An Roinn Talmhaíochta,
Bia agus Mara
Department of Agriculture,
Food and the Marine

Strategic Analytics in the Department of Agriculture, Food and the Marine

Catherine Dempsey, Data Management & Analytics, DAFM

Overview of Agri-food Sector

•137,000 farms producing over €8 billion in output

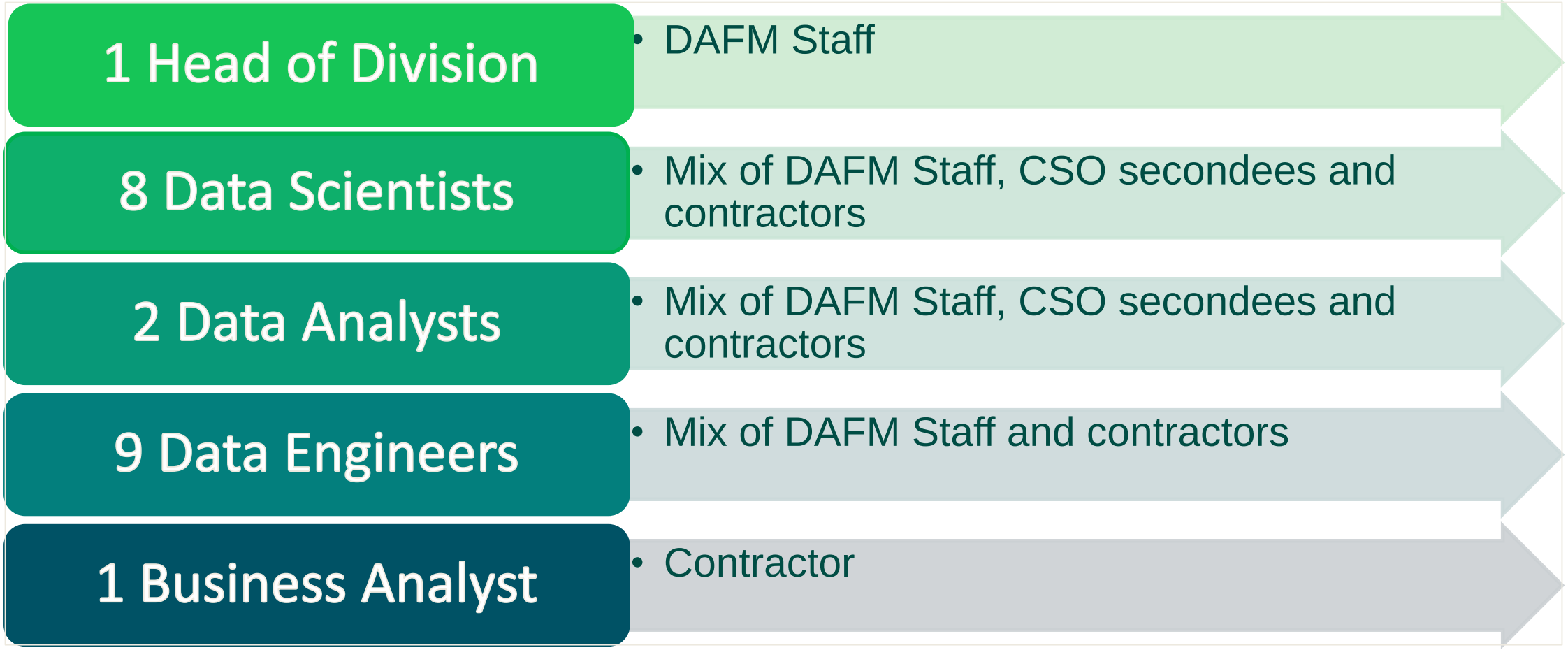
770,000 hectares of forest

Over 2,000 fishing vessels & aquaculture sites

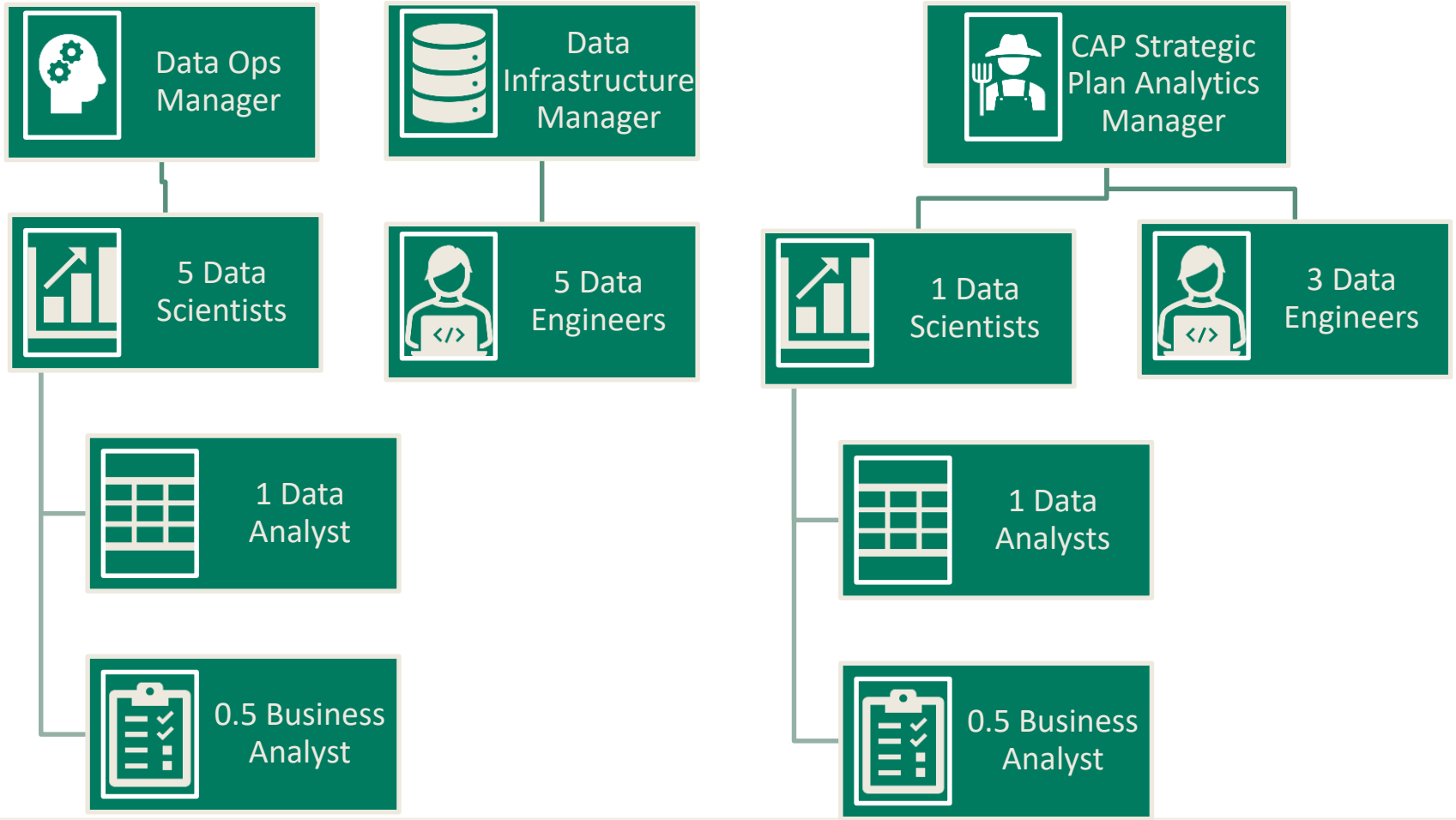
Agri-food sector employed over 163,600 people, 7.1% of total employment, in 2020

Data management & Analytics team

Division structure



Team structure



Data Ops

Business Understanding

Business case is drafted and approved and put into back log

Data Understanding

Functional Requirements gathering

Data Engineering

Pre-Ingestion

Data Ingestion

Data Transformation

Data Publication

Analtyical Development

Clean Data

Feature Engineering

Dashboard/ Model Development

Evaluation

Dashboard/Model UAT

Dashboard/Model PROD

Pilot

Deploy

QA log and Testing completed

Dependencies tested

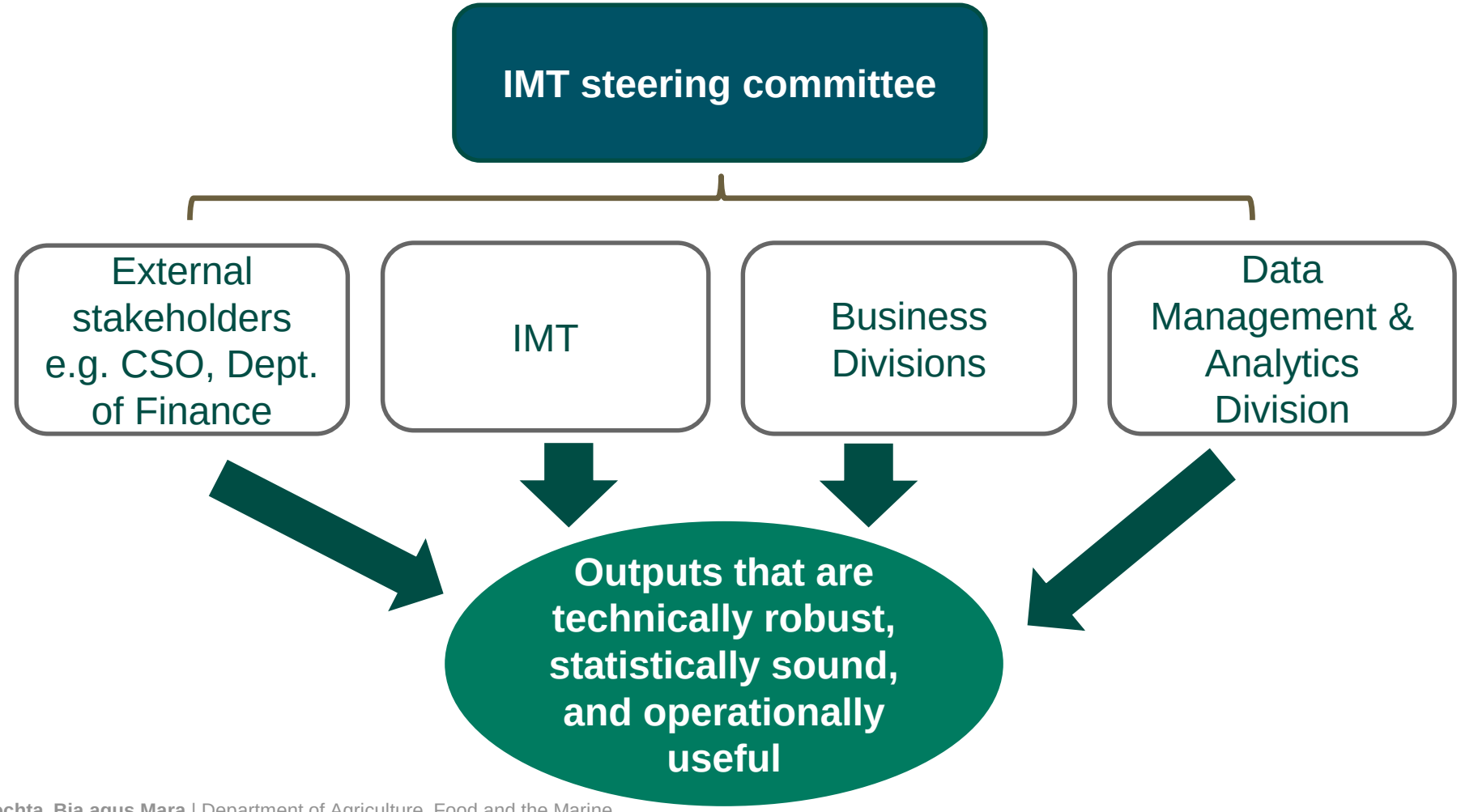
Training

Documentation published

Monitor and logging

monitor product in live environment

Strong governance ensures IT, operations, and analytics work together effectively to manage advanced analytics projects



