Problem Statement

The spread of disease over livestock is a huge problem for the agricultural industry. Many poor farmers in places such as rural India may take the risk of not vaccinating their herd in order to save money. This means that they are more vulnerable to being devastated by disease outbreaks. Currently, the method of communication of these outbreaks is left to word of mouth (articles, phone calls), which can be inefficient and inconvenient when it comes down to farmers notifying nearby farmers of diseases spreading through their herd.

According the following table, you can see that the costs of vaccinations for a herd (which can average around 143 cows in the UK [1]) can be quite extensive, depending on the disease one is vaccinating against.

Table 1. Typical herd diseases to vaccinate against & per dose cost

Disease	Example Vaccine	Vaccine Protocol	$/dose
Blackleg	Covexin-8 (Clostridial, 7 or 8-way)	Spring – cows, bulls, calves Fall - calves	$0.50
IBR/BVD/PI3/BRSV	Express 5	Spring – cows, bulls, calves Fall – calves	$2.37
Anthrax	Anthrax vaccine	Spring - treat herds in outbreak areas and former outbreak herds	$1.53
Bacterial Pneumonia (H. somnus and P. haemolytica)	Somnu-Star Ph	Spring – calves Fall - calves	$3.50
Vibriosis	Vibrin or get coverage with Express 3 VL5 or Bovishield FP VL5	Treat cows going to community pasture	$1.76
Footrot	Fusoguard	Spring – 2 shots, 3 wks apart	$5.04
Parasites	Ivomec, Dectomax, Vetomectin	Fall/Winter – cows, bulls	$0.70-$2.00[a]
Scours	Scourguard	Pre-calving – cows, heifers Booster shot – 1st calf heifers	$4.18

[a] Pour-on rate 1 mL per 22 lb; based on 5 L pour-on for 1200 lb cows. Range based on four available products – Ivermectin, Vetomectin, Dectomax and Ivomec (listed in order from lowest to highest cost). Source: Prices for the vaccinations have been sourced from a local vet clinic.

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Reference: [2]

Purpose

The purpose of this application is to provide an efficient way to notify farmers of diseases within their region. Once a disease has been recorded by a farmer, they can notify this system, and the system will notify all nearby farmers. This allows nearby farmers to vaccinate their livestock as a preventative measure to slow or stop the spread of the disease. Providing a service such as this can save many farmers a lot of money, as the spread of the disease throughout an agricultural region can be diminished substantially.

Technical Details

Server: Java Spring, REST, mySQL
Client: Website, Javascript, Google Maps API

Functional Requirements

Sign-up System
1. Application shall allow farmers to sign up to become a member. Members can use the service.
2. Farmers must provide proof of ownership of farm via Telephone to be able to sign up.
3. Application shall check if telephone matches farm's registered telephone on public record.
4. Application shall allow new members to pick a username and password.

Log-in System
1. Application shall allow members access the services upon providing a verified username and password.

Server Application
1. Server shall store of alerts and images from farmers.
2. Server shall send relevant information to clients.
3. Server shall collect data from clients for data analysis purposes.

Client Application
1. Client shall allow farmers to sign up to become members.
2. Client shall allow members to sign in.
3. Client shall allow members to send out alerts to nearby farms.
4. Client shall allow members to see alerts from nearby farms.
5. Client shall allow members to report possible false alerts from other clients.
6. Client shall allow members to send alerts via SMS in low-connectivity regions.

Non-Functional Requirements

Performance:
1. The program must not take more than one second to respond to user input.

Usability:
1. The program user interface must be intuitive and clear to the user.
2. The program should function on low quality internet access.
3.

Operational:
1. The program shall function on any device that supports an internet browser.

Security:
1. The program shall encrypt all sensitive data retrieved through operation.
2. The program shall abide to the Data Protection Act of 1998.

Maintainability:
1. The program must be able to update its server without affecting the functionality of the system.
2. Each client should receive updates via internet.

Portability:
1. The program shall be accessible from any browser with an internet connection.

Political:
1. The program shall support all official languages of the region it operates within.

