



Requirement Analysis and Risk Assessment

Banfield® PetFit

Team 9 - CSS 370 University of Washington, Bothell	Version: 6.0 Date: 03/12/2016
---	----------------------------------

Team Signatures

Robert Griswold

Blake Hashimoto

Eric Mitchell

Oscar Morales

System Requirements Specification Revisions

Revision	Date	Description
1.0	01/10/2016	Initial description and requirements.
2.0	01/24/2016	Added use case diagram, context diagram, glossary, 6 activity diagrams, 8 essential use cases. New working name. Altered descriptions to Pets, rather than specifically dogs. Added 1.12 (shifting existing 1.12 to 1.14 down one). Added 1.16 and 1.17. Updated domain terms to match glossary. Added value propositions for Pet Owner and Veterinarians (shifts Risk Assessments to 6).
2.1	01/25/2016	Standardized and reordered essential use cases. Updated 1.8 and 1.21 activity diagrams. Update 1.9, 1.11, 1.12, 1.14, 1.15 essential use cases.
2.2	01/26/2016	Added domain model and moved glossary to end of document.
3.0	02/07/2016	Added 1.24, 1.25, 1.26, 1.27, 2.5, and 2.6. Updated 1.7, and 2.4. Added placeholder for economic analysis shifting sections 7 and on up by one in number. Updated problem description. Added Researcher stakeholder (updated User description, business plan, and value propositions). Added wireframe diagrams for 1.1, 1.2, 1.6., 1.7, 1.9, 1.12, 1.13, and 1.14. Added robustness diagrams for 1.1 and 1.6. Added sequence diagrams for 1.1, 1.2, 1.6, 1.14. Added Eric Mitchell to contributors. Updated 1.1.
3.1	02/08/2016	Added robustness diagrams for 1.2, 1.9, 1.12, 1.13, 1.14, 1.19. Added sequence diagrams for 1.9, 1.12, 1.13, and 1.19. Fixed broken image URLs. Updated 1.14, and 1.15. Updated sequence diagram for 1.14.
3.2	02/11/2016	Updated sequence diagram for 1.9, 1.12, 1.13.
4.0	02/15/2016	Initial version of business plan. Rearrangement of software design section to be per use case. Use case numbers have dropped the 4.x section number. Updated glossary for Health Record, Pet Data, and Health Prediction. Added use cases 1.28, 1.29, and 1.30.
5.0	02/29/2016	Updated context diagram (Fig.5). Added level 1 context diagram (Fig. 5.1). Updated use cases to include "so that". Added additional risks (Table 2). Added threat model (Fig. 3). Added layered architecture (Fig. 6).Created essential use case for feeding Activity (Table 4). Shifted figure and table numbers where appropriate for new figure/table numbers. Updated glossary. Updated problems and solutions sections. Updated lean canvas (Fig. 1). Updated software design descriptions. Updated UI wireframe section. Updated cost analysis. Added deployment diagram (Fig. 7). Added cost benefit analysis (Table 2).
6.0	3/12/2016	Updated cover page. Updated cash flow diagram and associated assumptions. Added package diagrams (Fig. 9.1 and 9.2). Added component diagram for local directory (Fig. 30). Added component diagram for notifications (Fig. 19). Added Gantt chart (Fig. 10). Updated wireframe diagram (Fig. 4). Updated respective figure diagram numbers for new figures. Updated description of use case 1.12. Updated context diagram numbers for clarity (Fig. 5.1 and 5.2). Specified the preference of cloud computing options for deployment model. Updated various figure descriptions.

Table of Contents

[Executive Summary](#)

[Overview](#)

[Market Opportunity](#)

[Problems](#)

[Solutions](#)

[Key Stakeholders](#)

[Pet Owner](#)

[Description](#)

[Value Proposition](#)

[Veterinarian](#)

[Description](#)

[Value Proposition](#)

[Pet Trainer / Sitter](#)

[Description](#)

[Value Proposition](#)

[Pharmaceutical Researcher](#)

[Description](#)

[Value Proposition](#)

[Financial Plan](#)

[Assumptions](#)

[Economic Analysis](#)

[Competitive Analysis](#)

[Cost Benefit Analysis](#)

[Marketing Plan](#)

[Risks](#)

[SWOT Summary](#)

[Strengths](#)

[Weaknesses](#)

[Opportunities](#)

[Threats](#)

[Threat Model](#)

[Risk Classification and Mitigation](#)

[Key Metrics](#)

[Requirements](#)

[1. Functional](#)

[Database](#)

[PetFit Device](#)

[2. Non-Functional](#)

[General](#)

[Storyboard of UI](#)

[Software Design](#)

[Overview](#)

[Schedule](#)

[Use Case 1.1: Documenting Training Activity](#)

[Use Case 1.2: Document Feeding Activity](#)

[Use Case 1.6: View Breed Workout Regimen](#)

[Use Case 1.8: User Notifications](#)

[Use Case 1.9: Updating Health Recommendations Remotely](#)

[Use Case 1.11: Messaging Pet Owners Remotely](#)

[Use Case 1.12: Accessing Health Predictions](#)

[Use Case 1.13: Update Training Recommendations Remotely](#)

[Use Case 1.14/1.15: Hiring Pet Trainers and Pet Sitters](#)

[Use Case 1.18: Monitor Pet Heart Rate](#)

[Use Case 1.19: Monitor Calorie Count Levels](#)

[Use Case 1.21: Pet Location Tracking](#)

[Glossary](#)

Executive Summary

Overview

Banfield® PetFit is a comprehensive solution to Pet wellbeing, scheduling, and monitoring for Pet Owners, Veterinarians, Pet Sitters, Pet Trainers, and Pharmaceutical Researchers. The system utilizes a wireless collar device capable of monitoring various Pet Data such as heart rate, temperature, pedometer, location, etc. and then can tailor the data for its specific use such as Training Recommendations, Health Recommendations, or research data.

A brief overview of the business plan can be seen in Lean Canvas form, as shown in Fig. 1.

<p>PROBLEM</p> <p>Recognize long-term Health Patterns</p> <p>Find Pet Trainers and Pet Sitters easily</p> <p>Providing Pharmaceutical data to the respective companies</p>	<p>SOLUTION</p> <p>Identify trends in monitoring history with Veterinarian analysis</p> <p>Comprehensive directory incorporating Pet Trainer/Sitter schedule</p> <p>Recording extensive data on pet health over a long period of time and comparing it to find trends in health across a large number of pets</p>	<p>UNIQUE VALUE PROPOSITION</p> <p>For a Pet Owner who wants to track their pet's Fitness and Health, the Banfield PetFit is a Fitness and Health tracker for your Pet that is easily accessed anywhere. Unlike WÜF, our product is partnered with your Banfield Veterinarian to recognize Health Patterns that can be life saving for your Pet.</p>	<p>UNFAIR ADVANTAGE</p> <p>Access to Banfield Veterinarians and Banfield database from home</p> <p>First directory for Pet Trainers/Sitters to incorporate schedule availability</p>	<p>CUSTOMER SEGMENTS</p> <p>Pet Owners</p> <p>Pet Trainers</p> <p>Pet Sitters</p> <p>Veterinarians</p> <p>Pharmaceutical Researcher</p>
<p>EXISTING ALTERNATIVES</p> <p>Drive Pet to Veterinarian</p>	<p>KEY METRICS</p> <p>Accuracy of raw data on collar device</p> <p>Accuracy of Health Predictions</p> <p>App usage trends</p> <p>Product/App reviews</p>	<p>HIGH-LEVEL CONCEPT</p> <p>The FitBit for Pets</p>	<p>CHANNELS</p> <p>Banfield customer referrals</p> <p>Petsmart advertising</p> <p>Word of mouth</p> <p>Online advertising</p>	<p>EARLY ADOPTERS</p> <p>Competitive Dog Owners</p>
<p>COST STRUCTURE</p> <p>Manufacturing collars</p> <p>Maintaining server facilities</p> <p>Technical help</p> <p>Online advertising</p> <p>Petsmart advertising (Posters, Pamphlets, etc.)</p> <p>Employee wages</p>		<p>REVENUE STREAMS</p> <p>Free account with optional premium monthly subscription @ \$20/mo. Premium account provides real time tracking and priority Pet Trainer/Sitter reservations.</p> <p>Collar device starting at \$128</p> <p>Aggregate data for researchers \$? (Quoted)</p> <p>Promotion of Pet Trainer/Sitter listening via pay-per-click</p>		

Figure 1. Lean Canvas for Banfield® PetFit.

Market Opportunity

Similar to the Banfield® PetFit, [WÜF™](#) serves as an all-in-one collar device for a dog providing real-time tracking and monitoring of the Pet. It was successfully Kickstarted on

December 28, 2014 with \$90,596 USD from 723 backers. The PetFit however has a more comprehensive scope of planned features, including pharmaceutical integration and Pet Trainer/Pet Sitter directory, to invite a larger variety of invested stakeholders.

Problems

Banfield needs a user-friendly solution to aid Pet Owners in training and keeping their Pet(s) healthy in order to extend Banfield's care to the home. Currently very little aggregate data is collected on Pets that both a Veterinarian and a Pharmaceutical Researcher could use to improve Pet Health. PetFit aims to improve communication between Pet Owner and Veterinarian as well as produce Health Predictions from the Health Trends of the Pet.

The top three problems we wish to solve are:

- *Recognize long-term health patterns*
 - A system that regularly monitors a pet would have more opportunities than the typical infrequent visit to a Veterinarian.
- *Find Pet Trainers and Pet Sitters easily*
 - Finding reputable Pet Trainers or Pet Sitters is difficult without a standard system that can not only identify who is local, but also who is available.
- *Providing Pharmaceutical data to the respective companies*
 - Provide data on side effects and effectiveness of medications that pets take.

Solutions

The Banfield PetFit aims to solve the problems stated above by:

- *Identifying trends in monitoring history with Veterinarian analysis*
 - Metrics on fitness, health, diseases, and medications could be correlated to identify healthy or unhealthy activities and unintended side effects of medications.
- *Incorporating a comprehensive directory for Pet Trainer/Sitter schedule*
 - Creating a database that Users can search for skills, rating, price, and also availability would be the first of its kind.
- *Recording extensive data on pet health over a long period of time and comparing it to find trends in health across a large number of pets*

- The collar will record heart rate, calorie levels, activity and mood, record it in a database, and run algorithms to look for patterns among pets in order to provide useful data to pharmaceutical companies.

Key Stakeholders

Pet Owner

Description

This User owns a Pet that would be wearing the PetFit device. They expect the device to record data on their Pet, and provide location information. They expect the system to provide Health, Training, and Feeding Recommendations, give details of their Pet, schedule and remind activities, and find local Pet Sitters/Trainers to hire.

Value Proposition

For a Pet Owner who wants to track their Pet's Fitness and Health, the Banfield® PetFit is a Fitness and Health tracker for your Pet that is easily accessed anywhere. Unlike WÜF™, our product is partnered with your Banfield Veterinarian to recognize Health patterns that can be life saving for your Pet.

Veterinarian

Description

This User normally works with a Pet, and would be accessing the data on a pet from the system. They expect the system to be able to retrieve monitoring history for the pet, provide recommendations to the Pet Owner, and recognize Health patterns from Health Trends.

Value Proposition

For Veterinarians who want to monitor the Health of their client's Pets, the Banfield® PetFit is a Pet Health tracking system that provides comprehensive data on a Pet's Health and Fitness. Unlike WÜF™, our system aggregates Pet Data and predicts Health problems by observing Health Trends in Pet Data.

Pet Trainer / Sitter

Description

This User would be listing their availability in the system, and later performing services for the Pet Owner once hired. They expect the system to maintain their listing, allow for

feedback from customers, and display availability to Pet Owners that are looking to hire a Pet Trainer or Pet Sitter.

Value Proposition

For Pet Sitters or Pet Trainers who want to register in a database to be hired, the Banfield® PetFit is a pet scheduling system that provides local directory listings sorted by rating. Unlike Craigslist, our system incorporates availability for Users to schedule.

Pharmaceutical Researcher

Description

This User would be accessing monitoring history for all Pets in the system meeting their criteria for research. They expect the collar device to provide accurate data, and they expect the system to provide a large amount of data that can be correlated to activities (Feeding or Training), Health Data, and Pet Data.

Value Proposition

For Pharmaceutical Researchers who want aggregate data of Pets for research studies and analysis, the Banfield® PetFit is a Fitness and Health tracker for Pets that collects and stores large quantities of anonymous data including day to day heart rate, calorie count, pedometer, mood, and body temperature. Unlike performing a study, the data that PetFit collects is comprehensive over a large period of time, and is easily obtained.

Financial Plan

Assumptions

- All sales are considered cash sales
- The combined cost to manufacture and deliver the collar is \$60
- The collars are sold for \$100 and the monthly subscription is priced at \$15
- The percentage of the user base with a paid subscription is 40%
- The collar will sell at an average rate of 3,300 per month in the first quarter and gradually increase to 8,800 per month by the fourth quarter.
- Tax is 15% of net profit
- Payroll for software development will be estimated for 7 people with an average salary of \$60,000 a year
- Server cost per 100 people is \$400 a quarter on average
- Health Insurance per employee is approximately \$1,100 a quarter
- Rent (as estimated for Seattle) is \$5,000 a month
- Payroll taxes are 3% of payroll
- supplies are estimated at \$2,000 a month on average

- \$100,000 is the required cost for initial equipment setup

Economic Analysis

Table 1. Estimation of cash flow for Banfield® PetFit.

