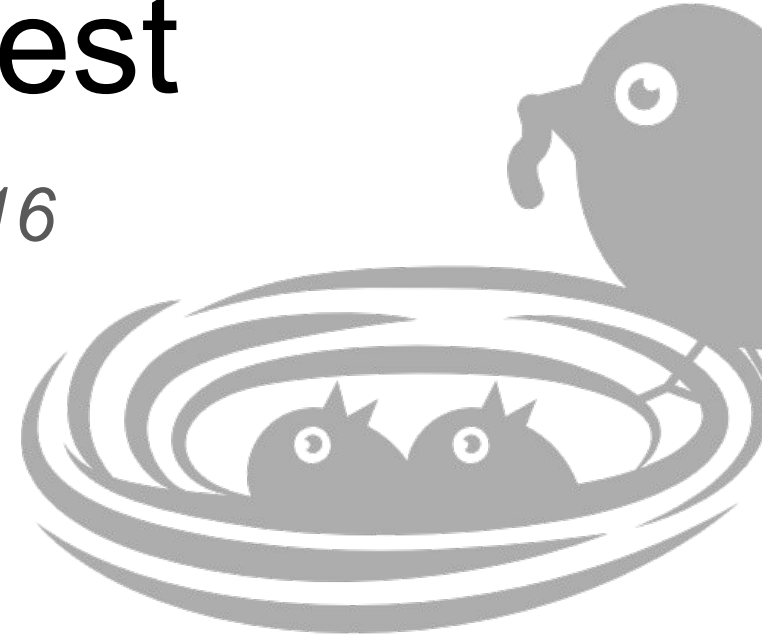




# Project Nest

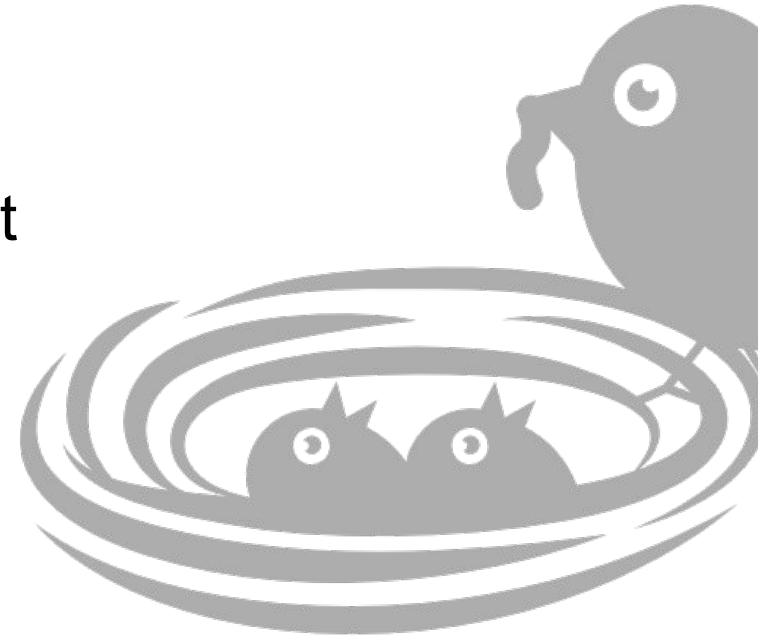
*Capstone 2016*





# Introduction

- The project context
- Presentation structure
- Introduction to the team
- Team development roles
- An overview of our product
- Management tools





# Introduction

- The project context *WHY*
- Presentation structure *WHAT*
- Introduction to the team *WHO*
- Team development roles
- An overview of our product *HOW*
- Management tools





# Predator Free NZ

2050





# Project Requirements

- supports iOS and Android
- should support operating systems from 2013 onwards
- mobile app. can be used to locate traps using acoustic and visual signals
- master data for a particular trapline can be configured
- an instance of the app can be protected by a password
- mobile app. can be used to capture data
- data can be synchronised with a central data store
- captured data can be exported
- web application facilitates admin actions
- admin access to web is secured using user accounts with password protection
- public web page shows aggregated data
- mobile app can be used to record audio to send to the open source 'Cacophony Project'
- the mobile app can capture photographs to attach to data logs
- damage and hazards to the tracks or traps can be recorded using the mobile app



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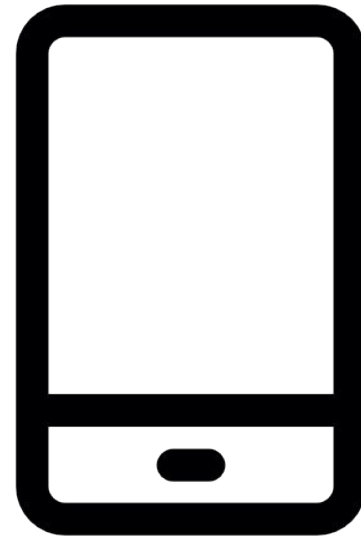
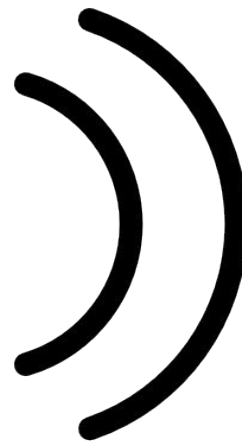
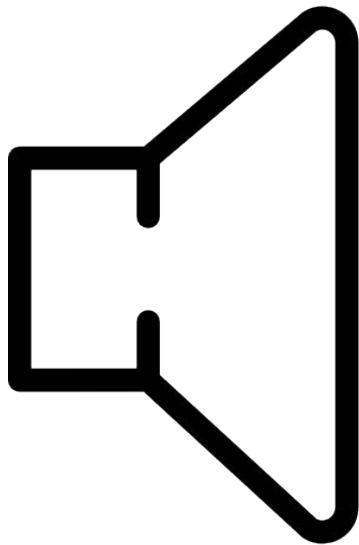
# Cross-Platform Support



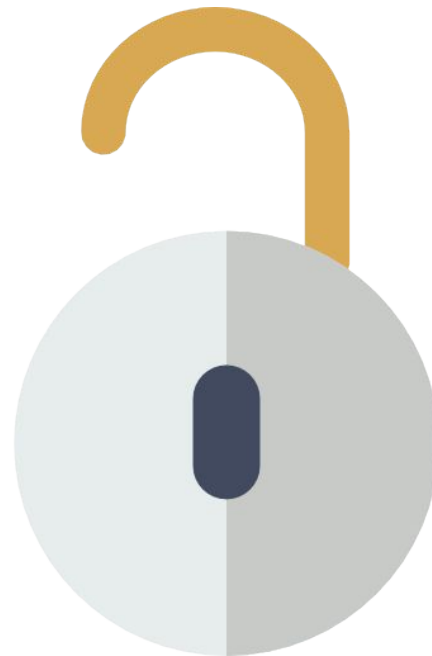
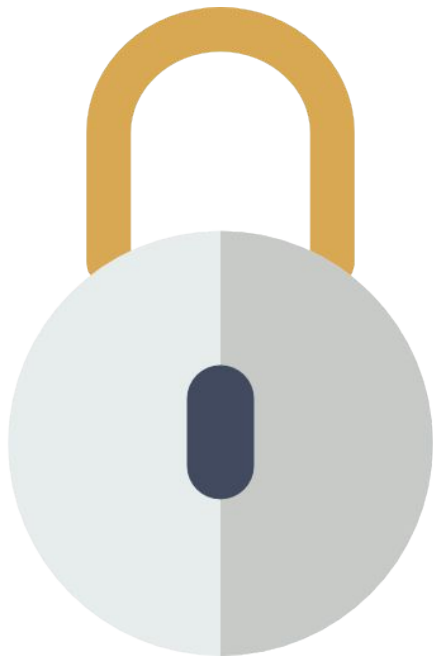
*Group Two - Capstone 2016*



# Location Services



# Security



*Group Two - Capstone 2016*



# Data Capture

Log catch #1

Empty

Stoat

Other

Rat

Wild cat

Manawatu  
Manawatu Gorge Tawa Loop

Trap	Catch	Date
1	Hedgehog	26 October 2016
1	Stoat	26 October 2016
1	Stoat	26 October 2016
2	Rat	26 October 2016
2	Stoat	26 October 2016
2	Rat	27 October 2016
3	Hedgehog	27 October 2016
4	Wild cat	27 October 2016

