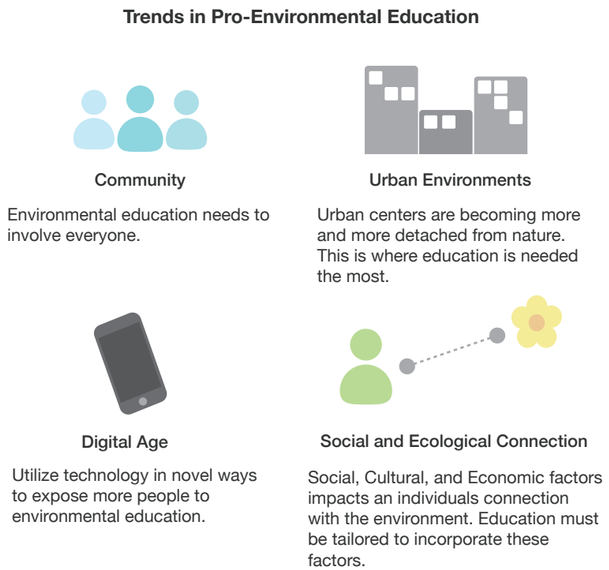


Figure 6 | **Trends in Pro-Environmental Education**
(Ardoin et al., 2013)

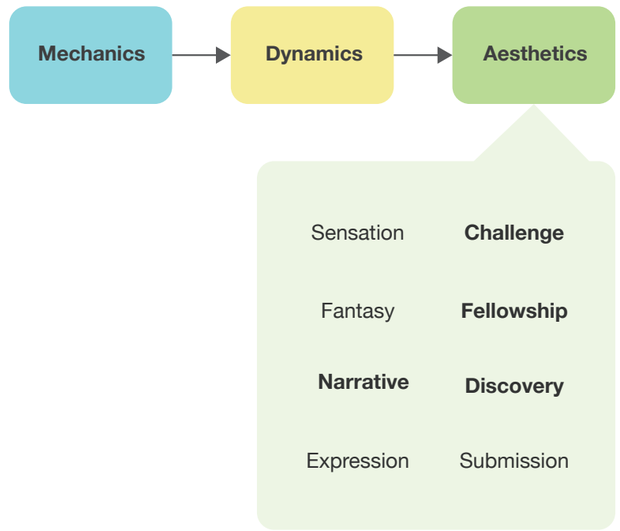


Figure 7 | **MDA Framework - Aesthetics of Games**
(Hunicke et al., 2004)

general understanding

With little to no understanding of behavior change, pro-environmental behavior models, and game design the team began performing secondary research on these areas. The findings from this exploration would inform decisions that were made throughout the project.

We looked into a variety of behavior models to gain a general understanding of human behavior and behavior change. These included *The Presentation of Self in Everyday Life* (Goffman, 1959) and *Trans-Theoretical Model of Health Behavior Change* (Prochaska et al., 1997). The most influential research, however, was in our research of pro-environmental behavior. The models identified barriers to adopting pro-environmental behaviors. The research also showed where pro-environmental education should focus.

When looking into game design, the team identified serious games as a potential style of game for behavior change. These games are traditionally used for training and educational purposes. A game design framework was also identified through our research. The Mechanics, Dynamics and Aesthetics (MDA) framework helped the team see the various elements needed in a game. We found the aesthetics portion of the framework extremely interesting (Hunicke et al., 2004). There was also research done on the effectiveness of rewards in games, like points and leader boards. This research showed that effectiveness depends on context and that many times these virtual motivators lose novelty over extended periods of time (Zuckerman et al., 2014).

With this background, the team focused the research on specific behaviors and also pervasive games. The team found that pervasive games might better address our project goals than a serious game.

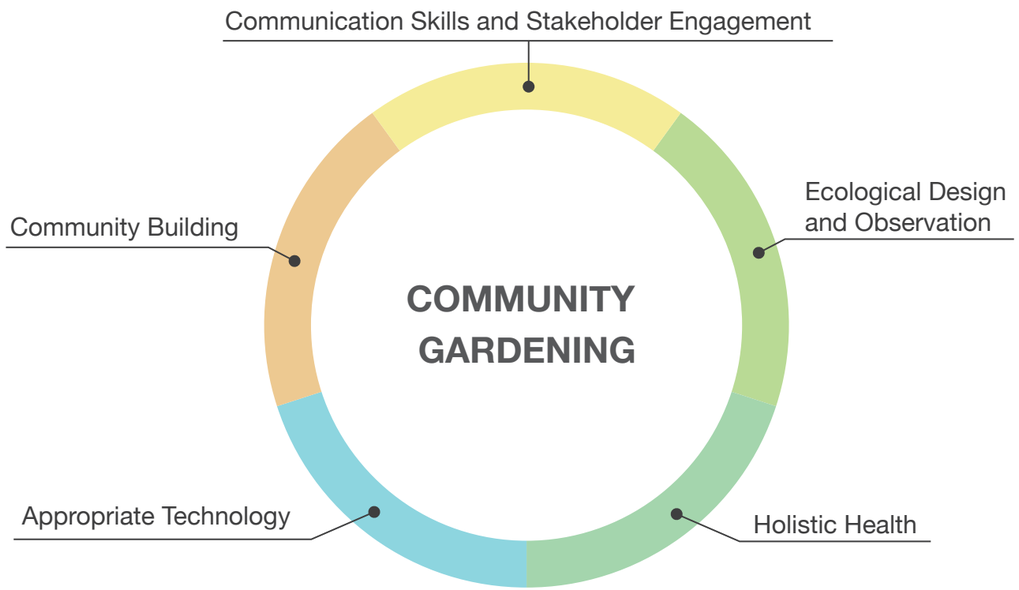


Figure 8 | **Elements of Community Gardening**
(Calvin)

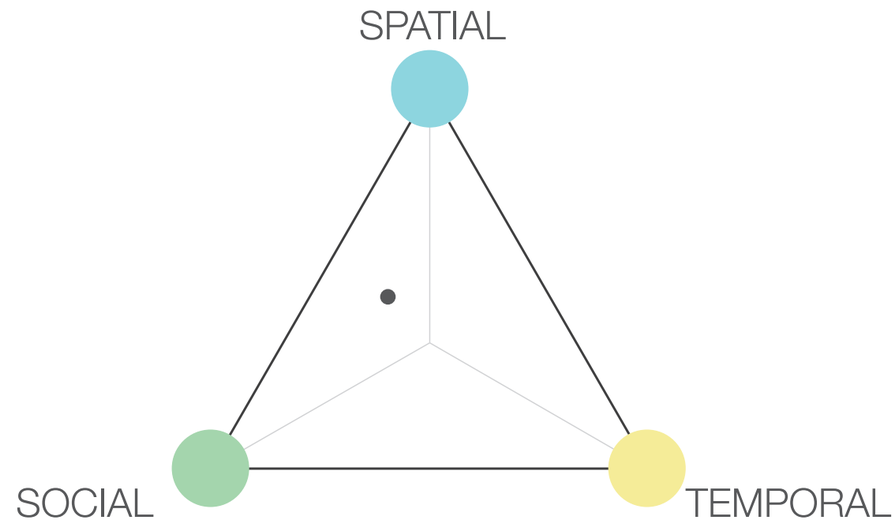


Figure 9 | **Elements of Pervasive Games**
(Montolo, 2005)

focused understanding

With a sturdy foundation of general behavior research, pro-environmental behavior models, and game design research, the team revisited variations on three of the themes identified in the early brainstorming session; biodiversity, community gardening, and cycling. The team also wanted to further explore pervasive games, which was initially uncovered in the first research phase. The research done on biodiversity and community gardening helped guide the future of the project towards gardening.

Reduced biodiversity was found as a serious issue that is not present in the common environmental conversation. The idea of biodiversity blindness is something that needs to be overcome (Palmer, 2008). Our research identified that awareness and doing common “green” activities can help improve biodiversity. Proper gardening was identified as a great opportunity to build awareness and positively impact biodiversity.

Community Gardening was found not only as an opportunity to engage with nature but also has social impact. During our research of community gardening, we identified a target audience for our game. Research found that though in general community gardening is popular, young adults are not as involved. This is due to lack of knowledge and skill, busy lifestyle, and disconnect with urban cities and nature (National Gardening Association, 2008).

Our research in game design explored pervasive games. These games were determined to be a perfect fit for pro-environmental behavior change because they bring the game into the real world. It was identified that direct interaction with nature is critical in adopting pro-environmental behavior making pervasive games an appropriate style. Community involve was also critical and pervasive games contain elements that incorporate social elements within the game.

With this focused understanding, the team was prepared to identify specific behaviors in community gardening.

popular media scan

To identify the current state of the three subject areas explored in the second phase of research, a popular media scan was performed to see how biodiversity, community gardening and cycling presented themselves in the present media environment.

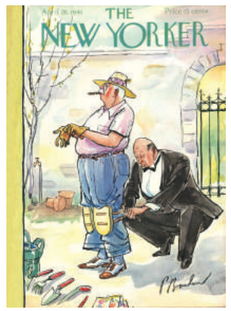
Biodiversity was lost in media coverage. Though extremely serious, it is over shadowed by other environmental issues that are easier to communicate.

Community gardening was found to be a topic that people, especially in the urban settings, are fascinated with, yet it requires effort and skill that creates a huge barrier.

Cycling was found as a popular and appealing way to reduce impact on the environment and become healthier, yet blockers exist that cause reduced motivation and create an initial barrier.

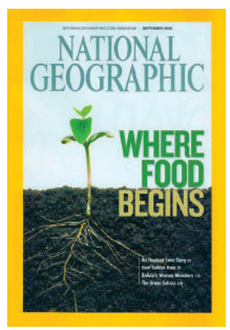
This solidified the teams decision to select community gardening because it was clear that people wanted to participate, but needed a tool to help get over the initial barrier. This was an effective method that would be extremely valuable when trying to identify trends that have not yet been explored extensively in academic or formal research.

Figure 10, right | **Popular Media Scan - Visuals and Quotes**



"People go crazy for a tree or a bench on their block. Every square inch is so precious in this city."
- NYT

"Propose, design, and implement services to help manage large amounts of user data for multiplayer gaming."
-Business Insider



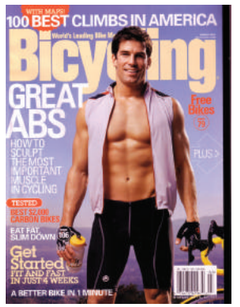
"The Battle for Biodiversity: Monsanto and Farmers Clash"
- The Atlantic

"Public awareness of the biodiversity crisis is virtually non-existent"
- The Guardian

"New species celebrated amid warnings of biodiversity loss"
- CNN

"Frog goes extinct, media yawns"
- The Guardian

"Riding in the city is freedom from traffic, timetables and transit delays."