Cash inflow	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Quarter 5	Quarter 6	Quarter 7	Quarter 8
Starting Balance	\$2,200,000							
	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Sale of products					\$1,000,000	\$1,920,000	\$2,280,000	\$2,640,000
Subscription Payment	\$0.0	\$0.0	\$0.0	\$0.0	\$60,000.0	\$138,000.0	\$234,000.0	\$300,000.0
Total User Base	0	0	0	0	10,000	23,000	39,000	50,000
Pharmaceutical Research Data	\$0	\$0	\$0	\$0	\$30,000	\$69,000	\$117,000	\$150,000
Inflow Total	\$2,200,000	\$0	\$0	\$0	\$1,090,000	\$2,127,000	\$2,631,000	\$3,090,000
Cash Outflow								
Collar Manufacturing	\$0.0	\$0.0	\$0.0	\$0.0	\$600,000.0	\$1,152,000.0	\$1,368,000.0	\$1,584,000.0
Advertising	\$0.0	\$0.0	\$10,000.0	\$15,000.0	\$20,000.0	\$15,000.0	\$10,000.0	\$8,000.0
Server Maintenance	\$0.0	\$0.0	\$0.0	\$0.0	\$40,000.0	\$92,000.0	\$156,000.0	\$200,000.0
Payroll	\$420,000	\$420,000	\$420,000	\$420,000	\$420,000	\$420,000	\$420,000	\$420,000
Payroll Taxes	\$12,600.0	\$12,600.0	\$12,600.0	\$12,600.0	\$12,600.0	\$12,600.0	\$12,600.0	\$12,600.0
Taxes	\$0.00	\$0.00	\$0.00	\$0.00	\$159,000.00	\$308,700.00	\$377,100.00	\$441,000.00
Health Insurance	\$1,100	\$1,100	\$1,100	\$1,100	\$1,100	\$1,100	\$1,100	\$1,100
Rent or Lease	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000
Supplies	\$100,000	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000
Outflow Total	\$548,700.0	\$450,700.0	\$460,700.0	\$465,700.0	\$1,269,700.0	\$2,018,400.0	\$2,361,800.0	\$2,683,700.0
Total Cash	\$1,651,300.0	\$1,200,600.0	\$739,900.0	\$274,200.0	\$94,500.0	\$203,100.0	\$472,300.0	\$878,600.0

Competitive Analysis

There are multiple competitors that share various strengths and weaknesses. Whistle, FitBark, and Tractive Motion are a few examples of the competitive market. On average their products retail for \$100 and range from \$50 to \$200. Their products hold many of the features PetFit does including real time stats, movement tracking, location tracking, environment sensors, and activity monitoring.

Our main advantage is that they do not have the Pharmaceutical integration and backing of Banfield that PetFit has. It would be difficult for them to establish the pharmaceutical effect tracking software that our system has and match the distribution framework that Petsmart has already established.

Cost Benefit Analysis

To better evaluate where funding should be focused, Table 2 outlines some basic qualitative costs and the associated benefits for funding. Active User accounts should be counted and evaluated monthly, in addition to the key metrics mentioned later, to determine how funding should be managed to promote a healthy, sustainable system.

Table 2. Qualitative cost benefit analysis for Banfield® PetFit.

Cost	Benefit
Employee wages (development, security, technical) (\$60,000 average per person)	Reduce wasted effort training new employees by instead retaining employees that gradually learn the system more.
Manufacturing cost (\$60 per collar)	Reduced likelihood of needing to replace defective collars and better perceived value from customer for the collar.
Facilities (offices, computers) (\$10,000 per month)	Productivity of development team.
Server maintenance (\$400 per quarter per 100 people)	Reliable service for Users.
Technical support	More satisfied Users and reliable data.
Training costs (Veterinarians, Pet Trainers)	Consistent, reliable data. Potentially happier Users.
Promotions (i.e. free shipping)	Larger User base.
Bug fixing	Consistent, reliable data. Happier Users.
Infrastructure upgrades	More features for Users. Faster, more reliable, and responsive system.

Marketing Plan

PetFit’s marketing strategy will use modern media to target interest groups in places that they already frequent, as shown in Fig. 2. Pre-release marketing will be a Kickstarter campaign. The Petsmart and Banfield websites will have information on the product and links to the Kickstarter campaign.

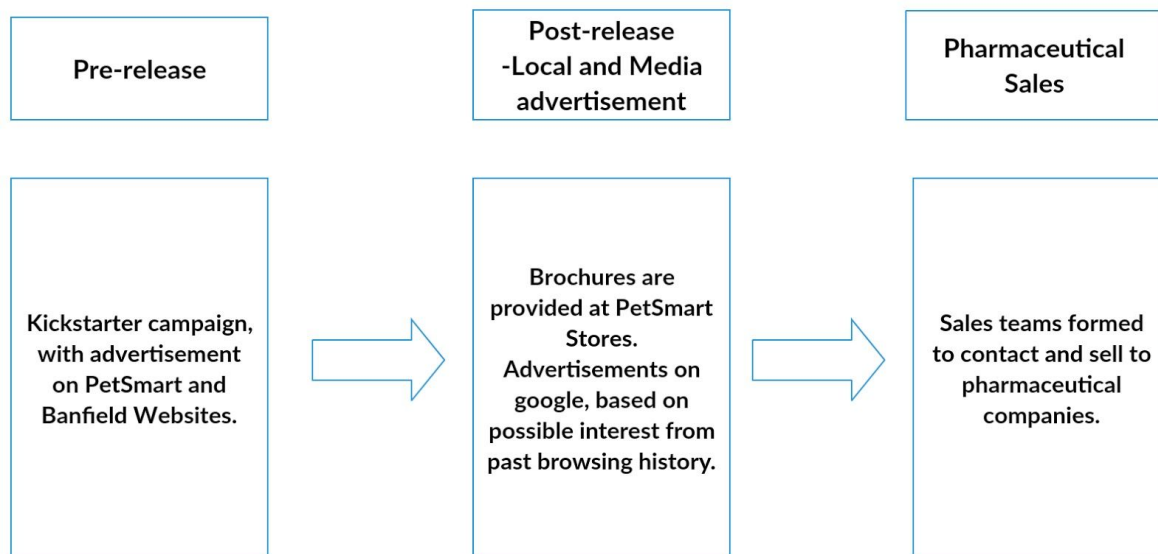


Figure 2. Brief overview of the marketing plan for Banfield® PetFit.

The post-release advertising will consist of local in-store advertising—with free pamphlets and brochures—that inform prospective buyers about the app and collar. Employees at Petsmart will be instructed to ask the customers if they have heard of the product and possibly introduce the product to them. Customers will be encouraged to use the free version of the app and see its capabilities.

The final stage of advertisement will be the forming of a sales team specifically for researchers and pharmaceutical teams. These teams will email, call, and personally visit pharmaceutical companies to try and sell Pet Health Data from our database. The quality of this information and competition between companies should be enough to attract attention from these companies already, but our sales team will make sure our visibility is maximized and we get maximum competition between these companies.

Risks

SWOT Summary

Strengths

- Access to Banfield Veterinarians and Benfield database from home
- First directory for Pet Trainer/Sitters to incorporate schedule availability
- Health predictions
- Quick and easy access to pets health status
- PetFit available on all internet enabled devices

Weaknesses

- Advertising plan needs more refinement
- User experience needs more prototyping.

Opportunities

- PetFit is a one of a kind with no close competition
- Opportunity to build loyal relationships with customers
- Can eventually be expanded for use on other animals

Threats

- Health predictions and data collection may not be accurate
- Privacy concerns over data collected and who it is shared with
- Being tied to Benfield may narrow the reach of our product.
- Initial number of Trainers/Sitters may not meet demand

Threat Model

For external systems that the PetFit communicates with, there are additional threats to take into consideration. For purchases made through external payment systems such as Mastercard, or through Petsmart, there is a data tampering risk associated with the confirmation of the purchase seen in Fig. 3. Additionally, there are two large concerns with data flow from Banfield. Spoofing is a possibility for Veterinarian messages in addition to information disclosure of personal Pet Owner information to unauthorized Veterinarian Users. These risks are also classified and mitigated in Table 2. Note that the data from Google Maps is not considered a risk because only erroneous location may be received that the system can discard.

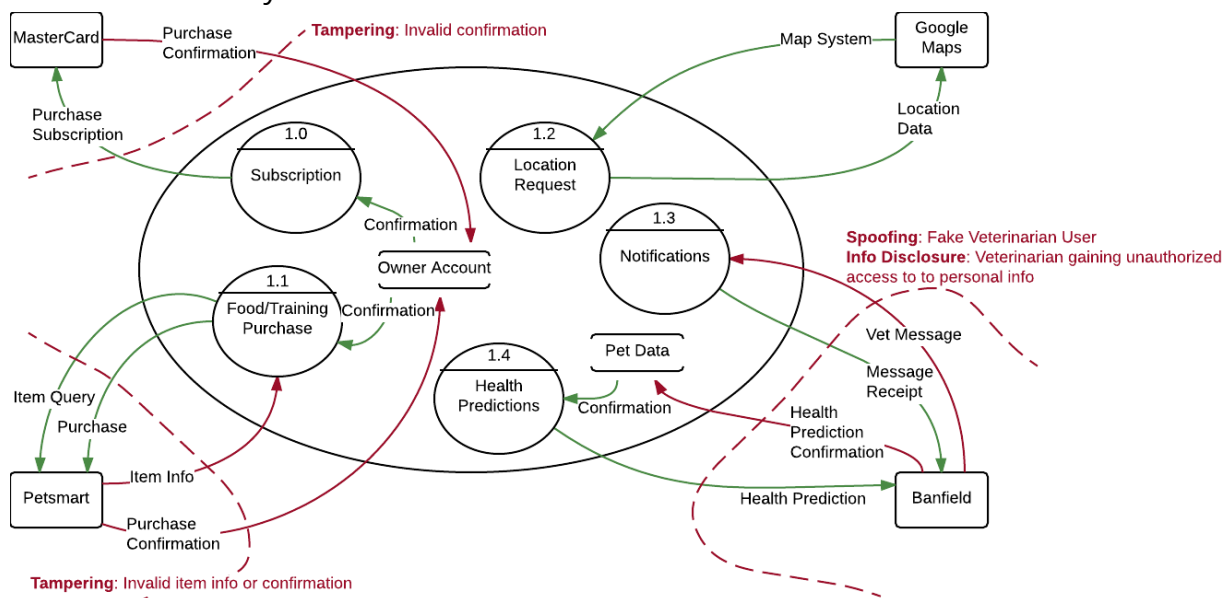


Figure 3. Threat model diagram for external systems associated with Banfield® PetFit.

Risk Classification and Mitigation

Risks are classified by their probability, or likelihood of happening, their severity, or impact, and their acceptability in Table 3.

Table 3. Classification and mitigation table for risks associated with Banfield® PetFit.

Risk	Probability	Severity	Acceptability	Mitigation
Insufficient storage on device	Low	Low	Acceptable	Prefer storing most recent data whenever necessary
Loss of connectivity with servers	Medium	Medium	ALARP	Queue requests as long as not duplicate and cache most recent data received

Banfield® PetFit - Requirement Analysis and Risk Assessment

Fraudulent Trainer/Sitter registration	Medium	High	ALARP	Require a background check for registration and put trainer/sitting account on hold to allow review
Trainer/Sitter do not render services	Medium	Medium	Acceptable	Allow customers to review Trainer/Sitter once per visit
Customer creates false claim about Trainer/Sitter	Medium	Low	Acceptable	Internally record the number of flags and review customer account if over 3
Customer abuses Trainer/Sitter system past threshold	Low	Low	Acceptable	Limit account from using Trainer/Sitter services
PetFit transfers pets	Medium	Low	Acceptable	Monitor when color is removed and require verification to see if it is the same dog after attaching again
Distribution of PetFit availability	High	Medium	ALARP	Just in time manufacturing on demand
Insufficient servers or overloaded servers	High	Medium	ALARP	Maintain redundancy between servers centers during low activity or maintain and develop system to merge data when overloaded daily.
Insufficient trainers sitters registered	Medium	Low	Acceptable	Redirect to other services and recommend customer informing them of PetFit
Insufficient users	Low	Medium	Acceptable	Dynamically adjust advertising whenever the product is not being used
Insufficient staff for technical support	Medium	Medium	ALARP	Prioritize tickets, keep transparency and regular automated communication
Payment information compromised	Medium	High	Intolerable	Use external payment sources for receiving payments and only allow one time payments for credit cards to not store payment information
Device is altered to produce false data	Low	Low	Acceptable	Flag the integrity of the data when its standard deviation is out of threshold
Bad update to device	Low	Low	ALARP	Allow users to fall back temporality to old firmware
Device battery overheating	Low	Medium	ALARP	Implement diagnostics onboard device and recommend services when out of threshold
Compromised administrator accounts	Low	High	Intolerable	Only allow administration accounts to be accessed and used in office
Obtaining items for project such as hardware or	Low	Medium	ALARP	Have several different providers to fall back on if one of them becomes delayed and cannot deliver the

software is delayed				hardware or software as promised
Projects exceeds estimated schedule	Medium	Medium	ALARP	Practice agile scrum in order to always have some shippable software available for customers after sprints
Chosen hardware and software for project cannot handle workload required to complete project	Low	Medium	ALARP	Extensively test prototype hardware early
Development team is unfamiliar with technology being used or type of work being done.	Low	Medium	ALARP	Staff that is being hired must be competent in technology and work experience needed for project
Key personnel unavailable	Medium	High	ALARP	Avoid specializing staff in one area
Fake veterinarian messages	Low	Low	ALARP	Veterinarians must register with Pet Owners in order to send messages
Pet Trainers/Sitters may record illegitimate data to encourage good reviews and business	High	Medium	Intolerable	Software on PetFit collar can verify Pet Trainer/Sitter activity
Trainers/Sitters/Vets may deny an event	Low	Medium	ALARP	Correlate log information with location data to show correlation of event
Pet owners may deny a transaction	Medium	Medium	ALARP	Correlate log information with location data to show correlation of event
Overflow of collar request	Medium	High	ALARP	Time out collar
Overflow of user request	Medium	High	ALARP	Time out of scrub request for duplicates

Key Metrics

- Accuracy of raw data on collar device
 - All Users expect data collected by device to be accurate to a reasonable degree. The PetFit collar device must undergo testing on multiple dogs to test the accuracy of measured Heart Rate, Calorie Count, Pedometer, Body Temperature, and Mood.
- Accuracy of Health Predictions

- Veterinarians and Pet Owners expect the system's generated Health Predictions to be reasonably reliable to trust. Initial predictions will initially be required to be approved by Veterinarian after review. This will allow Veterinarians to provide feedback to developers on how to improve the algorithms used.
- App usage trends
 - In order to improve the UI experience for all Users, usage trends will be anonymously collected to monitor delays between clicks/taps, and [Fitt's law](#) for distance and size to common UI targets.
- Product/Application reviews
 - Application reviews will be periodically reviewed on all platforms following any application update for both feedback and suggestions.