Close Export



# Data Export

catch-report-simple x

https://docs.google.com/spreadsheets/d/18UCZVWONZimAC\_nUoH8JoG4u0LdYO4as1HuK9I8t

catch-report-simple\_1477535727227

File Edit View Insert Format Data Tools Add-ons Help Last edit was seconds... Comments Share

fx Date

	A	B	C	D	E	F	G	H
1	Date	Trap	Catch					
2	26/10/2016		1 Hedgehog					
3	26/10/2016		1 Stoat					
4	26/10/2016		1 Stoat					
5	26/10/2016		2 Rat					
6	26/10/2016		2 Stoat					
7	27/10/2016		2 Rat					
8	27/10/2016		3 Hedgehog					
9	27/10/2016		4 Wild cat					
10								
11								

Liberation Sans 10 B I U T

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	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	Region	Trapline	January	February	March	April	May	June	July	August	September	October	November	December	
2	Hawkes Bay	Hawkes Bay Reserve Track	0	0	0	0	0	0	0	0	5	5	0	0	
3	Hawkes Bay	Testing1	0	0	0	0	0	0	0	0	0	5	0	0	
4	Manawatu	Manawatu Gorge Tawa Loop	0	0	0	0	0	0	0	0	0	8	0	0	
5															
6															
7															
8															
9															



# The A Team



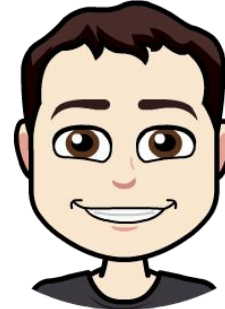
Zoe

Project Manager



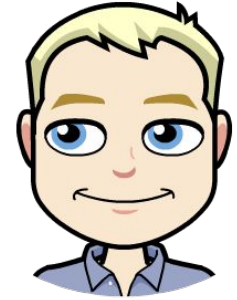
MJ

Web Dev.



Francis

Mobile Dev.



Sam

Backend Dev.



# The A Team



Zoe

Project Manager

- Write reports (weekly and monthly) for university project requirements
- Facilitate communication between team members, the project supervisor, and other key stakeholders
- Prioritise tasks and ensure they are completed by the appropriate milestone dates



# The A Team



MJ

Web Dev.

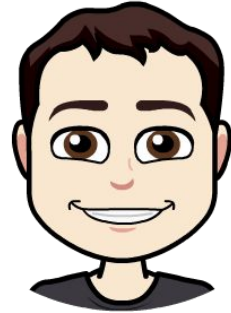
- Set up cloud based services
- Research web design and security
- Create the web application
- Implement admin tasks on the web app.





# The A Team

- Research platform independent mobile technologies
- Create the mobile application



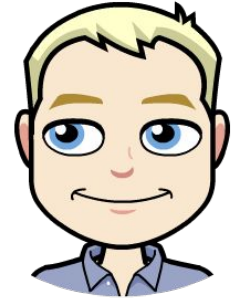
Francis

Mobile Dev.



# The A Team

- Define the RESTful API
- Manage server side request handler
- Manage the database

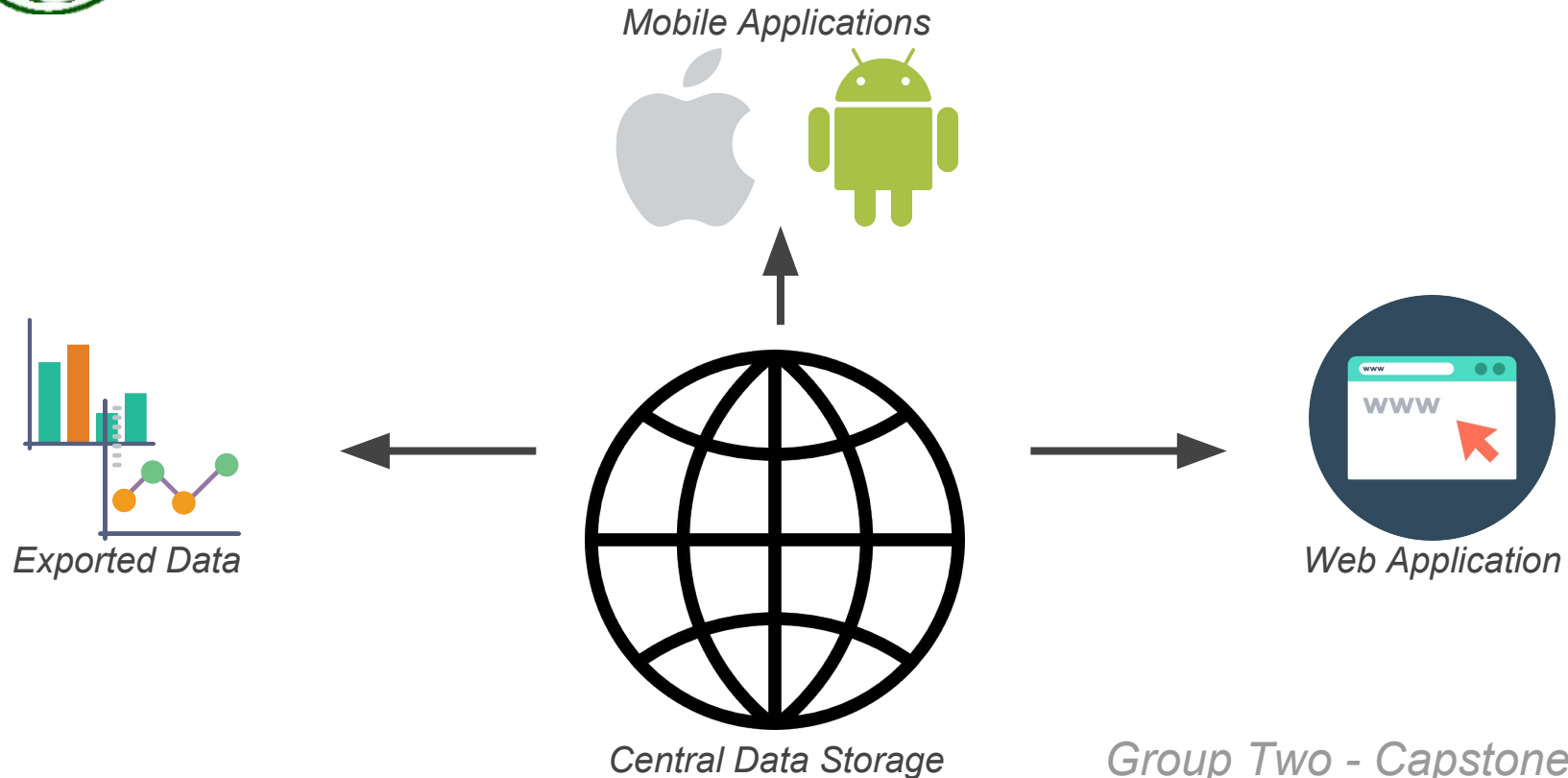


Sam

Backend Dev.



