

# Food & A.I.

EVA27: Project Controls  
Performing in Turbulent  
Times



# Stephen Burns

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- Apprentice Electronics Engineer
- Qualified from Strathclyde University
  - Electrical and Electronics Engineering
- Software Developer
- Electronics Design Technology Support Centre for Scotland
  - Napier University
- SRUC
- Agri-EPI Centre

# Part of the family of Centres




- Agri-EPI Centre is one of UK's four Centres of **Agricultural Innovation**. Supported by Department for Business, Energy and Industrial Strategy and Innovate UK, the four Agri-Tech Centres are delivering benefits to UK farming.
- Agricultural Engineering Precision Innovation Centre (Agri-EPI Centre)
- Big Data Centre of Excellence (Agrimetrics)
- Crop Health and Protection (CHaP)
- Centre for Innovation and Excellence in Livestock (CIEL)

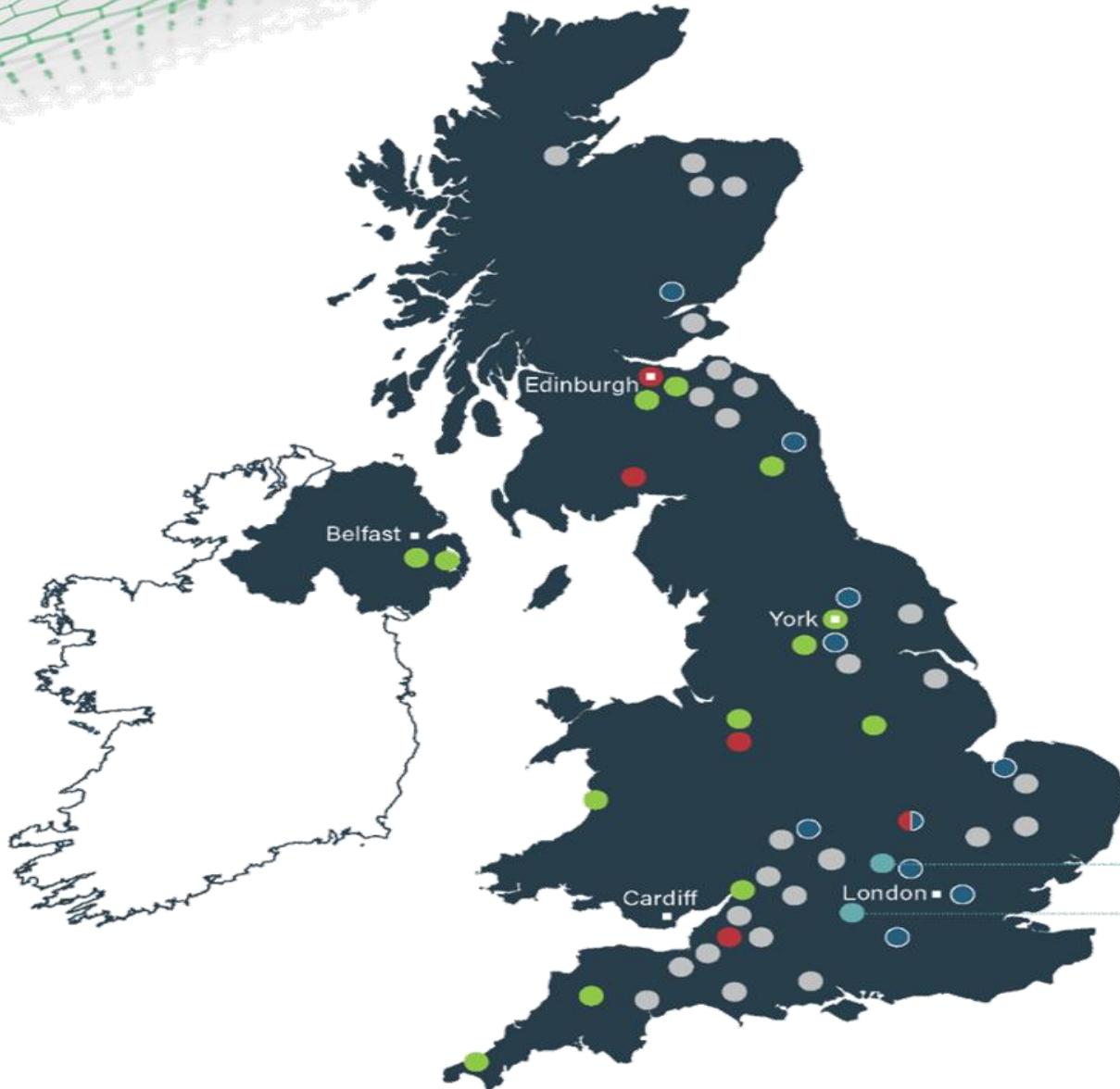
[www.agritechcentres.com](http://www.agritechcentres.com)