Requirements

This section will outline the functional and nonfunctional requirements for the entire PetFit system. Specific details and implementation of these use case requirements can be found in the software design section.

Due to the large volume of use cases associated with the Pet Owner stakeholder (shown in Fig. 3), the Pet Owner should be the first main focus for development of the system.

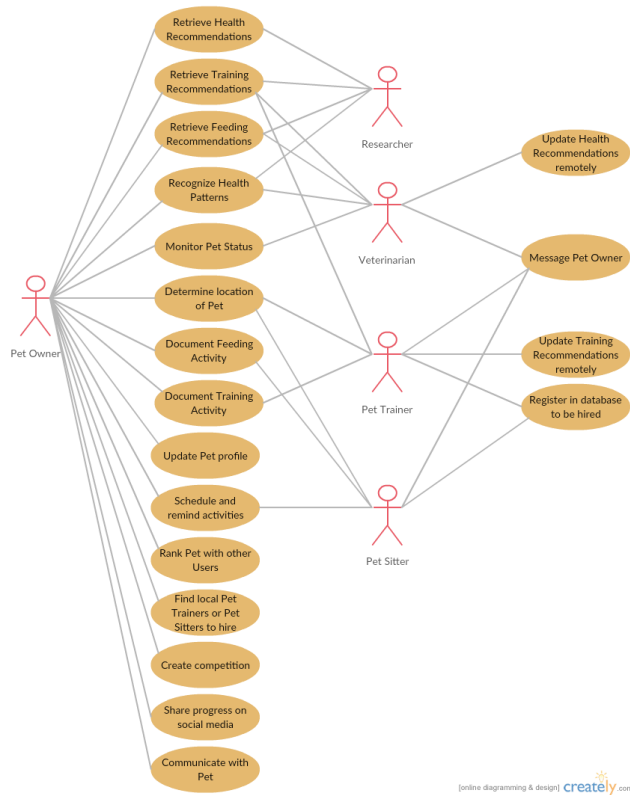


Figure 3. Use Case diagram for key stakeholders of Banfield® PetFit.

1. Functional Database

- 1.1. Users must be able to document Training Activity so that the training data is archived for future Training Recommendations.
- 1.2. Users must be able to document Feeding Activity so that the information can be viewed by the user and used by the system.
- 1.3. Users must be able to retrieve Training Recommendations so that they can improve the health and fitness of their pet.
- 1.4. Users must be able to retrieve Feeding Recommendations so that they can improve the health and fitness of their pet.
- 1.5. Users must be able to store Pet Data within the system so that the data can be viewed & edited by the user and accessed & used by the system.
- 1.6. Users should be able to view specific workout regimens within specific Breeds of Pets so that they can improve the fitness of their pet.

- 1.7. Users should be able to compare their Pet's Training Data with other Pets within the system so that they can better understand the relative fitness of their pet with other pets within the system.
- 1.8. The User should be able to receive notifications on when to feed or exercise the Pet so that they can stay aware of their pet's health.
- 1.9. Veterinarians must be able to update Health Recommendations remotely so that the Pet Owner(s) can apply these recommendations.
- 1.10. Veterinarians should be able to retrieve activity remotely so that pet activity can be conveniently accessed.
- 1.11. Veterinarians should be able to message Users remotely so that communication between Veterinarian and User is easy and convenient.
- 1.12. Veterinarians should be able to retrieve generated Health Predictions from the system for a specific Pet based on Health Trends so that they can compare their predictions with a pet's health based on the system's predictions.
- 1.13. Trainers should be able to update Training Recommendations remotely so that communicating Training recommendations to users is easy and convenient.
- 1.14. Pet Owners should be able to find local Pet Trainers to hire so that they can easily improve the obedience of their pet.
- 1.15. Pet Owners should be able to find local Pet Sitters to hire so that they can easily leave their pet in safe care.
- 1.16. Pet Trainers should be able to register in database to be hired so that they can easily offer their business within the system.
- 1.17. Pet Sitters should be able to register in database to be hired so that they can easily offer their business within the system.
- 1.26. Users should be able to see their Pet's Health Trends so that they can be aware of the predicted health of their pet.
- 1.27. Users should be able to see the Health Trends of other anonymous Pets so that they can be aware of their pet's relative health compared to other pets in the system.
- 1.28. Users must be able to record what medications are administered and when so that they can see a record of administered medications and so that the system can access and use this data.

- 1.29. Veterinarians must be able to record what vaccines are administered and when so that the system contains, can access, and use this record.
- 1.30. Pharmaceutical Researchers and Veterinarians should be able to view Pet Health data correlated with Pet Data so that they can draw medical conclusions based on the health trends of multiple pets.

PetFit Device

- 1.18. Users should be able to read Heart Rate so that they can be aware of their pet's Heart Rate.
- 1.19. Users should be able to read Calorie Count levels so that they can be aware of their Pet's calorie levels.
- 1.20. Users should be able to read Body Temperature levels so that they can be aware of their Pet's Body Temperature.
- 1.21. Users should be able to view their Pet's location in real time so that they can locate and find their Pet.
- 1.22. Users should be able to view the Pet Mood so that they can have insight into the mood of their Pet.
- 1.23. Users should be able to access the Pet's audio recordings so that they can better understand what their Pet has done and where it has been.
- 1.24. Users should be able to listen to their Pet's audio in real time so that they can audibly understand their Pet's state.
- 1.25. Users should be able to speak to their Pets in real time so that they can reassure or command their Pet, or speak to any individuals near the pet.

2. Non-Functional

General

- 2.1. Must be portable to HTML-5, iOS, Android, and Windows Phone devices so that the Pet Fit system can be accessed from most major devices.
- 2.2. User Account must be able to handle at least ten Pets so that the system works for users with multiple Pets.
- 2.3. Veterinarian database must be able to handle at least 5,000 User Accounts so that a single Vet can use the system to track potentially all of their client's Pets.

- 2.3. Must be able to store a week's worth of data when synchronization with server is delayed so that the collar will still provide functional data when disconnected and reconnected after a long period of time.
- 2.4. Interface should require no more than four button presses to navigate to any particular activity from any other activity so that the User experience is able to be navigated in a quick manner.
- 2.5. Users should be able to compare Pet Health data with the average data of all similar Breeds, the top performers in the system, and their friends' Pets so that the User can better understand the health and fitness of their pet in comparison to other groups of pets within the system.
- 2.6. Users should be able to see all data represented by numbers as easy to read graphs so that they can quickly and easily understand the data that the system has recorded of their Pet.

Storyboard of UI

Updating Training Recommendations remotely (1.13) and searching for local Pet Trainers to hire (1.14) use cases are demonstrated in a UI wireframe and seen in Figure 4. The image links to more details of the UI wireframe example.

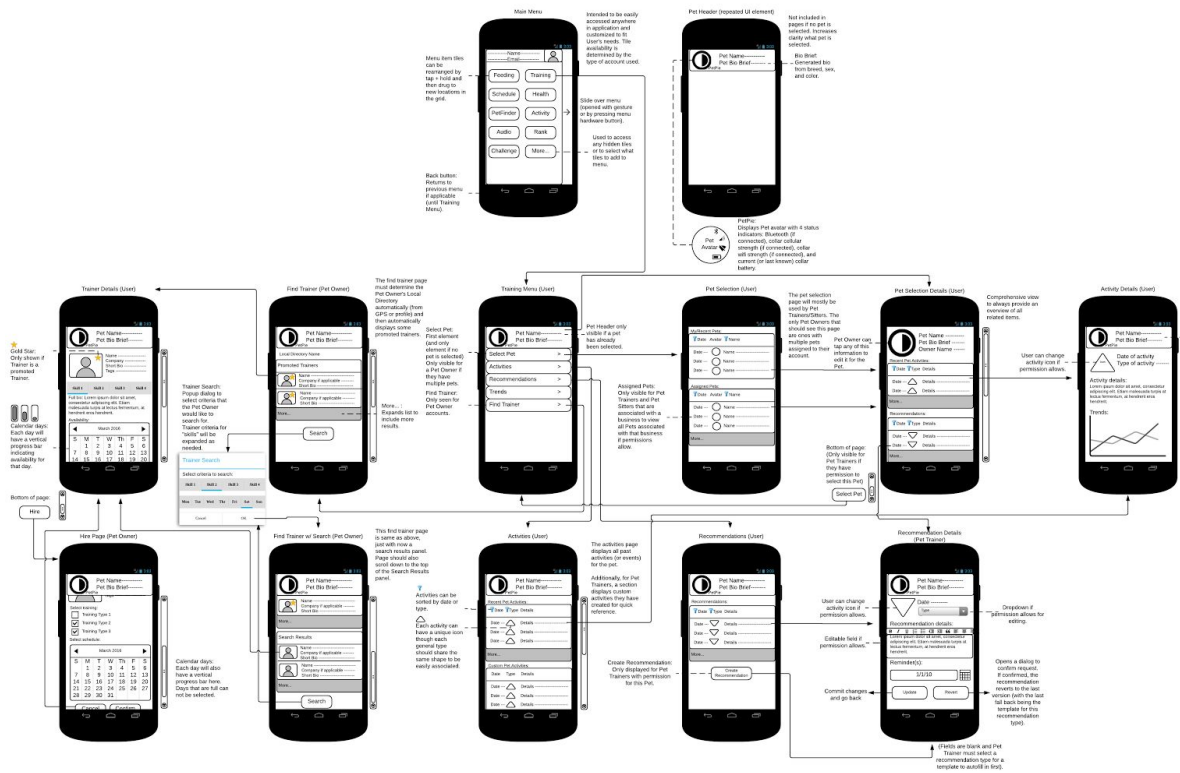


Figure 4. UI wireframe example overview for use cases 1.13 and 1.14.

Software Design

Overview

The interactions of our system with external systems is critical for many of the functions within our system. Google Maps is essential in providing and displaying location data for the PetFit collar. Banfield's systems can read and provide data to our system concerning the health of the dog, and they can also add veterinary visit data to the Pet Data within the system. PetSmart as an outside system allows for purchases through the PetFit app that relate to the function of the system and the health/fitness of the pet. In the context diagram (Fig. 5.1), note that MasterCard is a placeholder for multiple planned payment systems (Visa, PayPal, Apple Pay, Android Pay etc.). They are omitted due to the fact that they all work in nearly identical fashion.

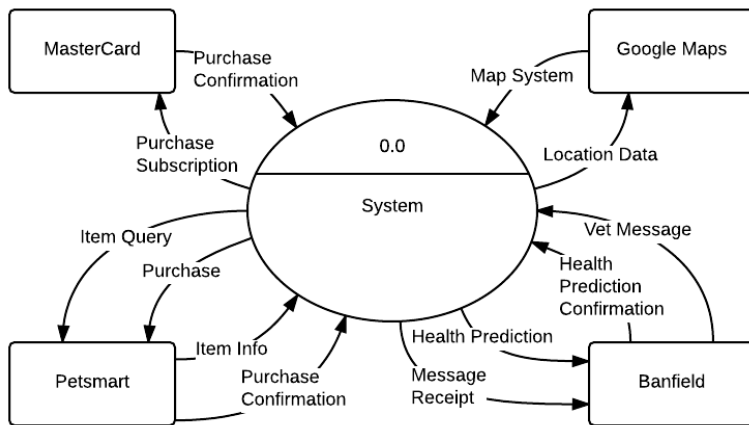


Figure 5.1. Level 0 context diagram for external systems associated with Banfield® PetFit.

Figure 5.2 reveals what internal systems interact with these external systems by showing a level 1 view of the context diagram shown in Figure 5.

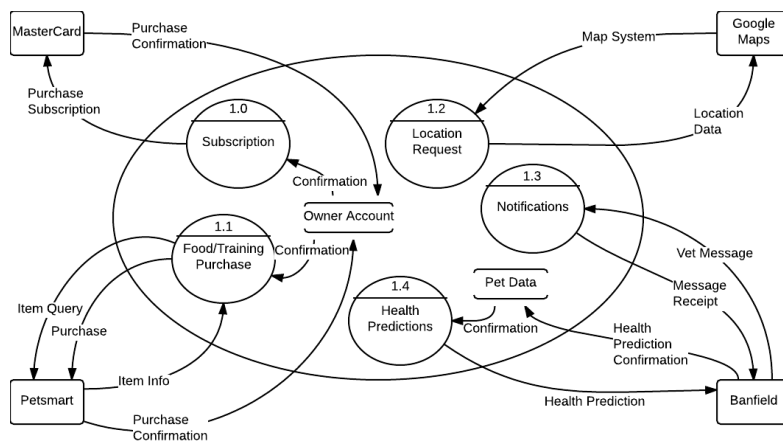


Figure 5.2. Level 1 context diagram for external systems associated with Banfield® PetFit.