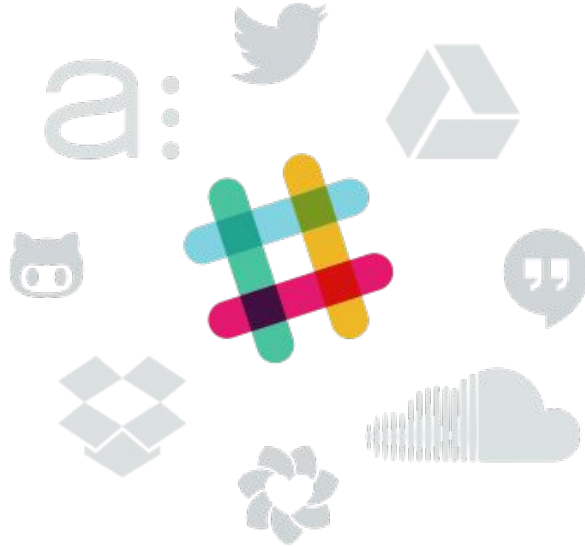
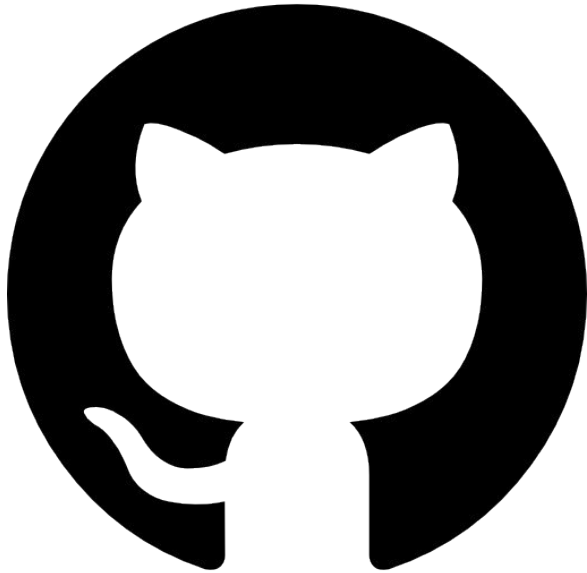
# Product Overview



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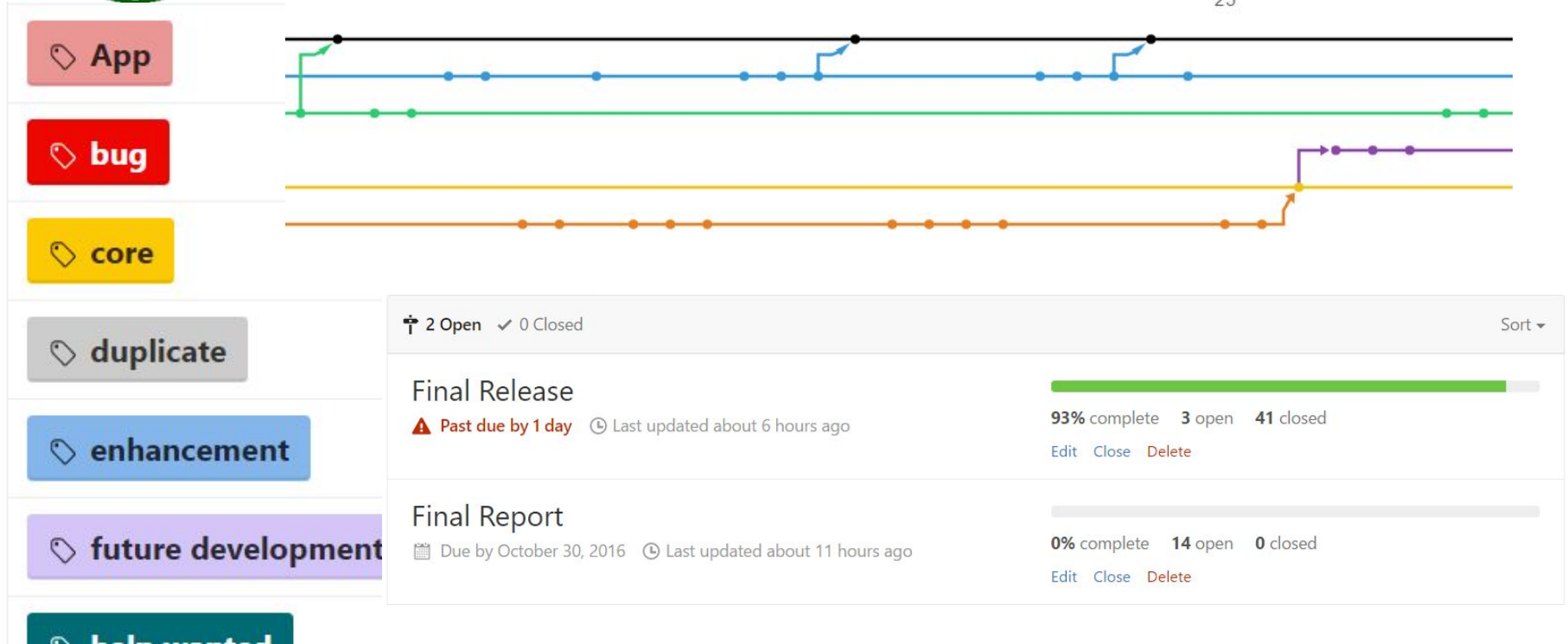
# Management Tools



*Group Two - Capstone 2016*



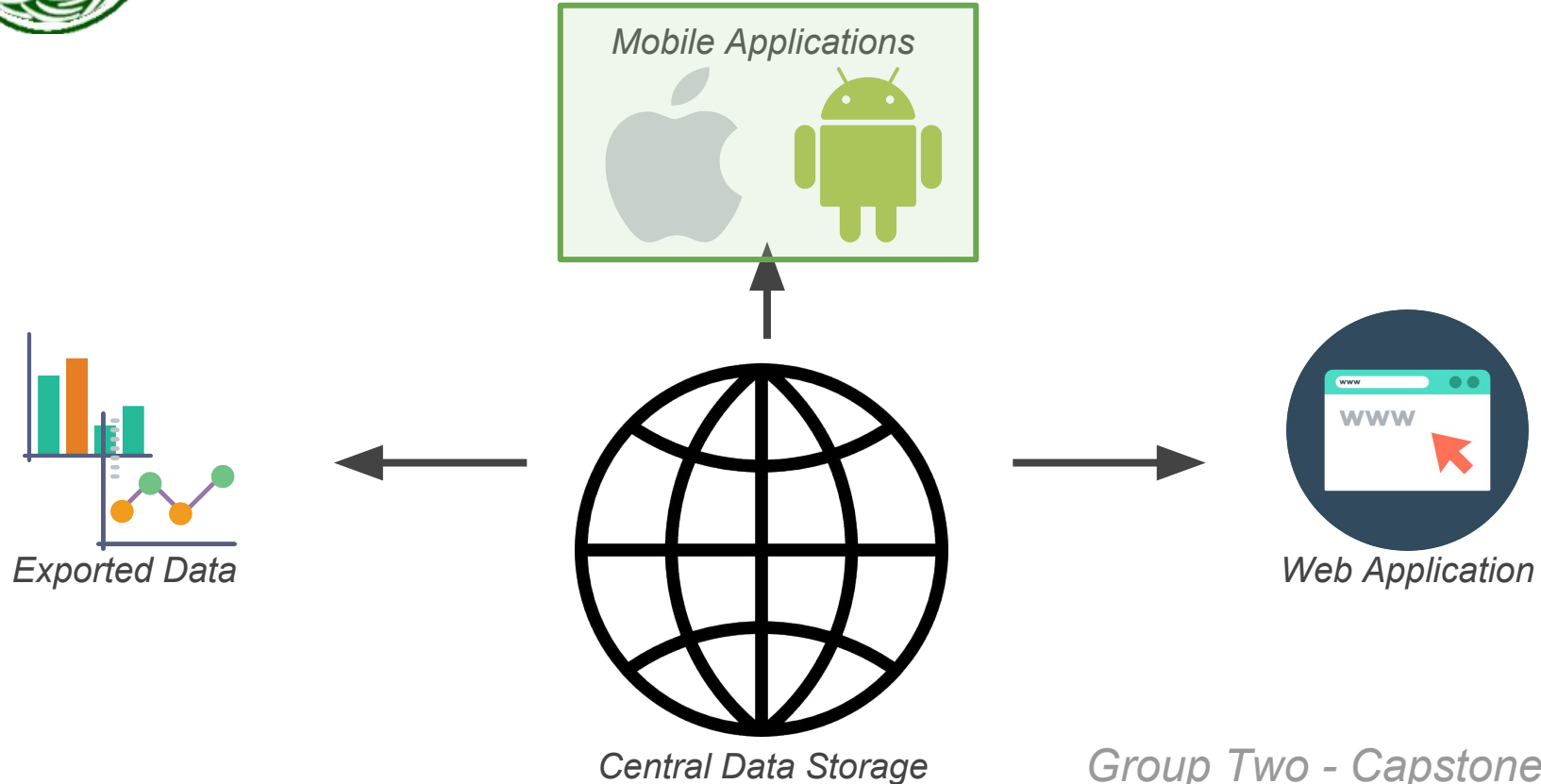
# GitHub Issue Tracker



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# Product Overview: MOBILE



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# Challenges addressed by mobile