"Bikes were crisscrossing and passing me; even mild-mannered Danes were ringing their bike bells in annoyance."
- Vogue

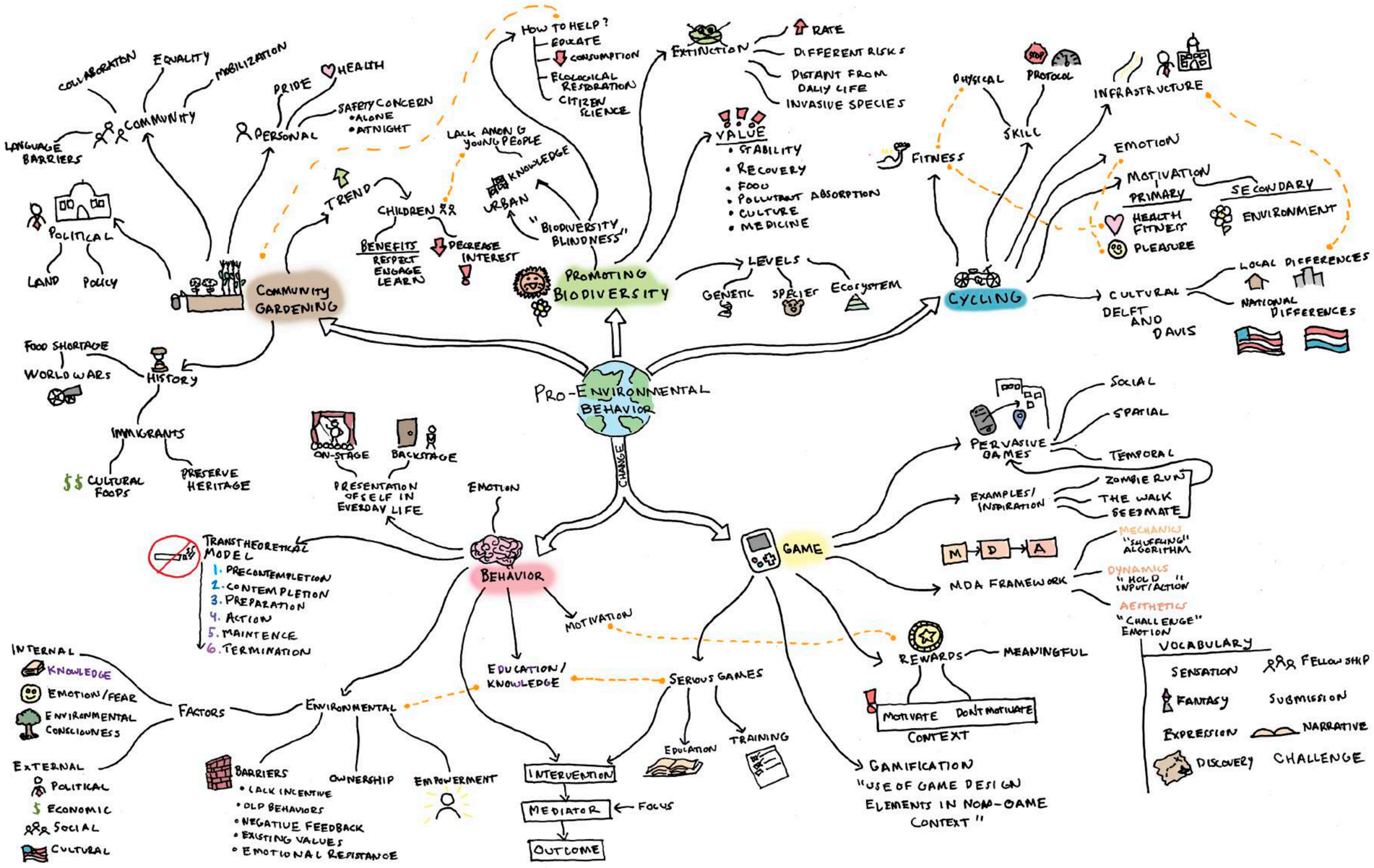


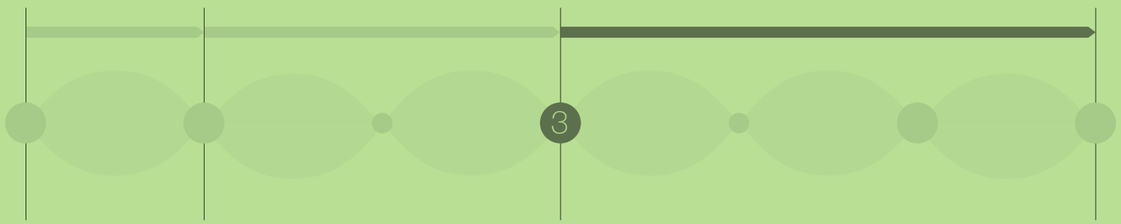
Figure 11 | **Mind Map**

A visual showing research findings to spot relationships, connections, and themes found in secondary research. Used as a discussion tool by the team.

B

Problem Solving

Ideation to Prototype



opportunity map

The team found that community gardening and gardening, in general, would be the best area to explore. The team felt that gardening was a great way for individuals to engage with nature and an activity that was the most approachable way to pro-environmental behavior change. The team, however, needed to identify specific behaviors related to gardening. In order to do this, specific gardening behaviors were sorted into three groups. Behaviors that could be changed, adopted, or eliminated.

The team was still faced with a large number of specific behaviors to address, so we looked to an opportunity map to help us organize these behaviors. The behaviors were also mapped in relation to potential appeal to our target audience. The target audience was determined to be young adults 18-34 in urban centers. The top three behaviors closest to the center of the map were making friends, learning more about plants, and eating organic food. We took these three behaviors to inspire our ideation.

Change	Adopt	Eliminate
Better Visual Design of Garden	Know More About Plants	Use of Harmful Pesticides
Protect the Garden from Theft	Eat Organic Food	Growing Non - Native Plants
Protect Garden from Bad Weather	Compost Food Waste	Reduce Over - Watering
Spend More time with Nature	Support Local Produce	
Plant More Native Plants	Using Compost Soil	
Garden a Variety of Plants	User Proper Tools	
Make Friends	Community Involvement	

Figure 12 | Specific Behaviors

Specific gardening behaviors that could be changed, adopted, or eliminated.

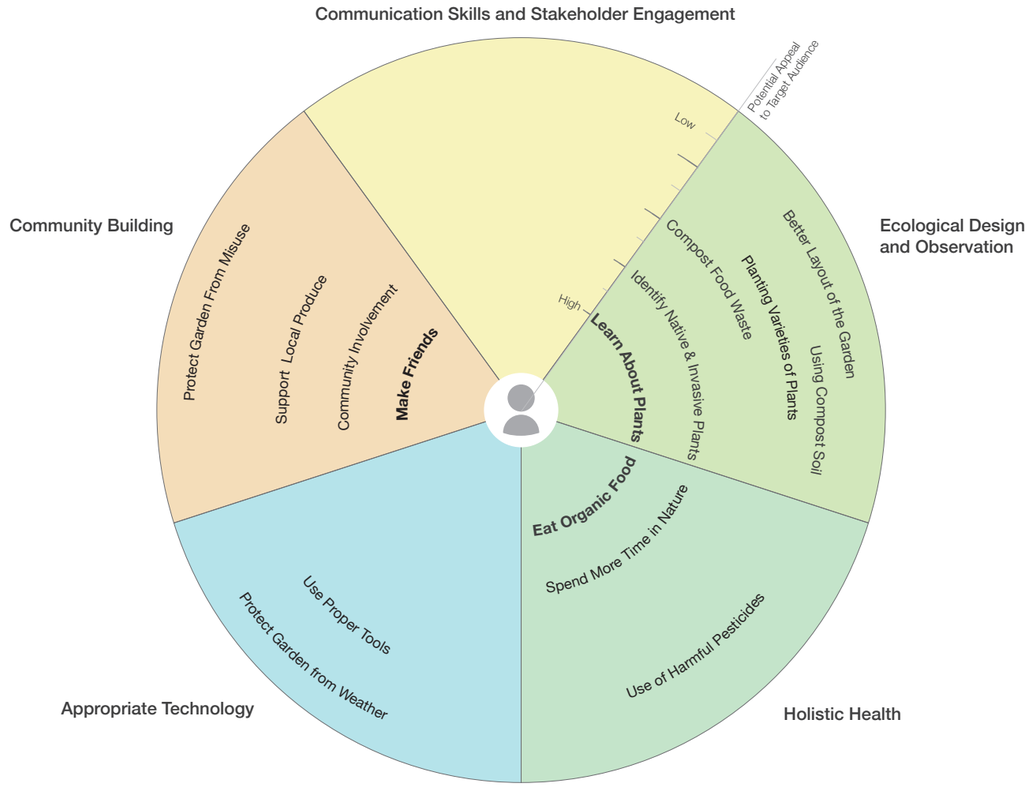


Figure 13 | Opportunity Map

Organizing specific behaviors and mapped radially the potential appeal of each behavior for the target audience.

Target Population: Young Adults 18-34 who live in Urban Community Garden Contexts

Figure 14 | **Brain Dump - Learn About Plants** B

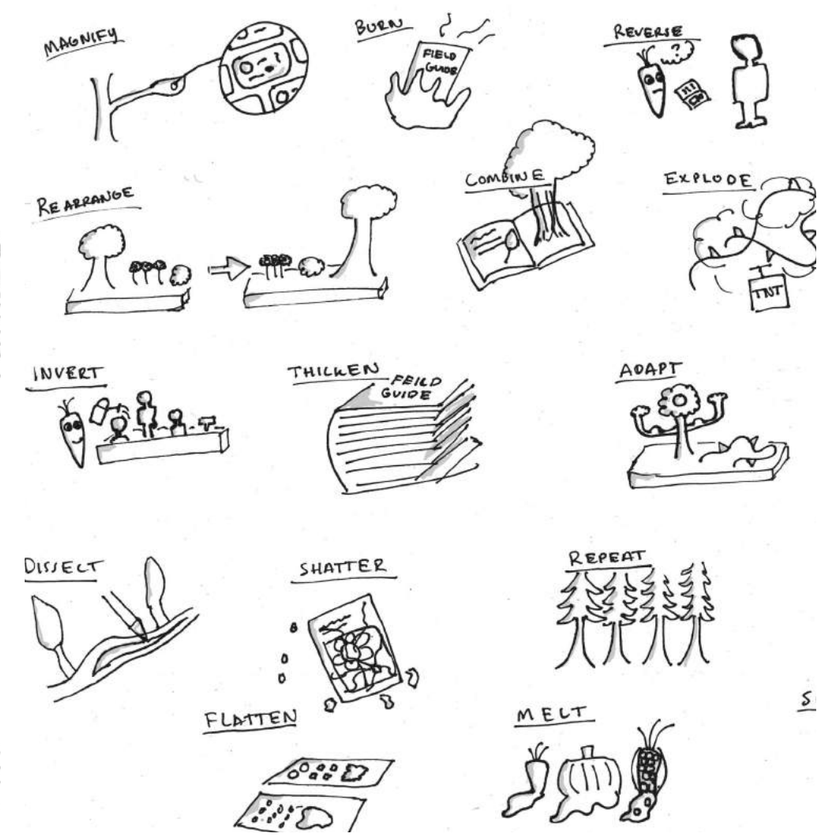
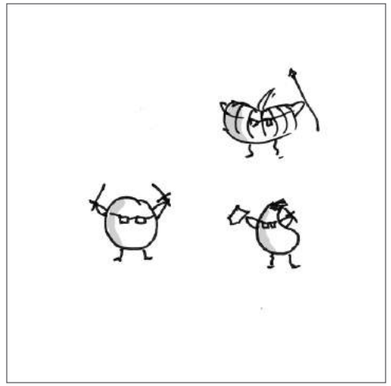


Figure 15 | **Action Verb - Learn About Plants** B

ideation

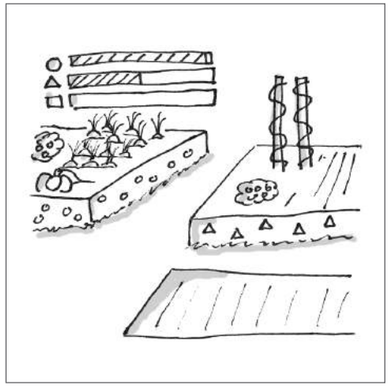
With the three behaviors of making friends, learning about plants and eating organic food in mind the team started ideation. Each team member came to the timed ideation session with a brain dump and a set of action verb sketches about one of these themes.

The brain dump was particularly useful as it started the flow of ideas and was used as a great way to start the session. The action verb sketches were not as helpful at this stage. This method would be better applied later when trying to elaborate on a single concept. The team then enter a series of timed ideation sessions, between which the team discussed and shared their ideas. This was very effective, since sometimes ideas arose from these conversations. The team had generated over 30 ideas, some of which are shown on the next page.



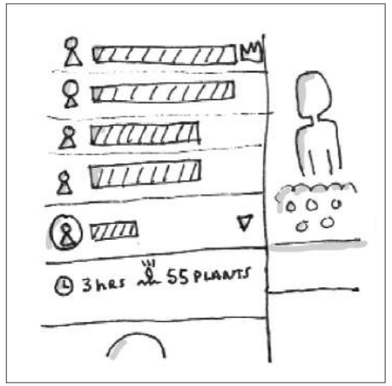
Augmented Reality Plant Battles E

Wear special glasses and see your friends as giant veggies. Defeat them!



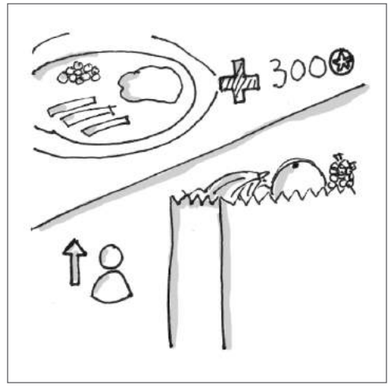
Battle of the Gardens B

Compete against other teams in your community garden. Grow more plants and the most variety.