Sources of Data in DAFM

Sources of Data in Agricultural Departments

Information from customers

- Registration, Central Customer DataBase
- Application forms, testing data, Animal tag data
- Customer contacts (Photographic data, telephone contacts, letters)

Information from third parties

- Government departments (e.g. CSO, OSI, Teagasc, EPA)
- Private sector (e.g. Abattoirs, Milk Processors, Shipping companies)

DAFM generated information

- Created from our activities (e.g. inspection results, test results, export certs issued)
- Derived data from other sources (e.g. Model scores, statistical data)
- Information about us (e.g. salaries, human resources data)

➢ **Structured or unstructured?**

Data Sources

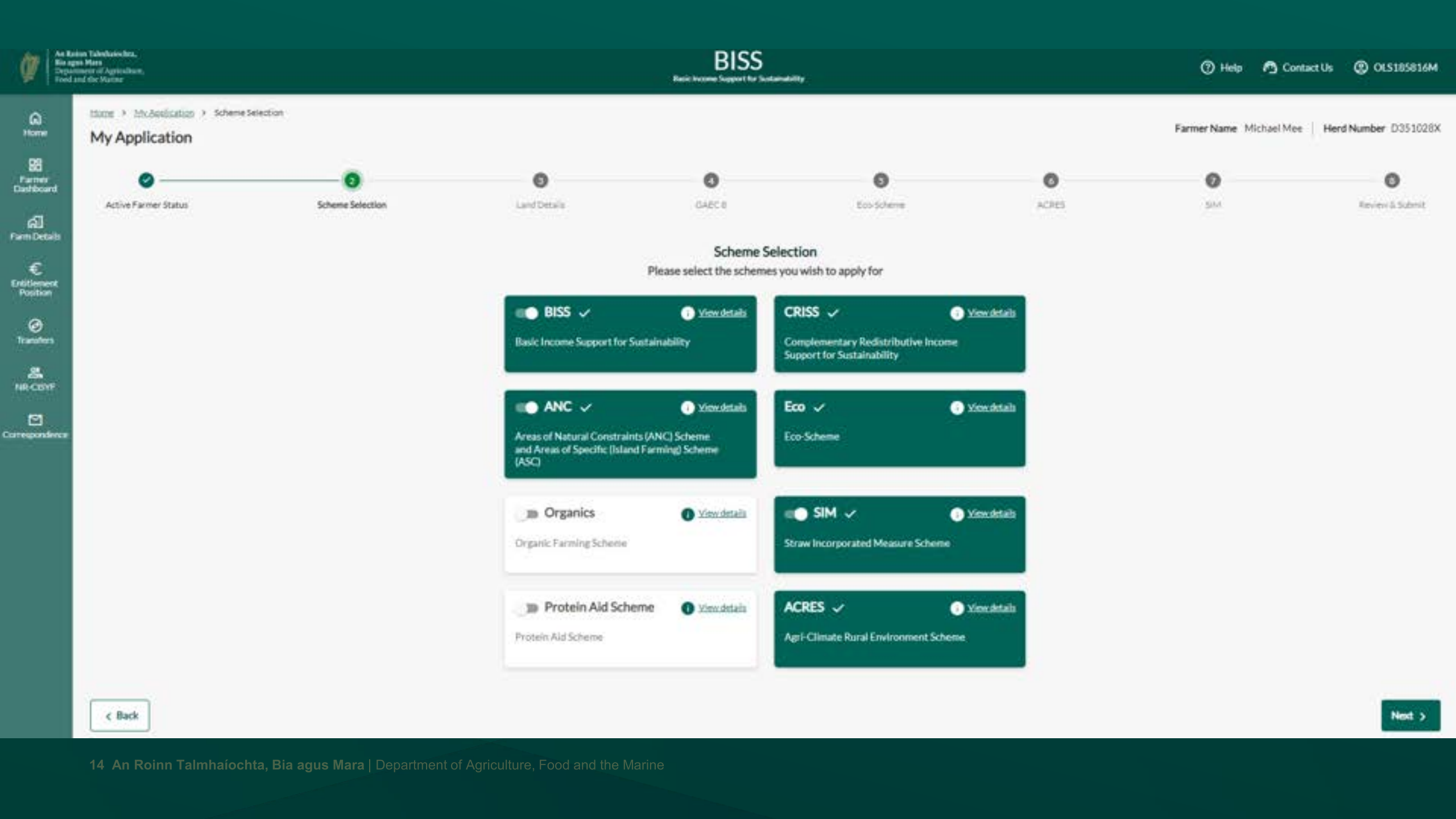
	Structured	Unstructured
Characteristics	• Data is consistently and clearly labelled • Easy to organise into tables or relational databases	• Data not clearly labelled so hard to tell which items correspond • Difficult to organise into tables or relational databases
Examples	• Scheme Applications, Nitrogen returns • These forms have many fields with categorised or numeric data	• Customer letters • Aerial/ satellite photos • Land parcel shapes

Additional sources of large volumes of **unstructured data**

- Voice (phone)
- Maps
- Free text (letters, email, web-chat etc.)
- Customer notes

372
21 -10597
50450
372
21 -10597
50450

75X5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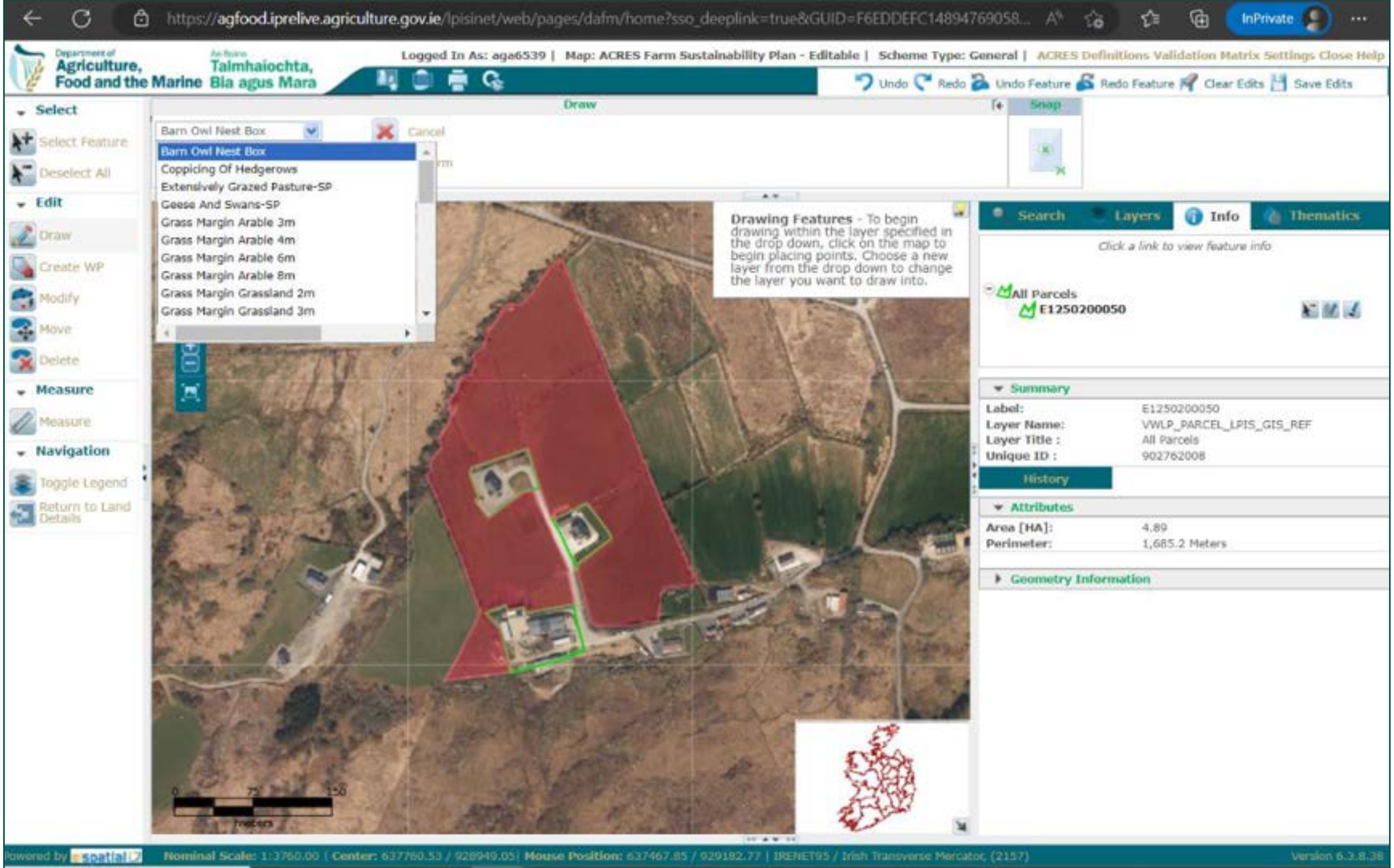
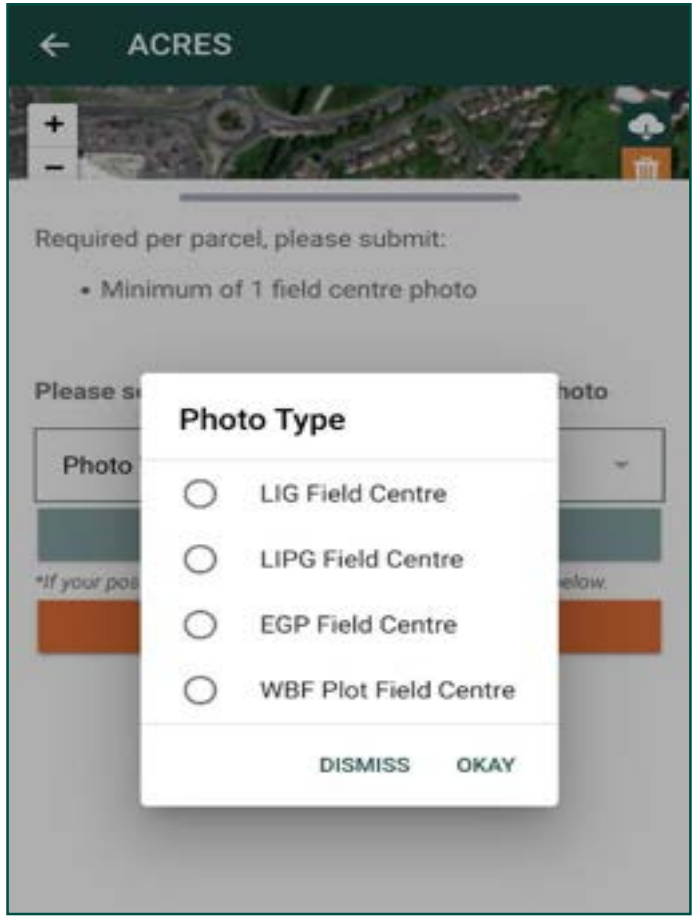
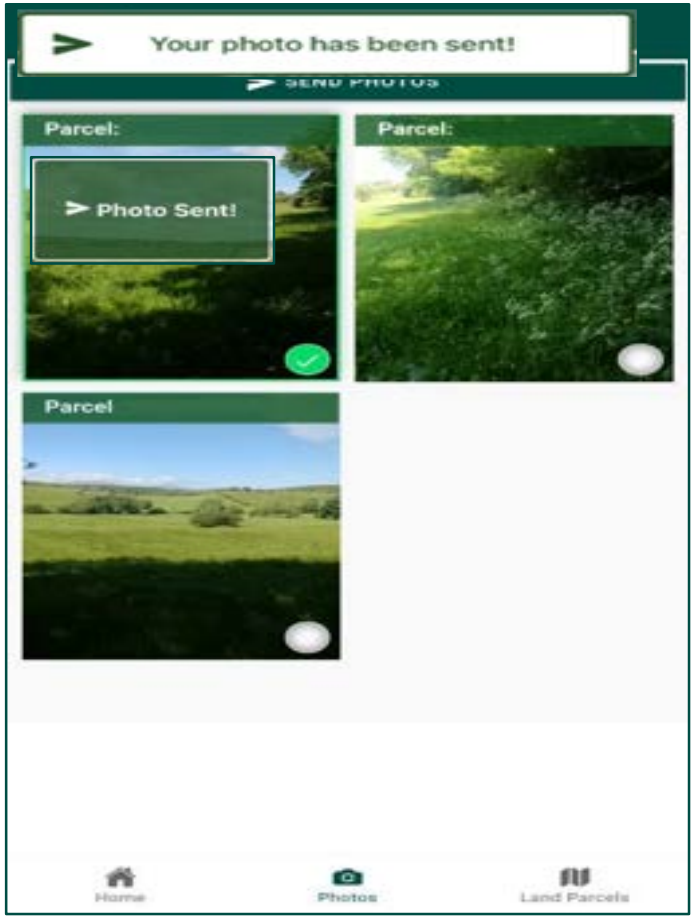
Department of Agriculture, Food and the Marine
BISS
Basic Income Support for Sustainability
Help
Contact Us
OLS185816M
Home
Farmer Dashboard
Farm Details
Entitlement Position
Transfers
NR-CSYP
Correspondence
Home > My Application > Scheme Selection
My Application
Farmer Name Michael Mee | Herd Number D351028X
Active Farmer Status
Scheme Selection
Land Details
GAEC 8
Eco-Scheme
ACRES
SIM
Review & Submit
Scheme Selection
Please select the schemes you wish to apply for
BISS ✓ View details
Basic Income Support for Sustainability
CRISS ✓ View details
Complementary Redistributive Income Support for Sustainability
ANC ✓ View details
Areas of Natural Constraints (ANC) Scheme and Areas of Specific (Island Farming) Scheme (ASC)
Eco ✓ View details
Eco-Scheme
Organics View details
Organic Farming Scheme
SIM ✓ View details
Straw Incorporated Measure Scheme
Protein Aid Scheme View details
Protein Aid Scheme
ACRES ✓ View details
Agri-Climate Rural Environment Scheme
Back
Next