- Supporting iOS/Android
- Locating traps
- Offline usage



# Cross-Platform Development

- Supported on Android and iOS
- Don't want to duplicate code!
- Solution: Use a cross-platform development environment





# Gluon

- Write the mobile app in Java, using JavaFX
  - ◆ Familiar, widely used programming language
  - ◆ Modern UI framework in JavaFX
- Use Charm Down libraries for platform-specific features (e.g. position, storage)





# Locating traps

- Need to know when you're near the next trap
- Sometimes miss a trap & have to backtrack
- Not always watching phone while walking the trapline

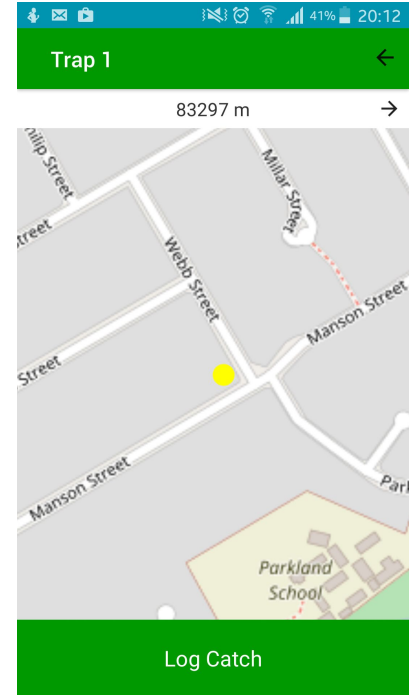


# Locating traps



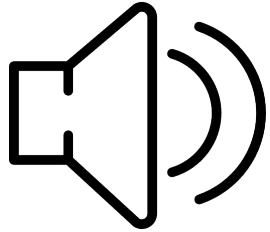
## Open Street Maps

- Tell the user where they are & where the next trap is
- Open Street Maps includes paths for most major tracks in New Zealand





# Locating traps



Audio signals

→ Audio beeps & vibration when the user gets close to the trap

◆ Tells the user a trap is 'nearby'

◆ Signals get longer as you get closer to the trap

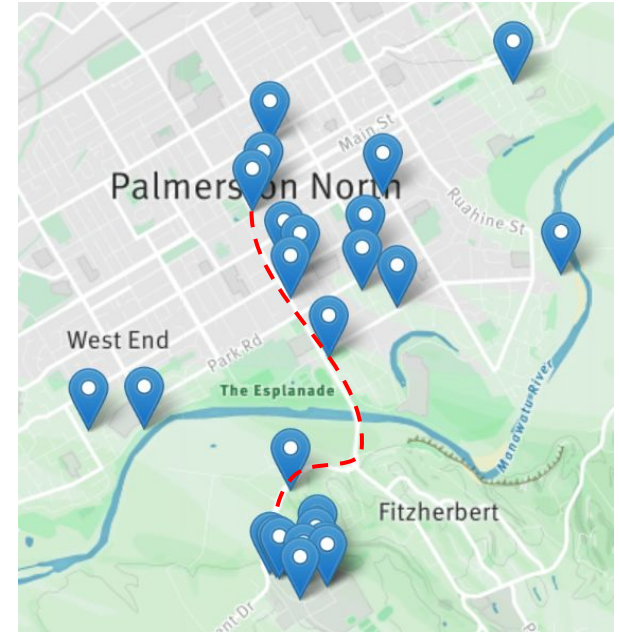


Vibration



# Limitations of mobile device GPS

- On low-end devices, location isn't always accurate
- Other mobile devices give approximate location
- App can still log catches, even if GPS isn't available
- As new devices come out, accuracy will improve





# Offline Usage

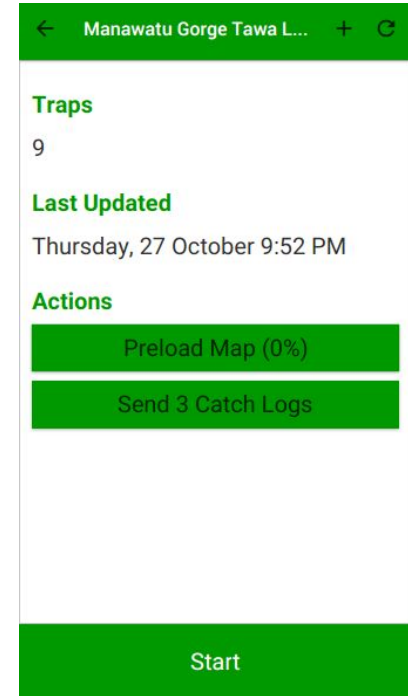
- No internet access deep in the bush!
- Mobile data is expensive & unreliable
- App must support offline access





# Offline Usage

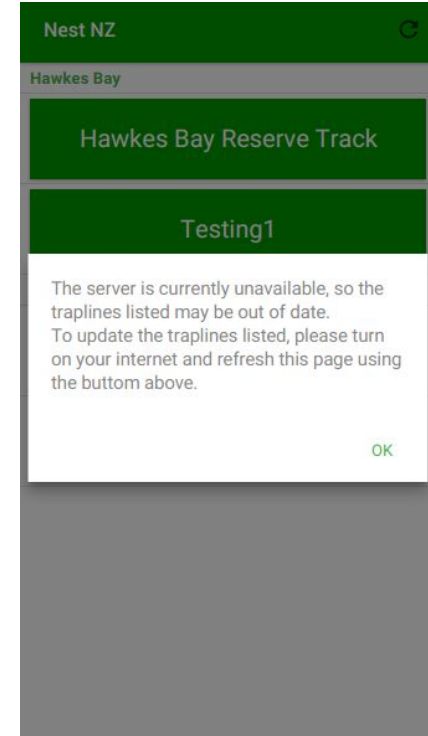
- Catches stored on device until the user is ready to send
  - ◆ User notified if they need to send data
- Able to 'pre-load' map tiles
  - ◆ Use Wi-Fi to download the trapline map, where more data is available





# Offline Usage

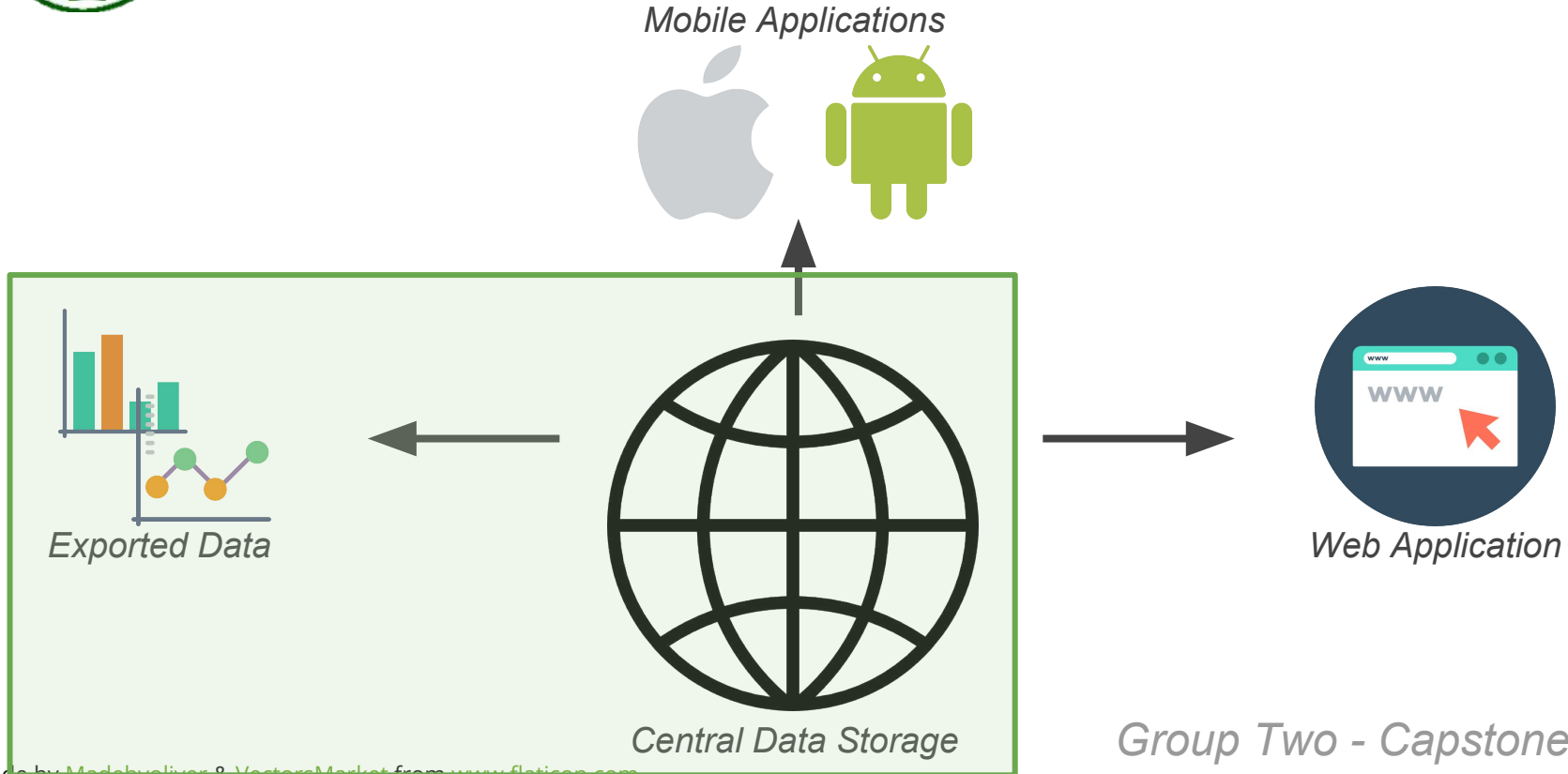
- Offline Mode on app
  - ◆ Activated on login if no internet
  - ◆ Or if any request fails due to internet
  - ◆ Stops all automatic requests
  - ◆ Goes back to online mode if a manual request succeeded







