

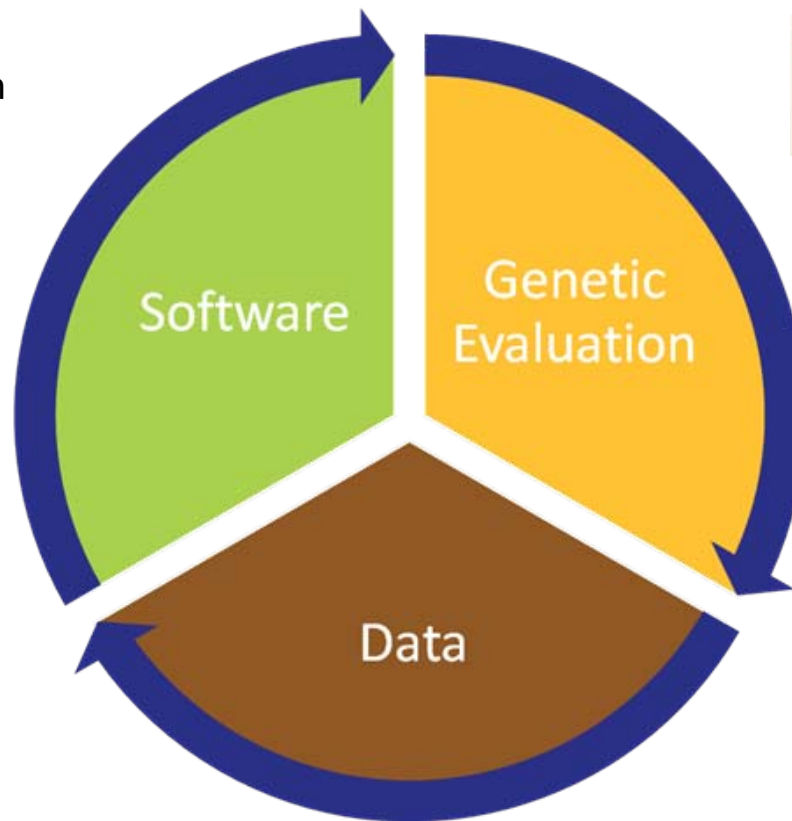


# Mating data capture

ICAR Annual Conference  
Tony Francis

# DataGene Overview

Herd Improvement  
Industry Software from  
HICO (MISTRO)