https://agfood.iprelive.agriculture.gov.ie/lpisinet/web/pages/dafm/home?sso_deeplink=true&GUID=F6EDDEFC14894769058...
InPrivate
Department of Agriculture, Food and the Marine
An Roinn Talmhaíochta, Bia agus Mara
Logged In As: aga6539 | Map: ACRES Farm Sustainability Plan - Editable | Scheme Type: General | ACRES Definitions Validation Matrix Settings Close Help
Undo Redo Undo Feature Redo Feature Clear Edits Save Edits
Select
Select Feature
Deselect All
Edit
Draw
Create WP
Modify
Move
Delete
Measure
Measure
Navigation
Toggle Legend
Return to Land Details
Draw
Barn Owl Nest Box
Cancel
Barn Owl Nest Box
Coppicing Of Hedgerows
Extensively Grazed Pasture-SP
Geese And Swans-SP
Grass Margin Arable 3m
Grass Margin Arable 4m
Grass Margin Arable 6m
Grass Margin Arable 8m
Grass Margin Grassland 2m
Grass Margin Grassland 3m
Snap
Drawing Features - To begin drawing within the layer specified in the drop down, click on the map to begin placing points. Choose a new layer from the drop down to change the layer you want to draw into.
Search
Layers
Info
Thematics
Click a link to view feature info
All Parcels
E1250200050
Summary
Label: E1250200050
Layer Name: VWLP_PARCEL_LPIS_GIS_REF
Layer Title : All Parcels
Unique ID : 902762008
History
Attributes
Area [HA]: 4.89
Perimeter: 1,685.2 Meters
Geometry Information
0 75 150
Powered by spatial
Nominal Scale: 1:3760.00 | Center: 637760.53 / 928949.05 | Mouse Position: 637467.85 / 929182.77 | IRENET95 / Irish Transverse Mercator, (2157)
Version 6.3.8.38