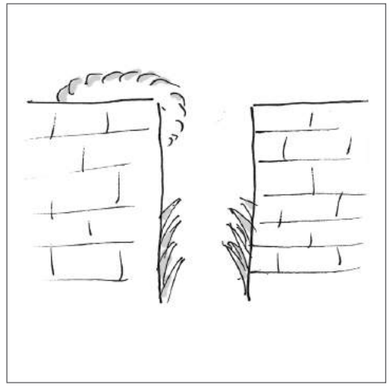
Community Garden Hero B

Spend more time in the community garden to beat your friends.



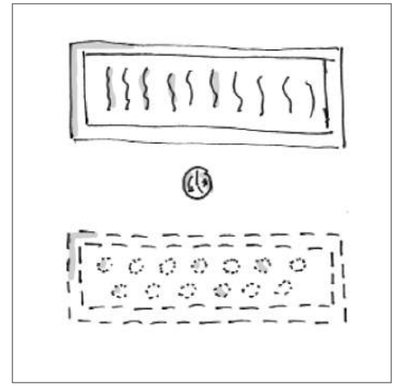
Eat and Buy Organic B

The food you eat provides a story as you eat, encouraging organic diet!



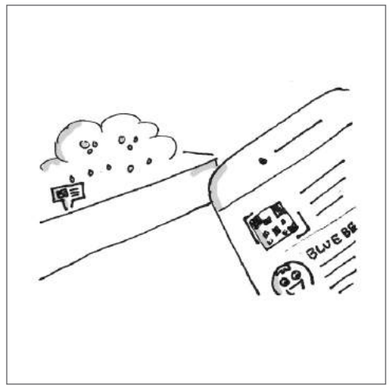
Garden Exploration B

Find new gardens and explore them, share your experiences with your friends.



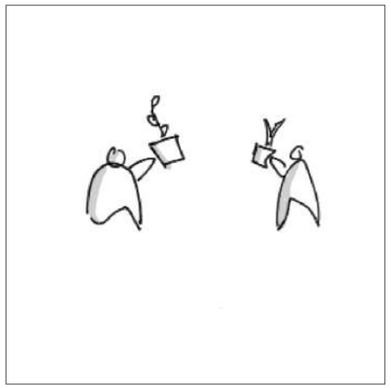
Garden History Leaders E

Document your personal garden and share pro-tips to other on making a glorious garden.



Plants Talk B

Point your phone at the plants in your garden and hear them talk to you!

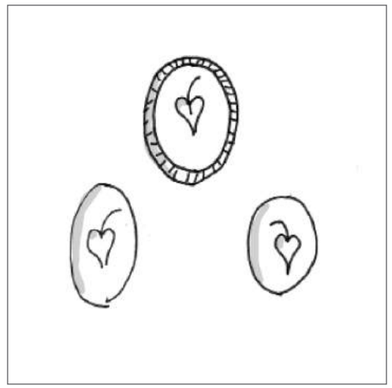


Plant Exchange E

Exchange different native plants with your friends.

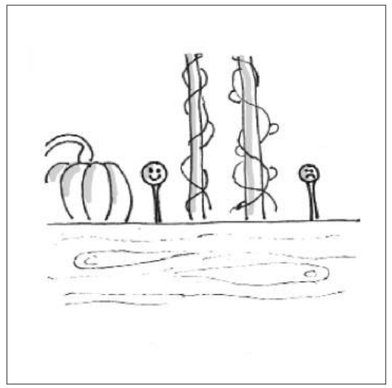
Plant Diary K

Grow your own plant and send the video diary to your friends as a gift.



Non-Native Plant Trophies E

Hunt down non-native plants and display them in your home.

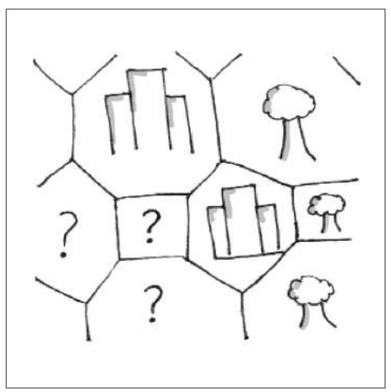


Happy Garden B

Faces in the soil show how the plants are doing. Make your garden happy!

Garden Plant Date K

Collect and grow your own plant for matchmaking and dating plants of others.

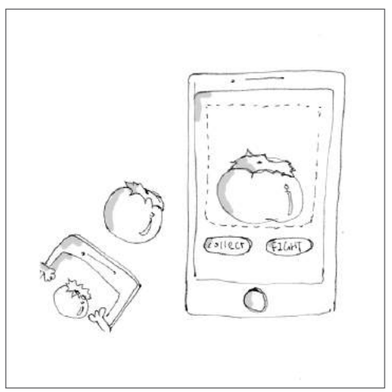


Where are the plants? B

Travel around your city and flip tiles on a virtual map to show where plants area.

Roll to Cook K

Roll to collect your organic material to complete the cooking task.

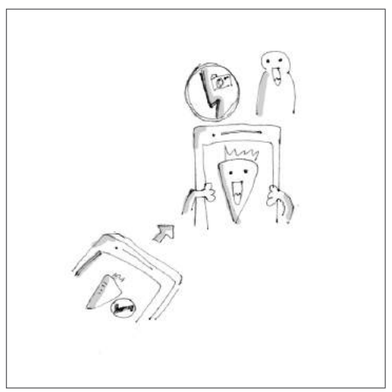


Save the local K

Identify if a plant is local to decide whether to fight or to collect!

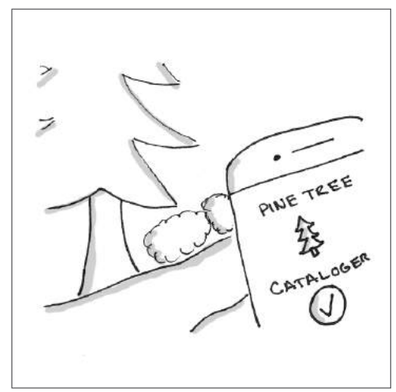
Super Hero Gardener B

Do common tasks like weeding and watering to defeat attacking creatures!



Veggie Alias K

Collect plants in reality to make veggie alias for your friend.



Virtual Cataloger B

Travel the world gathering and cataloging different plants.

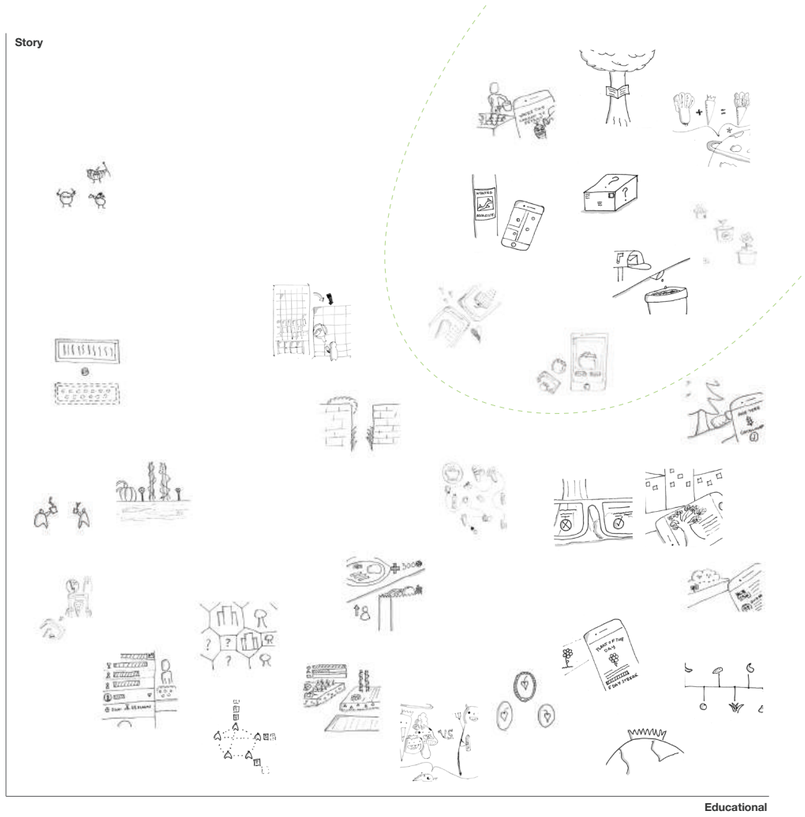


Figure 16 | **Story vs. Educational**

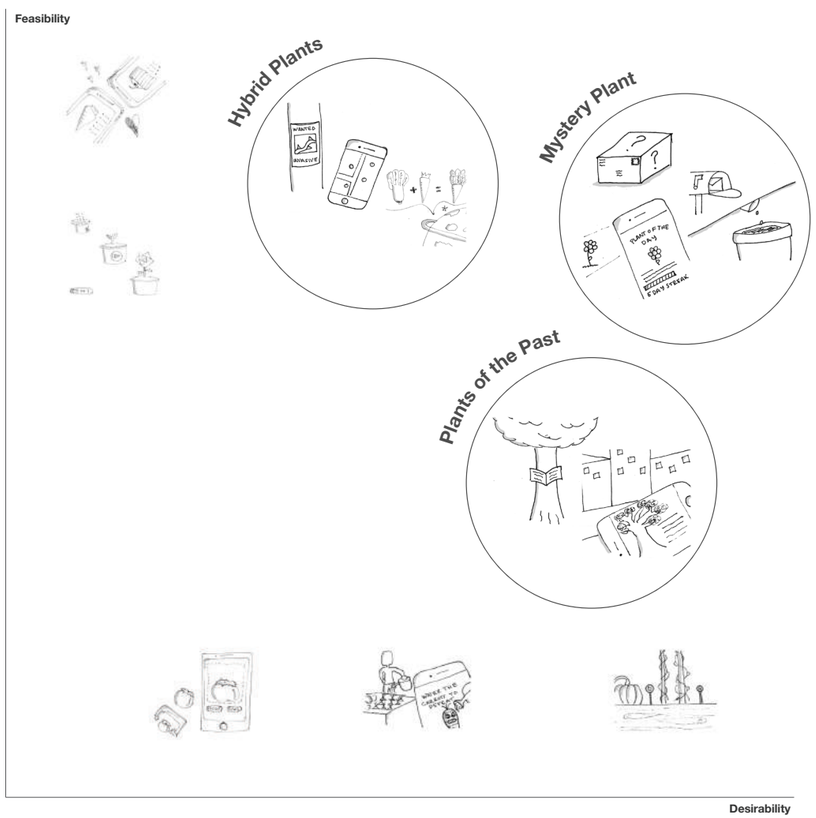


Figure 17 | **Feasibility vs. Desirability**

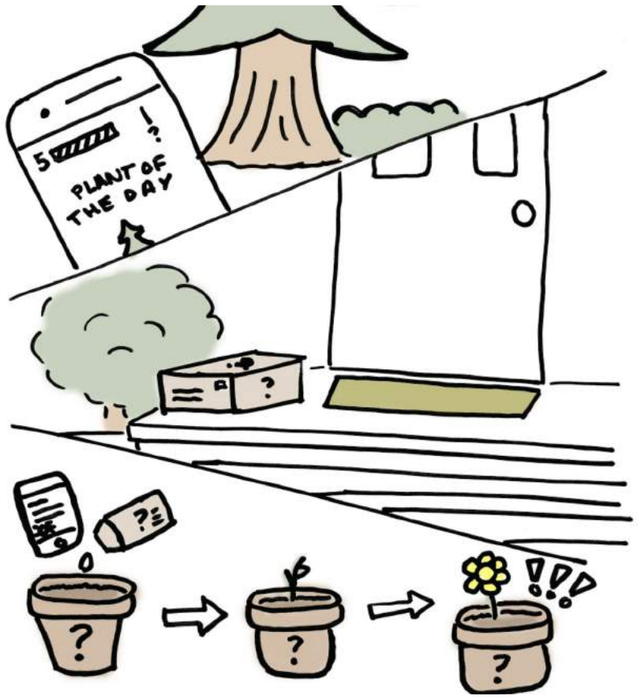
three concepts

With all the ideas from our ideation session gathered, the team organized them to narrow down to three concepts to present. Some of the ideas were combined due to similarity or because the ideas complemented each other and made a more intriguing concept.

The team used a 2x2 Matrix to organize and initially sort ideas. Safety and contact with nature were the first metrics used to narrow down the ideas. We were creating pervasive games which take place in the real world, so safety was an important metric. Contact with nature was also an important aspect of the game since this was integral for pro-environmental behavior change.