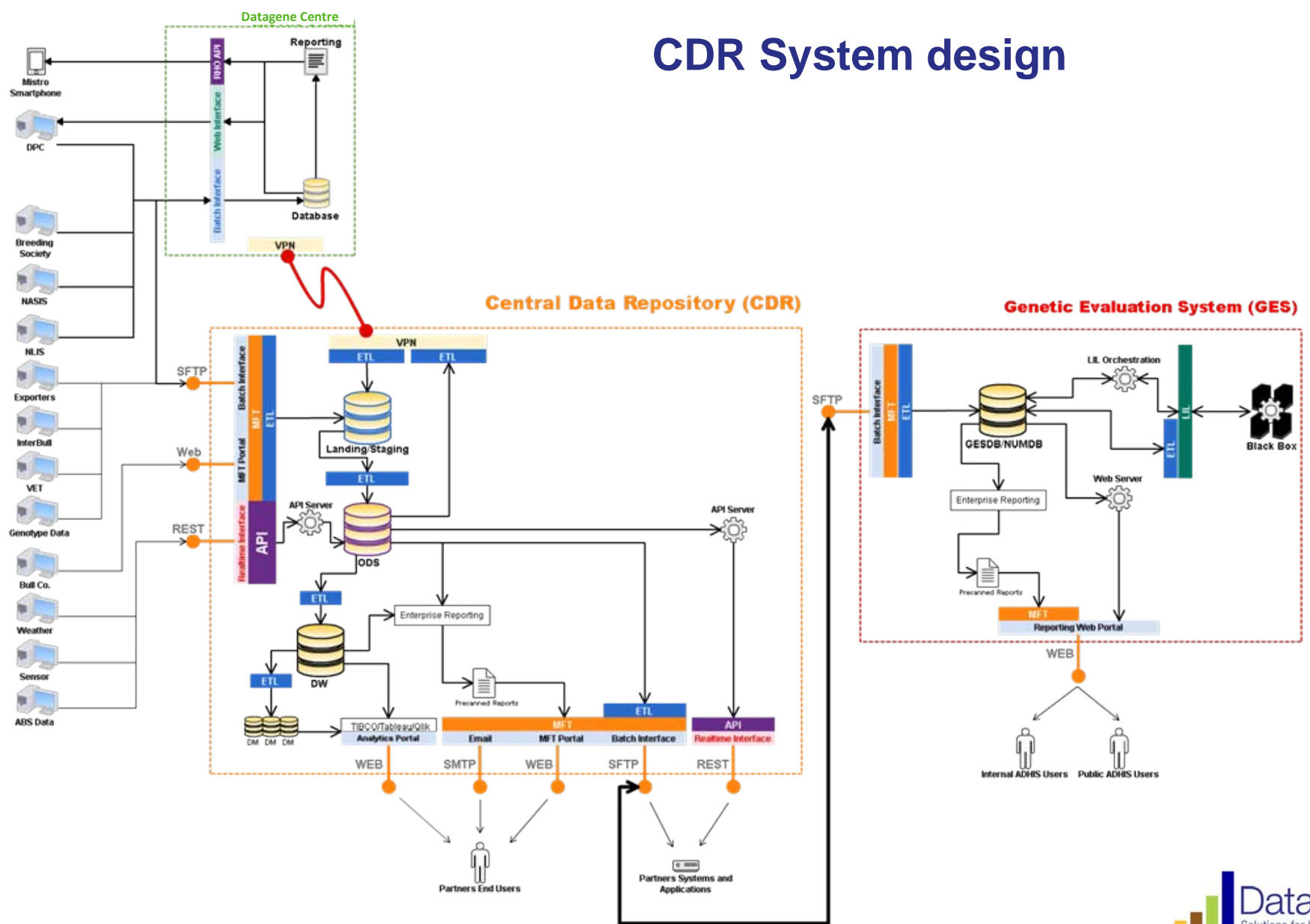


Central Data  
Repository

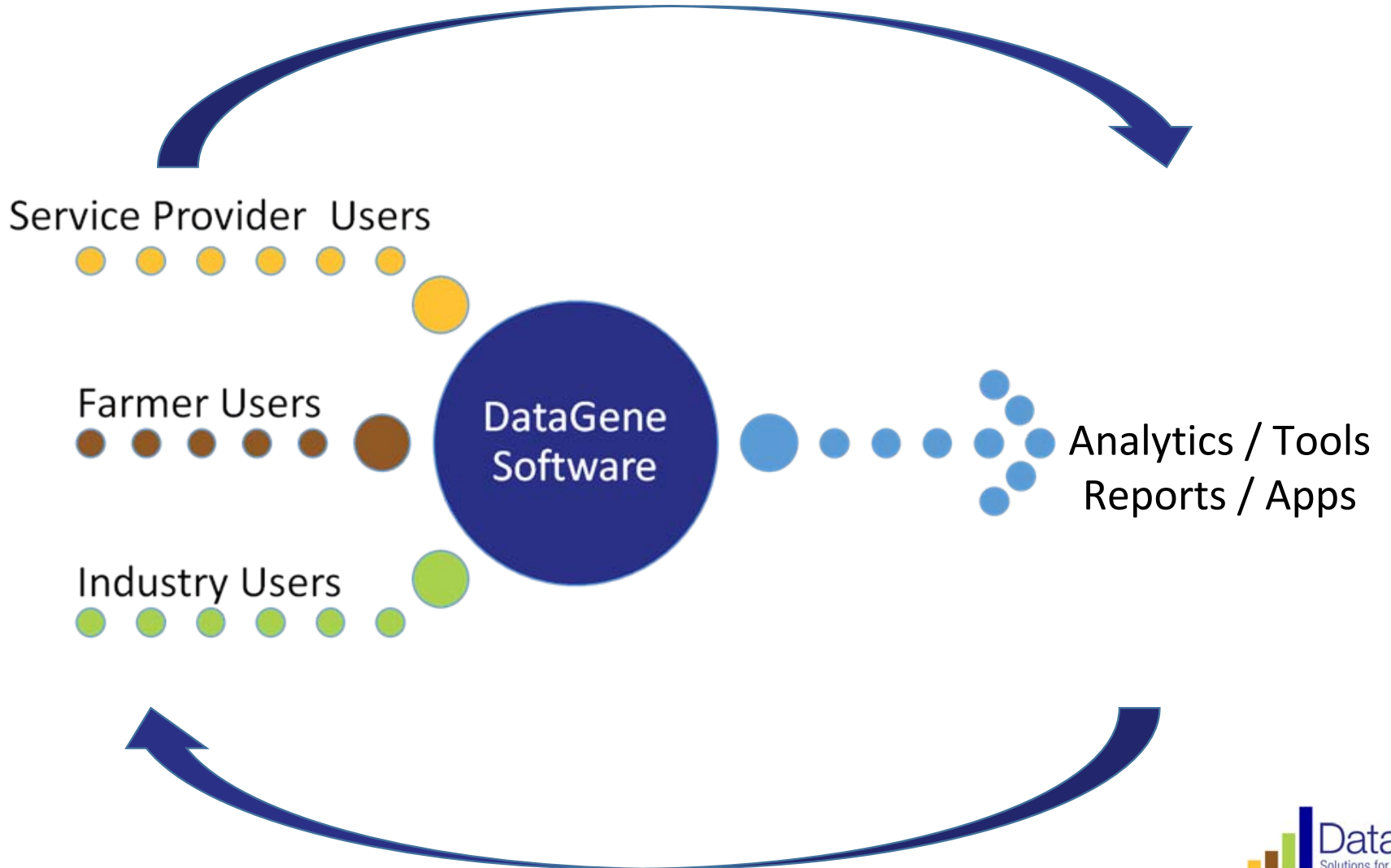
# Members



# CDR System design



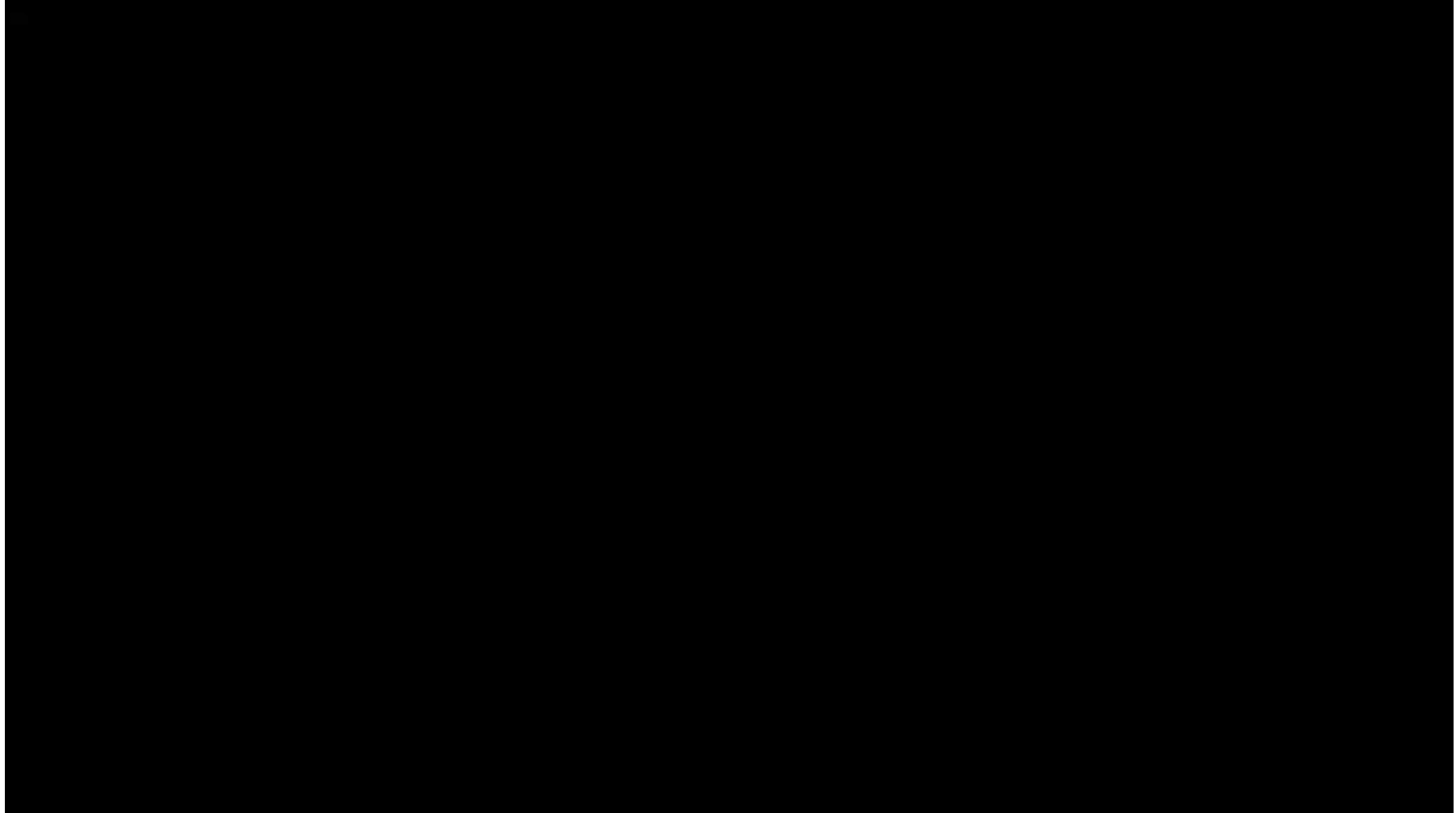
# Decision Support Tool Development



# HerdData App



# The challenge





# Project Scope

Using voice activated offline data capture

- ▶ Cow side mating data capture
- ▶ Metadata: Cow ID, Bull common name, Date, Farm ID, Technician ID
- ▶ Voice recognition in a noisy, wet and dirty environment
- ▶ Electronic AI docket
- ▶ Send request for artificial insemination services to the service provider





# Voice activated data capture

- ▶ Target Audience
  - ▶ AI Techs & farmers
- ▶ End User Engagement
  - ▶ Visited farms
