

Pikapoo

Tools: XD, Photoshop, Rhino, Procreate

System design | Individual Project | 2021.5 - 2021.8



Design Criteria



Problem Statement



Figure 1. Dog waste in the lawn.

Dog ownership in China is relatively new and owners lack knowledge and experience on how to care for their pets. With the recent, rapid population growth of dogs in China, this is causing countryside problems with pet waste becoming a nuisance in public places (Figure 1) and also tension in neighborhood relationship.

How might I design a system that helps dog owners realize the hazard of dog poop, pick it up, while also utilize it properly?

Project Outcome



Figure 2. The Pikapoo Application. Designed in XD and Photoshop.

01 APP

1. Locating user's dog's poop and call PooBot to pick up poop.
2. Checking user's friend location and walking dog with friends.
3. Receiving fecal test reports
4. Making appointments with veterinarians.
5. Shopping dog supplies.

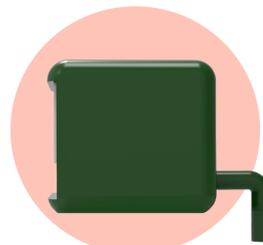
02 PooBot

PooBot (Figure 3) arrives and picks up poop when it receives coordinates information. It takes a sample of the poop for fecal test and then delivers the remaining portion to the waste disposal unit.



Figure 3. The Pikapoo PooBot. Designed in Rhino.

03 Waste Disposal Unit



Micro-organisms in the waste disposal unit turns dog waste into environmentally-friendly rich liquid that nourishes the lawn.

Figure 4. The Pikapoo Waste Disposal Unit. Designed in Rhino.

Check the video: <https://youtu.be/RMw0YTjm4Os>

Background Research

• Field Research



Figure 5-7. Dog waste on the ground in Beijing.

On a field-research expedition, I realized this problem was bigger than I had expected.

In fact, on a 15-minute walk trailing other dog owners, I found 15 different places where owners didn't clean up after their dog excreted.

• Why is the situation different between China and the U.S. ?



Figure 8. An American single-family home with private yard.

Over 70% of Americans live in these properties.



Figure 9. A Chinese apartment complex with public landscaping.

Over 64% of Chinese live in these properties.

• Hazard of Dog Feces

"Just two to three days of waste from 100 dogs can contribute enough bacteria, nitrogen and phosphorous to close 20 miles of a bay-watershed to swimming and shellfishing, according to the U.S. Environmental Protection Agency.

It also can get into the air we breathe: a recent study of air samples in Cleveland, Ohio, and Detroit, Mich., found that **10 to 50 percent of the bacteria came from dog poop.**"

LIVESCIENCE

The distribution of parasitic elements in stool sample (Figure 8).

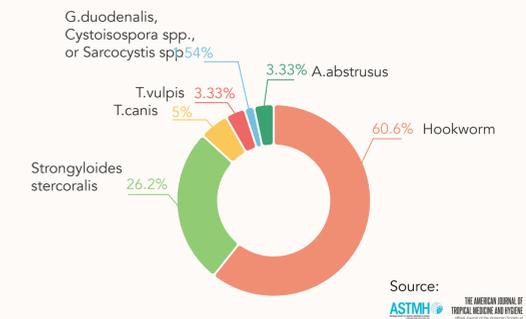


Figure 10. Distribution of parasitic elements in stool samples.

1 GRAM ≈ 23 MILLION BACTERIA

136.11M in CHINA ≈ 17.38 MILLION TONS / year ≈ 4 x 10⁸ trillion

Key Business Drive

01

Percentage of Chinese living in communities is

64%

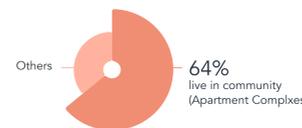


Figure 11.

02

The number of communities in China is

450 k



03

The number of dogs in China 2022 is

136.11M

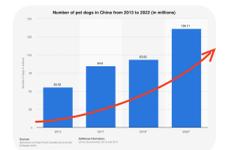


Figure 12. Number of pet dogs in China from 2013 to 2022 (in millions)

*Target communities in the research are defined as urban apartment/villa complexes (rural residential homes not included). All data is from POI, Gaode Map and Statista)

Market Research

• Survey

I designed a series of questions especially for dog owners and got 112 feedbacks from them.

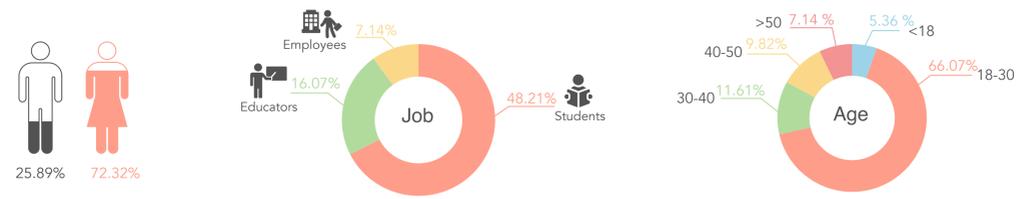
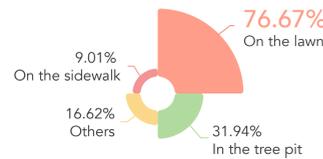
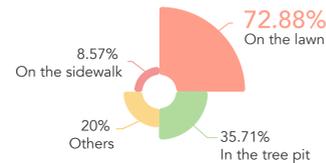


Figure 13-15. Survey demographics.