# Product Overview: BACKEND



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# Challenges addressed by the API

- Centralised data storage
- Data exporting
- Data security



# Centralised Data Storage

- HTTP REST Interface
  - ◆ Java Servlets (Tomcat7)
- External Database
  - ◆ PostgreSQL
- Concurrency issues



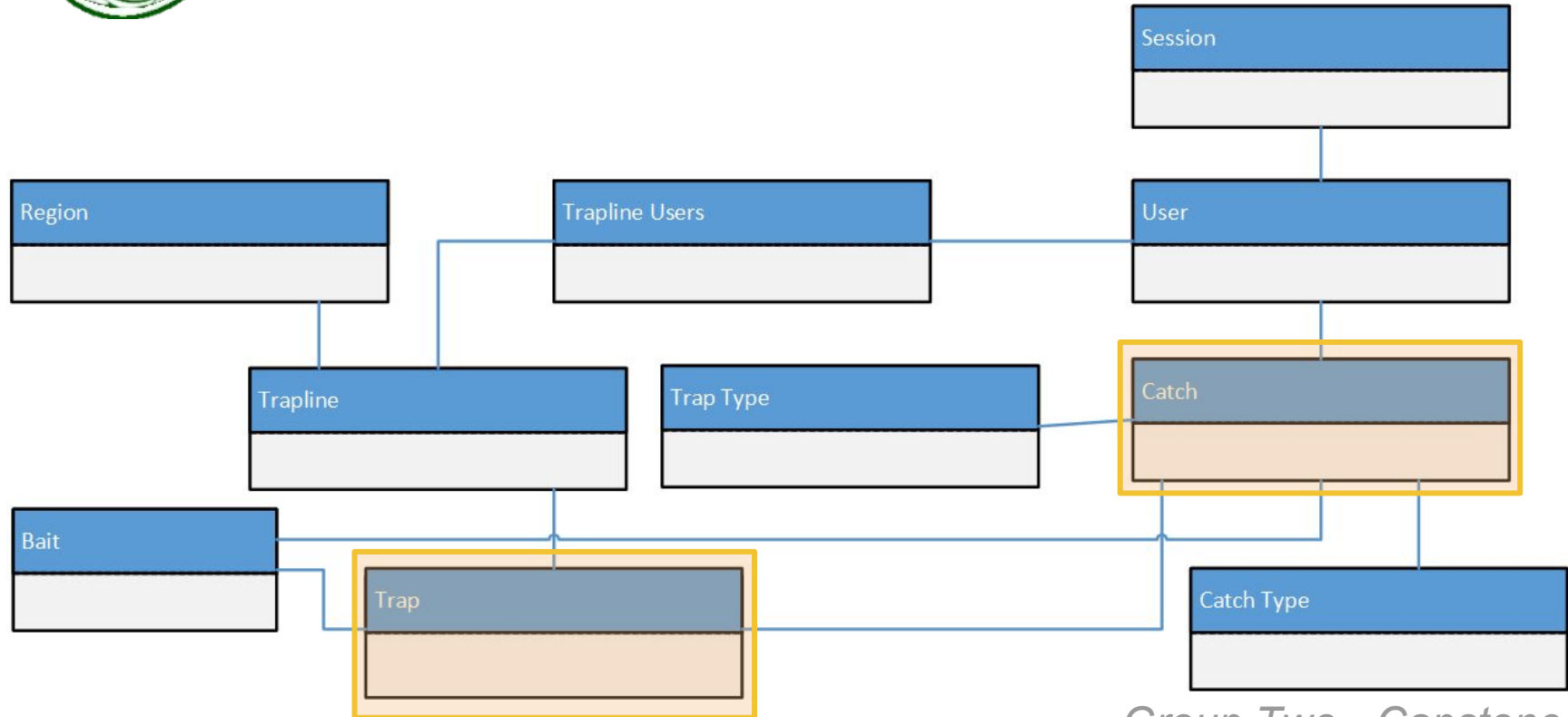
# HTTP REST Interface

- REpresentational State Transfer (REST)
- SQL Template dataset structure

REST Operation (CRUD)	HTTP method	SQL method
Create	POST	INSERT
Read	GET	SELECT
Update	PUT	UPDATE
Delete	DELETE	DELETE



# Entity Relationship Diagram





# Data Exporting

- Javascript Object Notation (JSON)
  - ◆ Lightweight
  - ◆ Portable
- Comma Separated Value (CSV)
  - ◆ Spreadsheet-compatible
- Parameterized filtering





# CSV Reports

catch-report-simple x

https://docs.google.com/spreadsheets/d/18UCZVWONZimAC\_nUoH8JoG4u0LdYO4as1HuK9I8t

catch-report-simple\_1477535727227

File Edit View Insert Format Data Tools Add-ons Help Last edit was seconds... Comments Share

fx Date

	A	B	C	D	E	F	G	H
1	Date	Trap	Catch					
2	26/10/2016		1 Hedgehog					
3	26/10/2016		1 Stoat					
4	26/10/2016		1 Stoat					
5	26/10/2016		2 Rat					
6	26/10/2016		2 Stoat					
7	27/10/2016		2 Rat					
8	27/10/2016		3 Hedgehog					
9	27/10/2016		4 Wild cat					
10								
11								

catch-report-annual\_1477571041282.csv - Excel

FILE HOME INSERT PAGE LAYOUT FORMULAS DATA REVIEW VIEW ADD-INS TEAM

Clipboard Font Alignment Number

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
	Region	Trapline	January	February	March	April	May	June	July	August	September	October	November	December			
1	Hawkes Bay	Hawkes Bay Reserve Track	0	0	0	0	0	0	0	0	5	5	0	0			
2	Hawkes Bay	Testing1	0	0	0	0	0	0	0	0	0	5	0	0			
3	Manawatu	Manawatu Gorge Tawa Loop	0	0	0	0	0	0	0	0	0	11	0	0			
4																	
5																	
6																	
7																	
8																	
9																	
10																	
11																	