  - ▶ Observed Sync Programs
  - ▶ Consulted with AI providers
  - ▶ Interviewed technicians and farmers
- ▶ Current methodology
  - ▶ Cow ID and Bull ID manually recorded on paper



# Scenarios

- ▶ Farmers know the cows on heat and the technician only knows the number of cows on heat - AI dockets can be pre-populated
- ▶ Technician knows the bull names beforehand and keeps a stock of straws for the farmer
- ▶ Farmer orders the inventory with the service provider, and stores the straws on his farm

COW NO.	BULL	NO.	COW NO.	BULL
1 4123	INT. CLASS	16		
2 4118	KINGPIN	17		
3 4118		18		
4 4118	CASPIAN	19		
5 4118		20		
6 4118		21		
7 4118		22		
8 4118		23		
9 4118		24		
10 4118		25		
11 4118		26		
12 4118		27		
13 4118		28		
14 4118		29		
15 4118		30		

# Voice activated data capture

- ▶ Solution: Online/Offline resources
  - ▶ Data capture at the time of insemination
  - ▶ Mobile application having speech recognition capabilities
  - ▶ Keywords trained as commands for the recognition
- ▶ Features
  - ▶ Offline Speech detection
  - ▶ Integrate with the existing systems
  - ▶ Separate application for farmers and technicians

# Technical framework

- ▶ Programming Languages
  - ▶ Android – Java
- ▶ Databases
  - ▶ SQLite
  - ▶ MySQL
  - ▶ SQL Server
- ▶ Pocket Sphinx
  - ▶ Benefits
    - ▶ Lightweight / Free / Offline capability
  - ▶ Downsides
    - ▶ Accuracy Issues
  - ▶ Functionality
    - ▶ Language model mode / Keyword phrase mode / Grammar mode