It is important to differentiate between Users and Pets as different entities in the system since they interact with different the system in distinctly different ways. This is outlined in the layered architecture (Fig. 6). Data validation are the systems that ensure that all the data/transactions going into and from the system is accurate and safe. Data processing covers the systems that are taking the data, performing calculations, finding patterns, and making predictions. The Database is the information where all of the user data and pet data is stored. The servers are the physical computers where the data is stored and most of the Data Processing takes place. The Services are the external entities that interact with the system (Petsmart, Banfield, Google Maps etc). Security, Communication, and Logging are items that are considered throughout the architecture of the system.

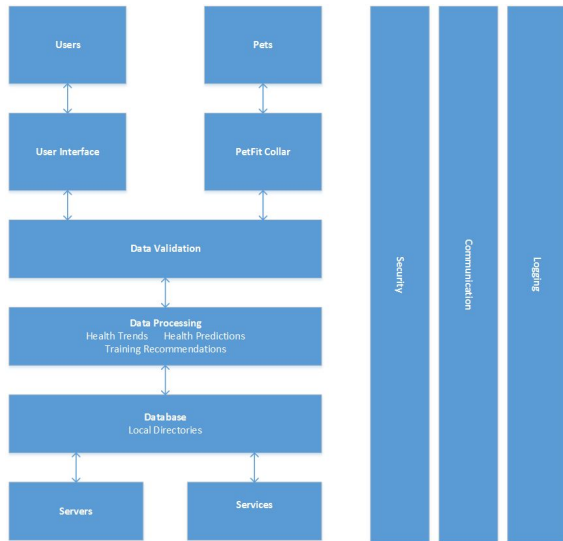


Figure 6. Layered architecture diagram with crosscutting concerns for Banfield® PetFit.

The deployment of the system is divided between three major components: the collar device, the front end web server, and the processing server seen in Figure 7. By adhering to interface specifications, the UI team(s) can focus on the front end web server, the software development team(s) can focus on the processing server, and the hardware engineering team(s) can focus on the collar device. Components should be able to be updated independently of one another, but still function together for minor updates. The servers themselves will preferably be hosted by cloud computing to minimize disruption to Users.

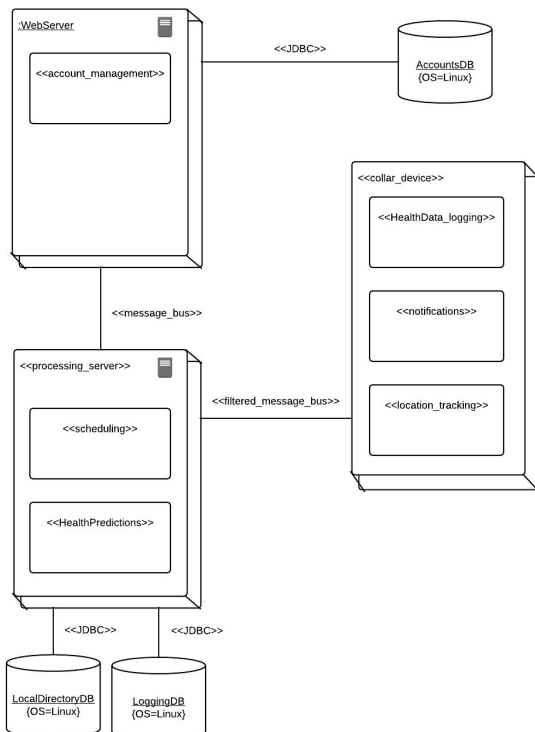


Figure 7. Deployment diagram for Banfield® PetFit.

When implementing PetFit, the major classes that need to be created are represented in the domain model (Fig. 8). Note that TrainingActivity, HealthActivity, and HealthRecord must be extendable for future classes that may be implemented. Additionally, each stakeholder account is also associated with a LocalDirectory, Schedule, and ClientList so these three classes must adhere to a standard interface for new stakeholders that may be implemented later.

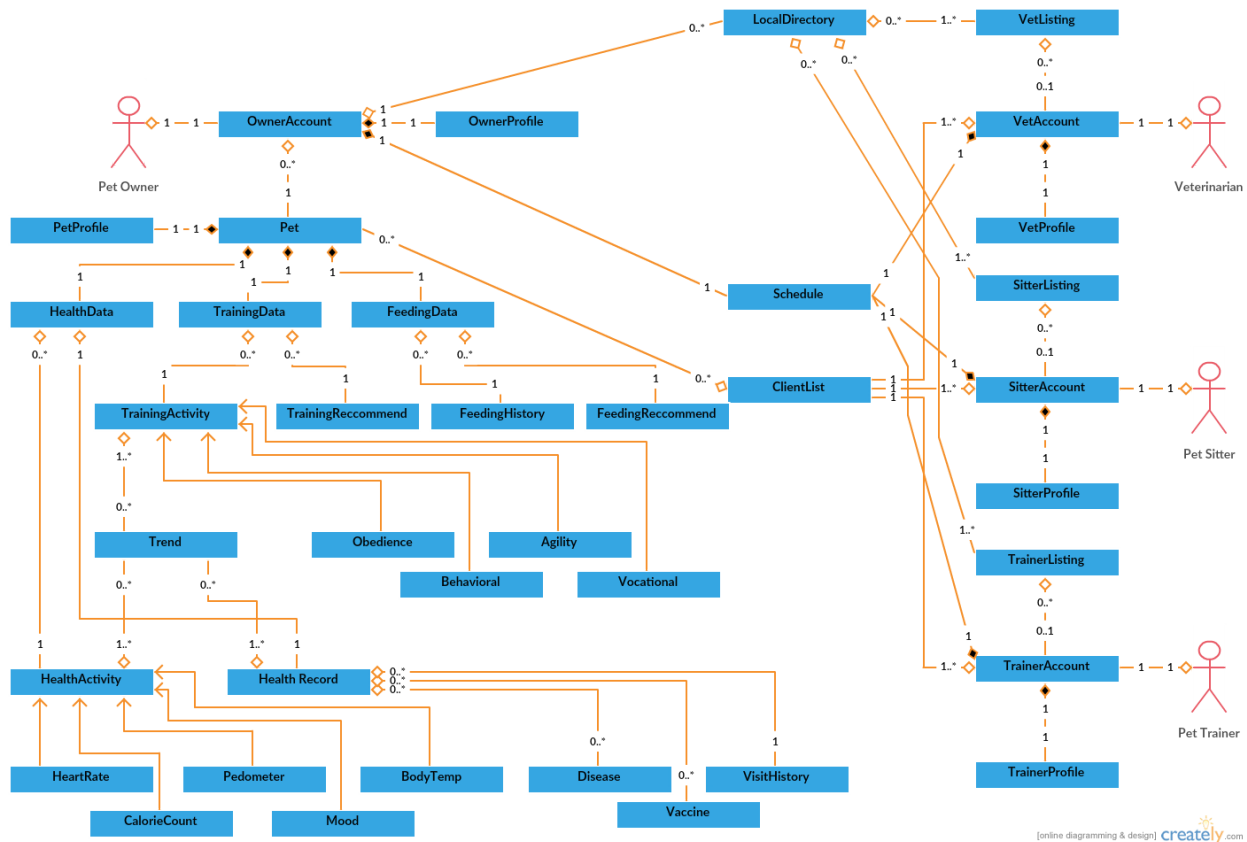


Figure 8. Domain model for Banfield® PetFit.

Figure 9.1 shows the package structure of user accounts in PetFit. Trainers and sitters have a few extra fields(i.e: client lists, ratings) associated with running their business.

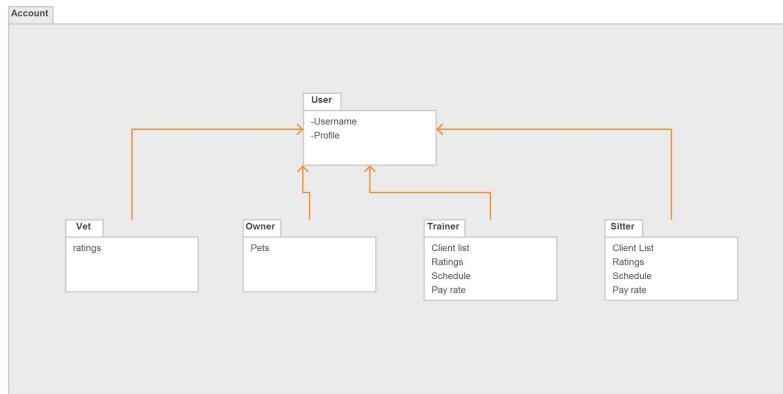


Figure 9.1. Package diagram for User Accounts.

Figure 9.2 shows the package structure for Pets in PetFit. Almost all of the pet’s information is divided into three categories: health, training, and feeding.

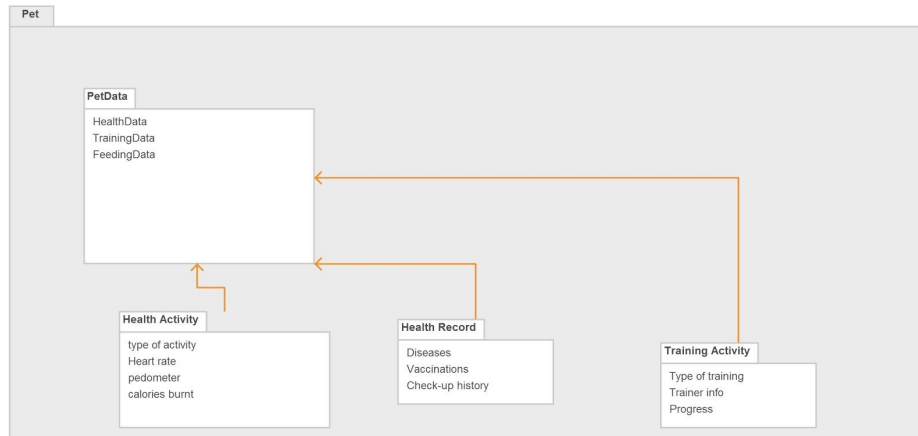


Figure 9.2. Package diagram for Pet Data.

Schedule

The project schedule starts with PetFit device requirements. After these requirements have been completed then the development team will work out the User, Pet, Sitter, and Trainer requirements. The Pet Health requirements will require a lot of work and have to be completed before the Veterinarians requirements can be started. The development team finishes off with the Pharmaceutical requirements. The total estimated time for all of these requirements currently sits at 1200 hours. This roughly equivalent to five months with eight hour workdays and holidays, weekends off. Requirements (1.1), (1.2), (1.9), (1.12), (1.18) and (1.19) will each require more than 100 hours to complete. The rest of the requirements are listed in Figure 10 with their respective estimated times of completion.

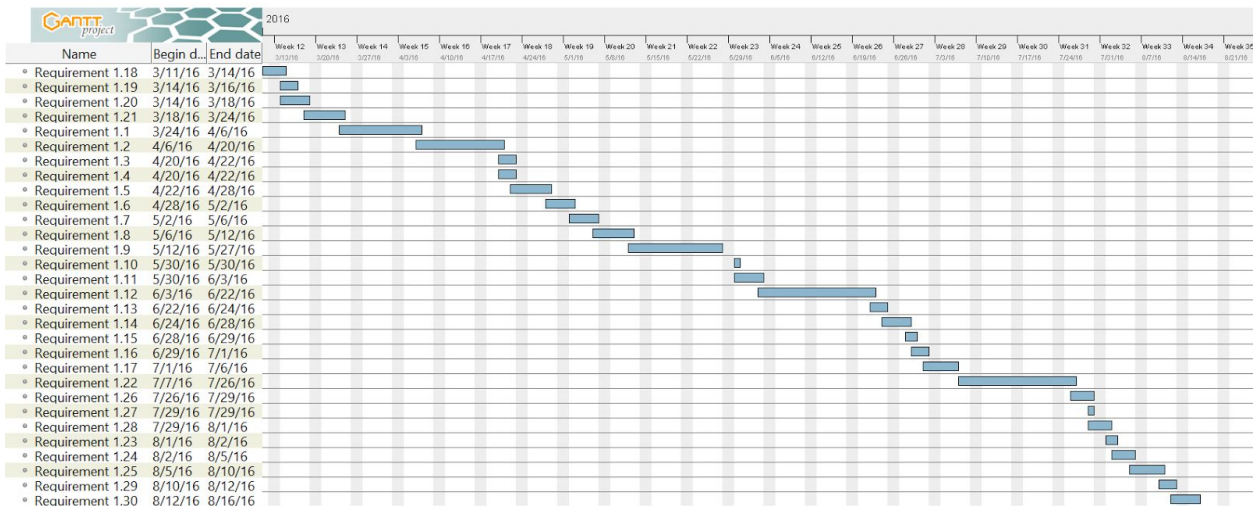


Figure 10. Gantt chart for Banfield® PetFit.

Use Case 1.1: Documenting Training Activity

Users must be able to document Training Activity so that the training data is archived for future Training Recommendations.

Table 4. Essential use case for documenting training activity (1.1).

Users must be able to document Training Activity	
<i>Precondition(s):</i> User is in system, Pet is in system	
<i>Post-condition(s):</i> None	
<i>User Intention</i>	<i>System Responsibility</i>
User Identifies Himself and Enters Password	Verify User exists Validate password Display list of user's Pets
Choose Pet	Verify that the pet's past is in the system Give User option to document Training Activity
Enter Training Information	Transfer data to the system Add data to the database Convert data into displayable information Display converted data to User

The activity diagram in Figure 11 shows the steps required to document training activity.

If this is the first time logging in from a new device or a different computer then the Trainer must enter a username and a password. Then the Trainer selects a pet to update with new training information and the system verifies the data entered by the trainer and displays the new training data.