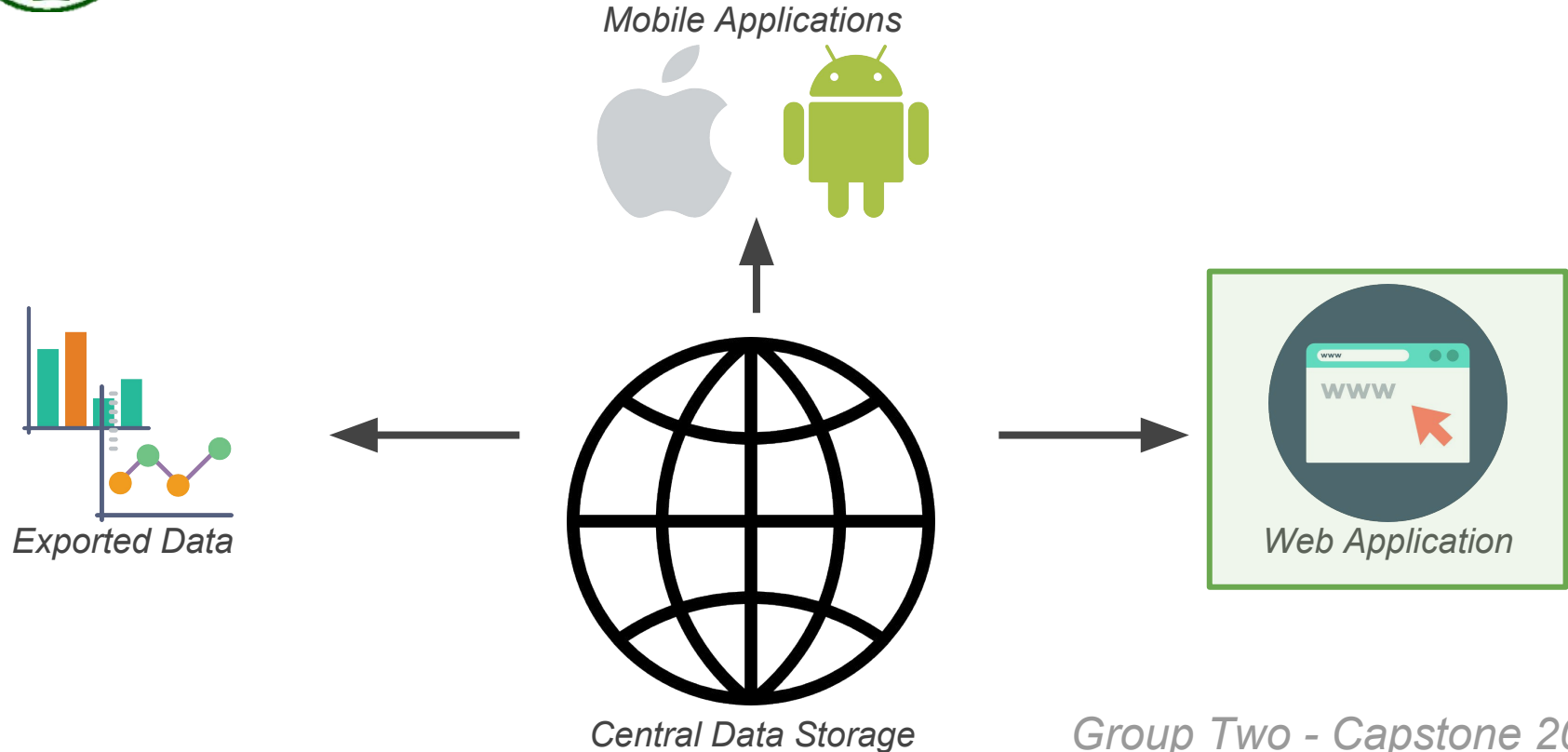


# Data Security

- Sessions and timeout
- HTTPS
- BCrypt password hashing
- Permissions model
  - ◆ User Administrators
  - ◆ Trapline Administrators
  - ◆ Volunteers



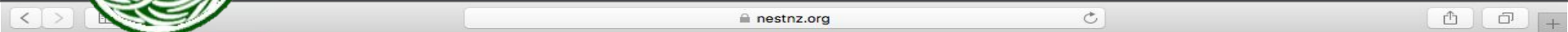
# Product Overview: WEB



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# Web Application



NEST NZ  
Ōhanga o Aotearoa

[About](#) [Mobile App](#) [Statistics](#) [Volunteer](#) [Contact](#) [Log In](#)



**Mobile Application**

**Data**

**Volunteers**

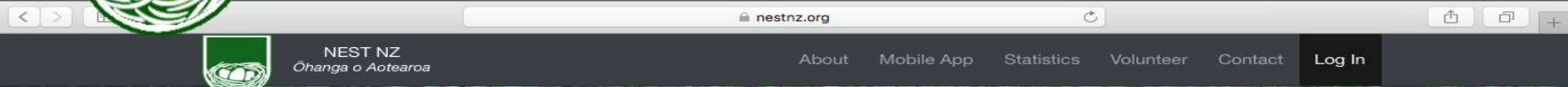


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# Web Application





# Challenges addressed by web

- Creating & Configuring Trapline
- Registering Users
- Visualising Information



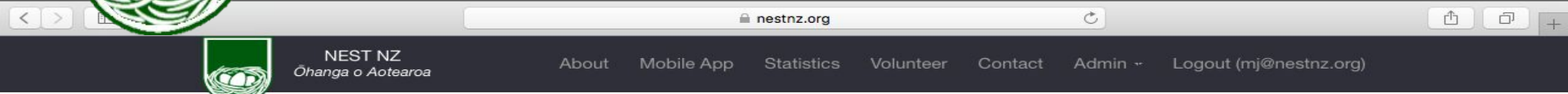
# Creating & Configuring Trapline

- Need a way for coordinators to manage traplines
- Can't be done on mobile - too small

**Solution:** A dynamic web interface for managing traplines via NestNZ web app



# Creating & Configuring Trapline



[Home](#) / [Admin](#)

## Available Regions

[+ Add Trap Line](#)

### Manawatu

Trapline Name	Start	End	Traps	Volunteers	Catch History	Action
Manawatu Gorge Tawa Loop	Ashhurst	Woodville	<a href="#">View</a>	<a href="#">View</a>	<a href="#">View</a>	<a href="#">Edit</a>
Manawatu Gorge (Stephens Data)	Ashhurst	Woodville	<a href="#">View</a>	<a href="#">View</a>	<a href="#">View</a>	<a href="#">Edit</a>

### Hawkes Bay

Trapline Name	Start	End	Traps	Volunteers	Catch History	Action
Hawkes Bay Reserve Track	Napier	Hastings	<a href="#">View</a>	<a href="#">View</a>	<a href="#">View</a>	<a href="#">Edit</a>
Testing1	TestBegin	TestEnd	<a href="#">View</a>	<a href="#">View</a>	<a href="#">View</a>	<a href="#">Edit</a>

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# Registering Users

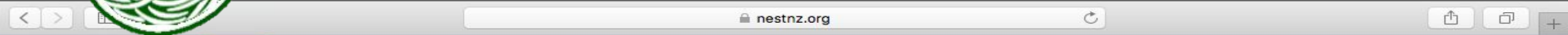
- Need a way for coordinators to give volunteers access to trapline data
- Don't want users to create their own accounts
  - ◆ Requires someone to approve accounts

**Solution:** Coordinators register new users & assign them to the trapline via NestNZ web app





# Registering Users - View Users



NEST NZ  
Ōhanga o Aotearoa

[About](#) [Mobile App](#) [Statistics](#) [Volunteer](#) [Contact](#) [Admin](#) [Logout \(mj@nestnz.org\)](#)

[Home](#) / [Admin](#)

## Users

[+ Add User](#)

Full Name	Email	Start Date	Permission	Trapline	Action
Master	admin@nestnz.org	25 October 2016	Admin	<a href="#">View Traplines</a>	<a href="#">Edit</a>
Sam Hunt	sam@nestnz.org	25 October 2016	Admin	<a href="#">View Traplines</a>	<a href="#">Edit</a>
Zoe Udy	zoe@nestnz.org	25 October 2016	Admin	<a href="#">View Traplines</a>	<a href="#">Edit</a>
MJ LEE	mj@nestnz.org	25 October 2016	Admin	<a href="#">View Traplines</a>	<a href="#">Edit</a>
Francis G	francis@nestnz.org	25 October 2016	Admin	<a href="#">View Traplines</a>	<a href="#">Edit</a>
Mr Test	test@example.com	25 October 2016	Volunteer	<a href="#">View Traplines</a>	<a href="#">Edit</a>

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# Registering Users - Add Trapline User