• Where do you find dog waste normally?



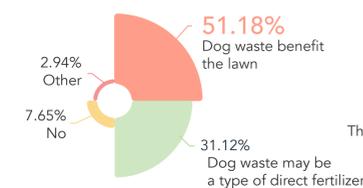
• Where does your dog poop usually?



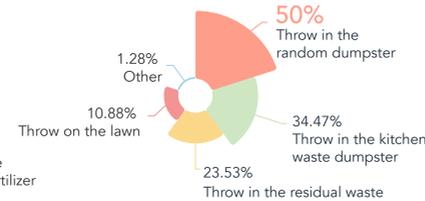
Insights from survey

Dog waste often exists on the lawn, and dogs are used to poop on it.

• Do you think dog waste is good to the lawn?

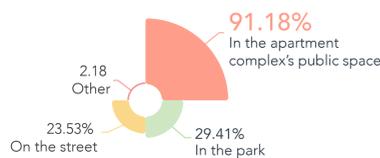


• How do you deal with dog waste?

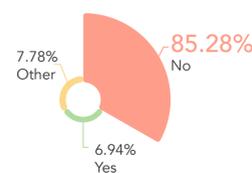


Most people deem dog stool as a benefit to the lawn, and they don't know how to categorize dog waste when dumping trash.

• Where do you usually walk your dog?



• Do you check your dog's health regularly?



Over 90% people walk dogs within community and they don't usually check for dog's health.

Figure 16-21. Survey results.

• Conclusion

My respondents are well-educated. However, they are unaware of the hazard of dog waste and lack experience in dog-raising.

People's understanding influences user behavior pattern, **so how can my service change it?**



Figure 22. A diagram showing how Pikapoo changes people's understanding of dog feces.

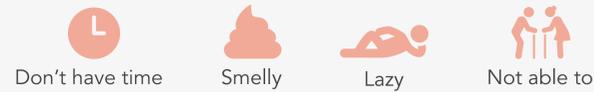
Journey of discovery

• Brainstorms & Evidences

After confirming my goals, I started to brainstorm my service system and found the evidence to my assumption.

Dog Owners

Why not picking poop up?



How often do you need to bring a sample for testing?

"We recommend fecal testing every 2-3 weeks for puppies/kittens until they are 16-20 weeks of age. Adult pets should be tested every 6 months."

Smith Station animal hospital

Walking dog together or alone?



Figure 23.

Disposing Poop

What "catalyzer" will help poop dispose quickly?



Figure 24.

"These all-natural micro-organisms include lactic acid bacteria, yeasts, photosynthetic bacteria, actinomycetes and fungi. These micro-organisms accelerate the breakdown of the waste, eliminate smell and help remediate any pathogens in your pet waste, and ultimately contribute to a healthier soil and a more beautiful garden."

ENSOPET

How do we dispose dog waste in a eco-friendly way?



Figure 25.

"BioBags are constructed of plant starches, vegetable oils, and compostable polymers. They're designed in a way that enables them to break down in both home and industrial composting."

<https://www.biobagusa.com/products/retail-products/pet-waste-products-retail/>

Utilize Poop

What Kind of Parasites does a Fecal Exam Check for?



Figure 26.

Drake Center for Veterinary Care

What equipment is required for fecal test?

"Microscope and PCR. Microscope is low-cost yet effective, while PCR is more expensive and more advanced. Most animal hospitals do not have PCR equipment. Equipment for both tests need manual operation."

Quanxinquanyi Animal Hospital



Figure 27.

How long does dog poop sample remain effective?

"Samples must be FRESH (still soft and moist) within the last 4-6 hours."

Smith Station animal hospital

How long does the delivery take?

"In China, a delivery can run 2-5 kilometers per time and it makes difference in different delivery company. And the average delivery time is within 30 minutes."

City Big Data



Figure 28.

The distribution of animal hospital in Beijing?

I have searched veterinaries in main area of Beijing, within 5th ring road, and it is 672 square kilometers. The locations of the veterinaries are marked as stars. Beijing has 308 animal hospital in total, and there is one animal hospital in every 2.2 square kilometers.



Figure 29.

The orange-highlighted areas are university campuses and the national cemetery (top-left), metropolitan recreational areas (top-right), the municipal airport (bottom), historical protection area (center), etc.

Competitive Analysis

A comparison of existing automated robots and cleaning tools that can be used to dispose pet feces.

| Robot/Tool | Pros | Cons |
|------------|---|---------------------------------------|
| | • No poop-touching • No bending over | • Carrying it around • Cleaning |
| | • No bag-holding | • Touching the poop • Bending over |
| | • No bag-holding • Small and easy to take | • Installing plastic bags |
| | • No bending over | • Cleaning • Inconvenient to carry |
| | • No poop-touching • No bending over | • Cleaning • Inconvenient to carry |
| | • No poop-touching • No bending over | • Cleaning • Inconvenient to carry |
| | • No poop-touching • No bending over • Automatic scooping | • Dealing with poop |

A comparison of existing dog - care - APPs.

| APP | Features |
|-----|--|
| | • Dog walking rewards • Map • Best dog walking spot • Dog-walking analytics |
| | • Online community • Shopping • VIP membership • Charity |
| | • User posts • Shopping • Education reminder • Photo album |
| | • User posts • Shopping • Education reminder |
| | • Map • Charity • Polling and discussion • Digital pet |
| | • Online healthcare • Shopping • Education • Charity |
| | • Vet-client messaging • Insurance guide |
| | • Pet services |
| | • Various species • Pet supplies |
| | • For dogs and cats • Pet services |
| | • Pet's daily health • Shopping • Dog training |
| | • Dog services |

Table 1. Competitive Analysis for existing automated robots and caring dog APPs.