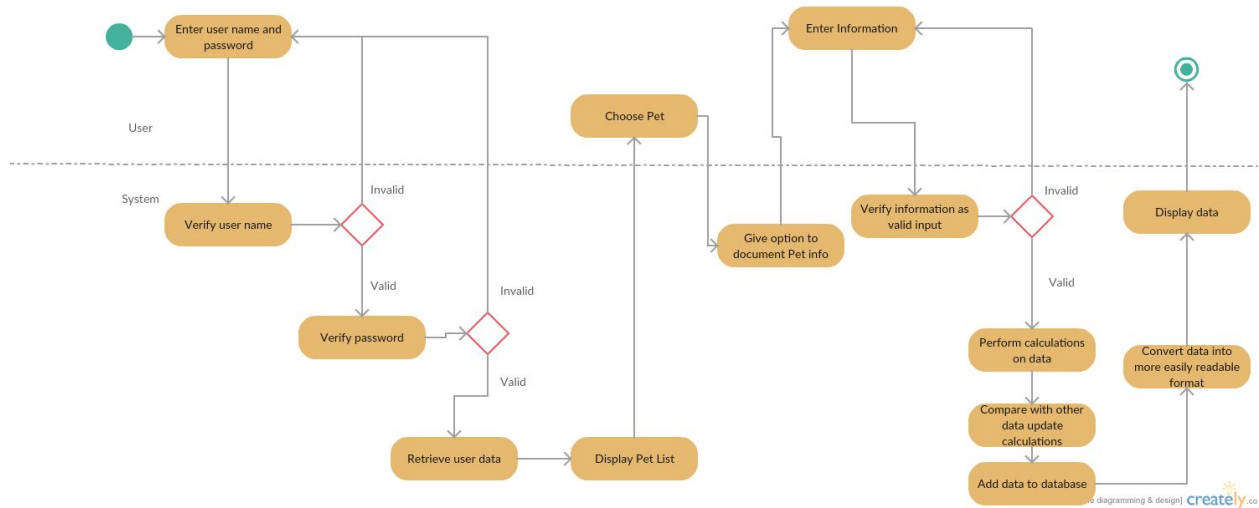


Figure 11. Activity diagram for documenting Training Activity (1.1).

Demonstrated in Figure 12, Pet owners can specify different types of training and give them priorities so that trainers know what to focus on first.

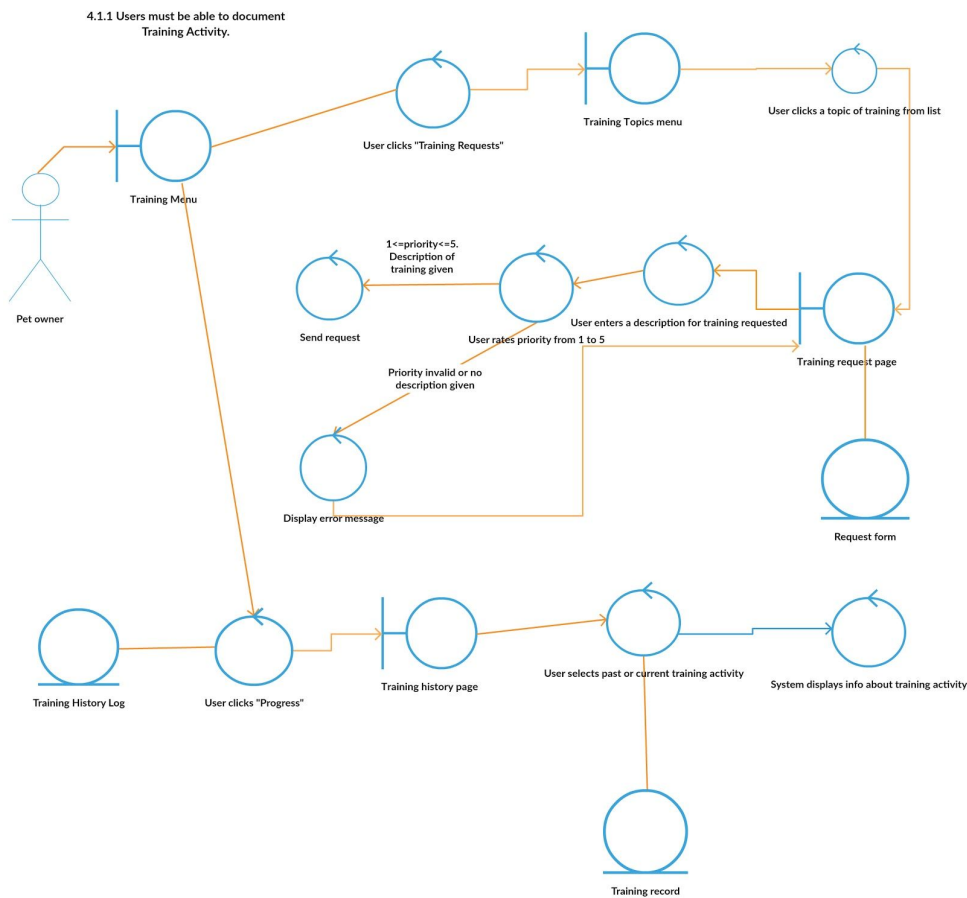


Figure 12. Robustness diagram for documenting Training Activity (1.1).

All training information past and present is stored in the 'Training History Log' object for that particular pet (Fig. 13). Any one activity's information is stored in a 'Training Activity' object within this log.

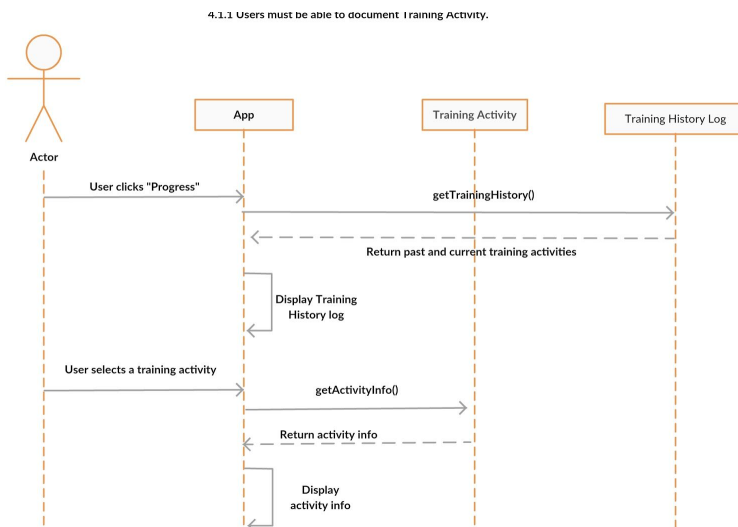


Figure 13. Sequence diagram for documenting Training Activity (1.1).

Use Case 1.2: Document Feeding Activity

This activity is used to record the meals that the pet has taken, and these values are used to help calculate calorie count and Pet Data.

Table 5. Essential Use case for Feeding Activity (1.2).

Users must be able to document Feeding Activity	
<i>Precondition(s):</i> Account Creation, Linked pet Device	
<i>Post-condition(s):</i> None	
<i>User Intention</i>	<i>System Responsibility</i>
User Clicks on Add Meal button	System displays edit new meal screen
User enters feeding data	System verifies feeding data
	System saves feeding data to Pet Data
	System displays updated feeding Data

The associated boundary objects, activities, and entities are displayed in Figure 14. User interaction for this use case follows a straightforward progression of events.

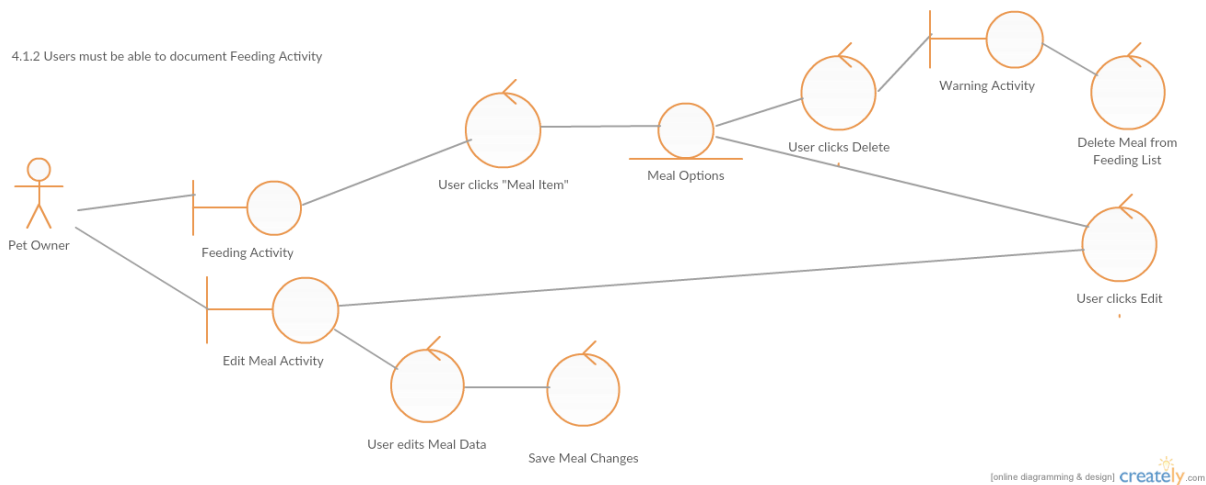


Figure 14. Robustness diagram for documenting Feeding Activity (1.2).

Documenting feeding activity is a simple process where the User enters the food type, the serving size, and the time as demonstrated in the sequence diagram (Fig. 15). This data is then sent to the server and recorded to the Pet’s Data.

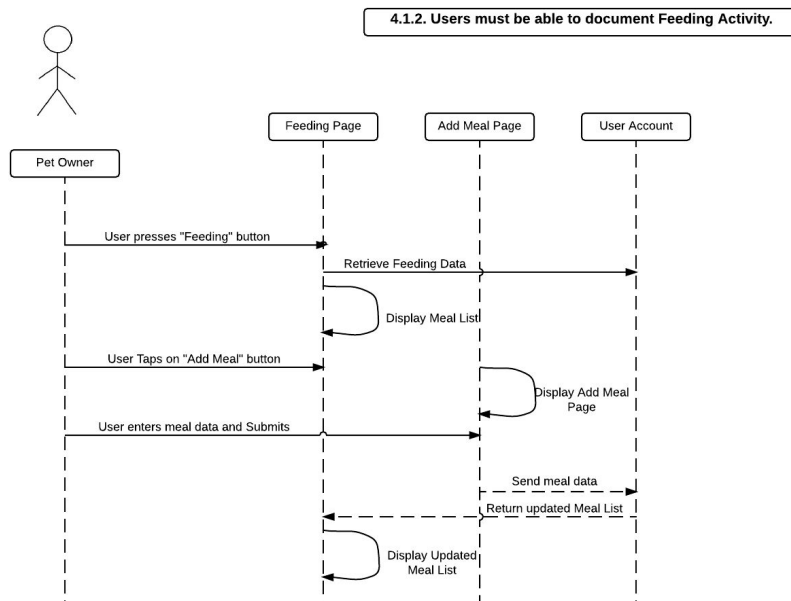


Figure 15. Sequence diagram for documenting Feeding Activity (1.2).

Use Case 1.6: View Breed Workout Regimen

Users should be able to view specific workout regimens within specific Breeds of Pets. This is essential for breeds that have health problems without proper exercise. For instance: bulldogs--who have a high chance of respiratory problems--need to limit any intensive cardio workouts that would overwhelm them. Demonstrated in Figure 16, "Breed" is one of several sorting criteria, like age, weight, etc. so sorting by other criteria is a nearly identical process.

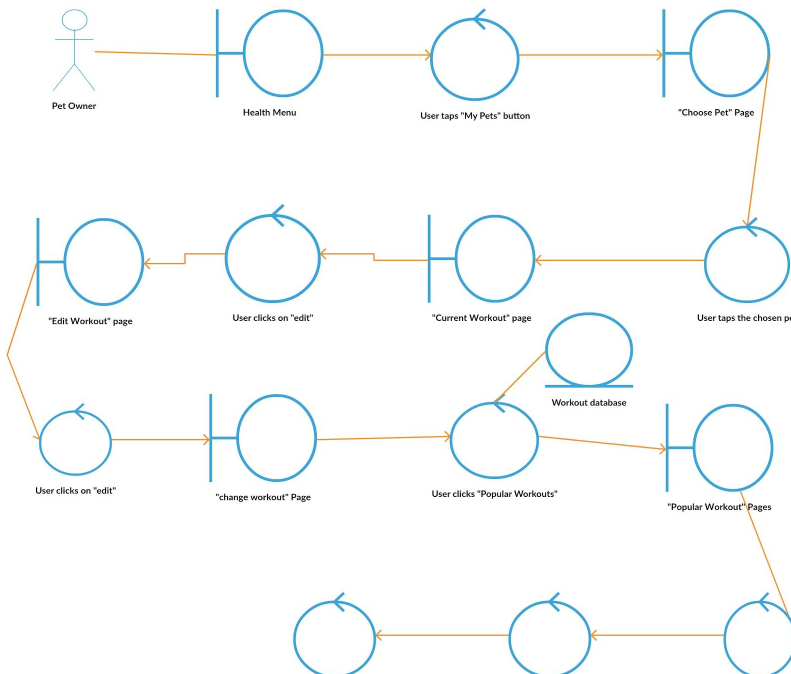


Figure 16. Robustness diagram for viewing Breed workout regimen (1.6).

Also demonstrated in the sequence diagram, (Fig. 17), individual pets each have their own workout schedule(s) assigned to them.