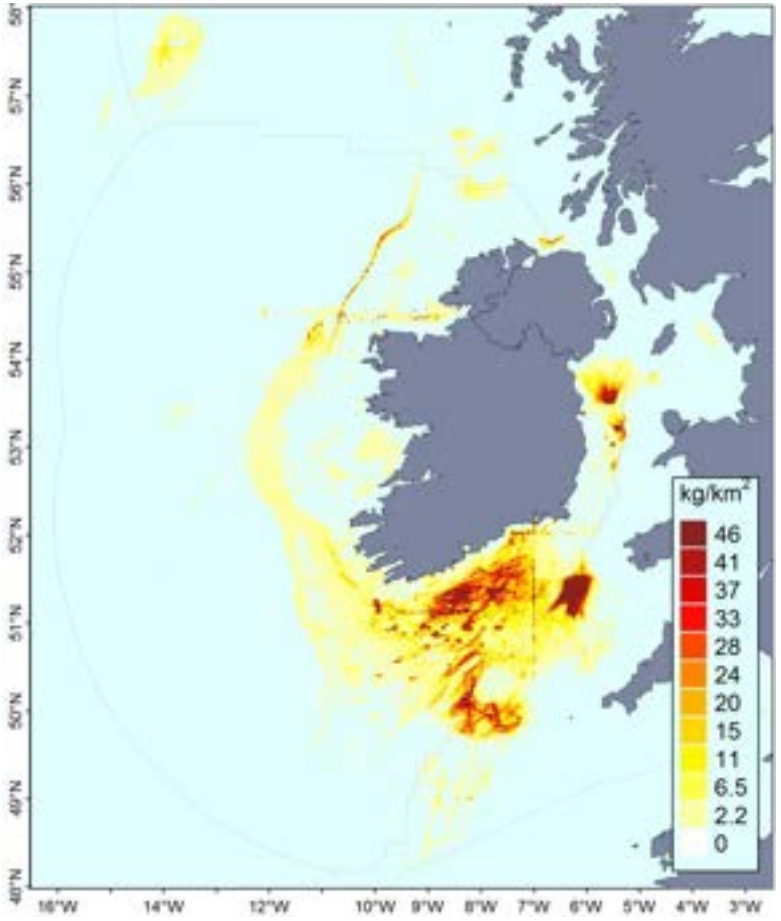
AgriSnap geotagged photographs

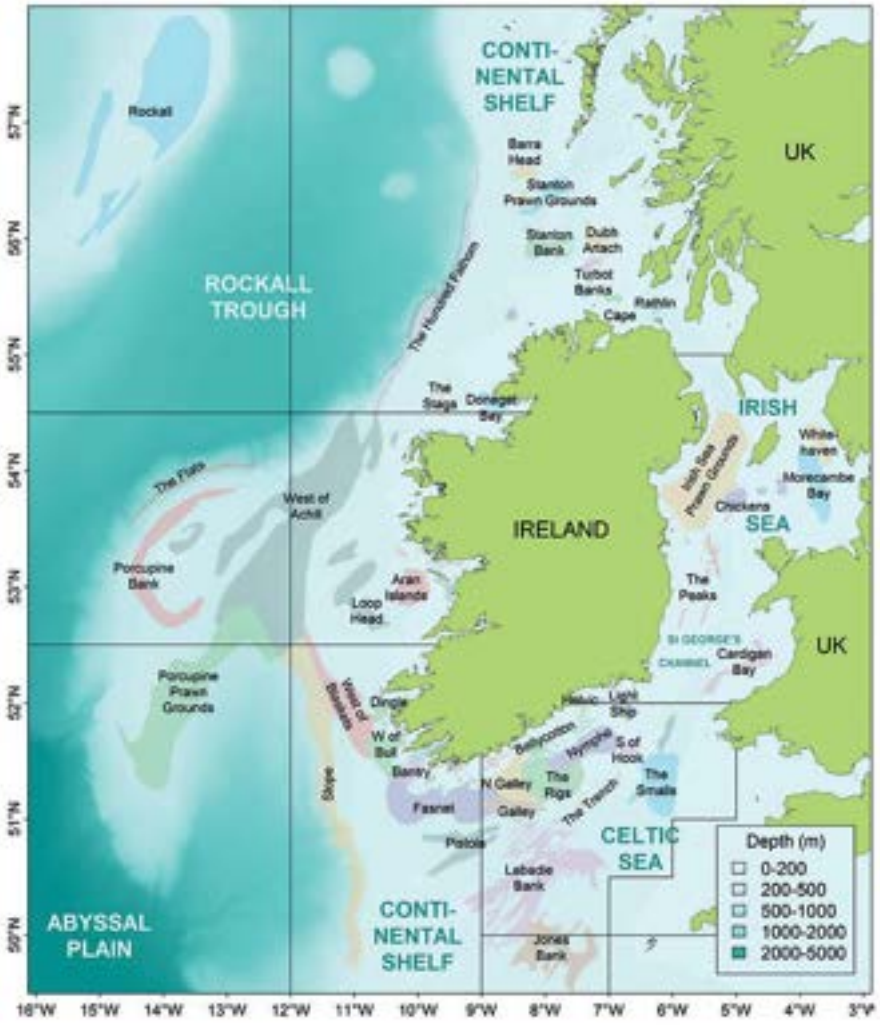




Fishery data

Fishery data

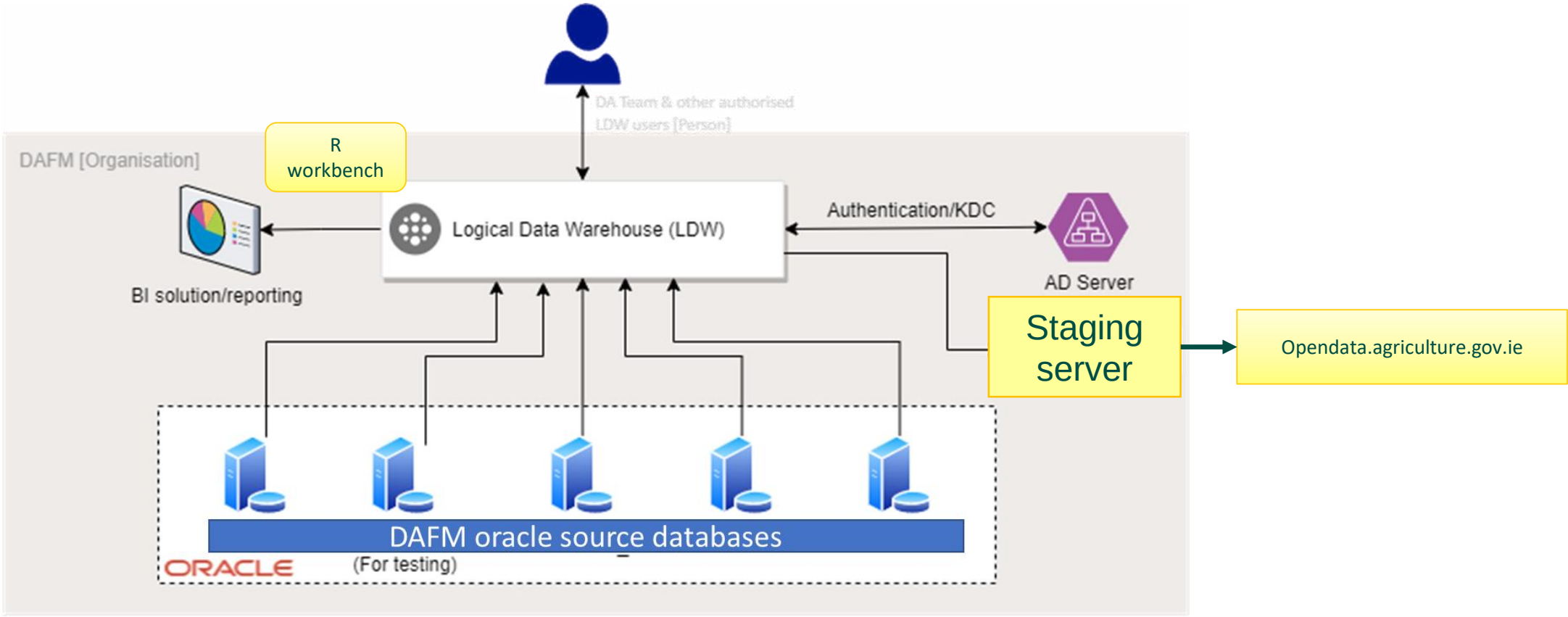




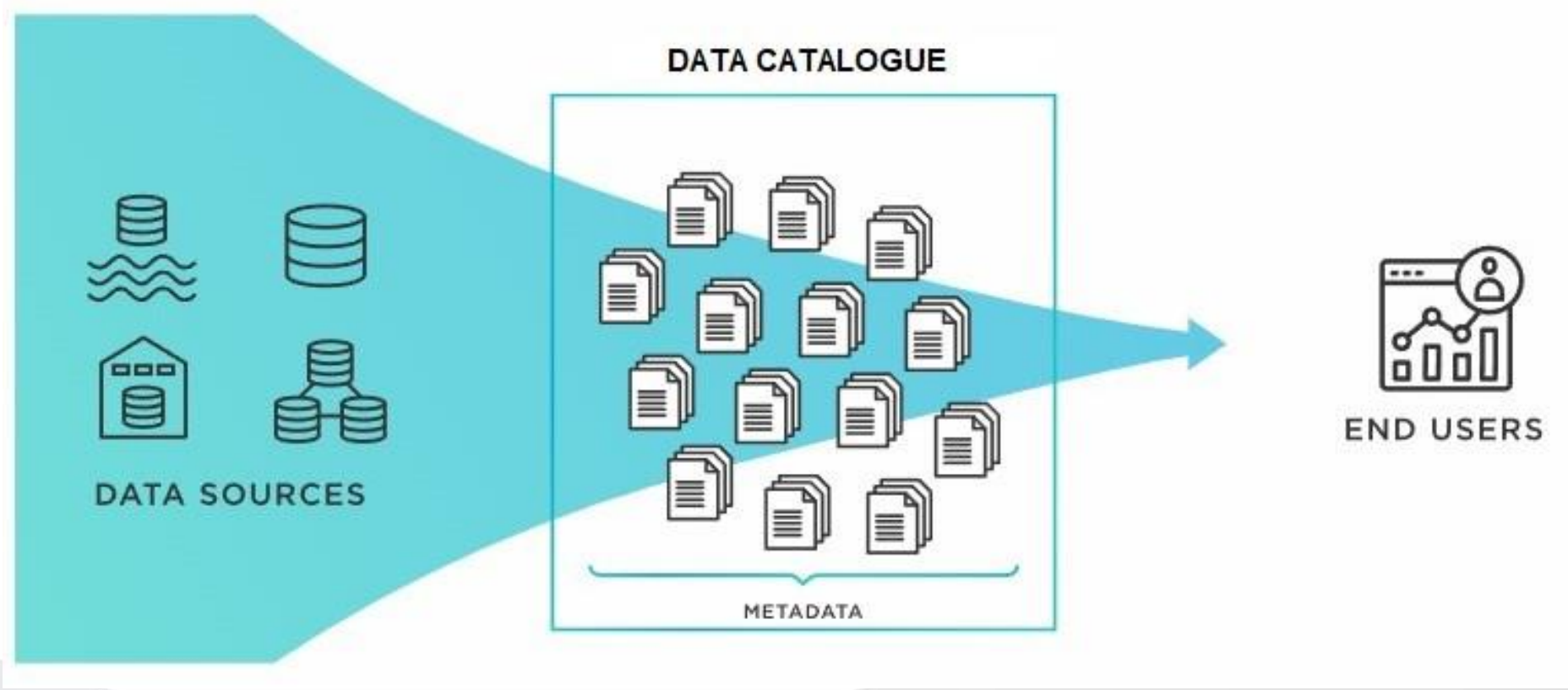
How we manage data in DAFM

Data infrastructure

Data architecture



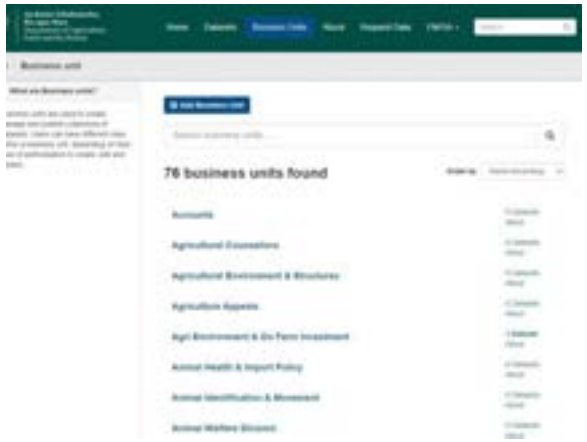
Open Data Catalogue



Open Data Portal

Thematic Areas

- Animal Health & Welfare
- Corporate
- Sustainable Seafood
- CAP
- Forestry
- Agri Food Trade
- Climate
- Land Use
- Safe Food

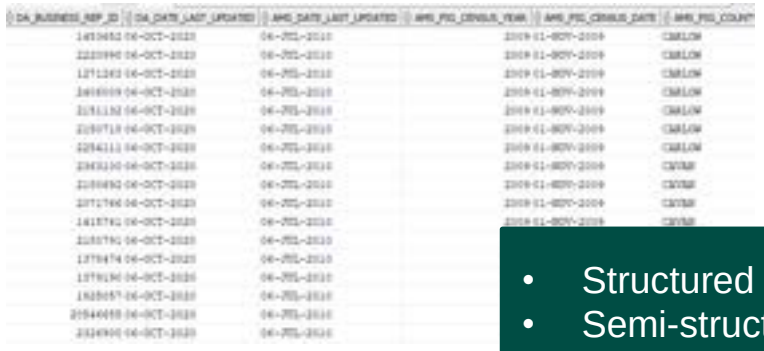


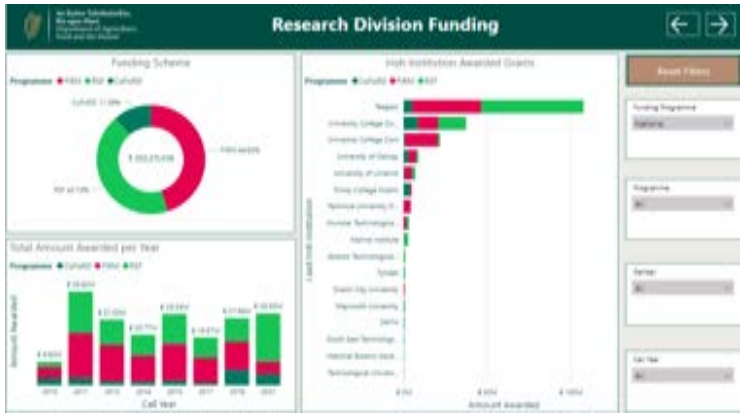
DAFM Open Data (agriculture.gov.ie)

How we use DAFM data

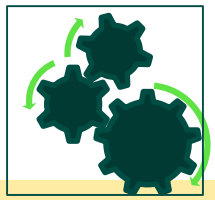
What is Operational Data Analytics?

Using an organisation's data to extract insight to support better decision making





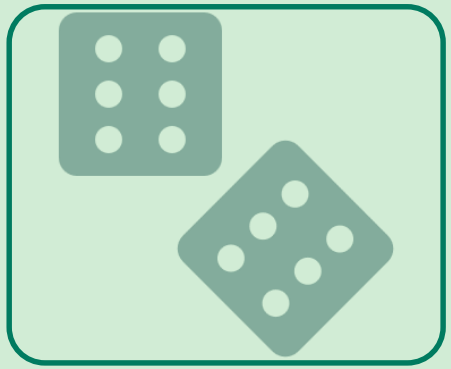
- Structured
- Semi-structured
- Unstructured



Data → Insights → Decisions

- BI/Reporting
- Descriptive & Predictive Analytics

- Dashboards
- Decision support
- Automation



Descriptive: what has happened?

Predictive: What could happen in the future based on past events?

Prescriptive: What should a business do?

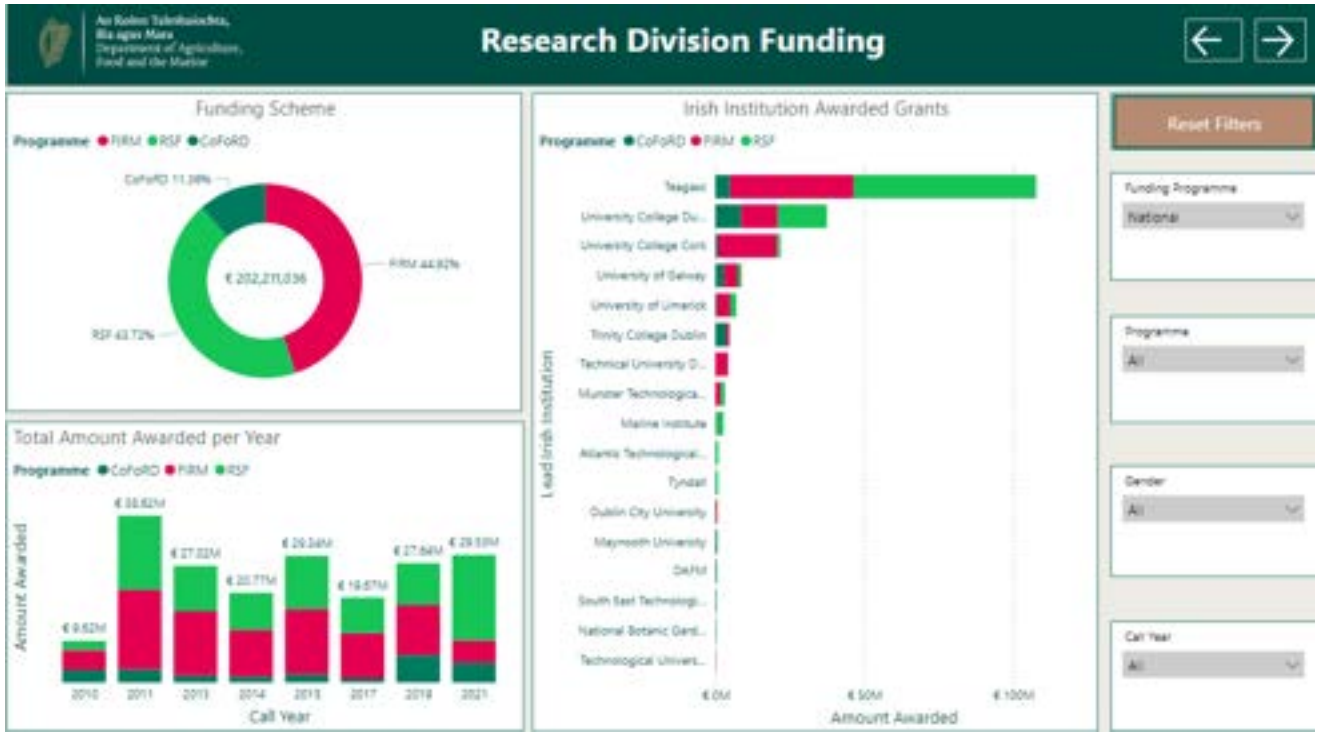
Descriptive analytics

What it is…

Use of statistical analysis and visualisations to explore and understand data
Identify interesting trends in current/past data etc.