# Challenges

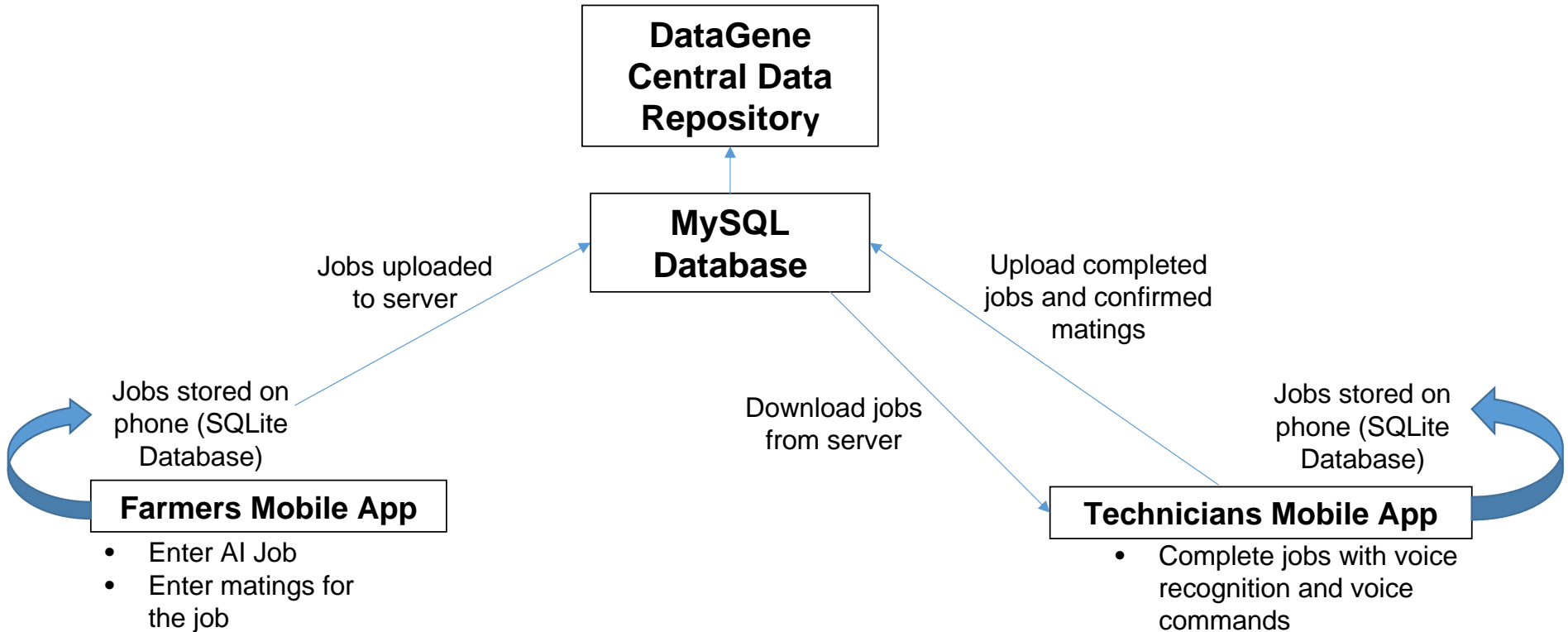
## Functional:

- ▶ Noisy, wet, dirty environment
- ▶ Bull common names have similar matches
- ▶ Users accents

## Technical:

- ▶ Native vs Hybrid
- ▶ Programming language: C# .NET and Java/Swift 3
- ▶ Accuracy of offline speech recognition library