## National Innovation Network

-  **Agri-EPI**  
Satellite Farm Network
-  **Agri-EPI**  
Precision Agriculture and Engineering
-  **CHAP**  
Crop Protection & Soil Health
-  **CIEL**  
Livestock Productivity, Health, Welfare and Sustainability
-  **Agrimetrics**  
Agrifood Data Marketplace



Global Data Ecosystem

## Our purpose, vision and mission



### Our purpose

A world where engineering and **precision agriculture technologies, systems and eco-systems are optimised** in order to maximise the agri-tech sector's contribution to sustainable food production and supply.



### Our vision

Transforming, driving growth and **supporting innovative** solutions to **help farmers** and agri-food businesses become more **sustainable** and **profitable**.



### Our mission

Providing scientifically robust and **commercially viable** solutions to **improve productivity and sustainability** within the food production system using cutting-edge precision technologies, **robotics and autonomous solutions** and engineering technologies, and using **data to reduce variance at producer level**.

# Enabling New Technology Development

- **Our services and support**
  - R&D funding
  - Project management
  - International links
  - Technical expertise
  - Farm environment testing
  - Technology business incubation
  - R&D capabilities
  - Procurement & Legal advice
  - KE and dissemination
  - UK policy engagement
  - Broker Engagement

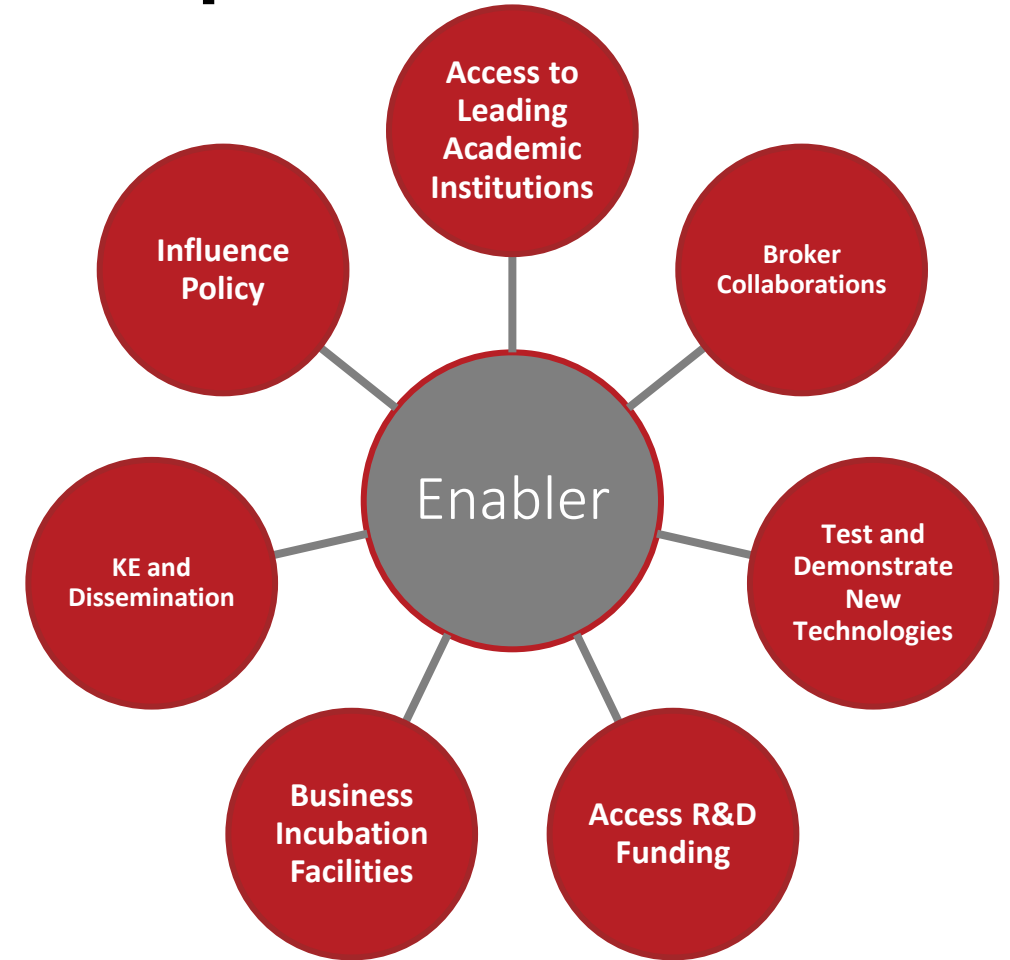
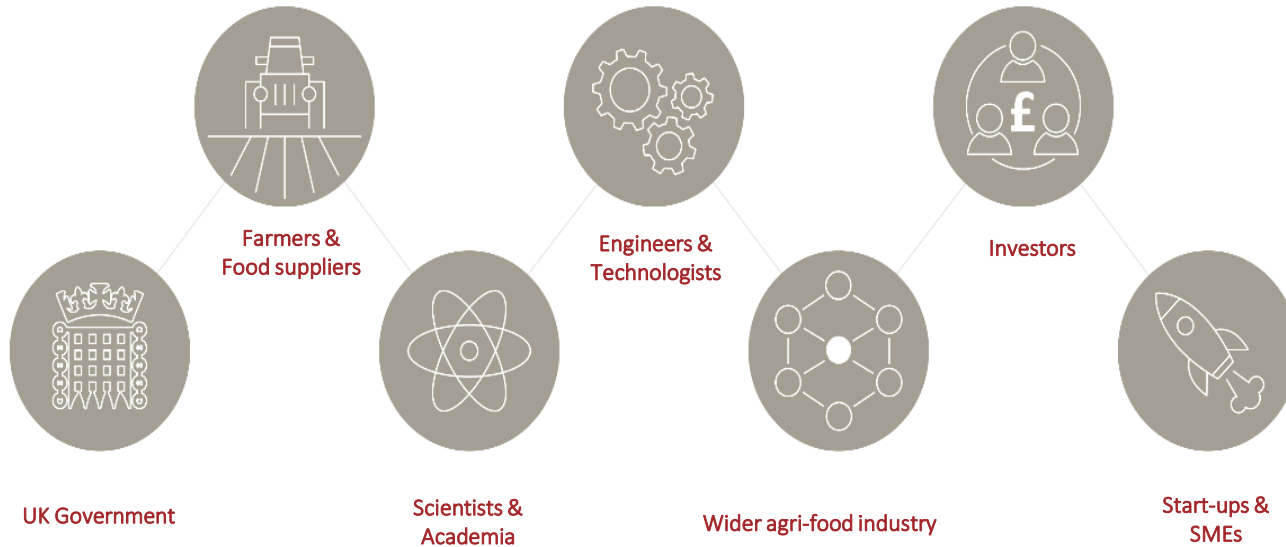


**Our partner  
network**

205 members  
with a  
combined  
turnover of  
**> £540B**

# Enabling New Technology Development

## Key collaborators



# The Satellite Farm Network 'at a glance'



## Dairy

- 5 dairy farms across Scotland & England including the renowned South West Dairy Development Centre
- Organic & conventional
- Robotic milking
- High genetic, high-health status herds
- Includes high-profile, award-winning farmers
- Milk for liquid milk, cheese & ice cream