Example: Research Division Dashboard

DAFM has a growing number of dashboards related to different aspects of its work
The dashboards provide some commonly used charts and tables to each division
Allows them to explore data and do custom analyses by defining their own ad-hoc queries and plots



Microsoft Power BI

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Research Themes

€ 202.21M	327	17	200	€ 618.38K
Total Awarded	Number of Signed Grants	Number of Lead Irish Institution	Number of Lead Coordinators	Average Award per Project

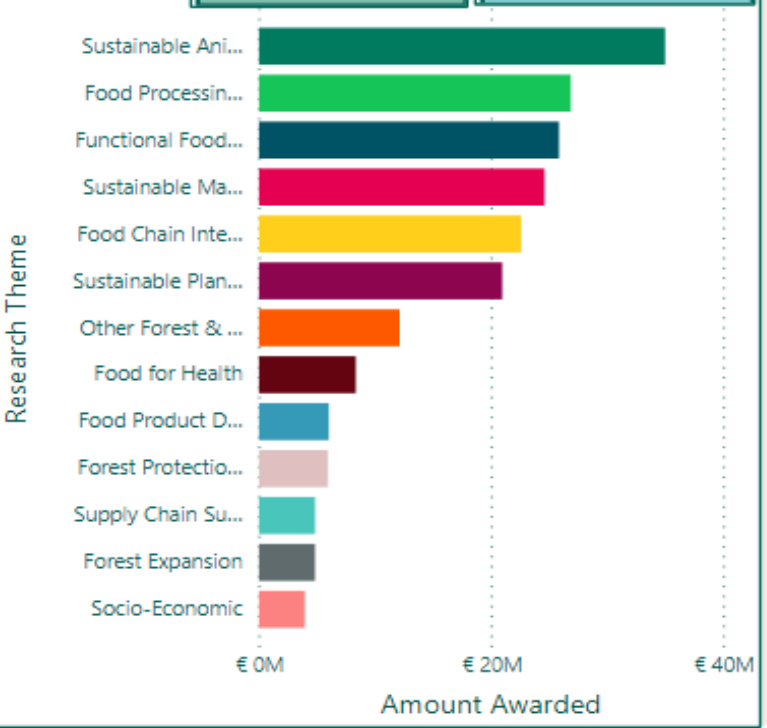
Food Chain Integrity & Safety | Food for Health | Food Processing Technology | Food Product Development | Forest Expansion | Forest Protection & Utilisation | Functional Foods & Health | Other Forest & Misc | Socio-Economic | Supply Chain Sustainability | Sustainable Animal Production | Sustainable Management of Natural Resources

Signed Grants By Theme

Research Theme

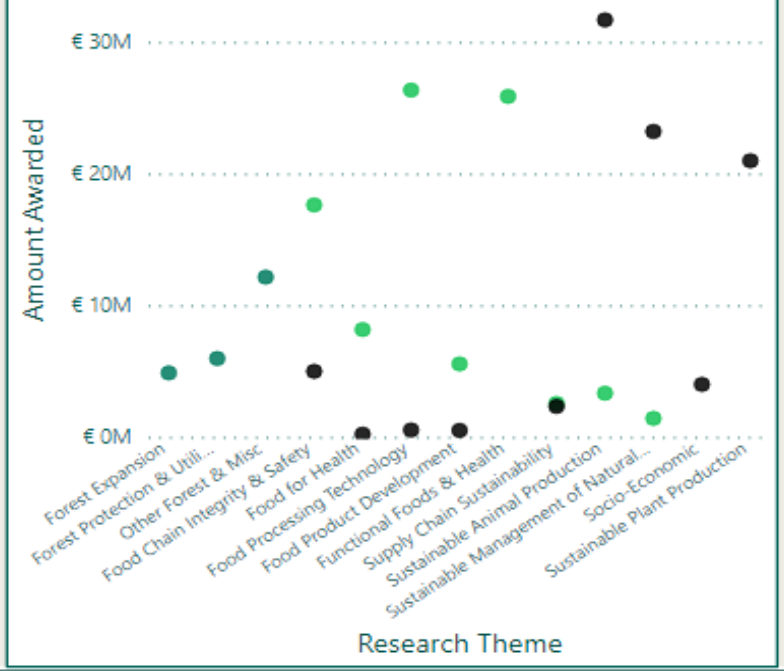
- Sustainable Animal Prod...
- Food Processing Technol...
- Functional Foods & Health
- Sustainable Managemen...
- Food Chain Integrity & S...
- Sustainable Plant Produc...
- Other Forest & Misc
- Food for Health
- Food Product Developm...
- Forest Protection & Utilis...
- Supply Chain Sustainability
- Forest Expansion
- Socio-Economic

Signed Grants By Theme | Lead Institution Funding



Amount Awarded per Thematic Area

Programme CoFoRD FIRM RSF



Reset Filters

Funding Programme
National

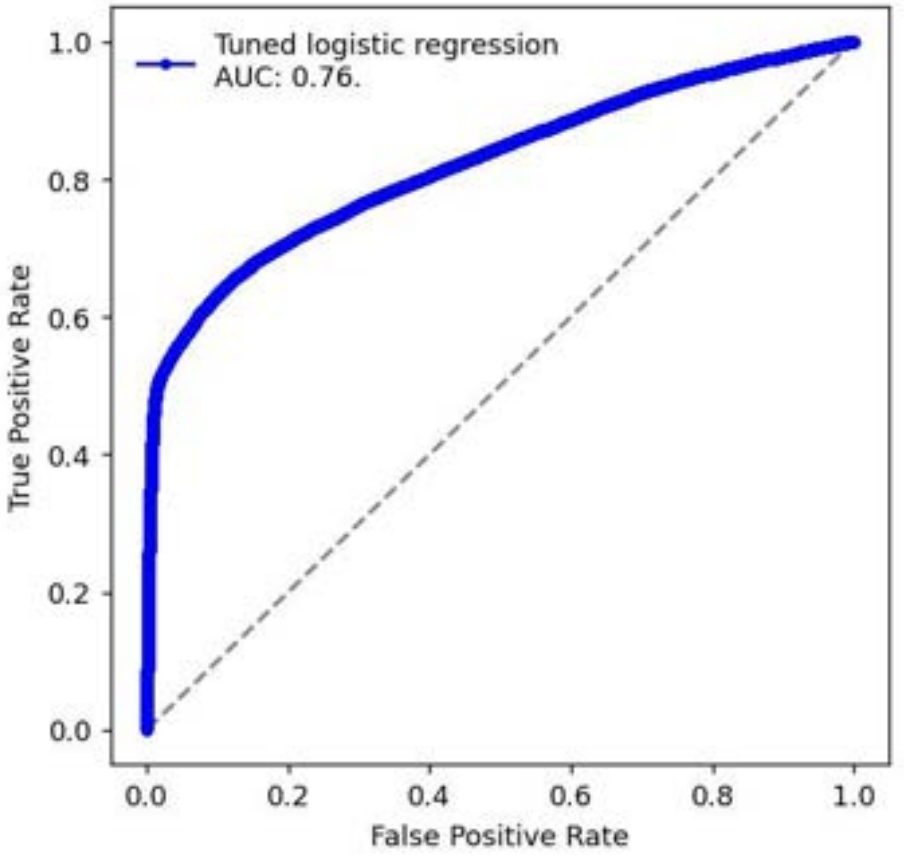
Programme
All

Gender
All

Call Year
All

Predictive Analytics: An operational machine learning model to predict TB risk

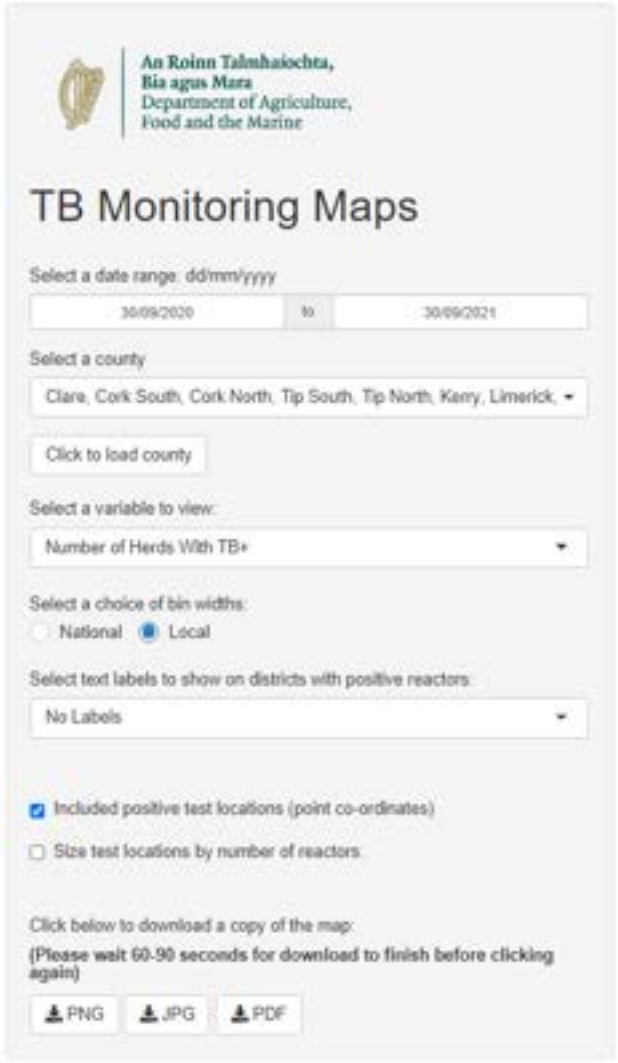
- 3 years of data already cleaned including demographic, TB testing and farm characteristics data.
- Leverage previous academic work including pilot model already developed through an academic collaboration with the Roslin Institute.
- TB mapping application already deployed will host model