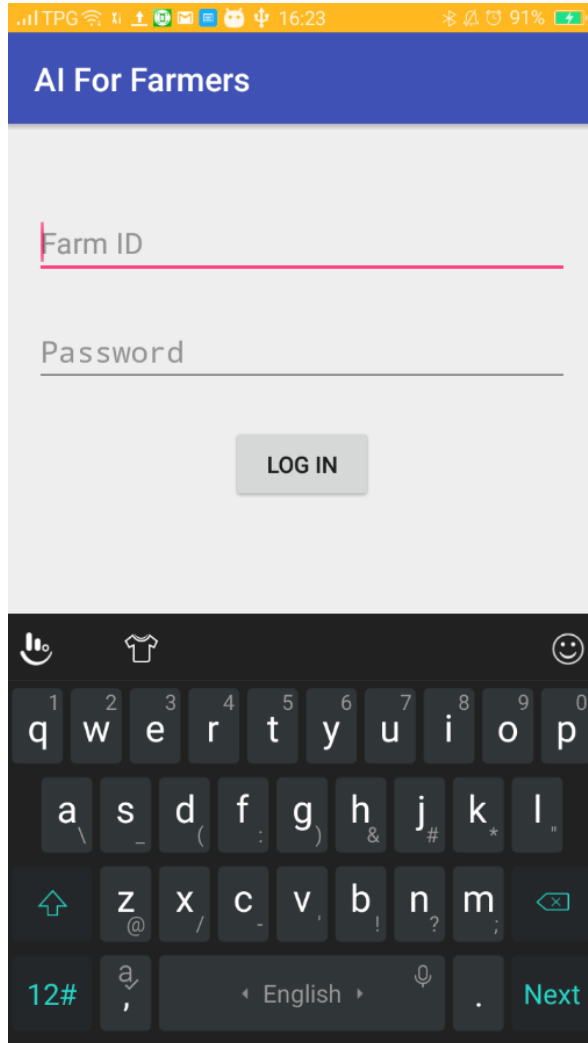
# AI Android Application Data Flow



# Farmer App



# Farmer Login Activity

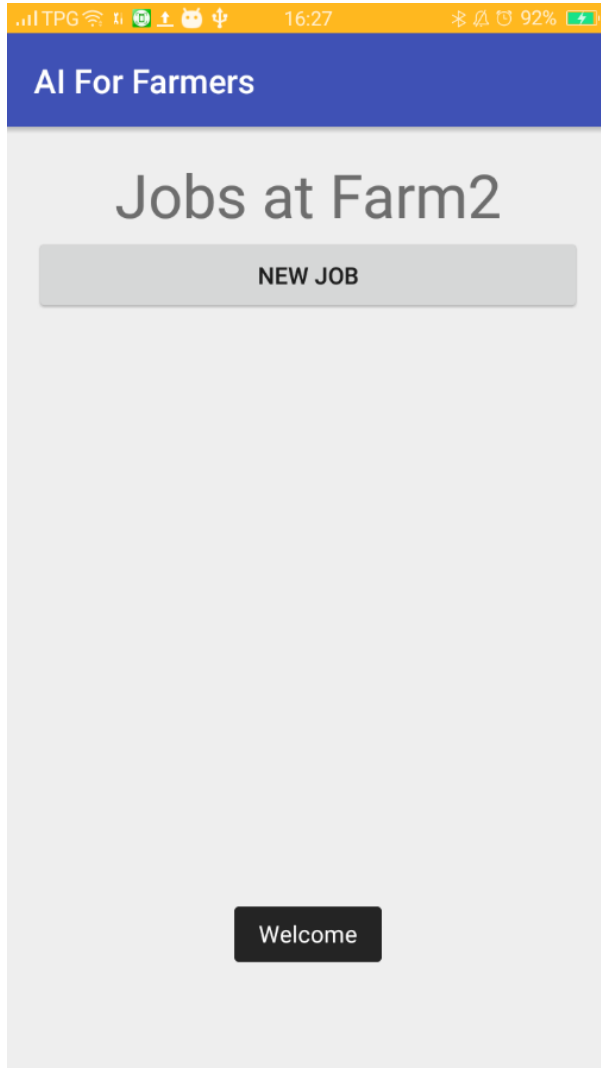


- ▶ LOG IN click.
- ▶ Connects with MySQL database.
- ▶ Runs authentication process.

**Farm Table**

<<T>>			Farm_Id	FarmPass	Farm_Name
			3	Password	Cohuna Farm
			2	Password	Farm1

# Jobs List Activity



- ▶ Checks MySQL database for jobs.
- ▶ Displays jobs as a list.
- ▶ Currently there are no jobs for this farm.
- ▶ NEW JOB click starts the New Job Activity.

TPG 16:28 92%

## AI For Farmers

New Job on Farm 2

15-02-2017

Choose your AI Company...

ADD SEND JOB

Cow Bull

1234 4567 9966 5643 1144

christmas christmas goldcrest westgate goldcrest

Next

# New Job Activity

- ▶ Electronic AI docket.
- ▶ Select Date, AI Company & matings.
- ▶ SEND JOB click uploads the job info and mating list.