## Other Livestock

- Organic and conventional sheep and beef
- Poultry layers and broilers
- 1 venison farm
- Organic and conventional pigs, including a member of the Scottish Pig Producers
- Beef Farmer of the Year, as well as other high-profile, award-winning farmers
- Implementation of activity trackers, feed mixers, tag readers, weighing platforms, and other animal handling kit

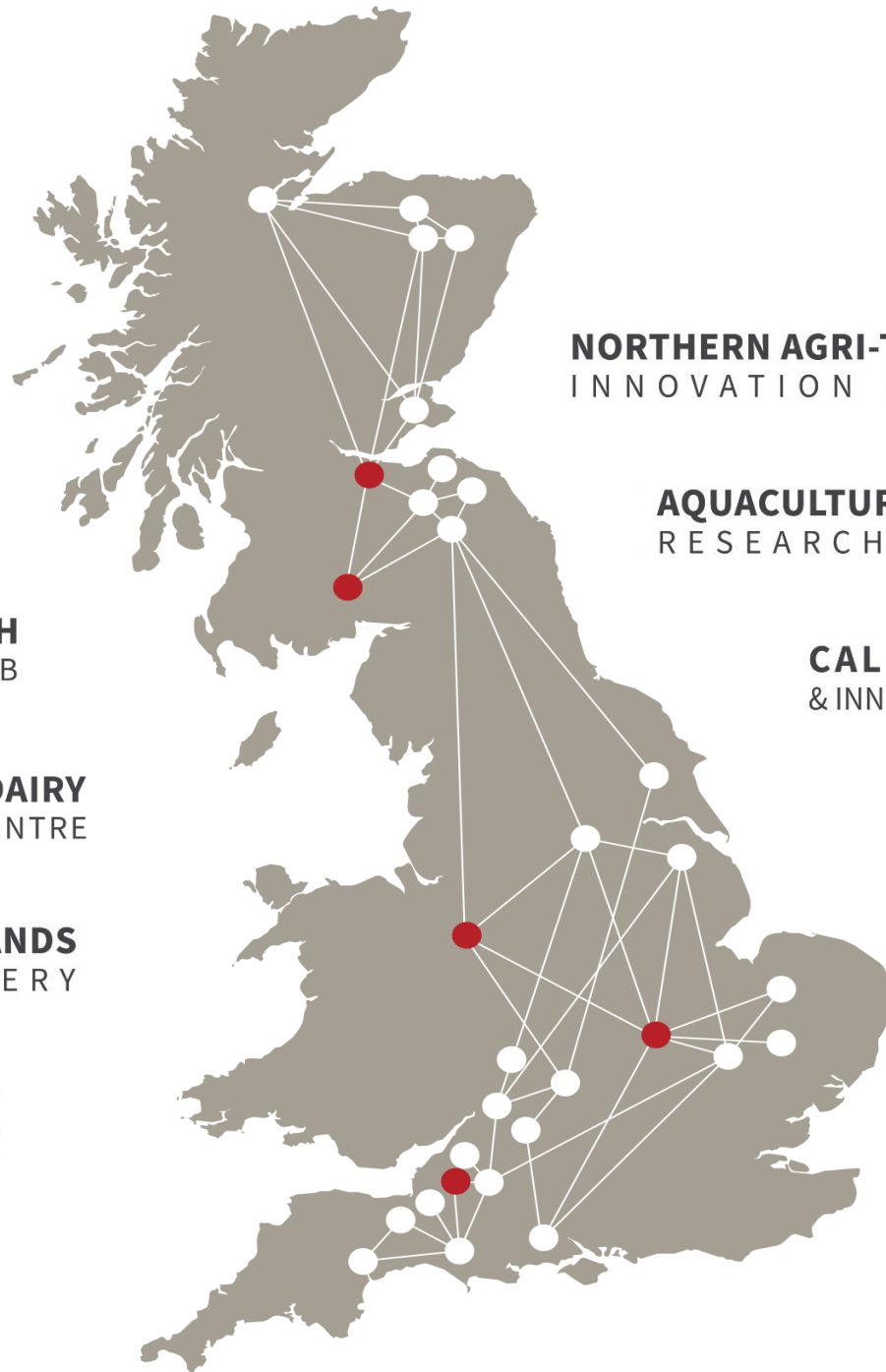


## Crops & Horticulture

- 3 potato farms, including growers for McCain and Branston
- Includes Elveden Estate, the largest onion grower in the UK
- Wide variety of arable enterprises across Scotland and England