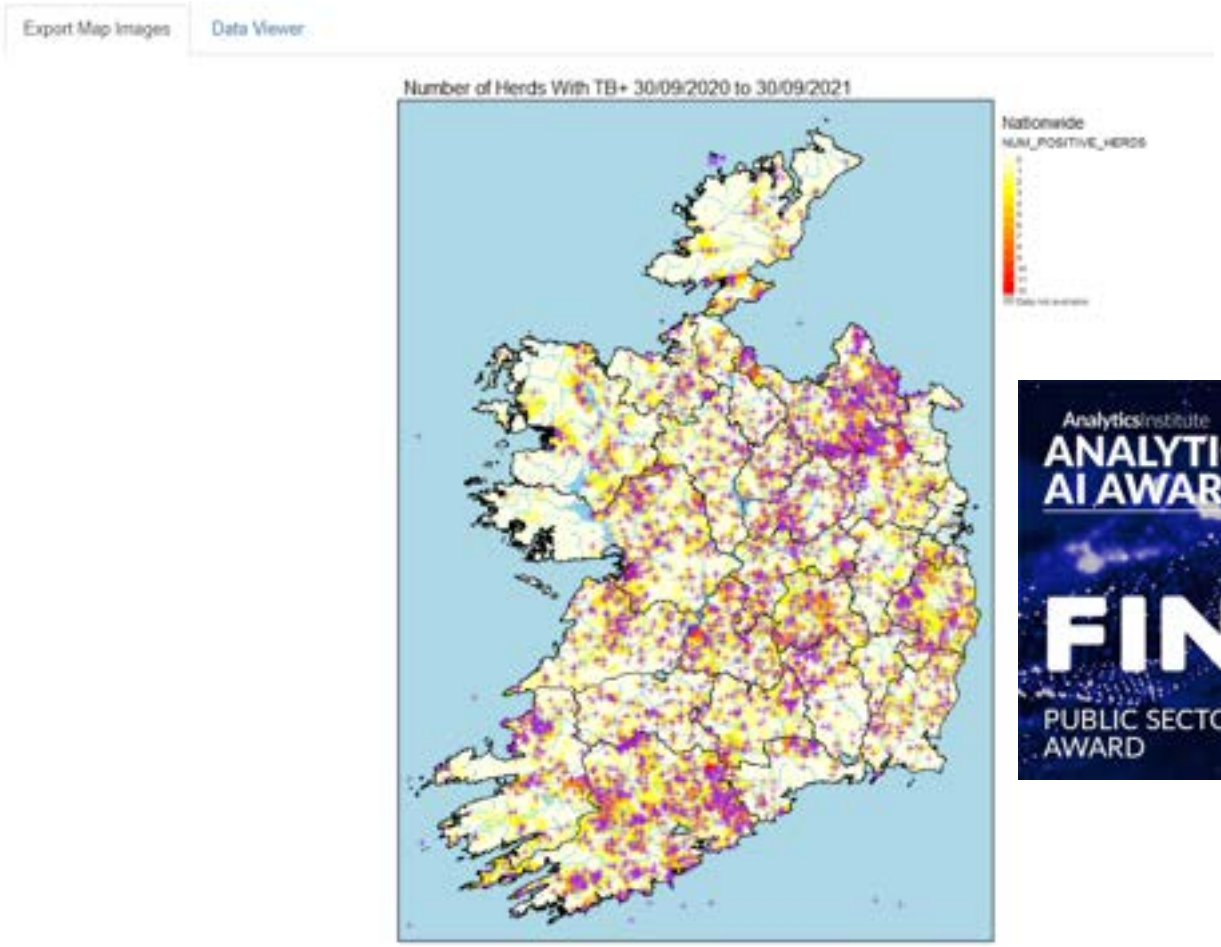


Our Public Service

Future Tech Challenge

TB Mapping Application in R Shiny





Deep learning in DAFM - H5N1 Bird Identification

BirdWatchIreland
protecting birds and biodiversity

The Cornell Lab of Ornithology
Macaulay Library

Step 1

Gathering lots of image data from various sources

Step 2

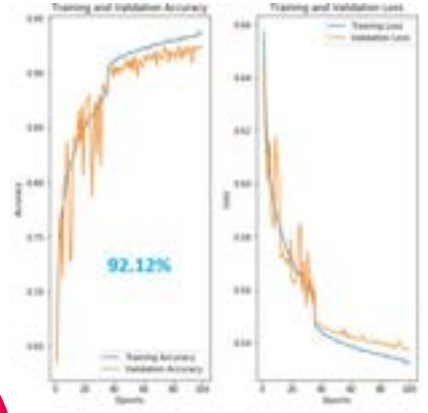
Cleaning data to achieve similarity

TensorFlow

Keras

Step 3

Implementation - Building Selecting the right ML algorithm



Step 4

Gaining insights from the model's results

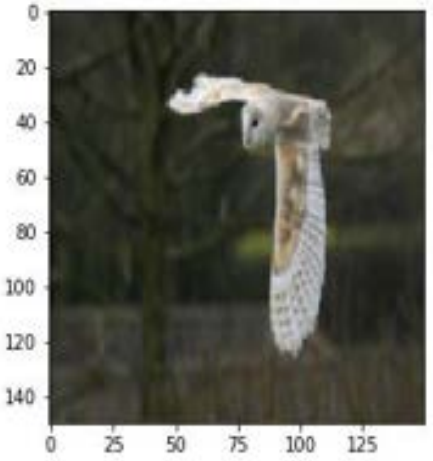
Ste p 5

Data Visualization – Transforming results into visual graphs

Predictions

Bird 56.48%

<matplotlib.image.AxesImage at 0x274ad715a88>

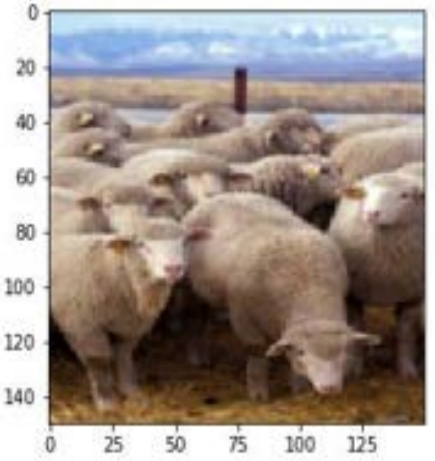


Not a Bird 100.00%

<matplotlib.image.AxesImage at 0x274afa71308>

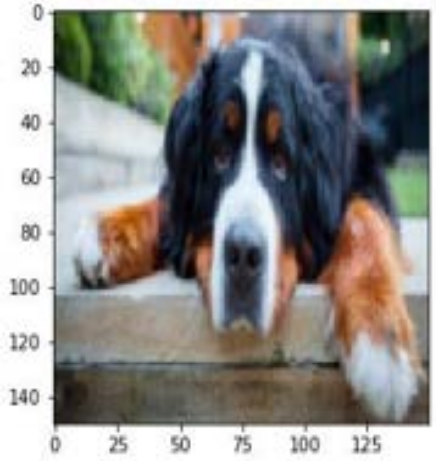
Not a Bird 100.00%

<matplotlib.image.AxesImage at 0x274b012aec8>



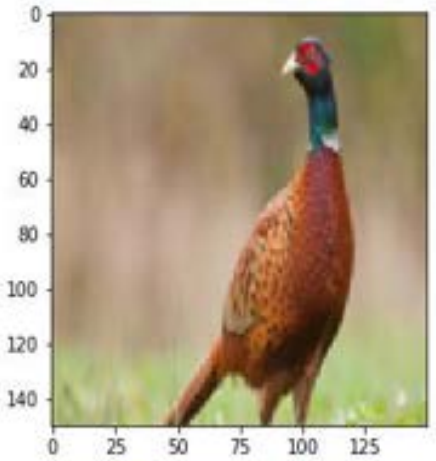
Not a Bird 100.00%

<matplotlib.image.AxesImage at 0x274ad2469c8>



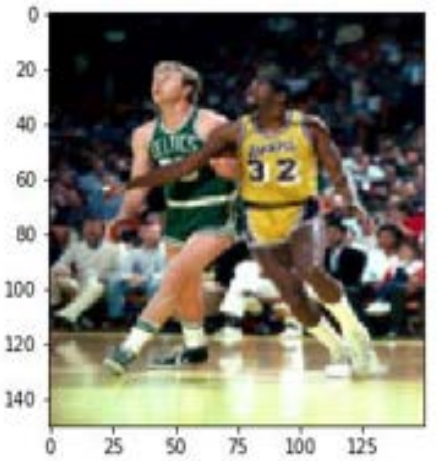
Not a Bird 62.35%

<matplotlib.image.AxesImage at 0x274b00eea88>



Bird 88.69%

<matplotlib.image.AxesImage at 0x274b6c9a708>



Prescriptive analytics

Data Selection

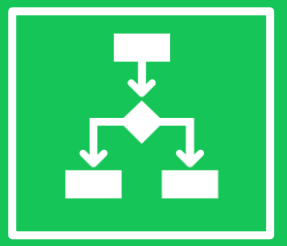
Farm description dataset, joined with relevant customer data and a binary flag for Forest Owner

Feature Selection

Identifying the variables that carry information for predicting whether a client is a Forest Owner or not

Modelling

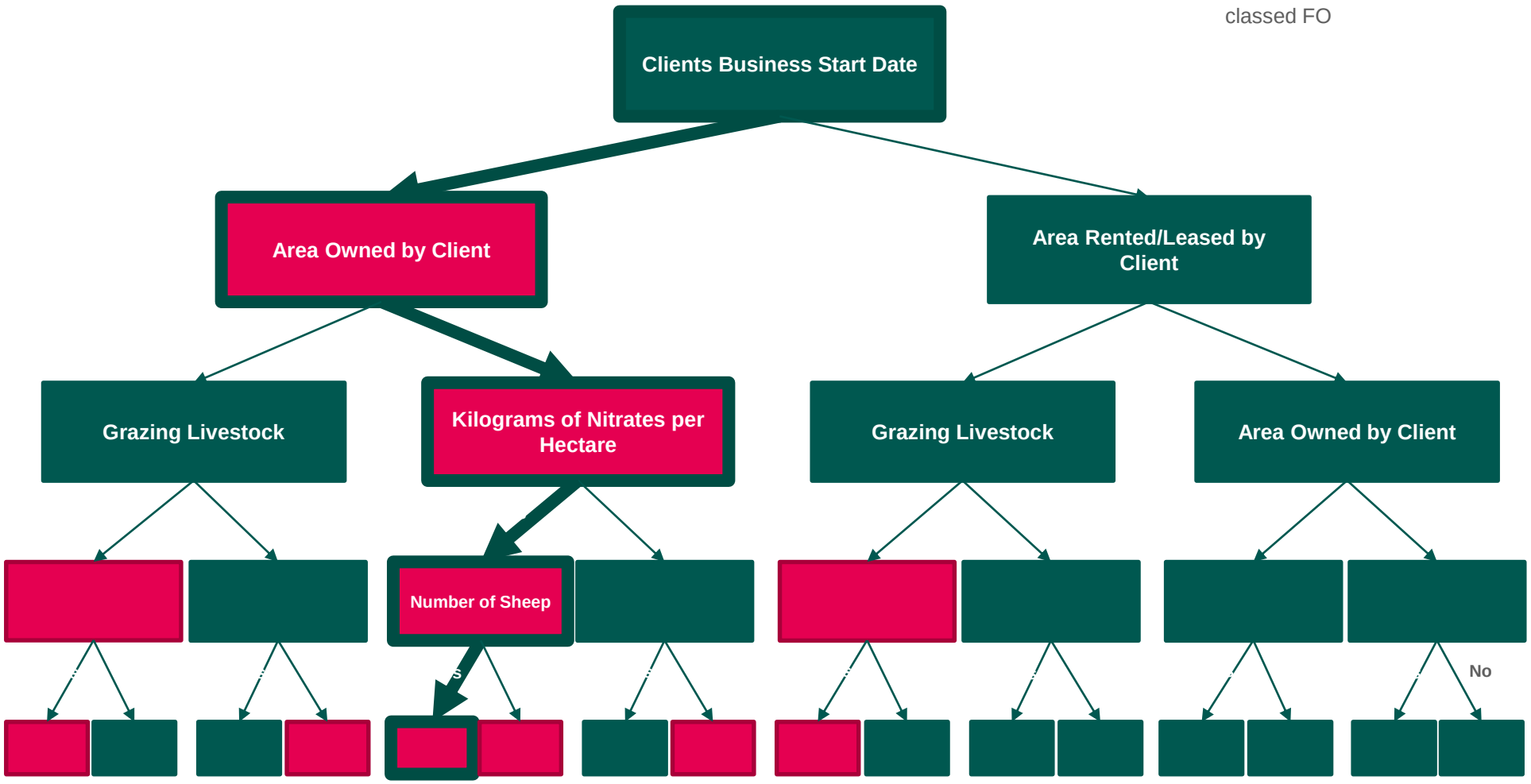
- Decision Trees were modelled
- Method of categorising clients based on a set of questions to be answered



Dashboard

- A Dashboard was built visualising the top features
- This Dashboard was built in PowerBI

Decision Tree - Individuals



*Areas given in Hectares

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Forestry Dashboard

This dashboard visualises the top features for classifying Forest Owners from the Forestry Customer Segmentation Project

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Department of Agriculture, Food and the Marine