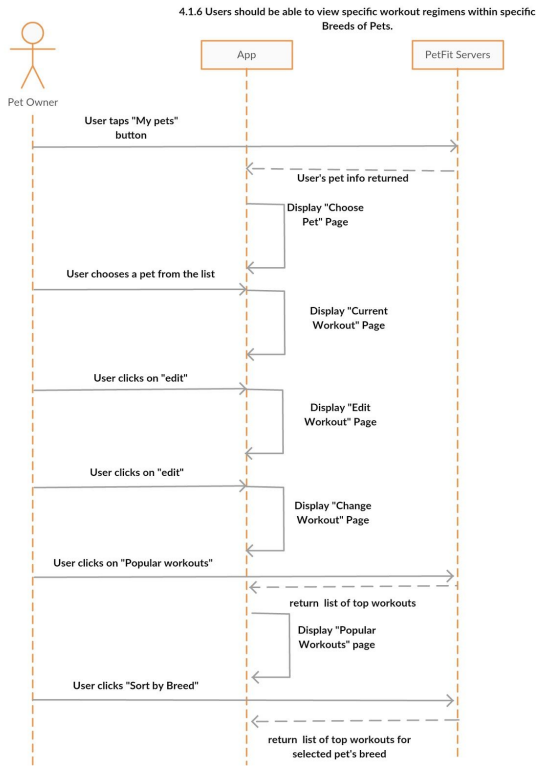


Figure 17. Sequence diagram for viewing Breed workout regimen (1.6).

Use Case 1.8: User Notifications

The User should be able to receive notifications on when to feed or exercise the Pet so that they can stay aware of their pet’s health.

Table 6. Essential use case for User notifications (1.8).

The User should be able to receive notifications on when to feed or exercise the Pet	
<i>Precondition(s):</i> Account Creation, Linked pet Device	
<i>Post-condition(s):</i> None	
<i>User Intention</i>	<i>System Responsibility</i>
Schedule Activity	System logs request System Reminds via email

Dismiss activity Remotely Inquire of Previous Request	Request transmitted and Store on device Device reminds when activity reminder due Transmit Request to device if within timeout period System provides history of requests Device logs all invalid requests with details to track
--	--

The activity diagram displayed in Figure 18 depicts how the sequence of events likely will unfold for User notifications. The important take away from the figure is that it displays the beginnings of a logging system for bug detection or even malicious behavior, but also presents a potential memory issue on the collar device. When requests are stored on the device, it is important to limit the amount of memory used for the optional logging so that normal functionality of the device can continue. This can be achieved by preferring the most recent logs and ensuring that old logs are discarded in the event of low memory.

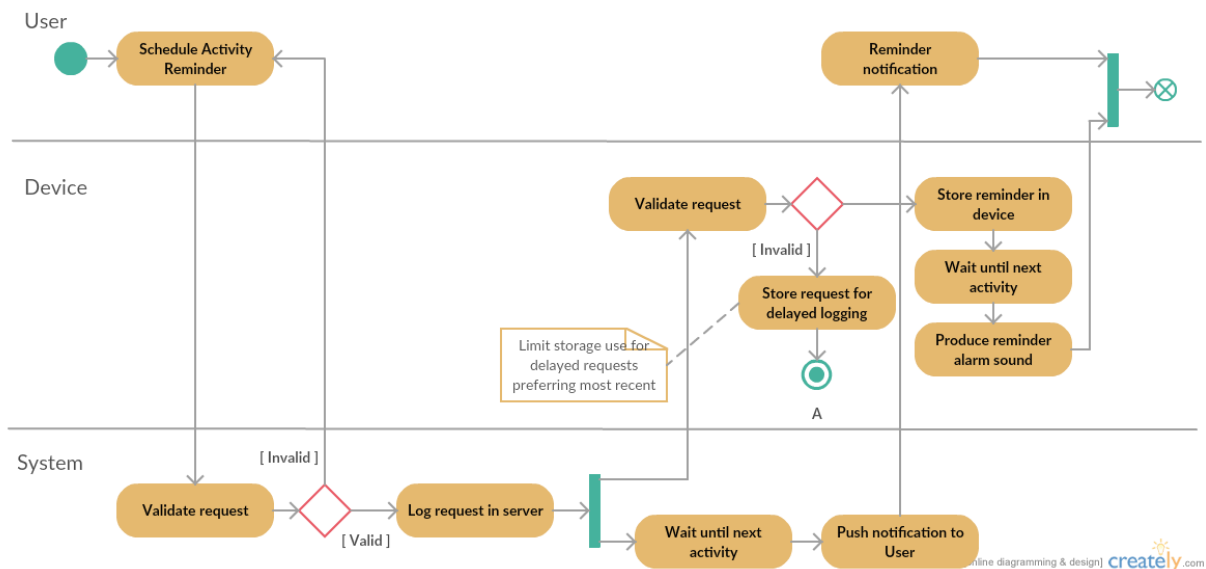


Figure 18. Activity diagram for User notifications (1.8).

Figure 19 shows a component diagram for the PetFit system. The information sent from the collar is sent to a data-processing server before it is sent to the logging server. This ensures smaller storage size and faster data-processing speeds.

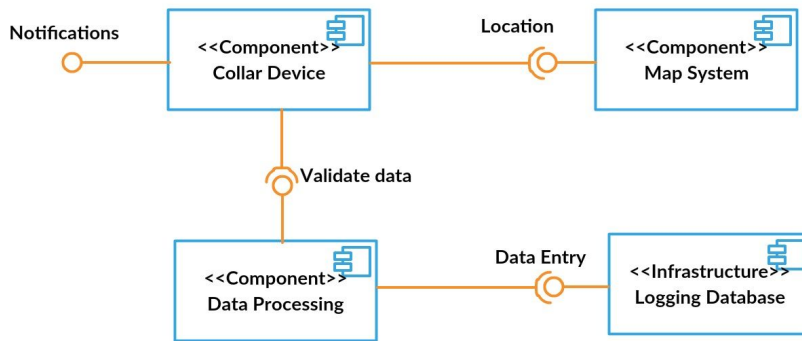


Figure 19. Component diagram for User notifications (1.8).

Use Case 1.9: Updating Health Recommendations Remotely

Veterinarians must be able to update Health Recommendations remotely so that the Pet Owner(s) can apply these recommendations.

Table 7. Essential use case for updating Health Recommendations remotely (1.9).

Veterinarians must be able to update Health Recommendations remotely	
<i>Precondition(s):</i> User is in system, Pet is in system	
<i>Post-condition(s):</i> None	
<i>User Intention</i>	<i>System Responsibility</i>
Veterinarian chooses Health Recommendations from list	Retrieve selections Check for conflicting Health Recommendations
Veterinarian leaves comment in textbox	Ensure textbox was not left empty Collect text entered in textbox
Veterinarian sends message to Pet Owner	Put message in "sent" folder Add sender information, and date sent to message Format message Deliver message to Pet Owner

A basic depiction of events associated with this use case are displayed in Figure 20. Aside from data validation, the system must check if this recommendation would conflict with another recommendation. The criteria will have to be determined by the type of

recommendation, and for custom recommendations, the system will have to assume that the Veterinarian is able to perform this check themselves.

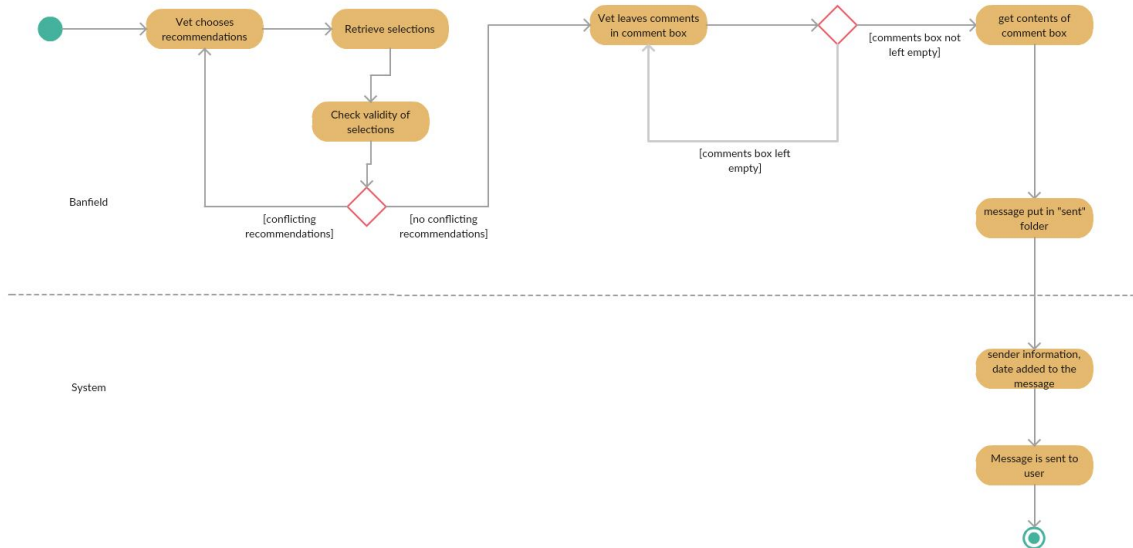


Figure 20. Activity diagram for updating Health Recommendations remotely (1.9).

The robustness diagram in Figure 21 shows the steps and the business logic for updating health recommendations remotely. Once the Veterinarian reaches the update health recommendations page the system will check to see if the recommendation is formatted correctly and then update the health recommendation remotely.

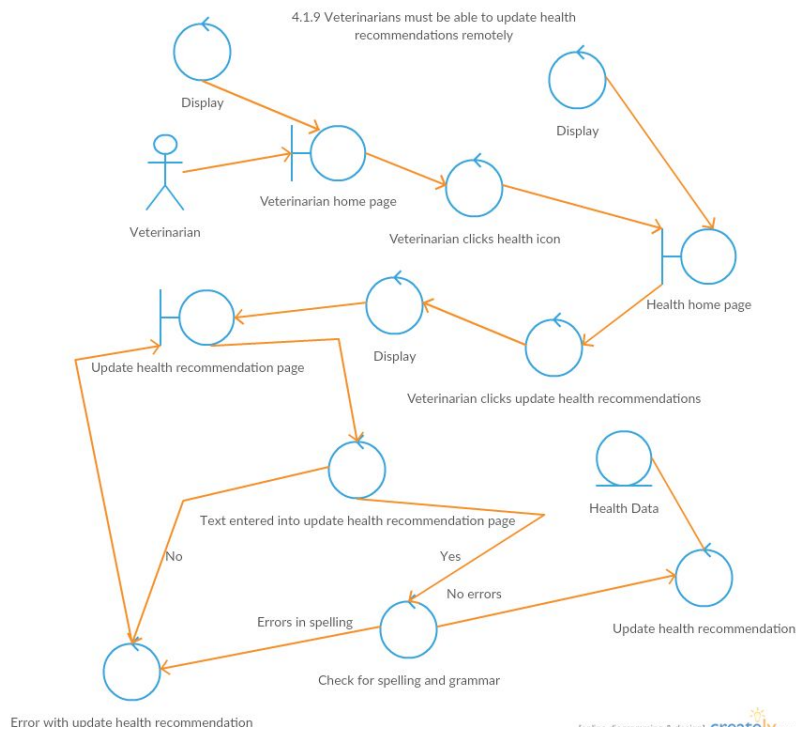


Figure 21. Robustness diagram for updating Health Recommendations remotely (1.9).

The sequence diagram in Figure 22 shows the flow of logic for updating health recommendations remotely. Once the Veterinarian has entered the new health recommendation then the veterinarian will be directed to a confirmation page.

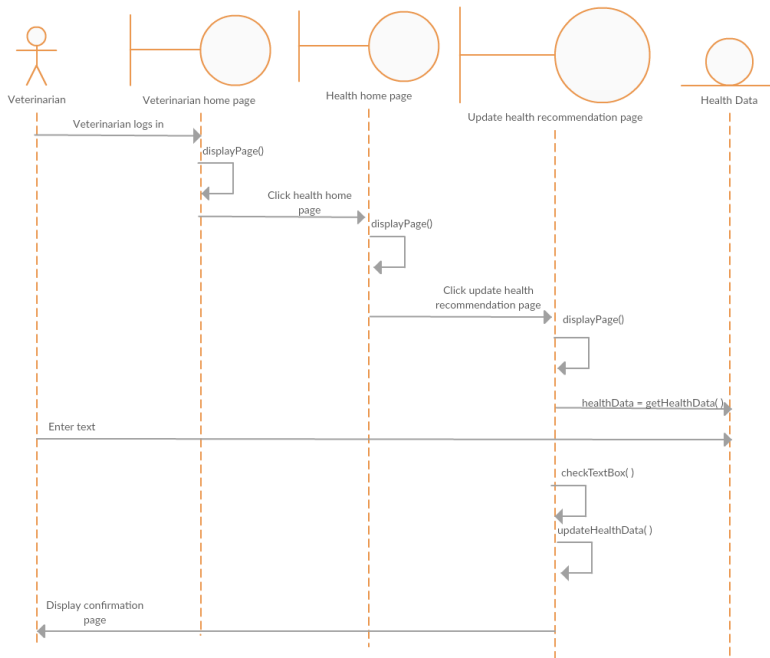


Figure 22. Sequence diagram for updating Health Recommendations remotely (1.9).

Use Case 1.11: Messaging Pet Owners Remotely

Veterinarians should be able to message Users remotely so that communication between Veterinarian and User is easy and convenient.

Table 8. Essential use case for messaging Pet Owners remotely (1.11).

Veterinarians should be able to message Users remotely	
<i>Precondition(s):</i> User is in system, Pet is in system	
<i>Post-condition(s):</i> None	
<i>User Intention</i>	<i>System Responsibility</i>
Veterinarian writes message	Collect information from textbox Ensure textbox is not left empty
Veterinarian selects recipient	Get selected recipients addresses Ensure at least one recipient was selected Ensure recipients have an account registered in system

Veterinarian sends message to Pet Owner	Put message in "sent" folder Add sender information, and date sent to message Format message Deliver message to Pet Owner
---	--

Use Case 1.12: Accessing Health Predictions

Veterinarians should be able to retrieve generated Health Predictions from the system for a specific Pet based on Health Trends so that they can compare their predictions with a pet's health based on the system's predictions.