Positioning Matrix

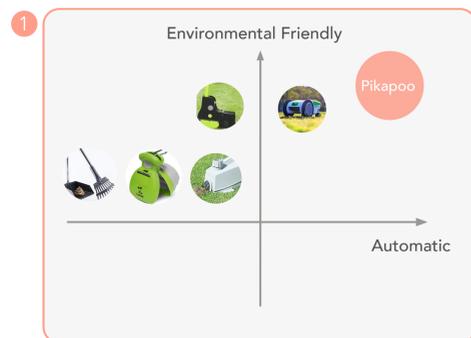


Figure 30.

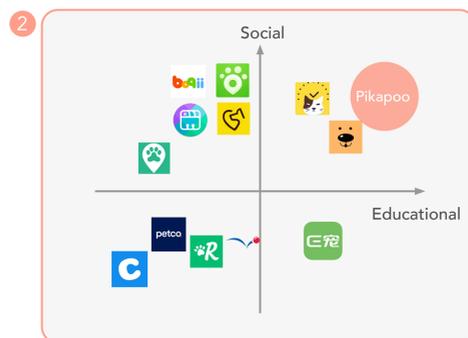


Figure 31.

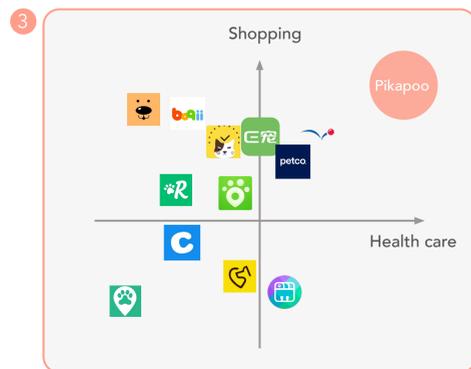


Figure 32.

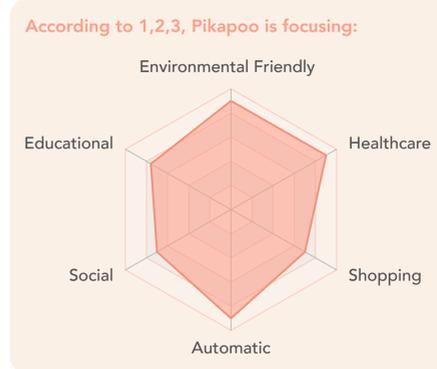


Figure 33.

A visual diagram that illustrates a unique opportunity for sustainable solutions for automated / service oriented solutions.

Persona

Catherine Yao
21 Student
Lives with parents

Personality

- Outgoing
- Responsible
- Explore new things

Wants & Needs

- Have a person who only walk dog together
- Check her dogs health issue regularly
- Find an alternative way to pick up dog poop

Painpoints

- Afraid of insects inside the lawn
- Does not have a good product to pick up dog poop
- Does not know dog waste is bad to the lawn

Goals

- Does not step on the lawn
- Prevents her dogs from potential health issues
- Protects the environment

Cassily Zhang
31 Designer
Lives alone

Personality

- Workaholic
- Passionate
- Optimistic

Wants & Needs

- A product can help her pick up poop
- Wants to make friends
- Wants to find an effective approach to learn dog's

Painpoints

- Does not have time to pick up poop
- Hardly finds people to walk dog together
- Too busy to check her dog's health

Goals

- Easy to handle dog waste
- Easy to search expertise in owning a dog
- Finds a person and walk dog with them

Kevin Zhao
63 Retired
Lives with his partner

Personality

- Talkative
- Weak
- Sophisticated

Wants & Needs

- Find an alternative way to pick up dog poop
- Easy to learn and use

Painpoints

- Not able to bend over
- Easy to forget to bring plastic bags

Goals

- Does not need to take plastic bags
- Does not bend over

Figure 34. Pikapoo Persona.