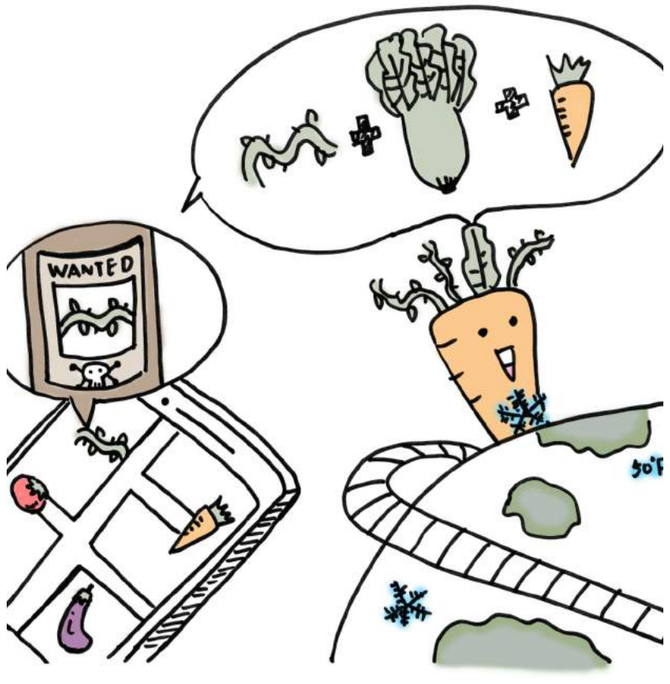
Story was a game aesthetic that we found was extremely effective in creating an enjoyable game experience and was something we wanted in the concept. We also wanted to make sure that the concepts were educational. Therefore, the team organized the ideas on a Story vs Educational x-y graph.

Lastly, the team looked at feasibility and desirability on an x-y graph. This left the team with three concepts to describe and present for feedback, which are shown on the next page.



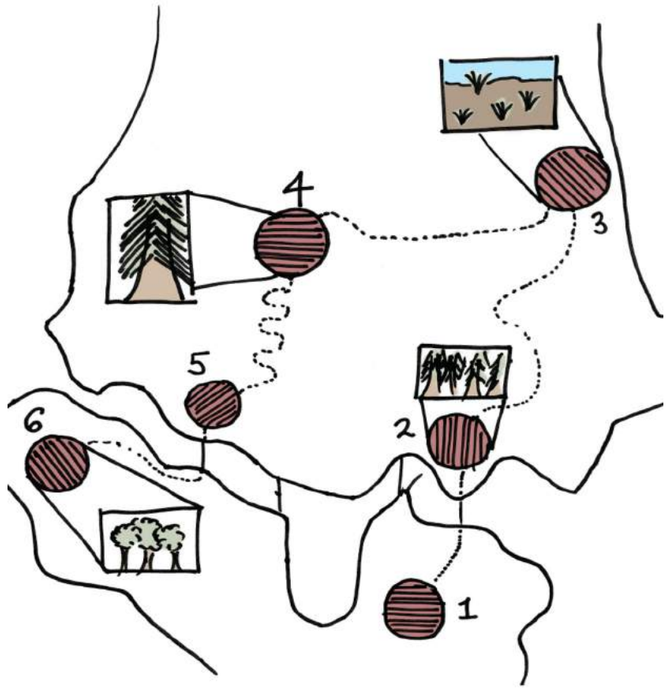
Mystery Plant

Players are asked to be plant detectives. Everyday, they get a plant which they must go and identify in nature. As they find and identify more and more plants, they receive a mystery plant in the mail which they have to grow and identify. As the mystery plant grows, they continue to have to identify plants in the real world. Once they identify their mystery plant, a new mystery plant is sent in the mail to grow and identify. After playing the game, the players grow a collection of plants to start their garden. B



Hybrid Plants

The game is set on extraterrestrial planets with distinct, strict environments. Players need to explore nature in reality, identify and collect plants (including invasive species), acquire knowledge about their characteristics and create hybrid plants to survive the extraterrestrial planets' environment. K



Plant of the Past

Players are given a map of their city to explore using a phone that can show them an augmented reality. When reaching new destinations, they learn about plant species that used to be in that location, thereby learning about native plant species and also how humans impact the environment around them. They will also complete mini-games in each location, for example learning how to make maple-syrup. E

one concept

Converging down to one concept can be a difficult task if no structure is given to the decision. Armed with the right methods, a team can effectively and soundly determine a concept that meets specified criteria and shows promise for further development. With three concepts in hand, feedback from instructors, and personal favorites the team decided to use a weight matrix to help structure and support the decision making process.

Referring back to our research, the team decided to use the barriers identified for adopting pro-environmental behavior change as the judging criteria for each of the concepts. For each barrier the team rated the concepts on whether they overcame the barrier, addressed the barrier or did not address the barrier. The concept that had the highest rating was selected.

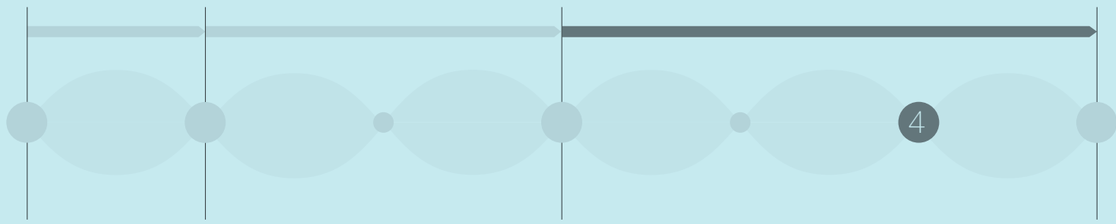
Mystery Plant overwhelmingly overcame many of the barriers and at least addressed all the barriers. It became a clear decision that this was the concept to further develop. The team was excited to move on with this concept and to start refining the idea. This was a pivotal moment in the design process and a moment that shows the importance of convergent thinking on divergent ideas using structured methods that utilize research to inform design decisions.

Figure 18 | **Weighted Matrix**

The above weighted matrix measured how well each of the concepts addressed the barriers that our research determined inhibit pro-environmental behavior change.

elaborate

With Mystery Plant selected as the concept to pursue for the rest of the project, the team began to better define the concept. Using multiple methods, we expanded the idea to better address our behavior change goals. The team established the mood of the game and created interfaces sketches, a user flow diagram, and a storyboard. These were used to elaborate on and communicate the concept, Mystery Plant.



morphological synthesis

Though the Mystery Plant concept had its main components established, the team was looking for a method to elaborate on the concept. Morphological Synthesis was the method the team decided to try with mixed results. In order to meet our needs, the team decided to perform a variation on the method. The main components of the game were used as the columns, in which we specified alternate ways to achieve or address the components.

In the traditional method, one idea in each column is connected to create a chain that represents a complete solution. However, the team felt that there were multiple ideas in each column that should be incorporated together. The traditional method also generates multiple solutions, here we were only trying to generate one detailed concept. Though this method shows value, the team felt it was not the best method to use in this case since it left many questions still unanswered and was too structured at this point. However, the method did help us elaborate on the concept.

Growing Plant	Receiving a Mystery Plant	Growing with Others	Rewards	Feedback	Rules
Hints on Plant Care	Mail	By Yourself	Build Up Garden	Show Achievements on Plant Pot	Identify Plant in Nature to Get First Mystery Plant
Track Growth of Plant through Images	At the Store	Friends Building a Garden	Home Grown Food	See How Other's are Growing	Difficulty of Plants Overtime Increases
Go Outside to Get Virtual Resources	From Friends	Community Group	Trophies for Plants Grown	Data About Plant Health	Must Successfully Identify a Plant Before Receiving the Next Plant
Personify Plant	From School	Share Plants with Others	Beauty	Data About Plant's Resource Usage	Identify Plant in Nature to Get a Chance to Identify Mystery Plant
Journal	Through Community Organization	Go Visit Other People's Plants	Knowledge	Plant Journal	
	By Season		Skill	Notify with Hints	
	By Region		New Plant to Grow	Show What Plants Should Look Like?	
	Depending on what Others are Growing			Can you identify it yet?	

Figure 19 | Morphological Synthesis

Looking to elaborate and gain clarification on the Mystery Plant concept, the team attempted to use morphological synthesis to identify and clarify key elements of the game.

user flow

Still lacked clarity in how the game would flow, the team decided it would be an excellent opportunity to craft a user flow diagram. This was a tool that became invaluable to the project. It was a structured way to communicate the flow of the experience for the user. The insights that came from using this as a communication tool generated not only internal understanding, but many outside mentors referenced this as way to generate feedback.

There was, initially, two parallel loops in the game. The first loop corresponds to identifying plants in the real world to gain in game points. These points could then be used to select mystery plants or use as chances to guess the identity of the current mystery plant the player is growing. Selecting plant sets and potentially inviting friends to grow with you makes up the transition to the second loop. The second loop involves the growing of a mystery plant in the real world, journaling the plants growth, and learning about the care and characteristics of the plant.