TPG 16:31 92%

## AI For Farmers

New Job on Farm 2

15-02-2017

Wellbred Genetics

ADD SEND JOB

Cow Bull

1234 4567 9966 5643 1144

christmas christmas goldcrest westgate goldcrest

# New Job Activity

TPG 16:33 93%

AI For Farmers

## Jobs at Farm2

NEW JOB



Job No. 36

15-02-2017











Job has been sent

- Jobs list is now updated with new job.
- Jobs and matings tables have been updated.

## Jobs Table

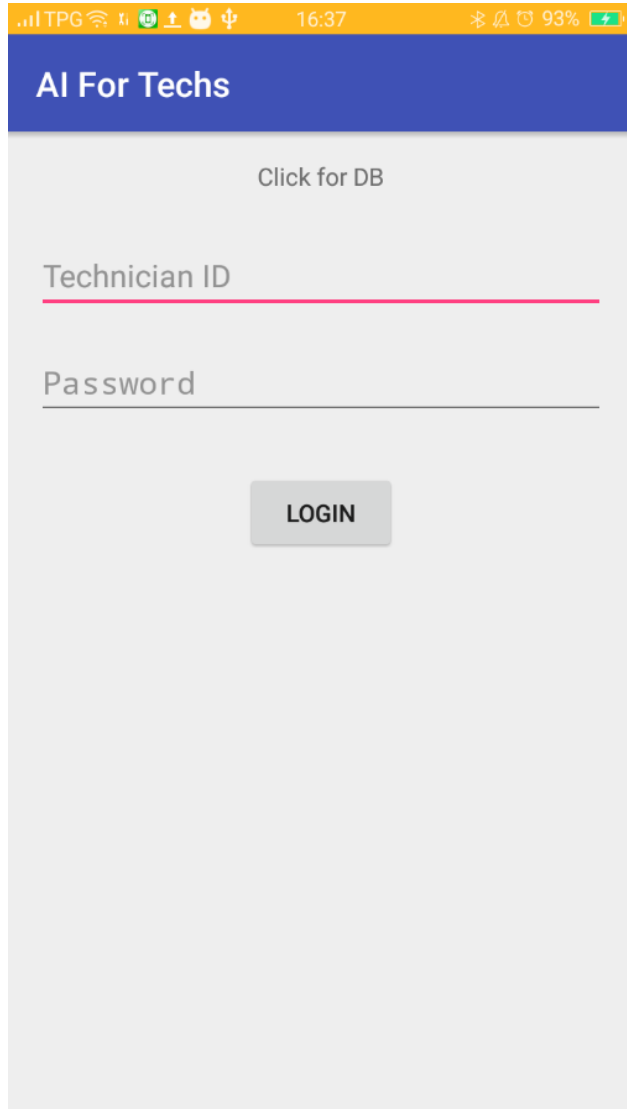
«T»	Job_Id	Farm_Id	Complete	Tech_Id	AI_Company_Id	Date
<input type="checkbox"/>  	36	2	0	NULL	1	15-02-2017

## Matings Table

«T»	Mating_Id	Cow_Id	Bull_Id	Job_Id	Tech_Id	AI_Company_Id
<input type="checkbox"/>  	63	1234	christmas	36	NULL	NULL
<input type="checkbox"/>  	64	4567	christmas	36	NULL	NULL
<input type="checkbox"/>  	65	9966	goldcrest	36	NULL	NULL
<input type="checkbox"/>  	66	5643	westgate	36	NULL	NULL
<input type="checkbox"/>  	67	1144	goldcrest	36	NULL	NULL

# AI Technician's App





# Technician Login Activity



The screenshot shows a mobile application interface for technician login. At the top, there is a status bar with various icons and the time 16:37. Below the status bar is a blue header with the text "AI For Techs". Under the header, there is a button labeled "Click for DB". Below this, there are two input fields: "Technician ID" and "Password". At the bottom, there is a button labeled "LOGIN".

- ▶ Connects to MySQL database.
- ▶ Runs authentication process.
- ▶ User info stored for fast-login.

**Tech Table**

«T»			Tech_Id	Company_Id	First_Name	Last_Name	Password
<input type="checkbox"/>			1	1	Sam	Mc	Password
<input type="checkbox"/>			2	3	John	Johnson	Password

# Technician Job List Activity

TPG 16:40 94%

AI For Techs

Wellbred Genetics Jobs

Job No. 36



Date: 15-02-2017

Farm No: 2











LOG OUT

- ▶ Jobs List loaded from MySQL.
- ▶ Jobs & Matings saved to SQLite for offline viewing.
- ▶ Job list loaded from SQLite if no internet connection.