User Journey Map

A day in the life analysis of what a pet owner encounters daily. Identifying pain points and interaction points are used as a tool for ideating solutions.

| Phases of the journey | Limited time to walk dog | Walk with neighbors | Unable to step on the lawn | Dog healthy issue | Expertise information |
|-----------------------|--|--|---|---|--|
| Emotions and thoughts | <p>I only have 15 minutes to walk my dog, so I don't have time to walk around. Sometimes I ignore the poop on the lawn because I don't have enough time to pick it up and find a dumpster to throw it.</p> | <p>I am so glad that I finish my work and have more time to walk my dog and play with him.</p> <p>When I walk in the community, I rarely find other dogs. My dog wants to play with his friends...</p> | <p>I finally meet one of the owners, and he tells me that actually there are some people who walk dogs, but I am simply not aware.</p> <p>My dog poops far inside the lawn but it's so dark at night! I am afraid of insects so I CANNOT GO INSIDE.</p> | <p>I always forget to take my dog to physical check-ups after which I need to wait for a long time</p> <p>The body check shows some bacteria and parasites inside of my dog's digestive system. It's not a big deal because we discover it earlier.</p> | <p>I search information about pet caring online. I get responses but they rarely are expertise.</p> <p>I bought food supplies from Taobao (AliExpress) but it is not that good for dogs after I show that to the doctor!!!</p> |
| Needs | <ul style="list-style-type: none"> • Simpler and faster poop pick-up process | <ul style="list-style-type: none"> • Socialize her dog • Walk dog with neighbors • Without sharing personal | <ul style="list-style-type: none"> • Do not go to the lawn • Educate dog owners | <ul style="list-style-type: none"> • Check dog's health regularly | <ul style="list-style-type: none"> • Lack knowledge related to dog |
| Doing | <ul style="list-style-type: none"> • Walk dog in a hurry • Take plastic bags and pick up poop • Cannot find rubbish can, so throw poop on the lawn | <ul style="list-style-type: none"> • Walk dog alone • Finding neighbors and exchanging info • Feeling uncomfortable sharing personal info | <ul style="list-style-type: none"> • Does not pick up poop because she is afraid of insects in the grass • Throw poop in the grass | <ul style="list-style-type: none"> • Does not pick up poop because she is afraid of insects in the grass • Throw poop in the grass | <ul style="list-style-type: none"> • Check knowledge/ask questions online • Buy snacks/food without asking doctor's • Leave dog poop on the lawn because she thinks it is fertilizer to the lawn |
| Opportunities | <ul style="list-style-type: none"> • A feature that can pick up poop • A dumpster near the lawn which can let dog owners easy to throw poop | <ul style="list-style-type: none"> • A feature which can invite neighbors to walk dog together • A feature that does not share personal information | <ul style="list-style-type: none"> • A product that helps dog owners pick up poop on the lawn and dump it | <ul style="list-style-type: none"> • A feature that connects dog owners and doctors • A feature that checks dog's health easily • A feature that can educate dog owners | <ul style="list-style-type: none"> • A feature that sells dog supplies with doctor recommendation • A feature checks dog's health easily • A feature that can educate dog owners professional Knowledge |

Table 2. User Journey Map.

Design Concept

System Diagram

This is the system diagram showing the workflow of Pikapoo's main features.

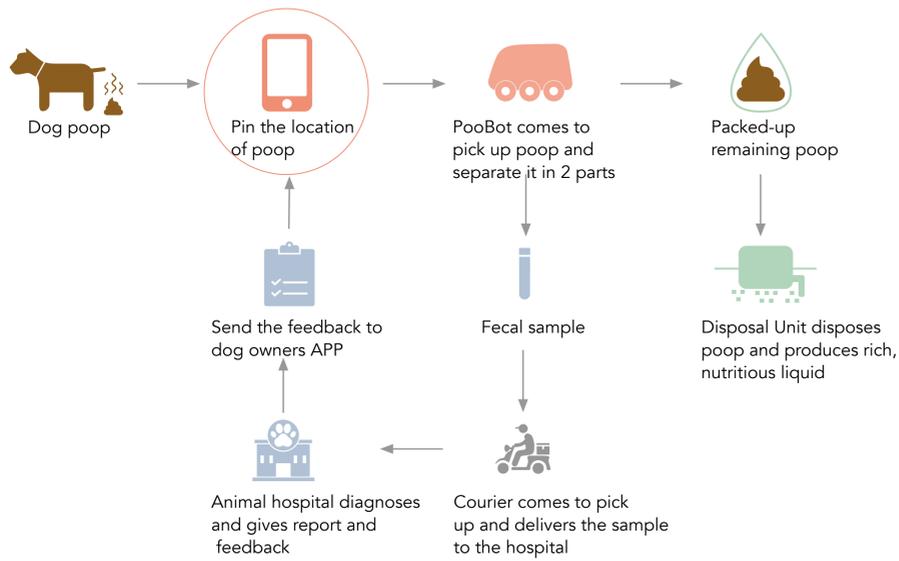


Figure 35. Pikapoo System Diagram.

Stakeholder Map: Overall System

A visual map of stakeholders, interactions, and artifacts of the Pikapoo system.

- Pikapoo's solutions**: The stakeholder map shows the value flow between different groups (service and stakeholders). And more important stakeholders are placed more inside.
- Health & Care** (Blue circle)
- Social interactions** (Orange circle)
- Environmental friendly** (Green circle)