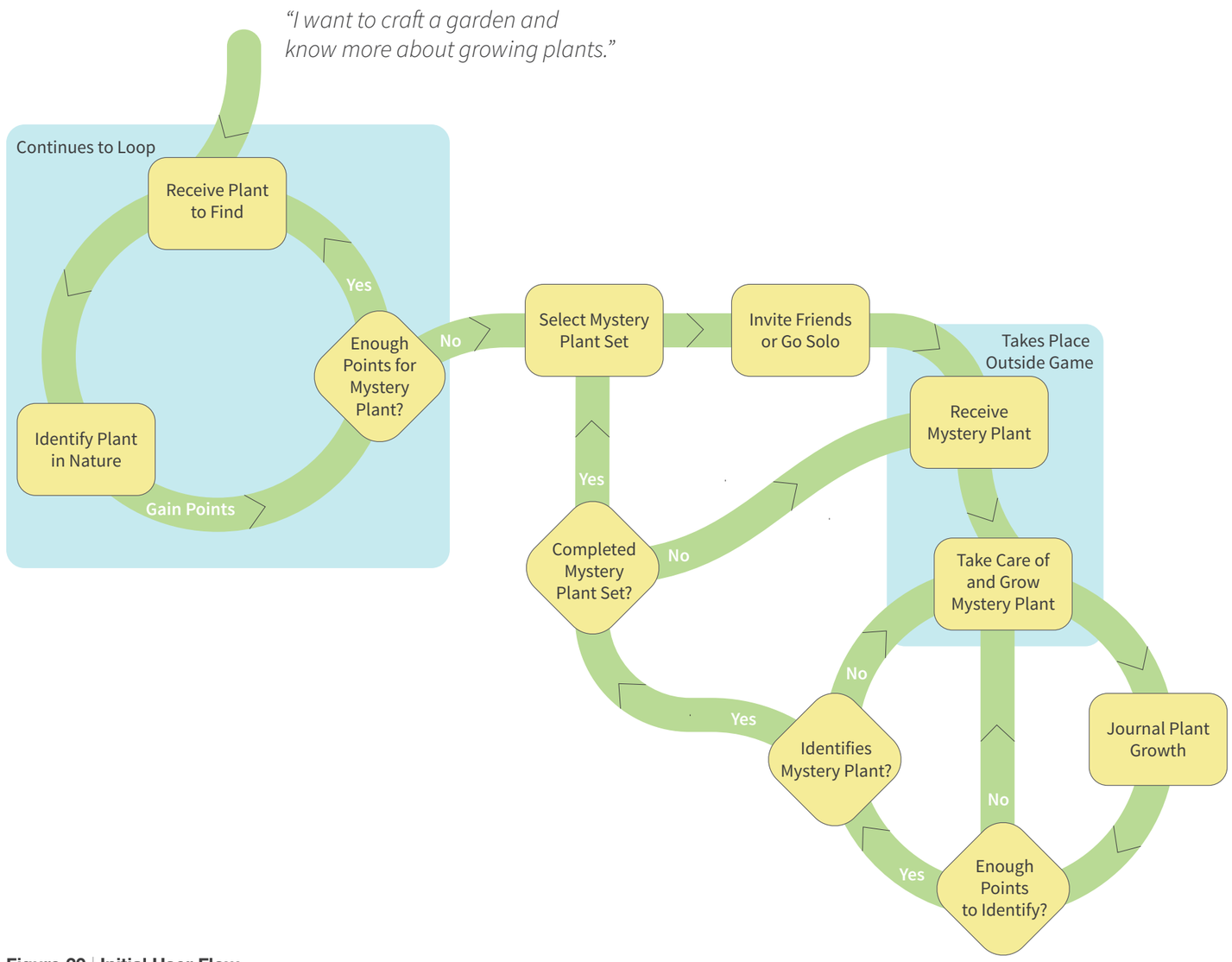


Figure 20 | **Initial User Flow**

Shows the user's journey through the game. B

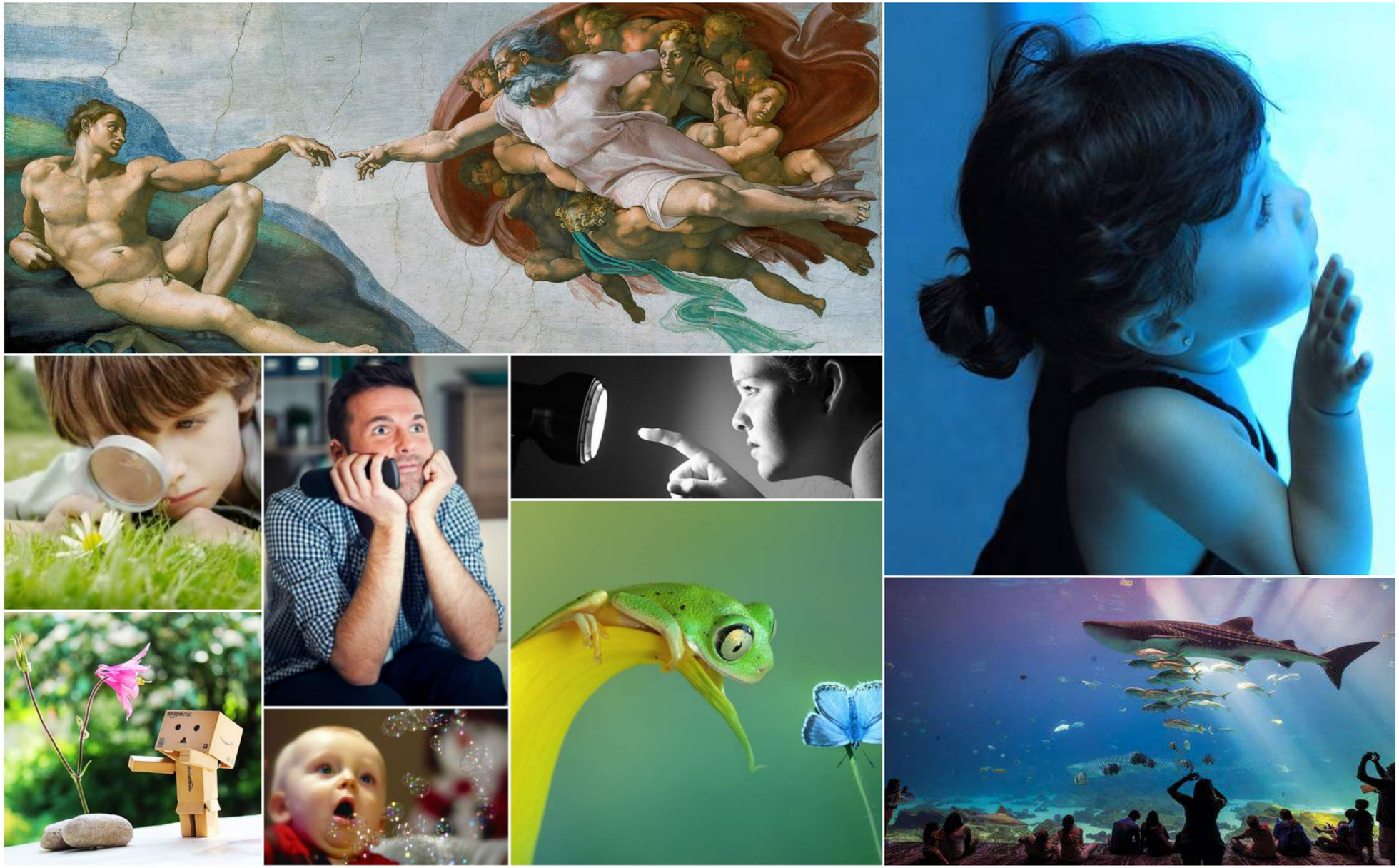


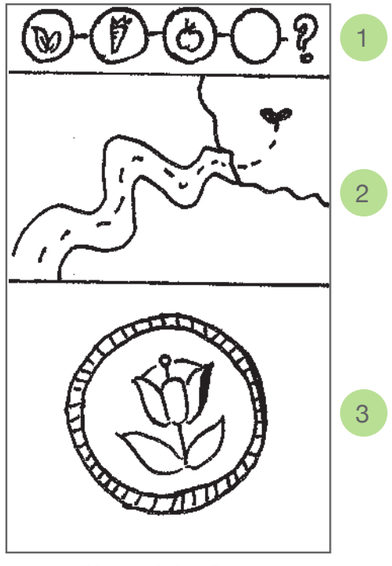
Figure 21 | **Moodboard** E
Knowledge, Curiosity, Wonder, Awe.

interface sketches

After identifying key moments in the user flow, the team created initial interface sketches. Though alterations to these interfaces was extensive as the project progressed, the team found that these helped showcase what the player would interact with. This also provided the team a chance to discuss what elements were necessary to have in the interface for the player to access the functional aspects of the game.

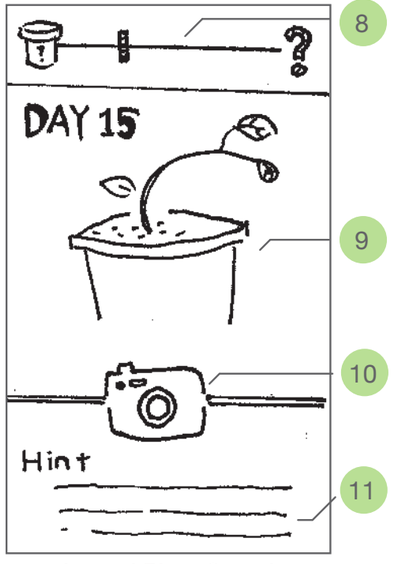
1. Progress Bar
2. Map to identifying the plant of the day
3. Picture of the plant of the day
4. Mystery Box Theme
5. Seasonal Special Box
6. Number of seeds in the box
7. Scroll down to see more boxes
8. Progress to fully grown plant
9. Picture of your plant
10. Taking picture button
11. Hint about your plant
12. Sliding picture show of your plant over time
13. Text entry box to guess name of plant
14. Number of guesses you have
15. Vine documenting your progress over time
16. 100 plants identified
17. First mystery plant guessed

Figure 22 | **Interface Sketches** K

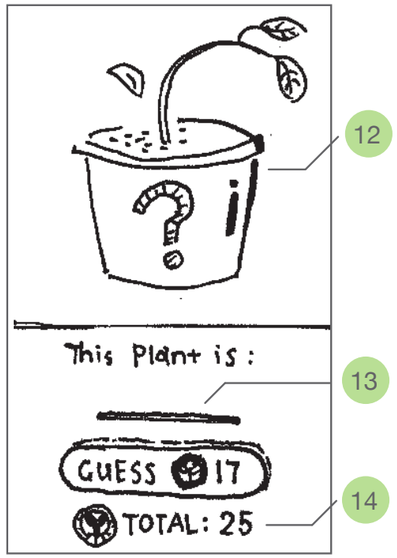


Plant of the Day

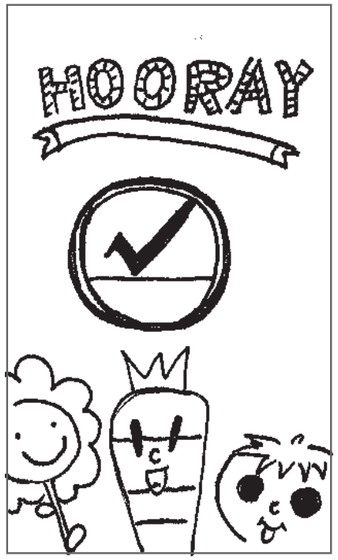
Select a Mystery Theme



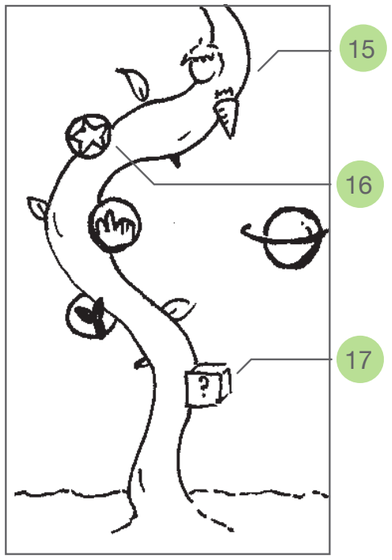
Journal Plant Growth



Identify Mystery Plant



Mystery Solved Page



Progress Vine

initial storyboard

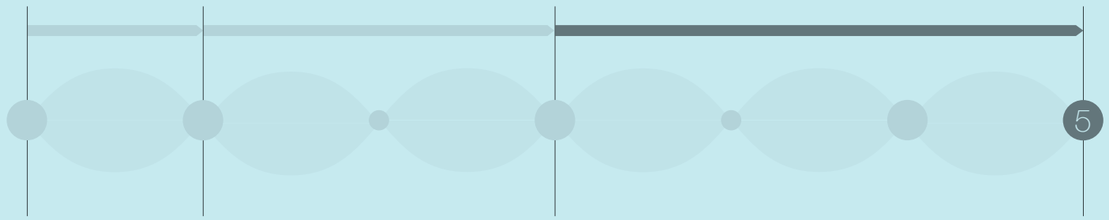
Using the user flow, we generated an initial storyboard that helped us explain and later examine the player's experience. The storyboard was found as an excellent communication tool that our team really found useful when communicating our idea to others and was used as a team dialog tool, as well.

"Windsor is a 20-year old student in Seattle, one of the players of our game, Mystery Plant Adventure. As a beginner, Windsor went out to nature to identify "the plant of the day" and gained plant credit. After collecting enough plant credits, Windsor selected which mystery theme garden he wanted to grow and he decided to grow Mama's Garden with his friend, Beth. Shortly a after, his mystery plant seed was shipped to him by mail. Windsor followed the hints offered by the game and took great care of his plants. Everyday, he compared it to the ideal condition picture of the plant and took photo of it for his plant journal. After one month, the idea suddenly dawned upon him that his plant is actually a tomato plant! At last, Windsor took his tomatoes and got together with Beth who has successfully grown a bunch of fresh basil. And they happily cooked Mama's classic spaghetti with the plants they grew."

Figure 23 | **Storyboard** K

refinement

With the initial user flow, sketches, and storyboard, the team looked for feedback on Mystery Plant. Taking that feedback and examining the concept more, the team started refining the solution. The team produced a robust interaction flow, a collection of wireframes, high fidelity interface mock-ups and crafted animated demos to bring Mystery Plant from an initial concept into an initial prototype.



Allergy Considerations?

Ask player for allergies

Seasonal differences?

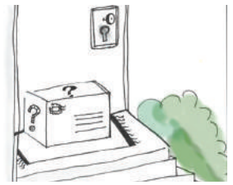
Auto-detects season

Regional Differences?

Auto-detects location based on GPS

Indecision on plant set?

Provide more information on plant sets



What plant do people get?

Random selection

Payment and Location details?

Photo recognize credit card

Save the payment info for next time

What do they get?

Plant in a box

QR code to link plant

Multiple plants at once?

Build up to getting multiple plants at once.

What are the hints?

Things about the plant to help with identification

Frequency of hints?

Instructions are given early and twice daily.

Hints are given every other day with increasing specificity as time goes on.

Difference between instructions and hints?

Instructions are how you take care of the plant, hints help with guessing the identity

Plant not growing… how do they get a new plant?

Give you a new seed after looking at the plant.

Point reward for daily doc?

No Reward

Write or photograph?

Just a photograph

Help with consistent photos?

A suggestion for where the pot should be in the picture, Timelapse View

Share on social network platforms?

Add to progress page and journal interface

How many times per time unit can they guess?

Once a day

How specific will the guesses need to be?

Becomes more specific as skill grows

When can they guess?

Whenever they want

Never guesses right?

Gets more specific hints

Does the system change according to guesses?

No it does not

What happens when they get it wrong?

They can guess again, if they have enough chances, with the aid of a more specific hint

What happens when they get it right?

Get a chance to select the next plant in the set.

Figure 24 | **Error Analysis - Problems and Resolutions**

error analysis

The team began the refinement of Mystery Plant by performing an error analysis. The initial storyboard and user flow were used to identify where the pain points were in the concept, what we needed to remove, and what we needed to address as we moved into generating wireframes and interface mock-ups for the project. At each point in our storyboard, we identify concerns and then formulated answers to address those concerns. This was a useful method to better understand the concept and settle team discrepancies on different aspects of the solution. We also identified issues that we had not considered or even new existed. This was an excellent way to start the refinement process.

interaction flow

Taking into consideration the feedback we received, the team refined the user flow and used it to inform a more robust interaction flow. Two main concerns were addressed with this new flow.