16.97K
Forest Owners

122.56K
Non-Forest Owners

Count of Forest Owners by Their Business Start Year

Client Age

0 94

Client Gender

All

Client County

All

Client Type

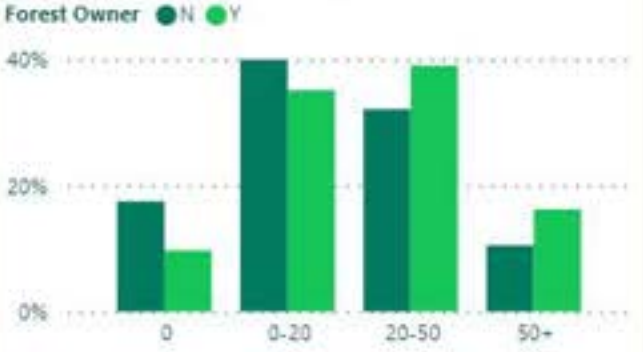
All

Farm Type

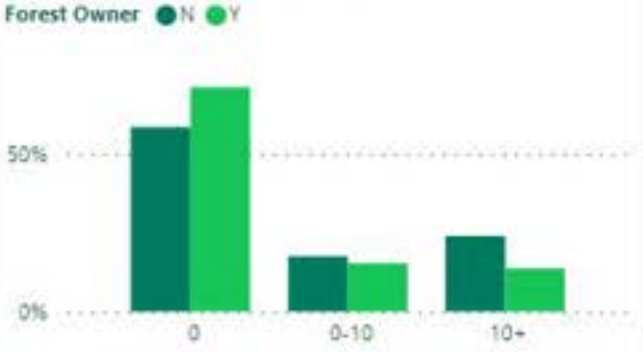
All

Count of Forest Owners by Region

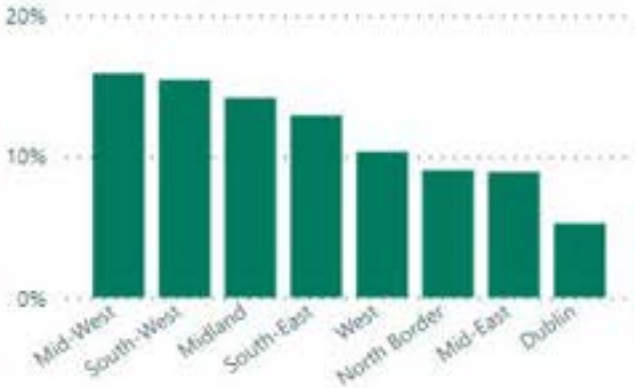
Distribution of Area Eligible Owned (HA) for Forest Owners vs Non-Forest Owners



Distribution of Area Eligible Rented & Leased (HA) for Forest Owners vs Non-Forest Owners



Ratio of FO's to No. of Farmers by Region

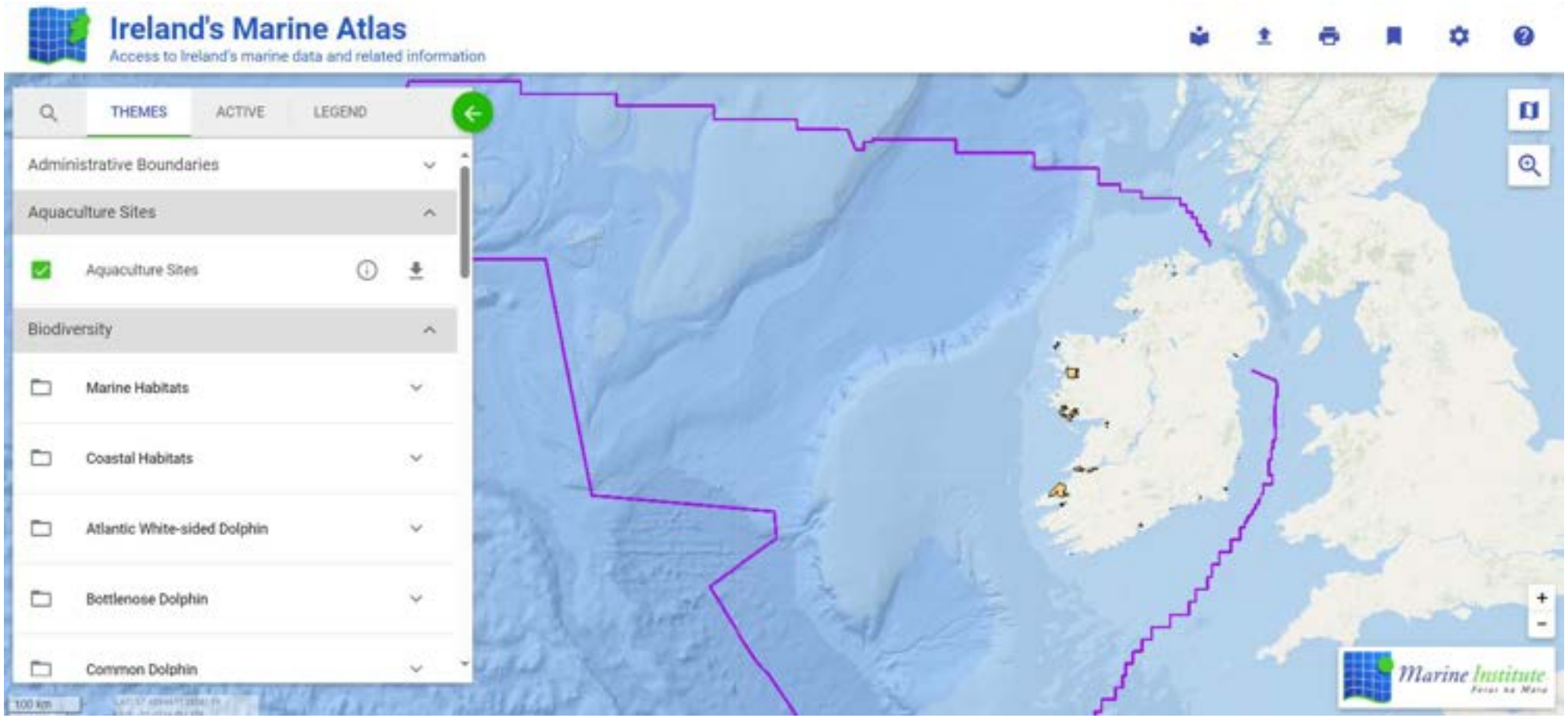


Average Client ESU Value

Average Client Stocking Density

How others use DAFM data

Uses by other Public Bodies



An Phríomh-Oifig Staidrimh
Central Statistics Office

Irish Agriculture Labour Force and Organic Farming

Census of Agriculture 2020

Agriculture Labour Force

278,600
persons

73.04% male

26.96% female

Labour Units on Farms (Family & Non-Family)

20.09% female

79.91% male

Organic Farms in Ireland

1,686

(both fully and under conversion)