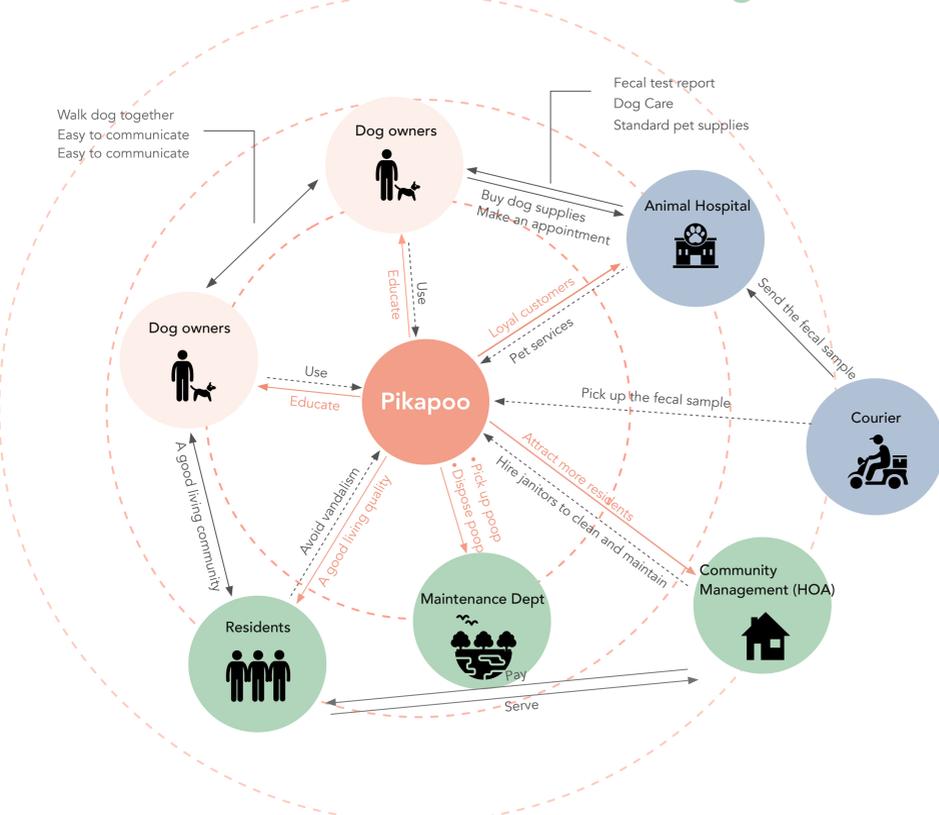


Figure 36. Pikapoo Stakeholder Map.

Service Blueprint

A visual map showing the relationship between different service components in Pikapoo system.

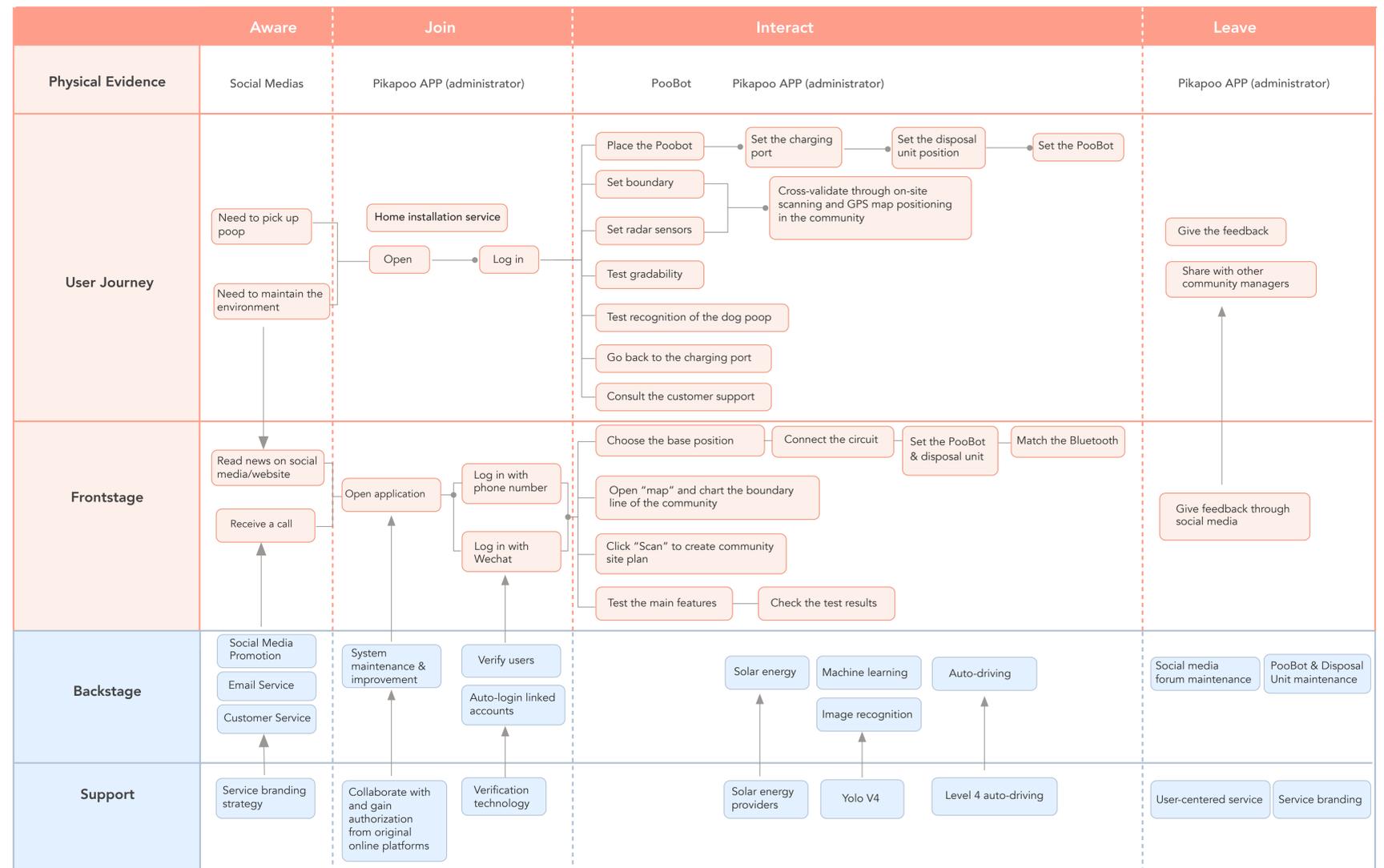


Table 3. Pikapoo Service Blueprint.