Client Configurable Parameters:
Username
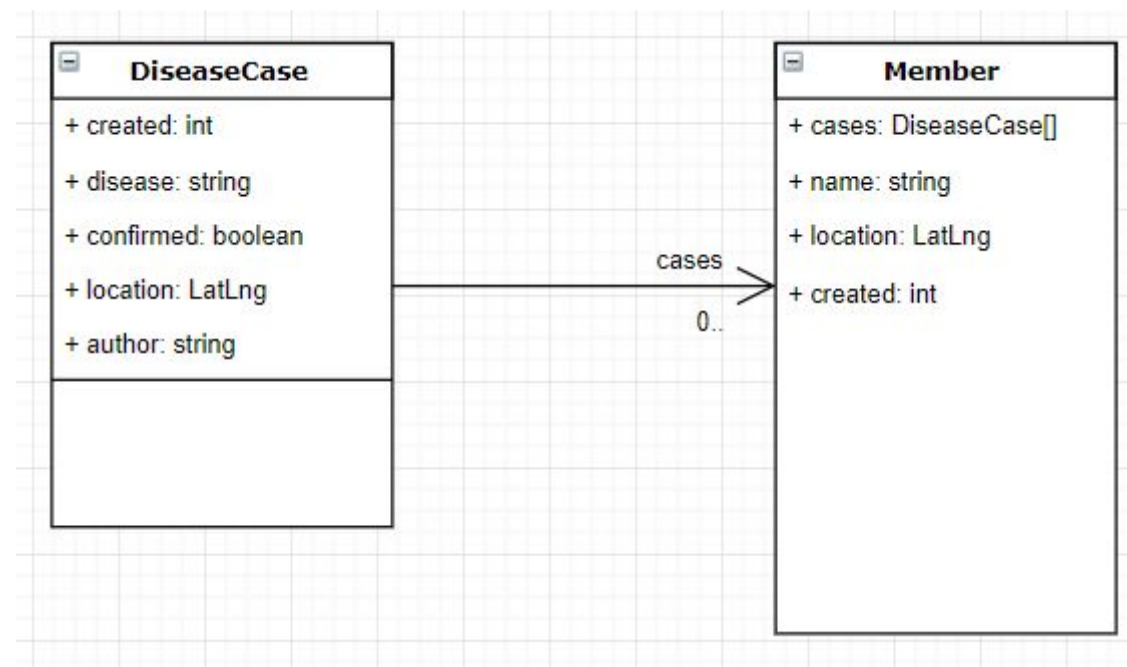Password
Owned Farm Animals.
Animal Filter.
Information distance.

Feedback Loops:
Crowdsourced information.

Sensors:
Client camera for photo verification.

UML

Assumptions

- Farmers submit correct information into the system.
- All farmers have access to an internet connection or SMS.
- The system will be used be the majority of farmers in a region.

Designs

Login Page

FARMER CONNECTION LOGO

User

Password

LOGIN

Farmer Portal Page

Signed in as: RICK

SUBMIT NEW CASE

NEARBY CASES

| Beak Rot | 1km |
| | Chicken |

| Black Foot | 1.5km |
| | Cattle |

MAP

Case View Page

Case #1214412
Author: Farmer Joe

Disease Suspected

Doctor ID

Affected Animal

Cow ▼

Picture

MAP

Case Submission Page

Case Submission Form

Disease Suspected *

Doctor ID (optional)

Affected Animal

Cow ▼

Chicken
Bull
Calf
Pig
Lamb
Sheep

Picture

Choose File

Submit New Case

Submitting a false report will result
in account termination!

References:

[1] *thisisdairyfarming.com, 2016,*
(http://www.thisisdairyfarming.com/discover/dairy-farming-facts/how-many-cows-are-there-on-the-average-farm/)

[2] *The Cost of Herd Health – Vaccination Kathy Larson, Western Beef Development Centre, Lanigan, SK Leah Pearce, Western Beef Development Centre, Lanigan, SK*
(http://www.wbdc.sk.ca/pdfs/fact_sheets/2010/Cost%20of%20Herd%20Health%20-%20Vaccination.pdf)