## Jobs Table

«T»	Job_Id	Farm_Id	Complete	Tech_Id	AI_Company_Id	Date
<input type="checkbox"/>  	36	2	0	NULL	1	15-02-2017

## Matings Table

«T»	Mating_Id	Cow_Id	Bull_Id	Job_Id	Tech_Id	AI_Company_Id
<input type="checkbox"/>  	63	1234	christmas	36	NULL	NULL
<input type="checkbox"/>  	64	4567	christmas	36	NULL	NULL
<input type="checkbox"/>  	65	9966	goldcrest	36	NULL	NULL
<input type="checkbox"/>  	66	5643	westgate	36	NULL	NULL
<input type="checkbox"/>  	67	1144	goldcrest	36	NULL	NULL



# Select Job Type

The screenshot shows a mobile application interface. At the top, a status bar displays 'TPG', signal strength, time '16:43', and battery level '94%'. Below this is a dark blue header with the text 'AI For Techs'. The main content area has a grey background and displays 'Wellbred Genetics Jobs', 'Job No. 36', 'Date: 15-02-2017', and 'Farm No: 2'. A white dialog box is overlaid on the screen, titled 'Select AI Program'. It contains two radio button options: 'NORMAL' (which is selected) and 'SYNC PROGRAM'. At the bottom of the dialog are two buttons: 'CANCEL' and 'OK'.

- ▶ Normal: Tech reads out a cow number, mobile reads out bull.
- ▶ Sync Program: Tech reads out Bull of the Day, followed by the cows.
- ▶ Also supports multiple bulls of the day.

# Voice Recognition Activity

TPG 16:44 94%

## AI For Techs

### Preparing the recognizer

START VOICE RECOGNITION

Cow Id	Bull Id
1234	christmas
4567	christmas
9966	goldcrest
5643	westgate
1144	goldcrest

- ▶ Pocket Sphinx Voice Recognition API.
- ▶ No internet connection required.
- ▶ Mating list loaded from SQLite database.
- ▶ Grammar files are created for herd and bull list.

# Voice Recognition Activity

TPG 09:32 88%

## AI For Techs

### SAY YOUR OPTION

DONE

Cow Id		westgate	
1234	christmas	1234	christmas
4567	christmas	4567	christmas
9966	goldcrest	9966	goldcrest
5643	westgate	5643	westgate
1144	goldcrest	1144	goldcrest

- ▶ Matings saved to Confirmed Matings table in SQLite as cow numbers are read out.
- ▶ Commands
- ▶ “ASSIGN BULL” – for entering Bull of the Day (Sync Program).
- ▶ “ASSIGN COW” – for entering cow numbers.

# Review Activity

TPG 09:32 88%

## AI For Techs

### Review

**FINISH**

Job Id 36

Farm Id 2



Tech Id 1

Company Id 1











1234	christmas
4567	christmas
9966	goldcrest
5643	westgate
1144	goldcrest

- ▶ For manual changes.
- ▶ On FINISH click, job is uploaded to the Completed Jobs in MySQL and deleted from the Jobs table.
- ▶ Mating list is uploaded to Confirmed Matings and deleted from Mating table.

## Completed Jobs Table

«T»	Job_Id	Farm_Id	Tech_Id	AI_Company_Id	Date
<input type="checkbox"/>  	36	2	1	1	15-02-2017

## Confirmed Matings Table

«T»	Mating_Id	Cow_Id	Bull_Id	Job_Id	Farm_Id	Tech_Id	AI_Company_Id	Date
<input type="checkbox"/>  	57	1144	goldcrest	36	2	1	1	15-02-2017
<input type="checkbox"/>  	56	5643	westgate	36	2	1	1	15-02-2017
<input type="checkbox"/>  	54	4567	christmas	36	2	1	1	15-02-2017
<input type="checkbox"/>  	55	9966	goldcrest	36	2	1	1	15-02-2017
<input type="checkbox"/>  	53	1234	christmas	36	2	1	1	15-02-2017

# The first alpha version





Thank you

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