Outcome: 1. PooBot

Workflow of internal structure of PooBot

- Pikapoo picking up poop and wrapping poop with a bio-decomposable bag.
- Putting poop on the platform
- Test tube holder releases tube, puncturing the sample bag and receives the sample feces.
- The cap is placed on the test tube to secure sample.
- Sample falls into collection bin.

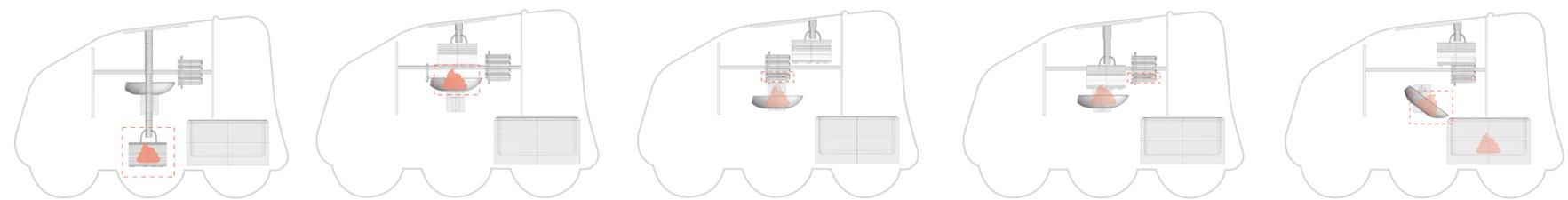


Figure 37-41. Workflow of internal structure of PooBot.

• Sketch and modeling

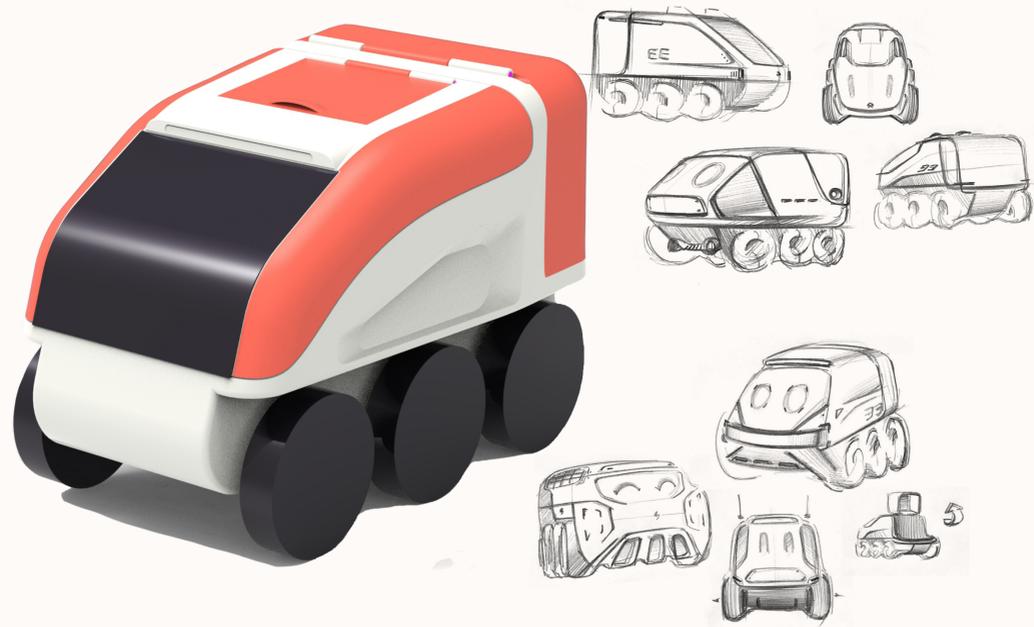


Figure 42. Poobot sketch and modeling. Designed in Procreate and Rhino. L 989mm, W 554mm, H 742mm.