Table 9. Essential use case for accessing Health Predictions (1.12).

<p>Veterinarians should be able to retrieve generated Health Predictions from the system for a specific Pet based on Health Trends</p> <p><i>Precondition(s):</i> Veterinarian has access to Pet's Health records <i>Post-condition(s):</i> None</p>	
<i>User Intention</i>	<i>System Responsibility</i>
Veterinarian identifies themselves	Checks to see if the Veterinarian is registered in the system Report any Health Predictions generated
Veterinarian inspects data	Display Health records of Pet and Health Trends
Veterinarian alerts Pet Owner of any critical Health Recommendations	Alert Pet Owner of critical Veterinarian Health Recommendations

The robustness diagram in Figure 23 shows the steps and the business logic for accessing health predictions. The system gathers data from the Heart Rate entity, Pedometer entity, Body Temperature entity, Mood entity, and Calorie Count entity. The system then uses this data to calculate the health trend and then create the health prediction.

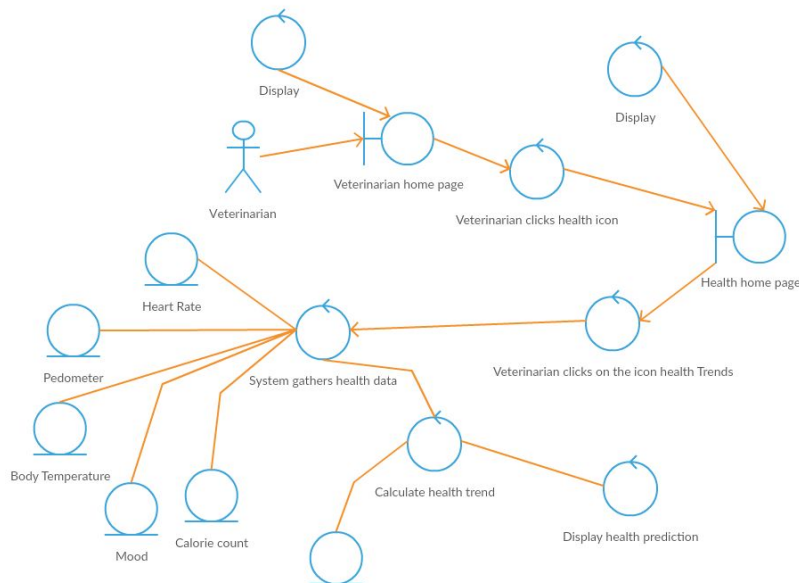


Figure 23. Robustness diagram for accessing Health Predictions (1.12).

The sequence diagram in Figure 24 shows the flow of logic for accessing health predictions. The system needs to gather the data from all the different entities to be able to then perform the health trend calculation.

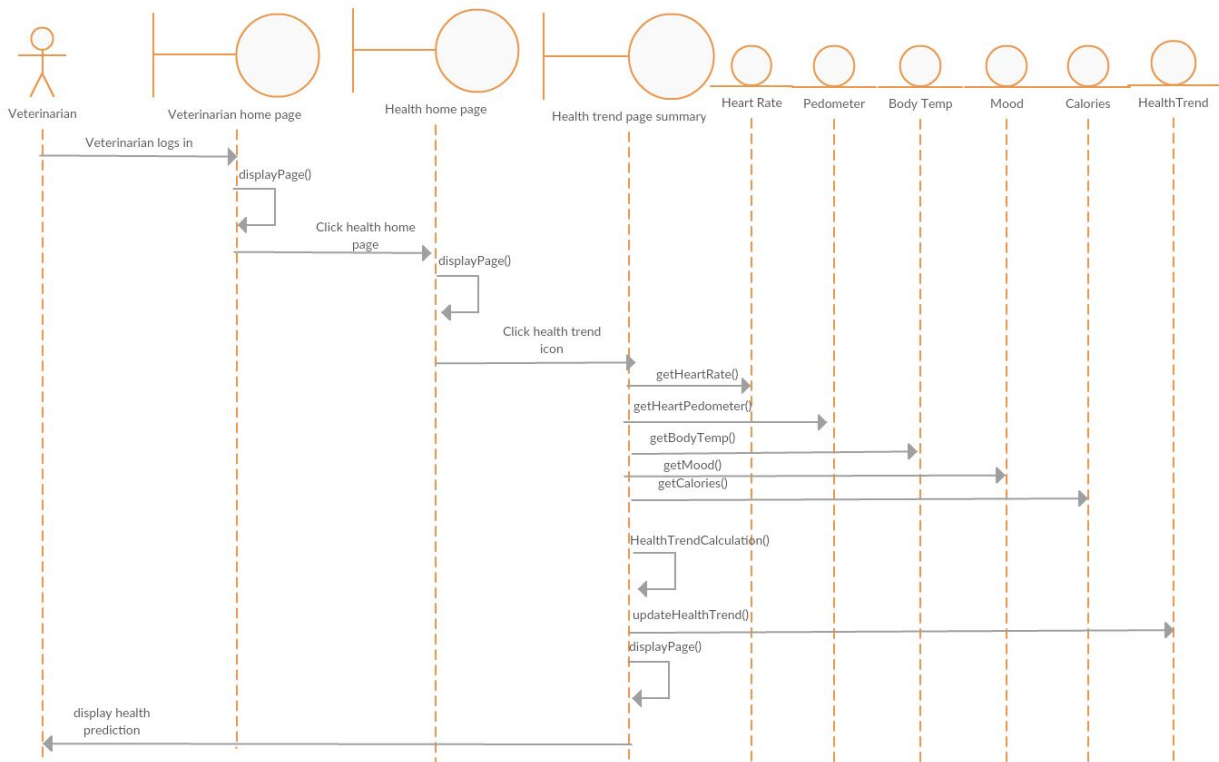


Figure 24. Sequence diagram for accessing Health Predictions (1.12).

Use Case 1.13: Update Training Recommendations Remotely

Trainers should be able to update Training Recommendations remotely so that communicating Training recommendations to users is easy and convenient. Figure 25 depicts how this use case is associated with a large number of activities, many of which are repeated between boundary objects.

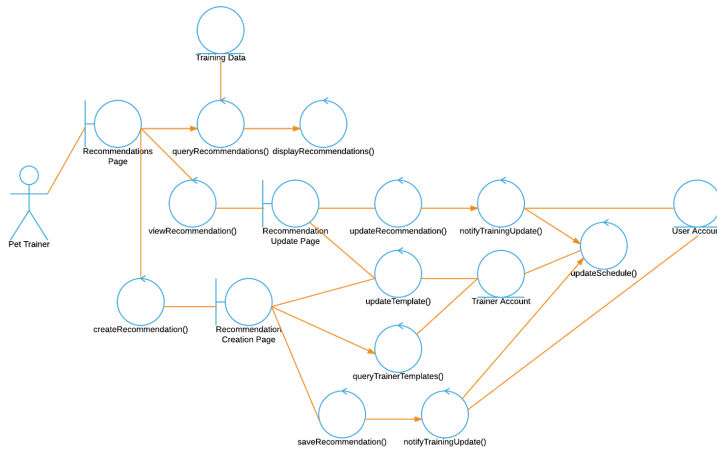


Figure 25. Robustness diagram for updating Training Recommendations remotely (1.13).

The sequence diagram for updating Training Recommendations remotely, seen in Figure 26, highlights how three entities in the system (TrainingData, UserAccount, and TrainerAccount) must all be accessible in quick succession in order to successfully complete this use case. In order to ensure a complete transaction, each activity must be verified for success.

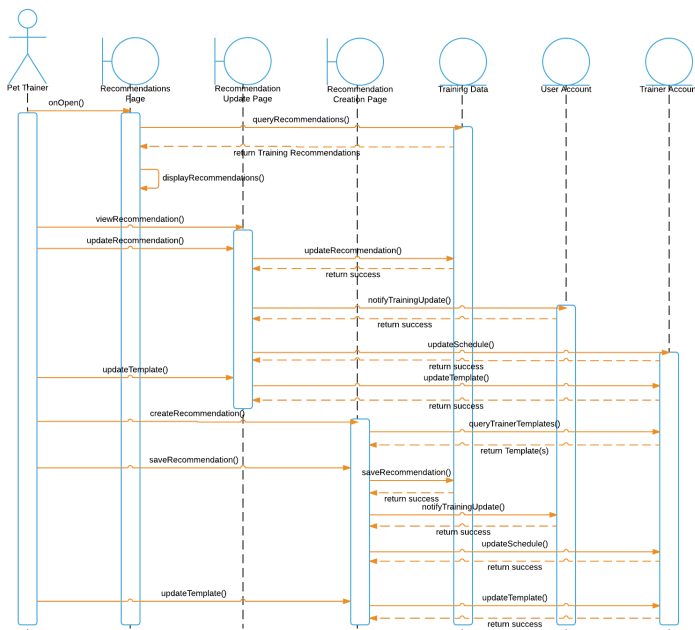


Figure 26. Sequence diagram for updating Training Recommendations remotely (1.13).

Use Case 1.14/1.15: Hiring Pet Trainers and Pet Sitters

Pet Owners should be able to find local Pet Trainers/Sitters to hire so that they can easily improve the obedience of their pet and can easily leave their pet in safe care. Both use cases are lumped together in this instance due to their similarity in how they are implemented, though they both seek to achieve different goals to the User.

Table 10. Essential use case for hiring Pet Trainers and Pet Sitters (1.14/1.15).

Pet Owners should be able to find local Pet Trainers to hire Pet Owners should be able to find local Pet Sitters to hire	
<i>Precondition(s):</i> Pet Trainers or Pet Sitters are registered in system <i>Post-condition(s):</i> None	
<i>User Intention</i>	<i>System Responsibility</i>
Pet Owner enters desired dates and hours	Searches database for Pet Trainers or Pet Sitters available on dates requested Indicates matches for Pet Trainers or Pet Sitters available on different dates, or no matches at all
Pet Owner accepts one of the matches, or decided to input different dates	Searches again, or proceeds to confirmation page
Pet Owner confirms date requested	Displays payment page
Pet Owner pays fee	Process payment and give confirmation code
Pet Owner gets confirmation code	Inform Pet Sitter or Pet Trainer of new appointment

The activity diagram in Figure 27 shows the steps required to hire a Pet Trainer/Sitter.

The User enters the dates and the system checks to see if there are any available Pet Trainers/Sitters. If there are no Pet Trainers/Sitters available, then the system displays Trainers/Sitters available on different dates. If these dates don't work then the system ask the User to enter new dates. After the user accepts Trainers/Sitters, they will be directed to a payment page and will then receive a confirmation.

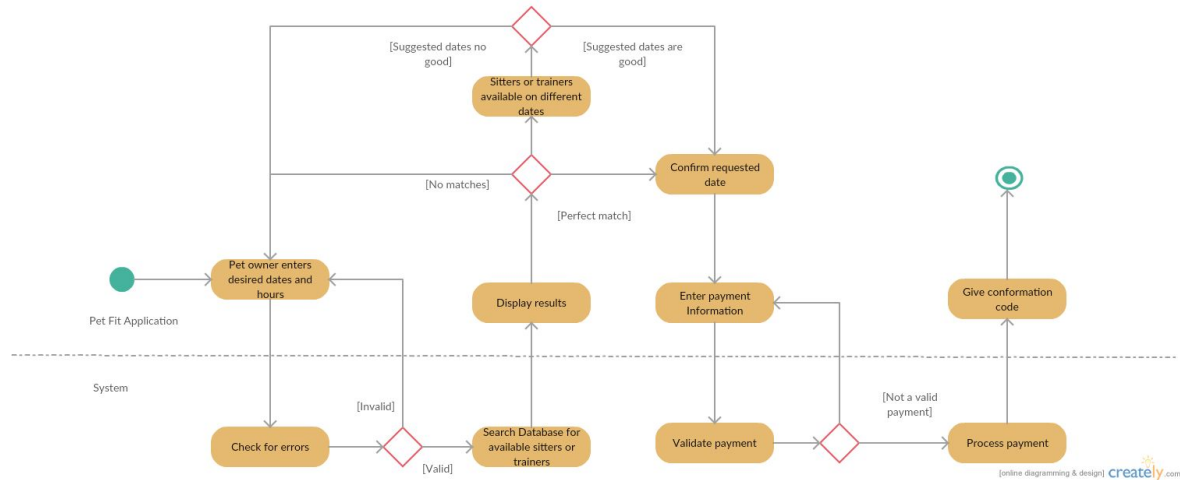


Figure 27. Activity diagram for hiring Pet Trainers and Pet Sitters (1.14/1.15).

Figure 28 displays how hiring Pet Trainers and/or Pet Sitters has a large number of associated activities, but must also be able to be delayed in the event that the Pet Owner is not currently subscribed for premium features in their account. This process is handled separately.