Browser address bar: nestnz.org

Page title: NEST NZ

Page header: Home / Admin

Modal title: View / Add Traplines for admin@nestnz.org

Modal title: View / Add Traplines

Available Traplines

Trapline	Start	End	Permission	Action
Hawkes Bay Reserve Track	Napier	Hastings	<input type="text"/>	<a href="#">Add</a>
Manawatu Gorge (Stephens Data)	Ashhurst	Woodville	<input type="text"/>	<a href="#">Add</a>

[Close](#)

User list (visible in background):

Name	Email	Date	Role	Action
MJ LEE	mj@nestnz.org	25 October 2016	Admin	<a href="#">View Traplines</a> <a href="#">Edit</a>
Francis G	francis@nestnz.org	25 October 2016	Admin	<a href="#">View Traplines</a> <a href="#">Edit</a>
Mr Test	test@example.com	25 October 2016	Volunteer	<a href="#">View Traplines</a> <a href="#">Edit</a>



# Visualising Information

- Easy way to view the information stored
- Don't want to import data into Excel every time!
- Mobile screens are too small to view these information

**Solution:** Historical Catch Data & Trap coordinates via NestNZ web app

# Visualising Data - View History



nestnz.org

## Catch History

### Manawatu

#### Manawatu Gorge Tawa Loop

Trap	Catch	Date
1	Hedgehog	26 October 2016
1	Stoat	26 October 2016
1	Stoat	26 October 2016
2	Rat	26 October 2016
2	Stoat	26 October 2016
2	Rat	27 October 2016
3	Hedgehog	27 October 2016
4	Wild cat	27 October 2016

Close

Export

Testing1

TestBegin

TestEnd

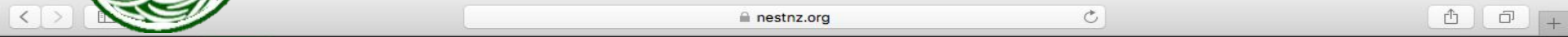
View

View

Group Two - Capstone 2016



# Visualising Data - View Map



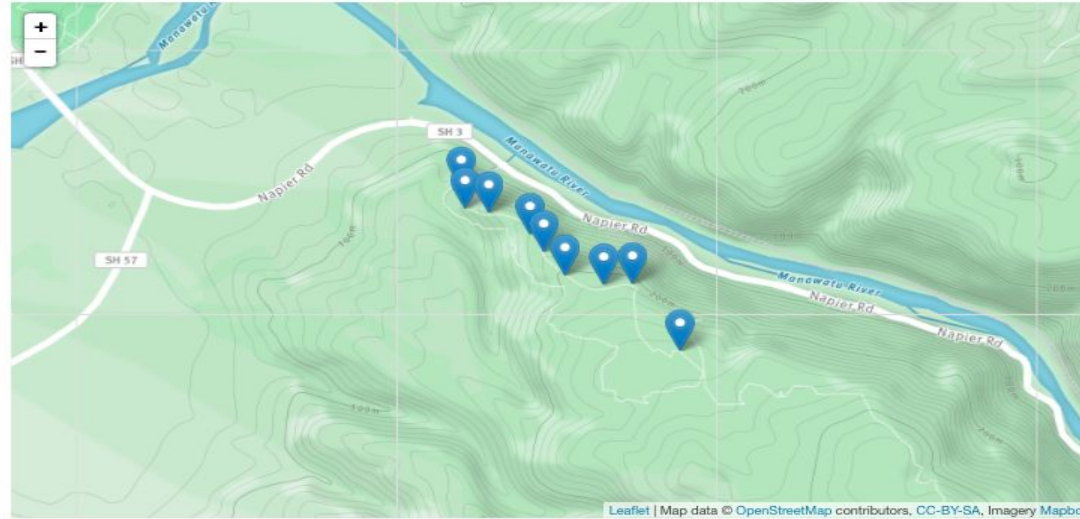
NEST NZ

Ohau

Admin

mj@nestnz.org)

## Manawatu Gorge Tawa Loop Traps



Close

175.777347 E

8

-40.312105 N

active

25 October 2016

25 October 2016

175.778328 E

9

-40.314206 N

active

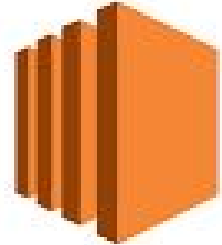
25 October 2016

25 October 2016

Group Two - Capstone 2016



# Technology



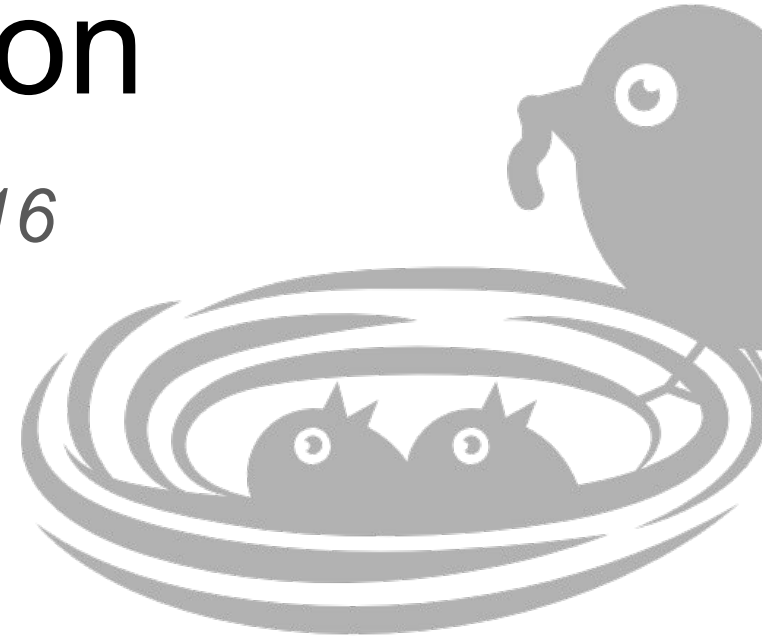
Amazon EC2

- Web Structure - AngularJS JavaScript framework
- Web design - Bootstrap CSS framework
- Web automation testing - Selenium testing tool
- Amazon Web Service EC2


















# Conclusion

*Capstone 2016*





# The Future

- ☐ ⓘ **GPS testing using different mobile devices** core Report/Presentation   3  
#140 opened 17 days ago by ZoeUdy  Final Report
- ☐ ⓘ **Support dataset pre-parsing and caching in memory.** API enhancement future development  2  
#138 opened 17 days ago by samhunt0
- ☐ ⓘ **Sensitivity when pressing buttons** App future development usability   4  
#134 opened 18 days ago by MrMJLee
- ☐ ⓘ **Support image storage/retrieval with AWS S3 buckets** App enhancement future development Web   9  
#129 opened 19 days ago by samhunt0
- ☐ ⓘ **Modifying a trap record's location should transparently create new.** API enhancement   4  
#115 opened 20 days ago by samhunt0  Final Release
- ☐ ⓘ **Modify catch option** App enhancement future development usability   4  
#113 opened 20 days ago by FrancisG-Massey
- ☐ ⓘ **App logout** App future development   5  
#92 opened 21 days ago by ZoeUdy