Outcome: 2. Mobile Application

• Information Architecture

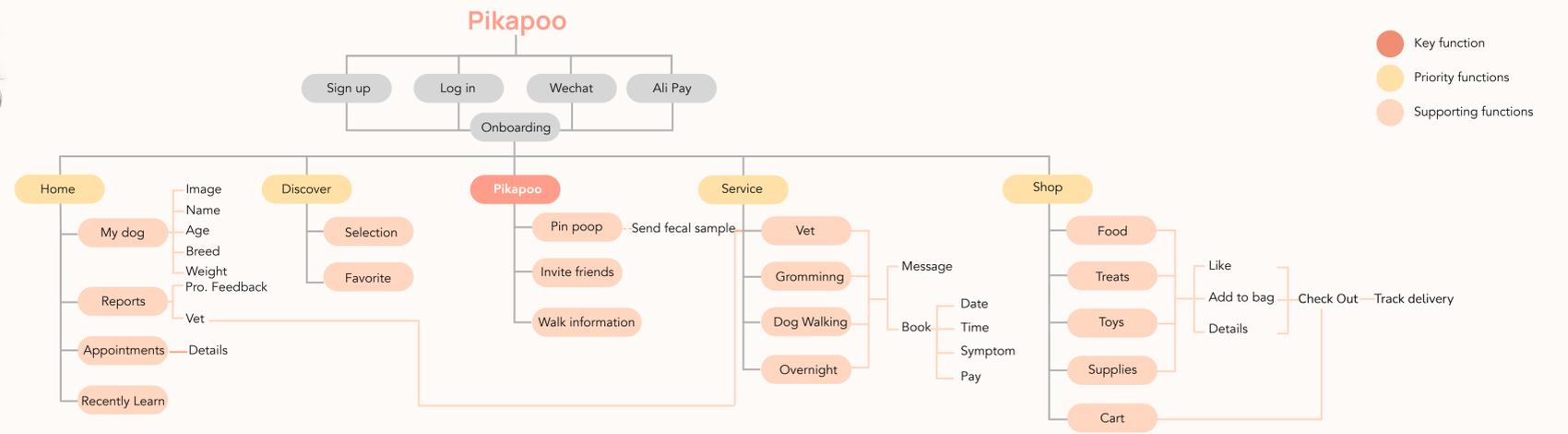


Figure 44. Pikapoo application information architecture.

• Internal Structures

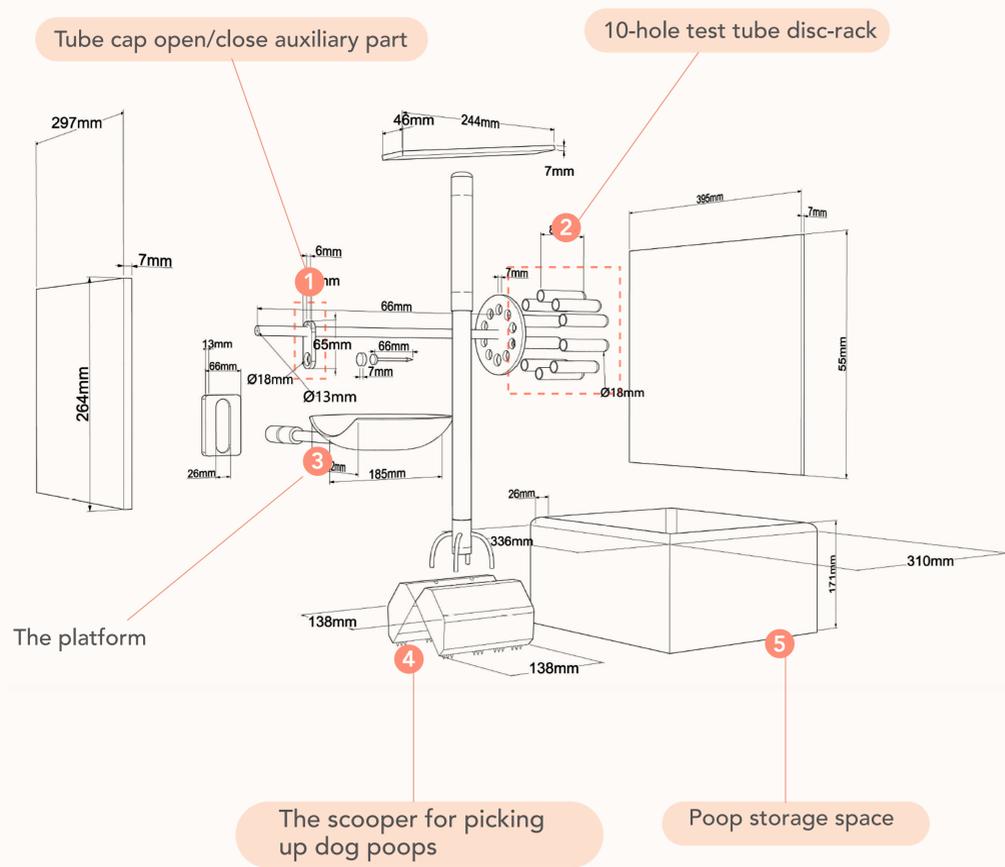


Figure 43. Poobot Internal Structures.