The team redesigned the interaction flow to remove the initial point gathering loop. There was feedback that was concerned with the loop potentially monopolizing the attention of the player. This could distract the player from the core purpose of the game, growing and journaling the plant in the real world.

The community aspect of the game was also missing in our initial flow. There were concerns that if issue would arise with the plant, who could the players turn to for assistance? Also not including this aspect deviated from an initial goal of incorporating community and social interaction with in the game.

These changes, plus an overall increased specification of how players will interact with the game, was incorporated into the final interaction flow for Mystery Plant.

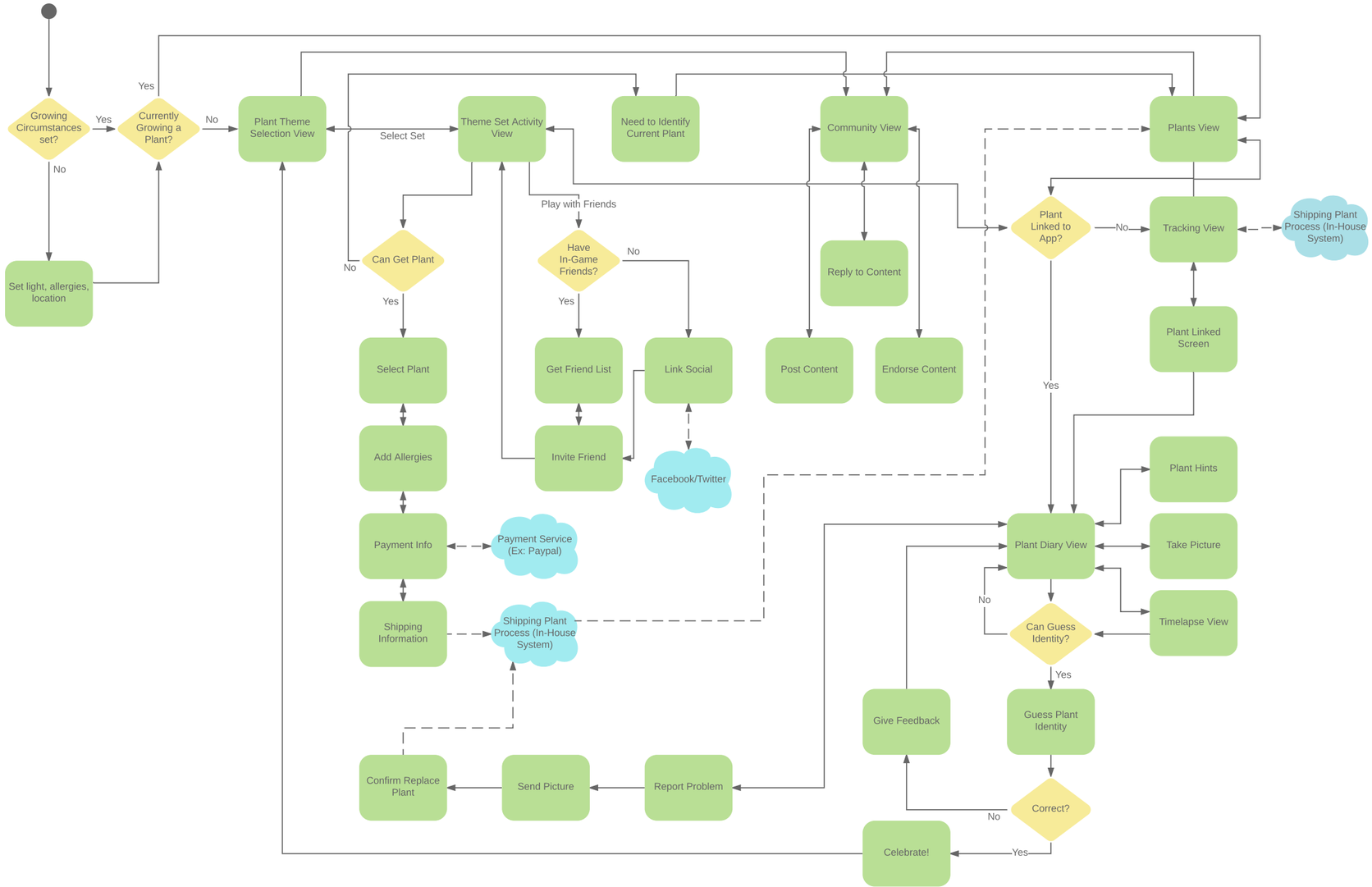


Figure 25 | **Final Interaction Flow** E

Established by the Team.

interface wireframes

Using the interaction flow, the team selected states to generate wireframes. The elements between different screens were linked to indicate the flow from one screen to the other. With all the wireframes combined and connected it became a visual representation of the interaction flow diagram. The wireframes became important blueprints used in the development of the high fidelity interfaces.

Figure 26, right | Selection of Wireframes K

Established by the Team.

high fidelity interface designs

This game was in no way attempting to monopolize the attention of the player. The experience needed to accompany and support the growing of plants in real life. This philosophy was maintained throughout the entire design process and was considered during the design of the high fidelity interfaces.

The look and feel of the application went through several iterations. As in many portions of the project, this was a learning opportunity. Looking at design inspiration was helpful and Instructor feedback was taken very seriously. Nature is an obvious cornerstone of this game and the aesthetic also wanted to emit a playful feel to the game.

In addition to these high fidelity interface mock-ups, the team continued to look for better ways to communicate the design. It was clear that an animated interface with a relatable storyline would bring an exciting and polished way to showcase a potential player's experience.

Designing these interfaces was a personal endeavor. They were challenging to create, but an opportunity to focus on the visual aspect and the overall experience they would lend to the game.

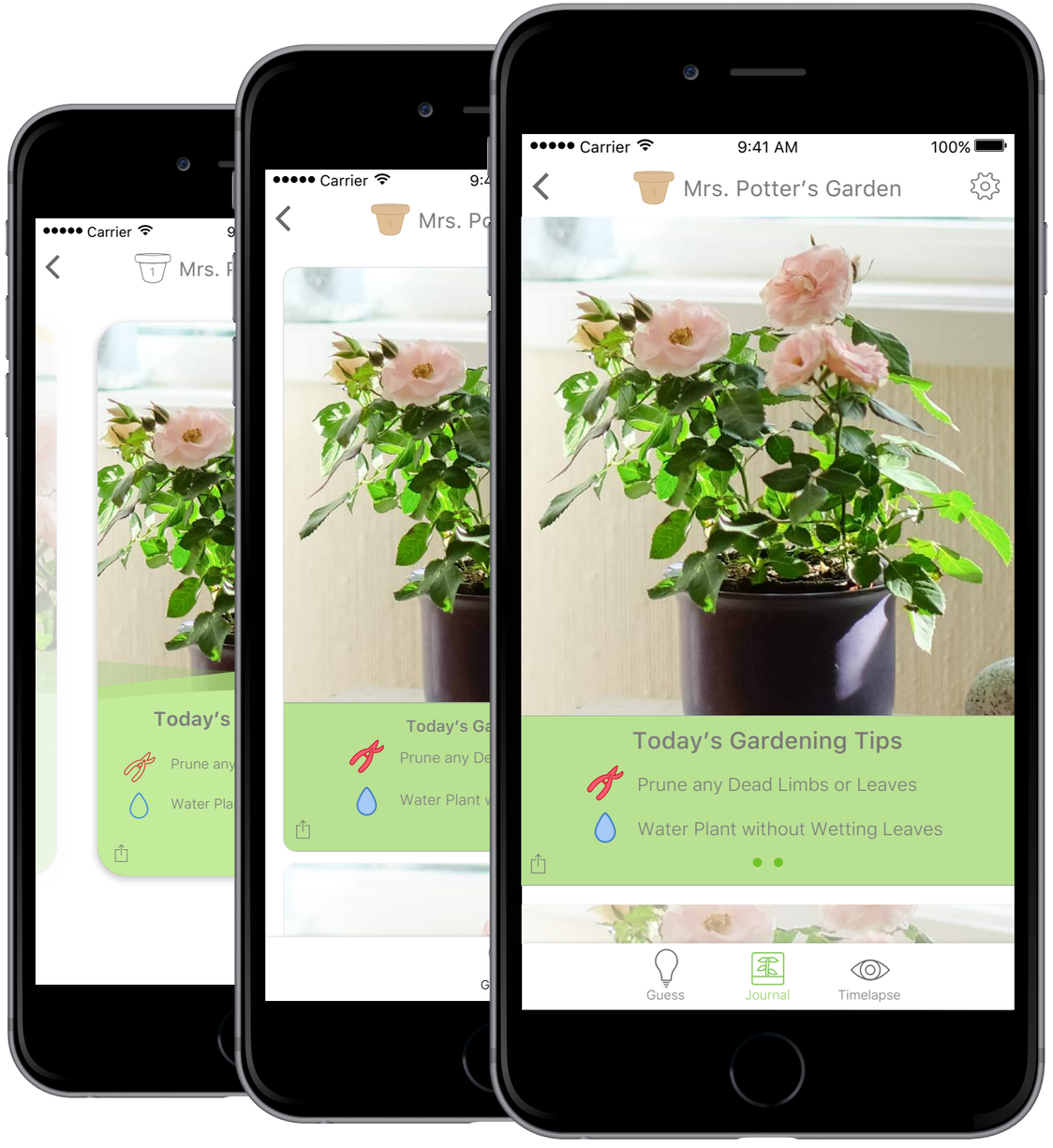
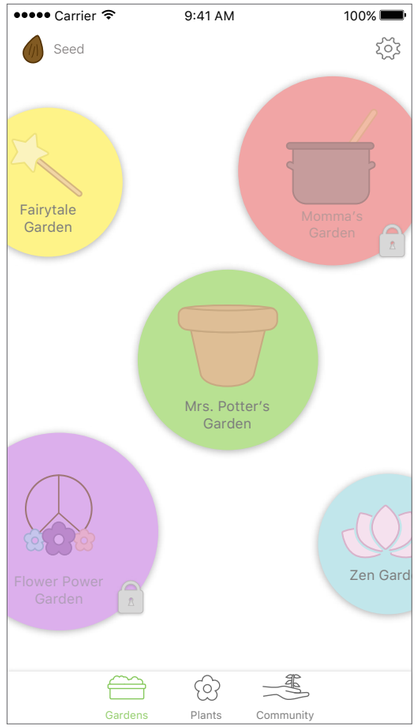
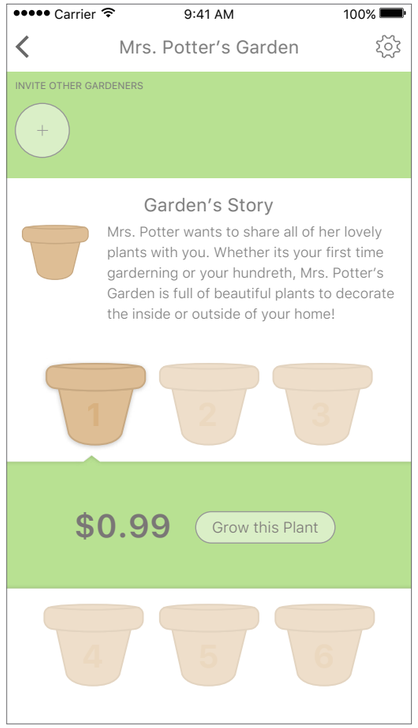
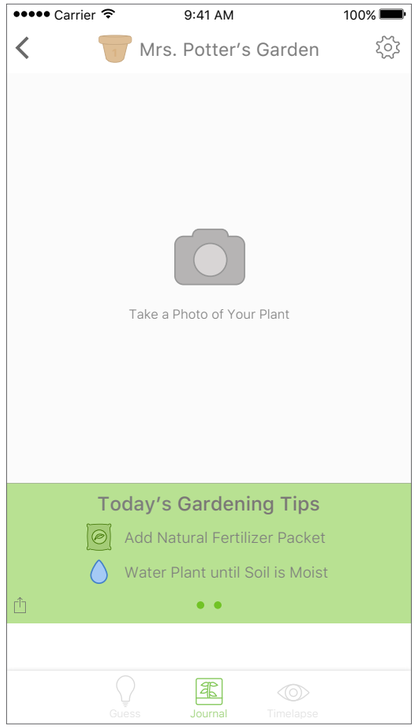