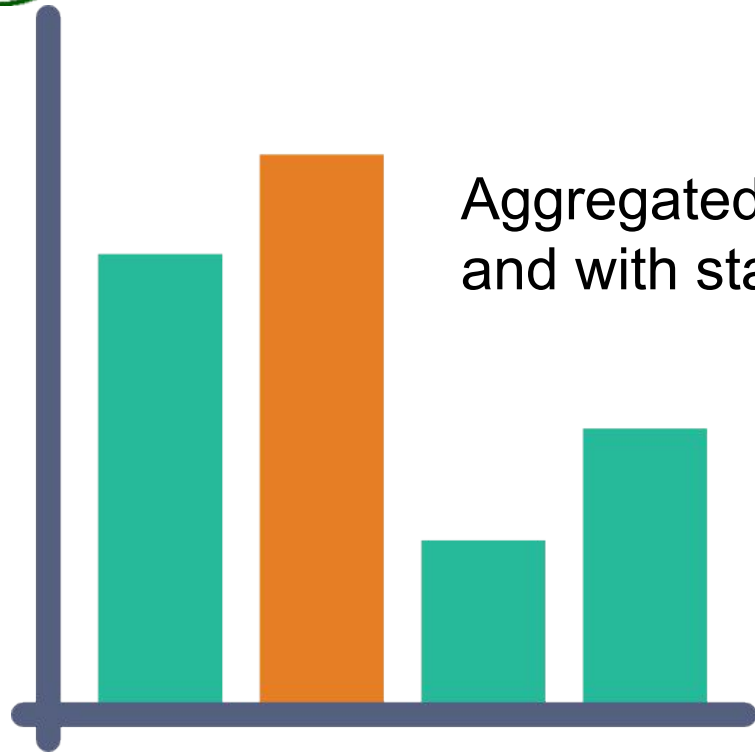
## The Future

*"Open source project  
in everyday use by  
DOC volunteers"*

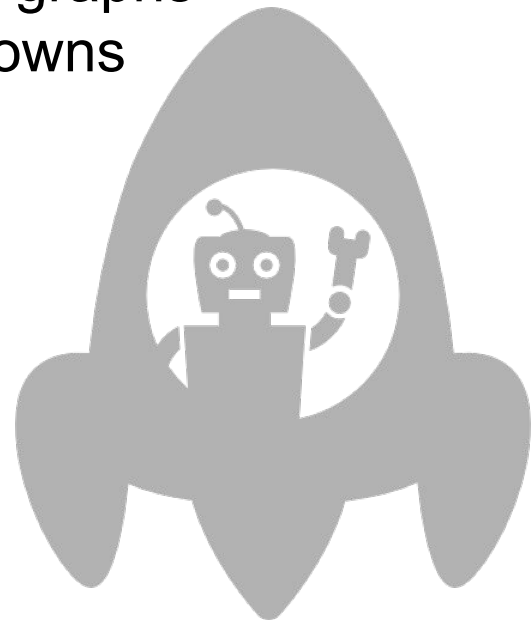




# The Future

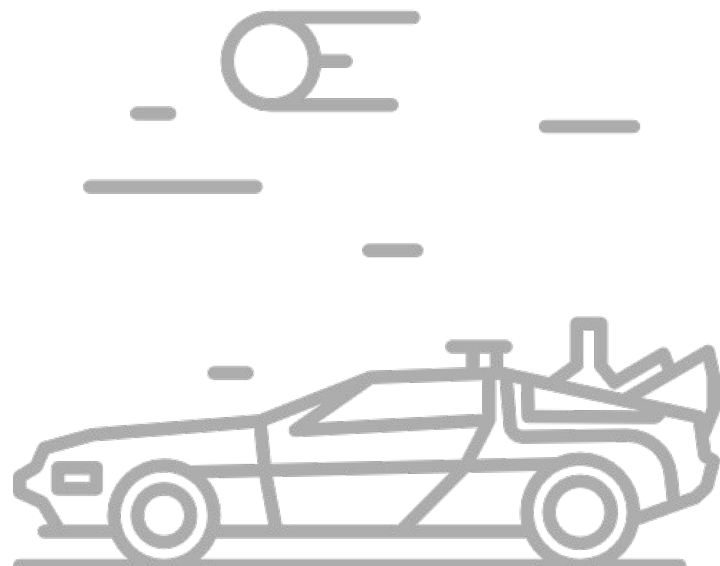
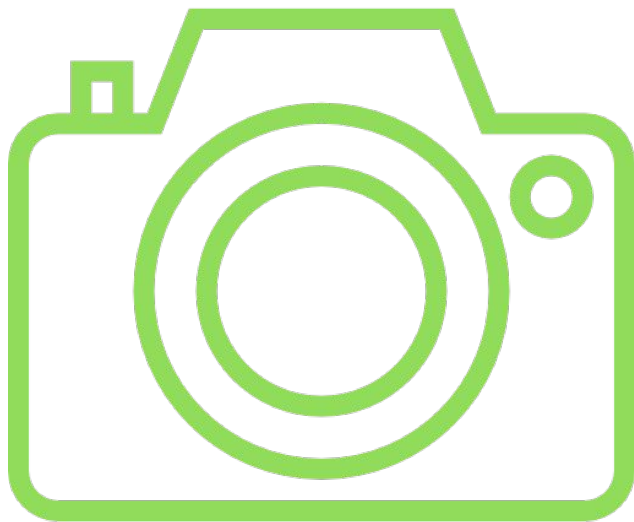


Aggregated data shown in graphs  
and with statistical breakdowns



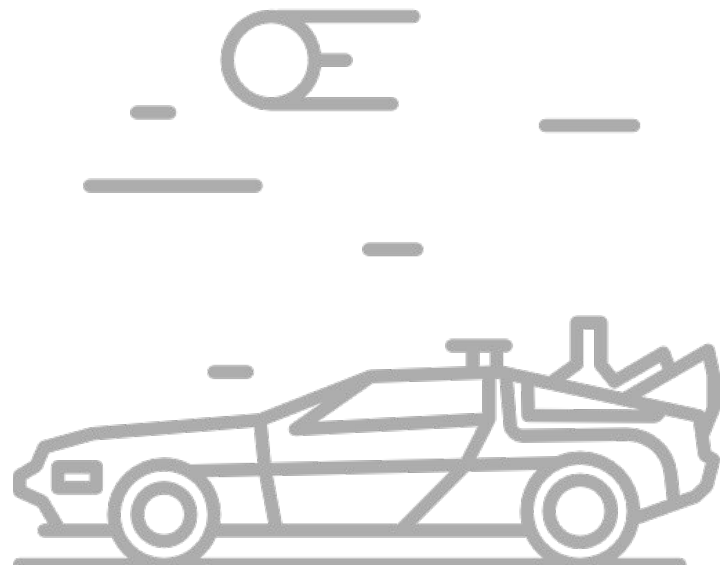
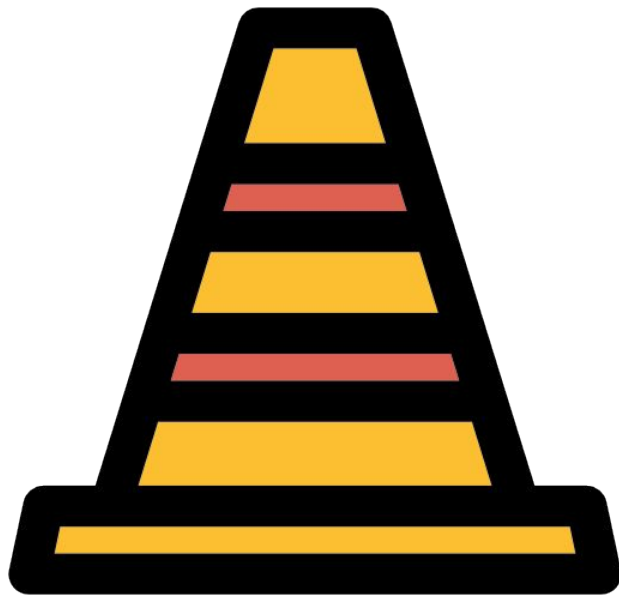


# The Future





# The Future



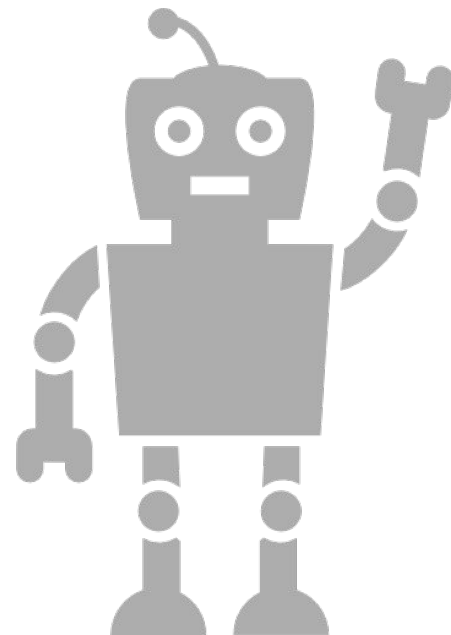


# The Future

Audio capture to support:



THE  
Cacophony  
PROJECT





# Project Nest

*Capstone 2016*

**Questions?**