• Digital Prototype

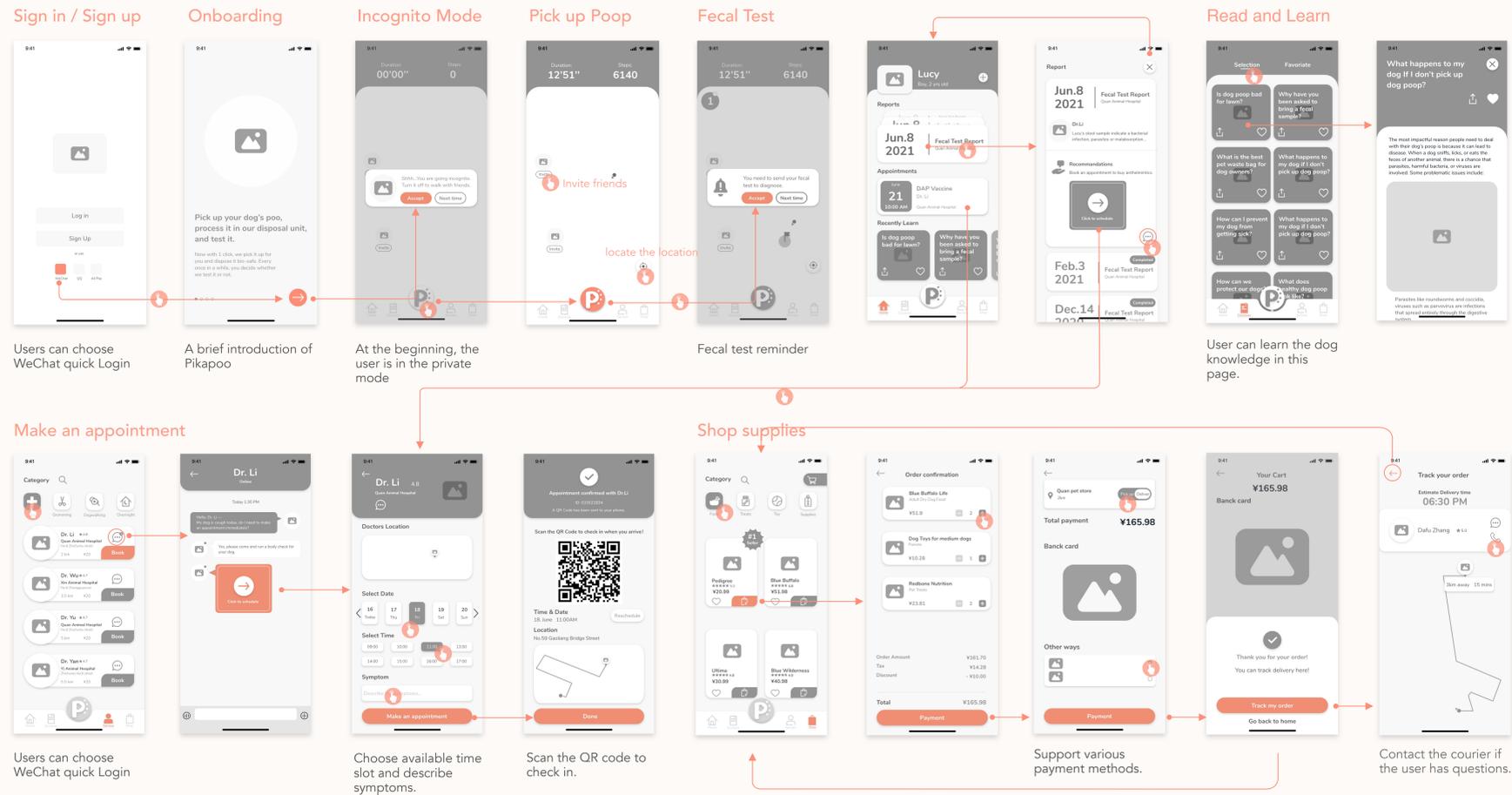


Figure 45. Pikapoo application prototypes.

Design System

Color Platte



Logo Experiment



Iconography



Typography

Pickapoo A life system for dogs baloo 2
 Pickapoo A life system for dogs Nunito

Font Size

Nunito Regular 9pt
 Nunito Regular 12pt
 Nunito Regular 15pt
 Nunito Bold 15pt
 Nunito Bold 18pt
 Nunito Bold 18pt
 Nunito Bold 24pt
 Nunito Bold 30pt
 Nunito Bold 36pt

High-Fidelity



Figure 46. Pika poo application in use.



Figure 47. Pika poo application interfaces. Designed in Photoshop and XD.

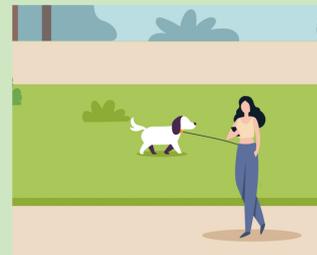


Figure 48. Poobot and disposal unit on duty. Designed in Rhino and Photoshop.



Figure 49. Hero image for Pika poo. Designed in Rhino and Photoshop.

Primary scenario



Cassily has 15 minutes to walk her dog every morning.



She pins the location in Pika poo after her dog poops, requests poop pick-up and an optional fecal test and goes to work.



PooBot picks up and generates a sample out of the poop.



A courier picks up stool samples and delivers to the nearest animal hospital. Cassily receives test results within 2 hours.



The non-sample part of stool in PooBot is delivered to a disposal unit.



After work, Cassily decides to walk her dog with another dog-owner. She invites her friend on Pika poo App. They have fun on their walk.



Pika poo App satisfies all her dog-raising needs. She would recommend it to other dog-owners!

Secondary scenario



Pika poo is excellent for people who cannot easily pick up their dog's stool. Elderly, children and late-night walkers all benefit from it. It saves you from picking up poop when it is rainy!

Figure 50-57. Pika poo Scenarios. Designed in Illustrator.