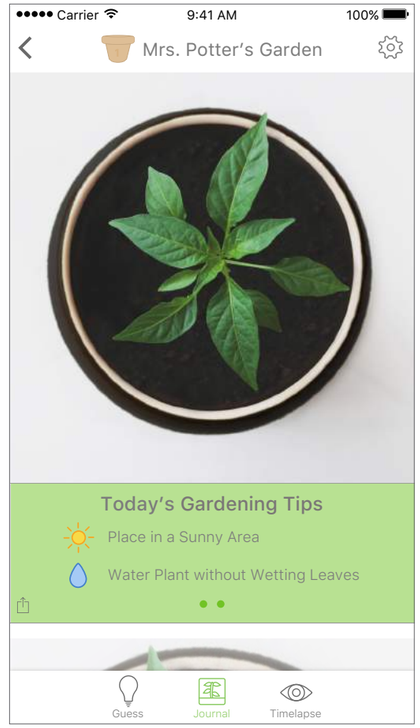
Figure 27, right | **Journal View** B

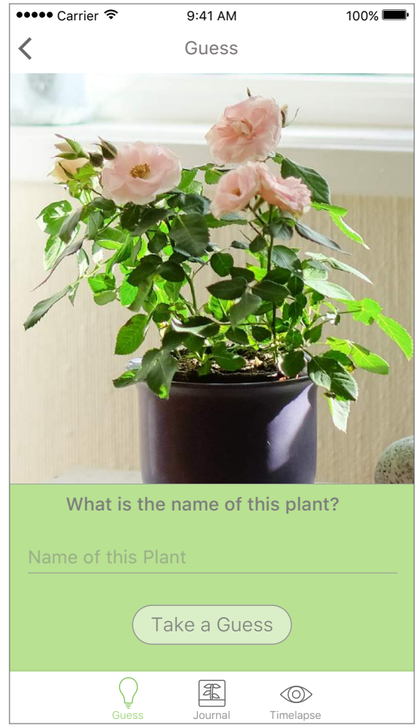
Showing iterative improvement. Final Design in foreground.

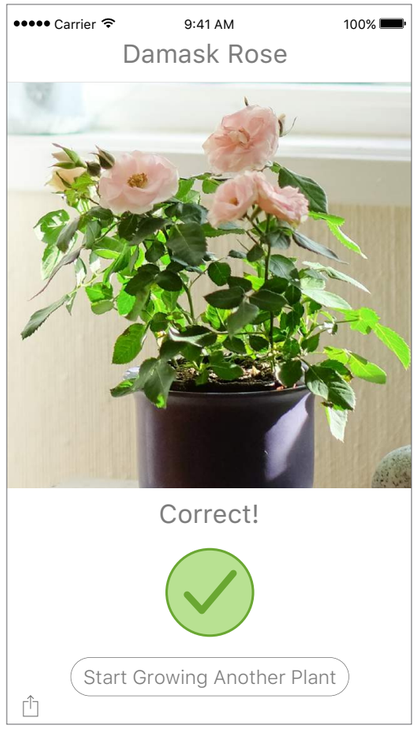


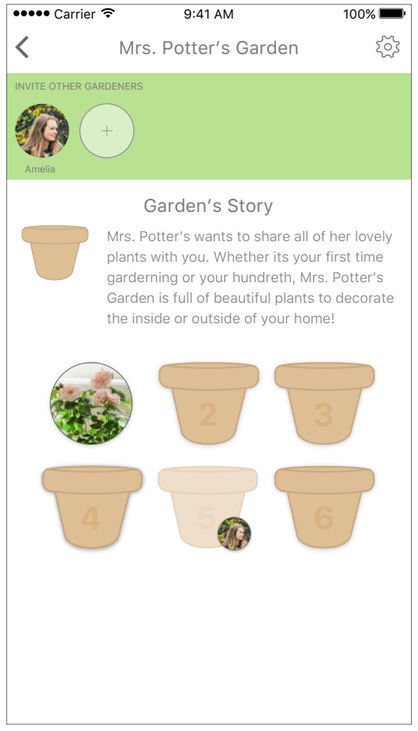


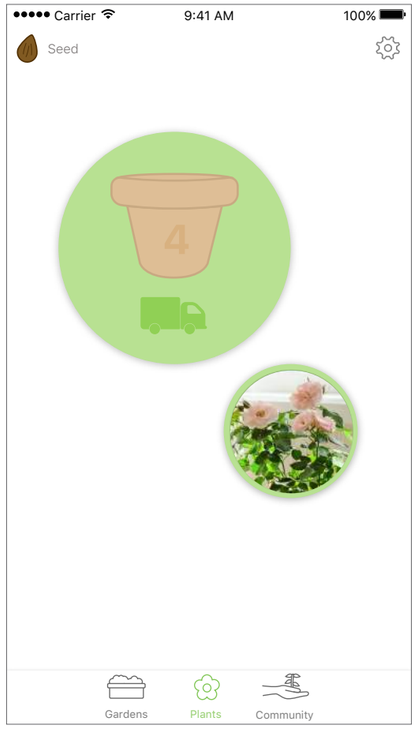


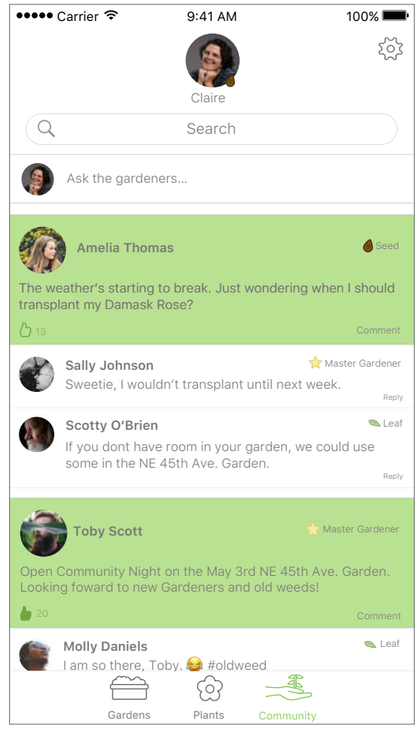






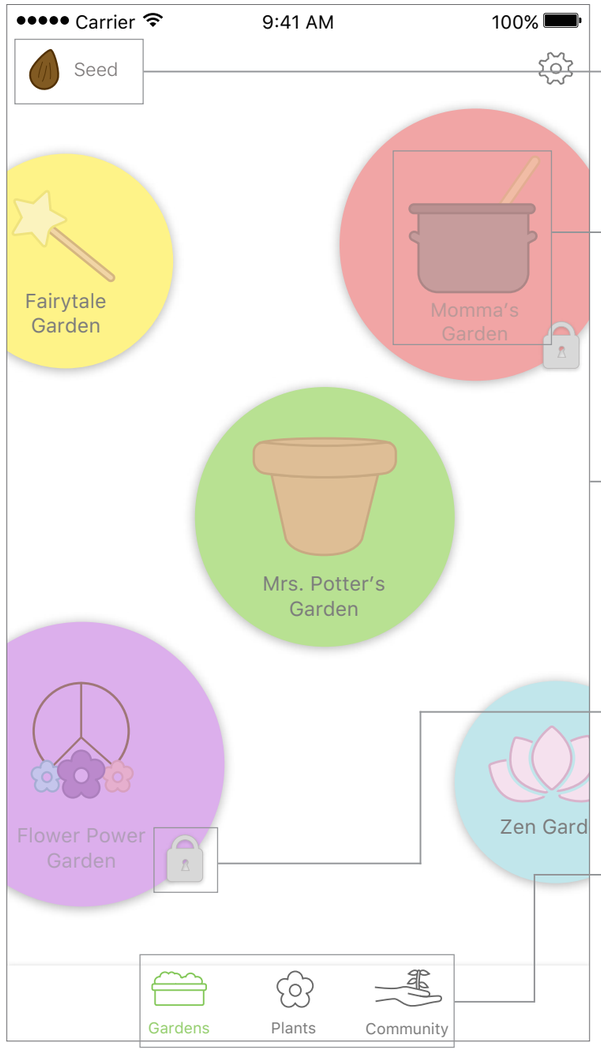






From left; select mystery plant, journal view with growing tips no photo, journal view with growing tips and photo, journal view with hint and photo, guess mystery plant, correct guess, select another plant it theme, see plants growing or will be growing, and community page.

B



Skill Level

It is important the player sees growth. As they grow more plants they move from a Seed to a Master Gardener.

Story Driven Themes

Story was a key game aesthetic that we wanted to incorporate. This provide a variety of themes for the players to explore.

Playful Aesthetic

Several iterations looked bland and mechanical. The team decided to adjust to this more playful feel.

Requires Different Skills

The game guides players to success, gradually incorporating challenge as skill increases.

Three Main Aspects of the Game

Players can navigate between the Garden themes they can grow, the Plants they are growing and the Community, a social platform that connects players with each other based on location.

Grow with Friends

Community is a powerful tool to help assist with behavior change. Allowing friends to play together, not only helps both players explore garden themes faster, but also starts a conversation outside the game.

Plants Grown

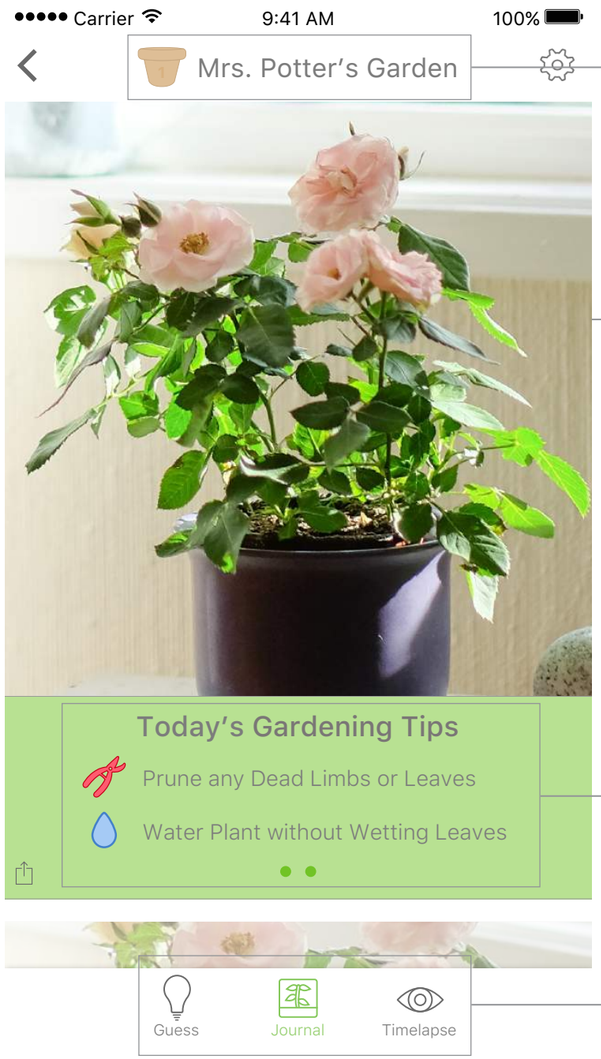
See your progress through the set by seeing the journal photo you have taken of the plant. This helps player see accomplishment and progress.

Friend's Progress

See your friends progress, as well. Promotes teamwork and collaboration and promotes conversation about gardening.

Start a New Plant

Players select another plant to grow to complete gardens. Though they select a plant, they still do not know its identity.



Plant Identity

Players needed a way to identify the plant with in the game with out giving away its true identity. The game uses the Garden Icon and a number to identify the plant in the game.