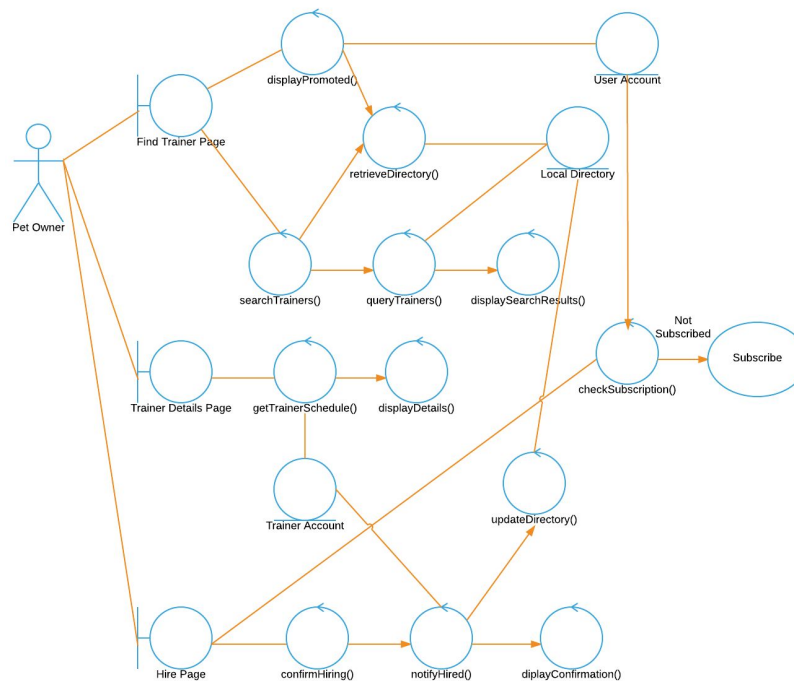


Figure 28. Robustness diagram for hiring Pet Trainers and Pet Sitters (1.14/1.15).

The sequence diagram, depicted in Figure 29, displays how each boundary object will have an immediate request to an entity in the system to check for either a directory, schedule, or subscription status.

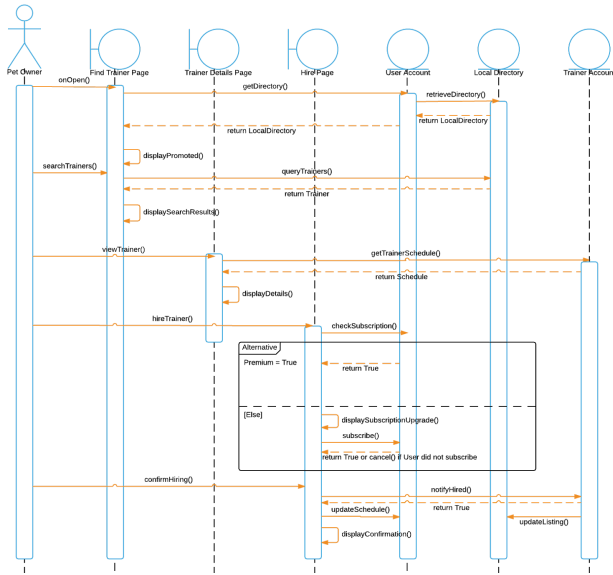


Figure 29. Sequence diagram for hiring Pet Trainers and Pet Sitters (1.14/1.15).

The local directory component will provide two types of Sitter lists and Trainer lists. The secondary list is a prompted list that is immediately displayed to the user whenever they go to a hiring page. The Sitter list display and Trainer list display components will use the list data provided and access more items as needed from the given object internally (rather than accessing the local directory component again unless there has been a long enough delay between requests). The display components will sort the list as desired by the User.

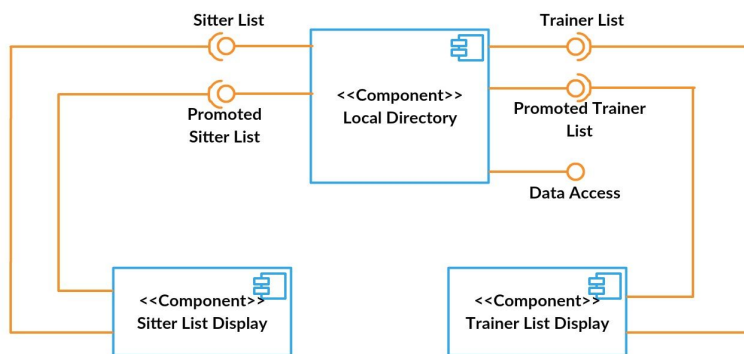


Figure 30. Component diagram for local directory used when hiring Pet Trainers and Pet Sitters (1.14/1.15).

Use Case 1.18: Monitor Pet Heart Rate

Users should be able to read Heart Rate so that they can be aware of their pet’s Heart Rate. Similar behavior should be used for use cases (1.19-1.20) that also monitor Pet Health.

Table 11. Essential use case for monitoring Pet heart rate (1.18).

Users should be able to read Heart Rate

Precondition(s): User in System, Pet is in System

Post-condition(s): None

<i>User Intention</i>	<i>System Responsibility</i>
User identifies himself and enters password	Verifies User exists Validate password
Choose Pet	Display list of User's Pets Verifies Pet's Data is available and current Retrieves Pet Data Translate data into easy to read format Display data to User

The activity diagram in Figure 31 shows the steps required to monitor the heart rate of the Pet. If this is the first time logging in from a new device or a different computer then the User must enter a username and a password. Then the User selects a Pet and the system displays heart rate information.

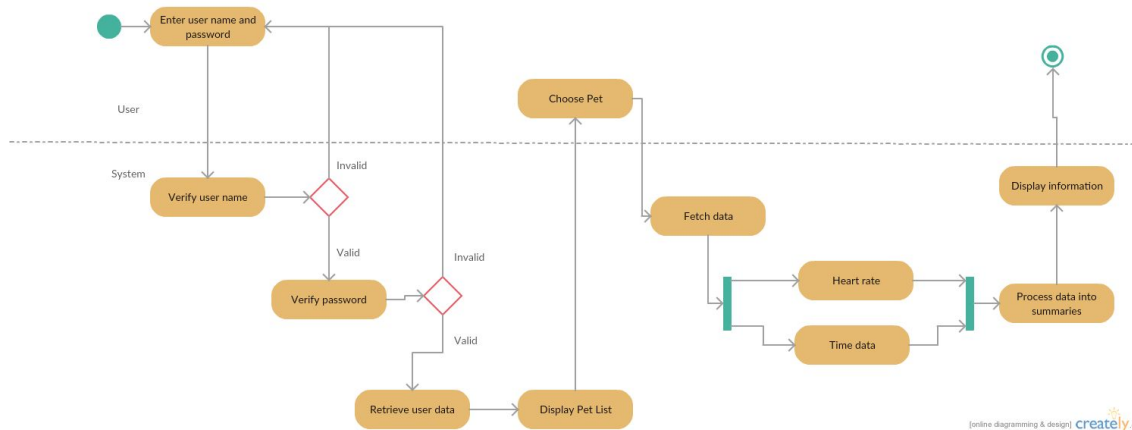


Figure 31. Activity diagram for monitoring Pet heart rate (1.18).

Use Case 1.19: Monitor Calorie Count Levels

In order for user to be able to keep track of their Pet’s calorie level, the system can display the calorie counts in an easy to read graph with simple numbers and metrics. The

user can also “zoom in” on the graph to get more detailed data on the specific calorie levels from a narrower time period.

Table 12. Essential Use Case Table for Monitoring Calorie Count (1.19)

Users should be able to read Calorie Count levels	
<i>Precondition(s):</i> Account Creation, Linked pet Device	
<i>Post-condition(s):</i> None	
<i>User Intention</i>	<i>System Responsibility</i>
User Clicks on Calorie Count Button	System retrieves Pet Data System formats data into displayable format System retrieves real time calorie count System displays Pet Calorie Data and real time calorie count System periodically updates and displays current calorie count
User “zooms in” on specific date in graph	System retrieves more detailed data on the calorie levels from that time period System formats data into displayable format System displays Pet Calorie Data

Figure 32 depicts how the reading calorie count use case should be kept simple in order to not delay other activities on the collar device.

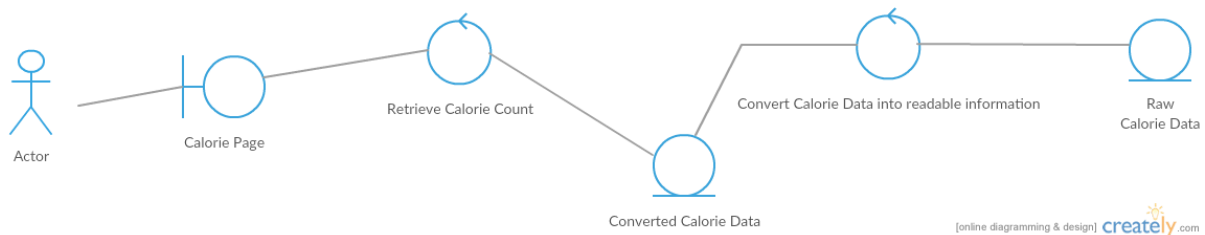


Figure 32. Robustness diagram for monitoring calorie count levels (1.19).

Only two User interactions are required for this use case as depicted in Figure 33. Each request results in a display update to the User.

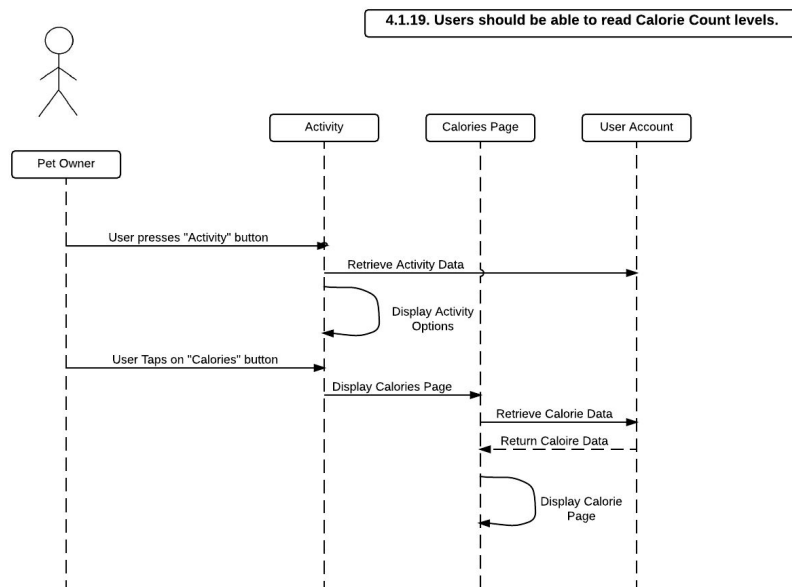


Figure 33. Sequence diagram for monitoring calorie count levels (1.19).

Use Case 1.21: Pet Location Tracking

Users should be able to view their Pet’s location in real time so that they can locate and find their Pet. Note that real time tracking may be a premium feature that could also be a temporary feature for new users.

Table 13. Essential use case for Pet location tracking (1.21).

Users should be able to view their Pet’s location in real time	
<i>Precondition(s):</i> Account Creation, Linked Pet Device	
<i>Post-condition(s):</i> Active Tracking	
<i>User Intention</i>	<i>System Responsibility</i>
Request Location of Pet	Transmit request to device. Repeat location request until successful Ping User when found Begin active tracking if user active
Active Tracking	Frequent transmissions between device Repeat until timeout or request end
Inquire of previous request.	System logs all requests

Stop Tracking	Device logs all invalid requests Transmit to device to end active tracking
---------------	---

Just like previously mentioned in use case 1.8 for User notifications, the activity diagram for Pet location tracking (Fig. 34) handles invalid requests by storing a log of them temporarily on the device to later be uploaded for debugging or malicious activity detection. Additionally, when the User is currently active and eligible for real time tracking, a separate service must initiate feeding quick responses between the system and the collar device.

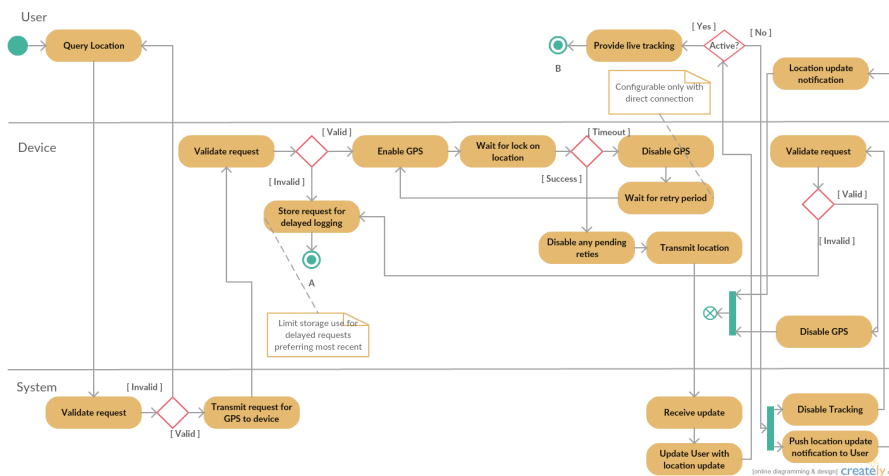


Figure 34. Activity diagram for Pet location tracking (1.21).

Glossary

Body Temperature	The body temperature of the Pet
Breed	The specific stock of Pet within its species
Calorie Count	The calories consumed and burned by the Pet
Feeding Activity	The past records of Pet food consumption
Feeding Recommendation	Advisory diet plans for the Pet
Fitness	The physical activity of the Pet
Health Record	The aggregate of vaccines, medications, vaccines, and veterinary visits of the Pet.
Health Prediction	Prediction of Pet's Health based on Pet Data
Health Recommendation	Advisory Health advice for the Pet
Health Trend	The statistical trends in Health for the Pet
Heart Rate	The heart rate of the Pet
Pet	The dog or cat of the User
Pet Data	The aggregate of Training Activity, Feeding Activity, Health Predictions, etc. of the Pet
Pet Mood	The current status of the Pet such as asleep, excited, neutral, etc.
Pet Owner	The individual who owns the Pet(s)
Pet Sitter	The individual hired to watch the Pet when Owner is unavailable
Pet Trainer	The individual hired to train the Pet
Pharmaceutical Researcher	The individual that gathers Pet Data in mass and correlates the information for external uses.
Training Activity	The past record of Pet training
Training Recommendation	Advisory training regiments and advice for the Pet
User	The individual using the system
User Account	The account of the Pet Owner
Veterinarian	The Veterinarian responsible for the Pet's Health