Livestock on Organic Farms

Cattle
51,685

0.71% of all cattle

Sheep
74,870

1.36% of all sheep

Poultry
161,471

0.98% of all poultry

CO_2 from Energy Use in Ireland Projections

seai SUSTAINABLE ENERGY AUTHORITY OF IRELAND

Year Selector for Time Series

2021 2035

Unit

$ktCO_2$

Scenario

High_WAM_CAP23

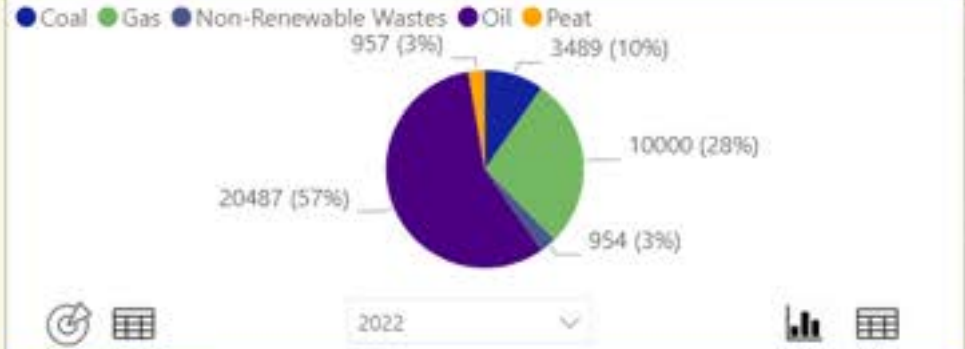
Sector

All

Fuel

All

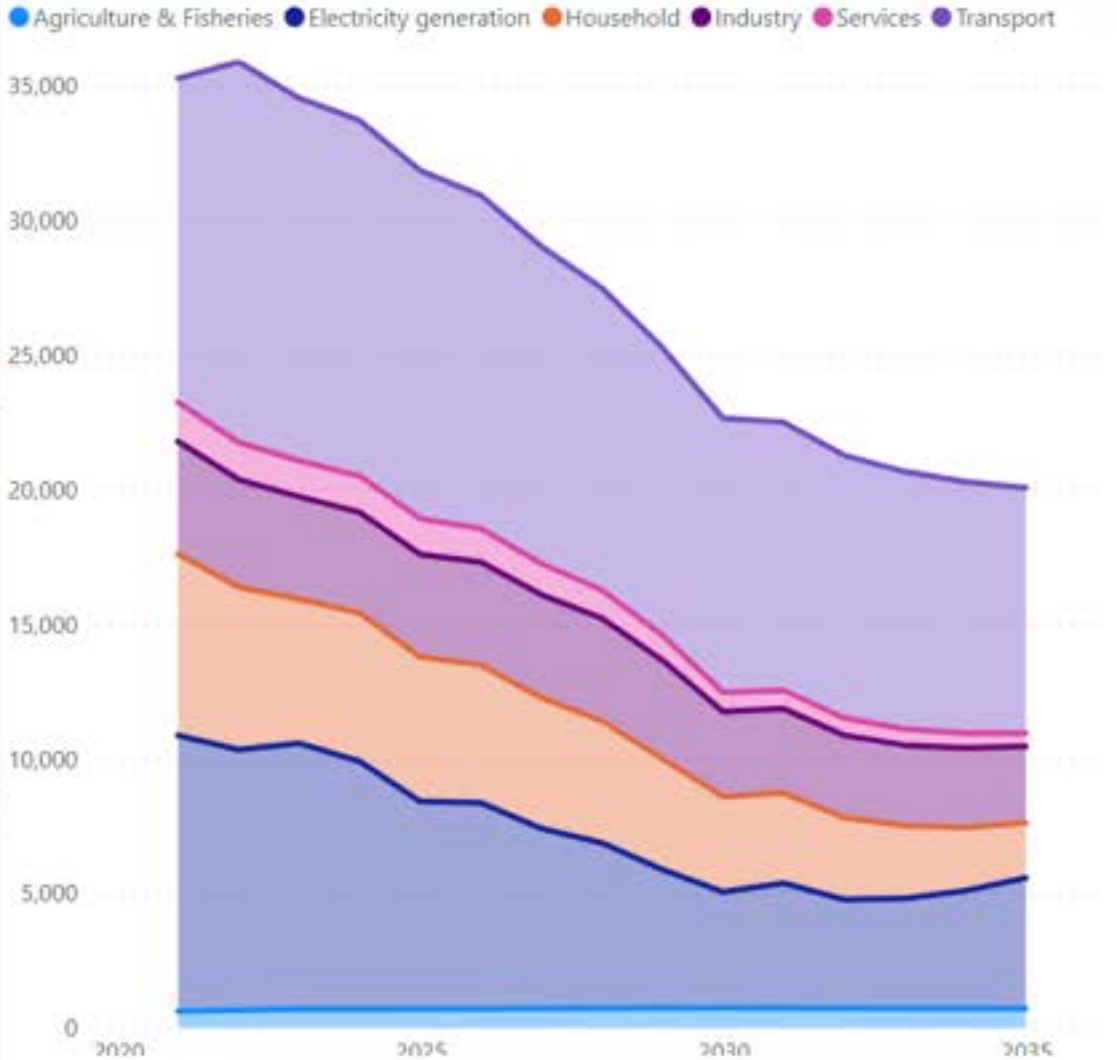
$ktCO_2$ breakdown by Fuel - 2022



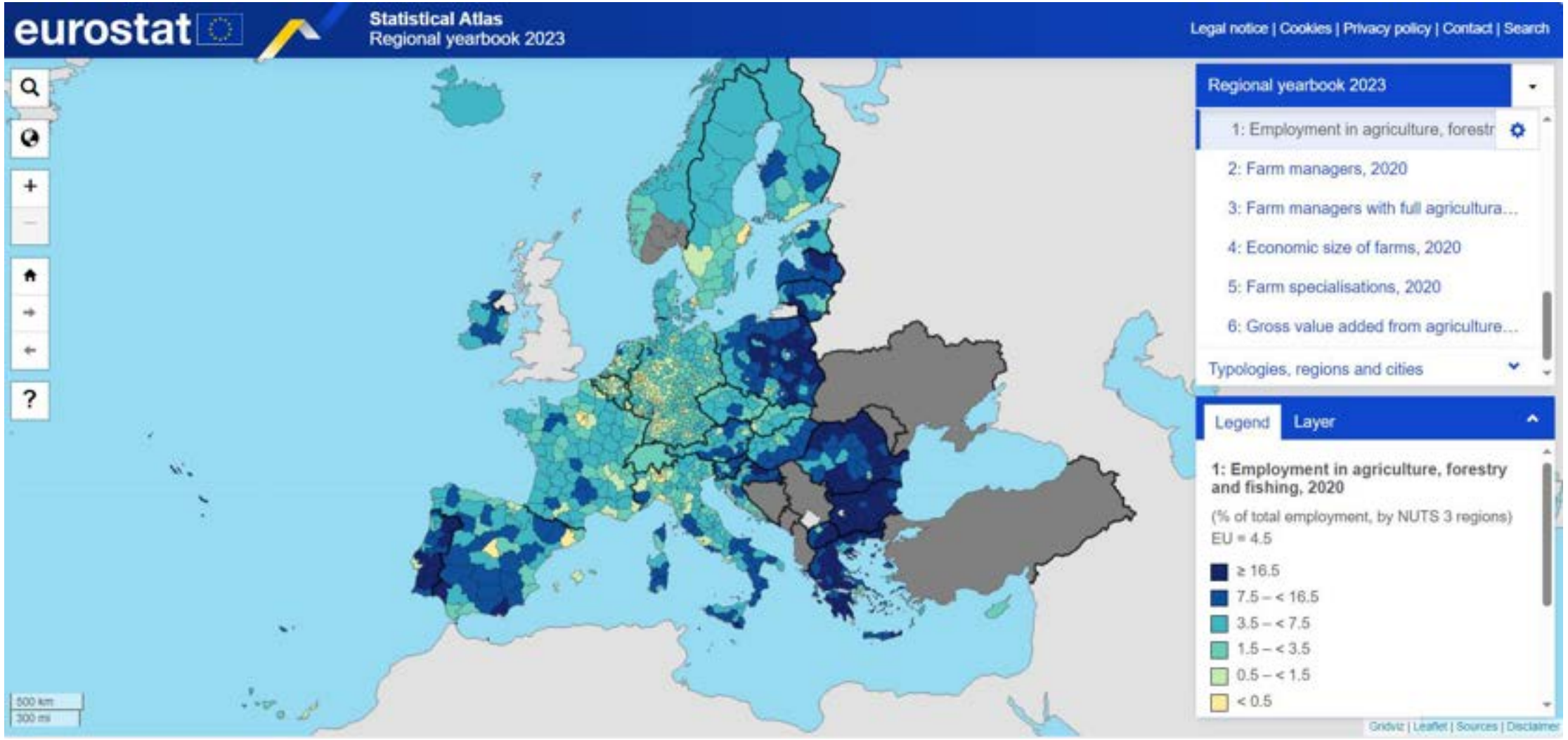
$ktCO_2$ - Projections

Annual Change in Energy Related CO_2 Emission

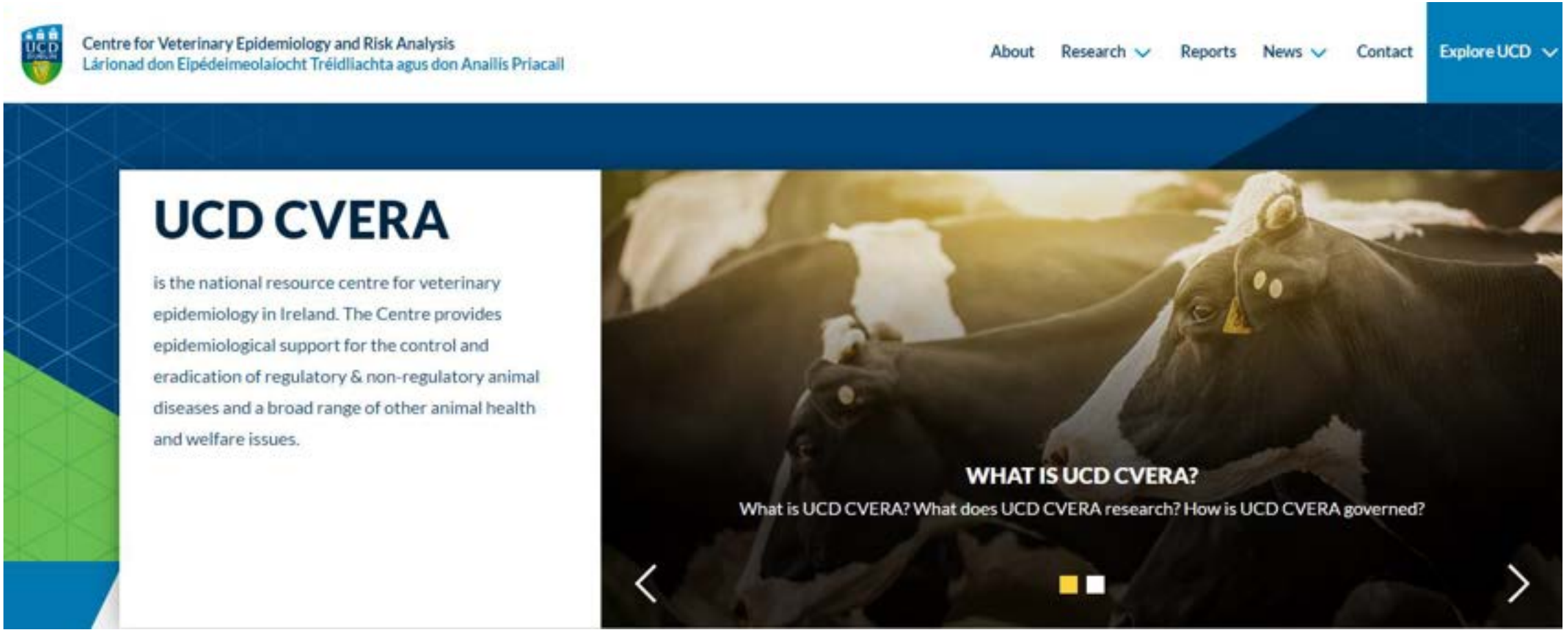
Projections $ktCO_2$ by Sector



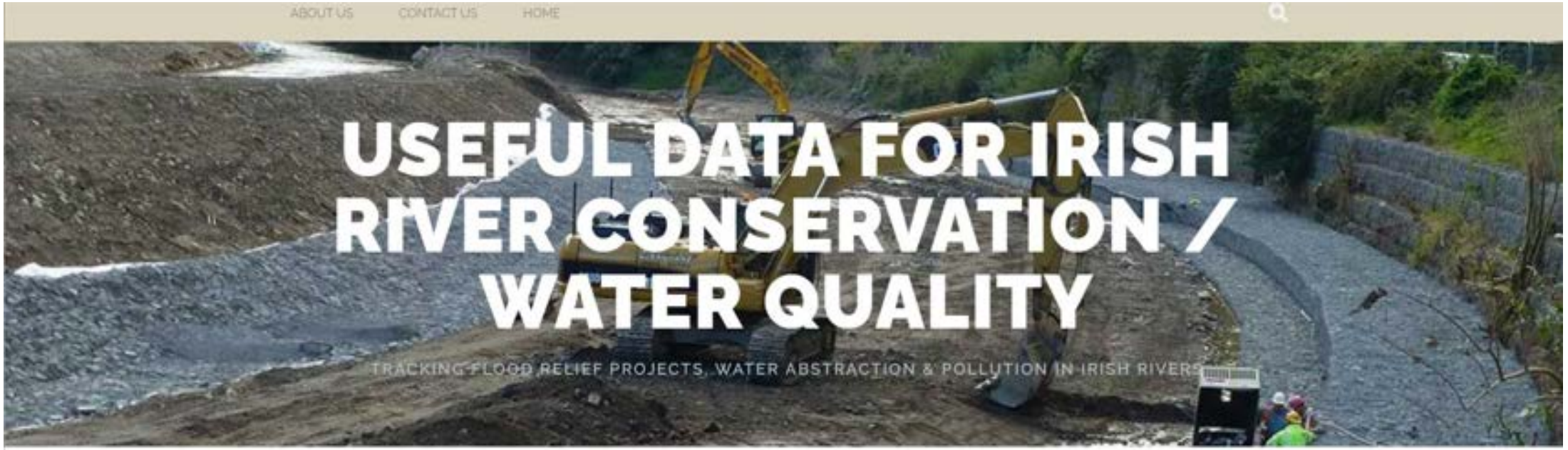
Uses by European level



Uses in Research



Uses by the Public



DAFM Animal Health Computer System: Poultry Records

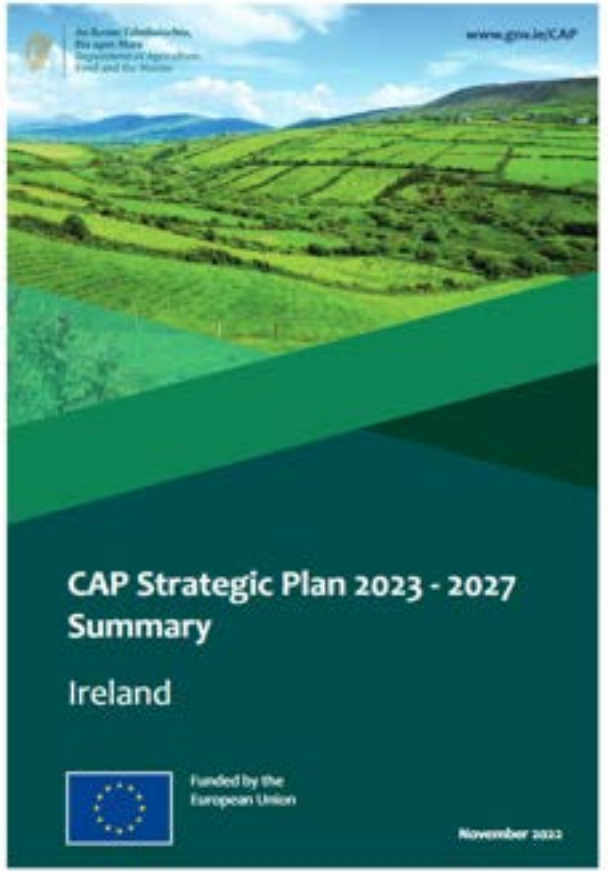
August 2, 2022 admin

DAFM maintains a register of poultry premises in this jurisdiction on its Animal Health

- 2,4-D
- 4-chloro-2-methylphenoxyacetic acid (MCPA)
- Aarhus Convention
- Agriculture
- AIE Requests

Critical Strategic Goals

Critical Strategic Goals



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Department of Agriculture,
Food and the Marine

Thanks!