Plant Growth

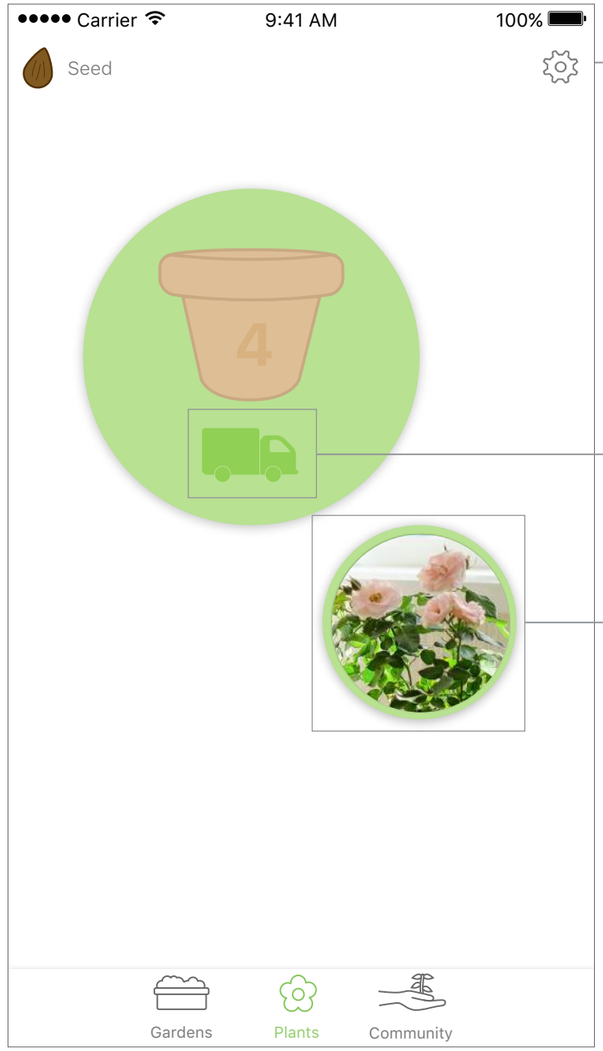
After several iterations, the design settled on a scrollable feed which allows the player to scroll through past journal entries to see progress and reference past instructions or hints.

Instructions and Hints

The core of the game, where players are given simple instructions on how to care for the plant. They also receive facts about their plants, which become hints to the identity of their plant.

Journal Features

All the features are in support of growing the plant and allowing the player to gather insights for guessing the plant's identity. The Timelapse view is a unique way for the player to see the growth of their plant using the photos they have taken.



View Past, Present and Future

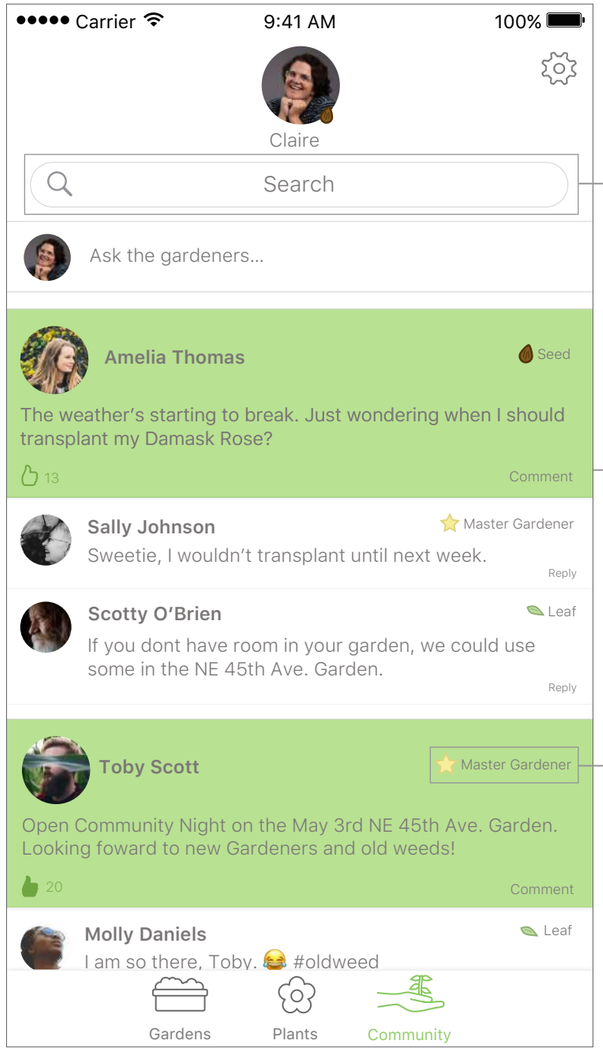
The player can view their plants they are growing, have grown, and will grow. This is another visual representation of their progress.

Delivered to Your Home

To help players track their mystery plants the game allows them to view tracking information and progress to generate excitement and anticipation of receiving a package.

Journal Access

The player can see their latest photo for that plant and tap to enter that plant's journal.



Search

Players can seek out specific topics or questions to find if others in the community have had the same questions. They can also look for specific gardeners to ask questions or see what they are growing.

Grow with the Community

Players can seek help with gardening questions or just get in contact with fellow local gardeners.

Show Skill

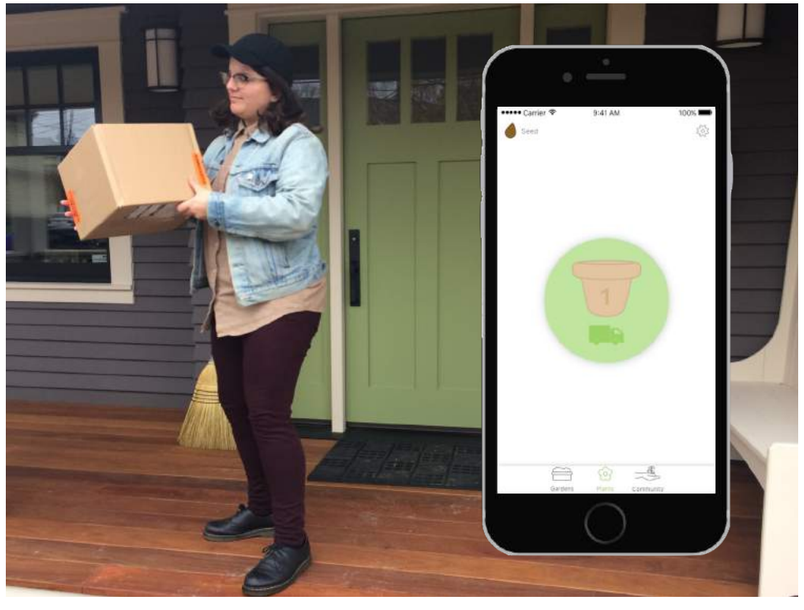
Players can see skill levels of others to judge reputability of advice and suggestions.

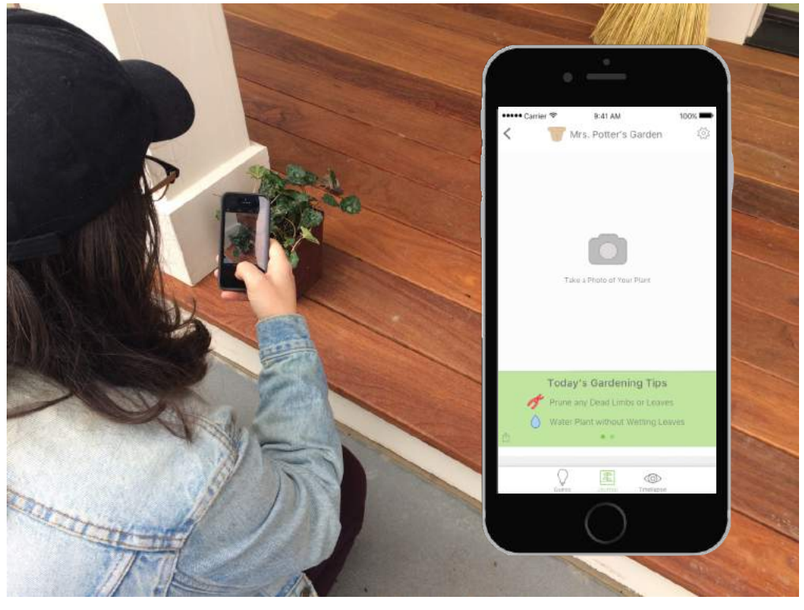
Conclusion

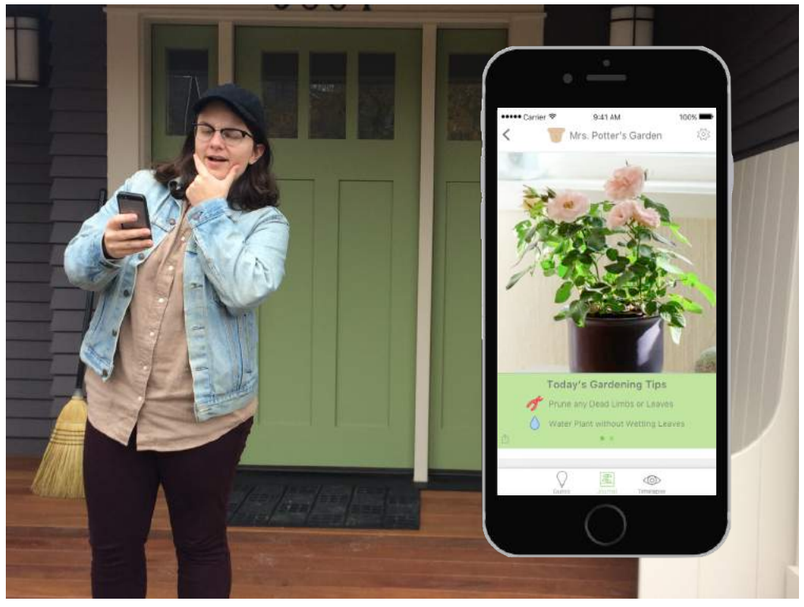
Mystery Plant

mystery plant

Supported by a solid background of research and process driven design, the team is happy to share Mystery Plant. Mystery Plant provides the player with not only the knowledge and skills necessary to grow a plant, but also give the player a chance to engage with nature and can be used as an outlet for players to interact with the local gardening community.







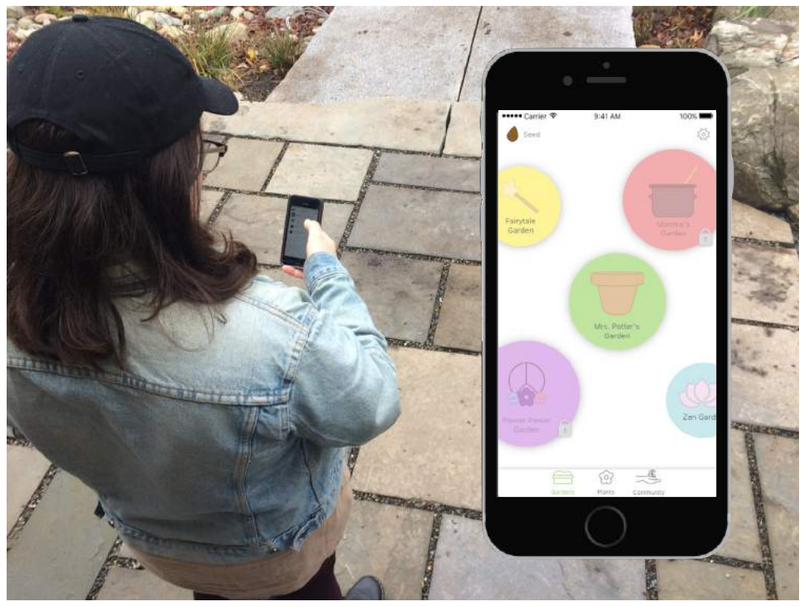


Figure 28, right | Selections from Claire's Story B K E
Animated Interface Storyboard.

conclusion & reflection

Mystery Plant is a unique mobile game that gives novices the chance to adopt gardening and become master gardeners. This game looked to address behavior change focused around engaging players with nature and to promote pro-environmental behavior.

In completing the initial prototype of Mystery Plant, the team looks to reflect on the experience up to this point. In retrospect, the team clearly understands where the project struggled and where the team excelled in crafting an engaging and effective solution.

Many methods were successful, however, some were not appropriately applied. Methods like using Action Verb Sketches, Popular Media Scan, and Morphological Synthesis are powerful methods that our team realizes could benefit the design process, but only if they are appropriately used. The team was always looking for ways to adopt and adapt different methods to meet the project's needs. For example, the team adapted the Opportunity Map method to identify key behaviors in relation to target audience appeal. The insights from this exercise where used in ideation and became a pivotal point in our process.

Mystery Plant is also rooted in sound secondary research that helped the team inform design decisions. When it was time to focus our thinking and converge on milestones in our process, the research we identity at the beginning of the project informed these discussions. The team realizes the importance of secondary research, but the insights that are generated through primary research were greatly missed.

Though Mystery Plant was created for academic exploration, the team outlined some potential future steps. The first step would be to start the process again, finding problems with the solution purposed in this document. The team would also like to look into how our target audience would interact with a working prototype of Mystery Plant. It is critical that the team sees how users would interact with the game. Mystery Plant also has a business component which our exploration did not consider. This was a concern that was expressed during Mystery Plant's final presentation and would be a problem that would need to be addressed if Mystery Plant were to become a reality.

Mystery Plant is an original solution that provides everyone the chance to engage directly with nature, build knowledge and skills related to gardening, and provides a platform for local gardening communities to grow.

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