- Organic and conventional
- 1 pea farm that supplies for Birds Eye
- Implementation of a wide variety of technical kit including remote sensing platforms



**SATELLITE FARM  
NETWORK**



**NORTHERN AGRI-TECH  
INNOVATION HUB**

**AQUACULTURE GENETICS  
RESEARCH FACILITY**

**CALF RESEARCH  
& INNOVATION FACILITY**

**CROP TECHNOLOGY  
SOUTHERN INNOVATION HUB**

**MIDLANDS AGRI-TECH  
INNOVATION HUB**

**MIDLANDS DAIRY  
RESEARCH CENTRE**

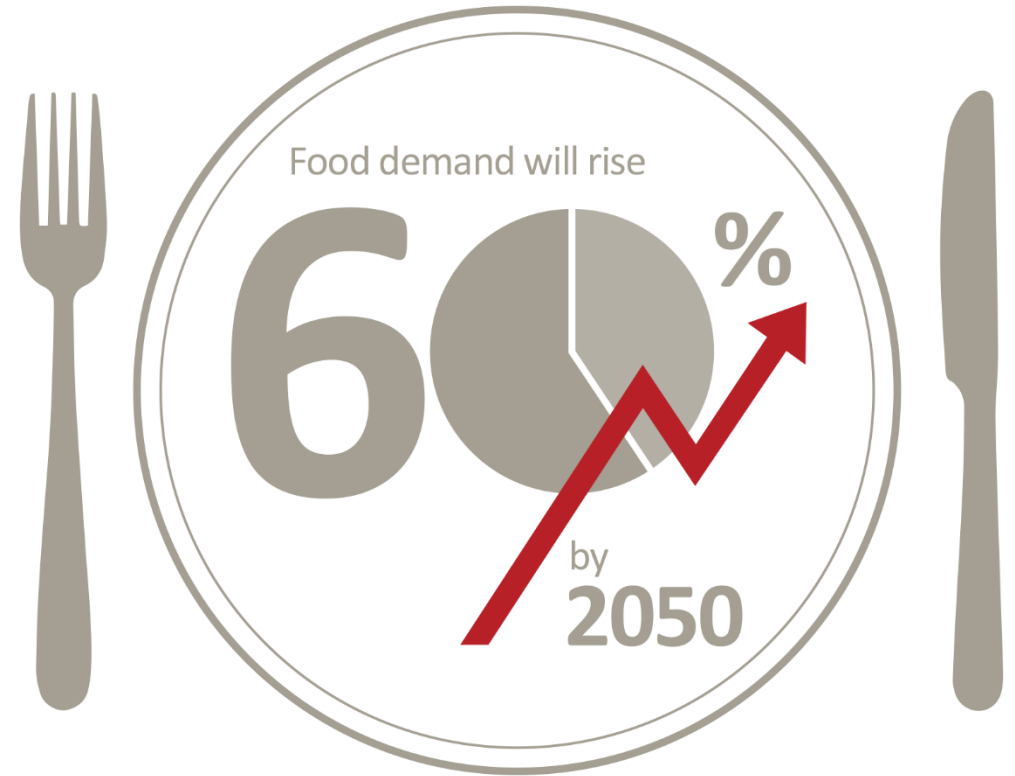
**MIDLANDS  
PIGGERY**

**SOUTH WEST DAIRY  
DEVELOPMENT CENTRE**

# Our UK Agri-Tech Innovation Map

# Responding to the global challenge of sustainable food

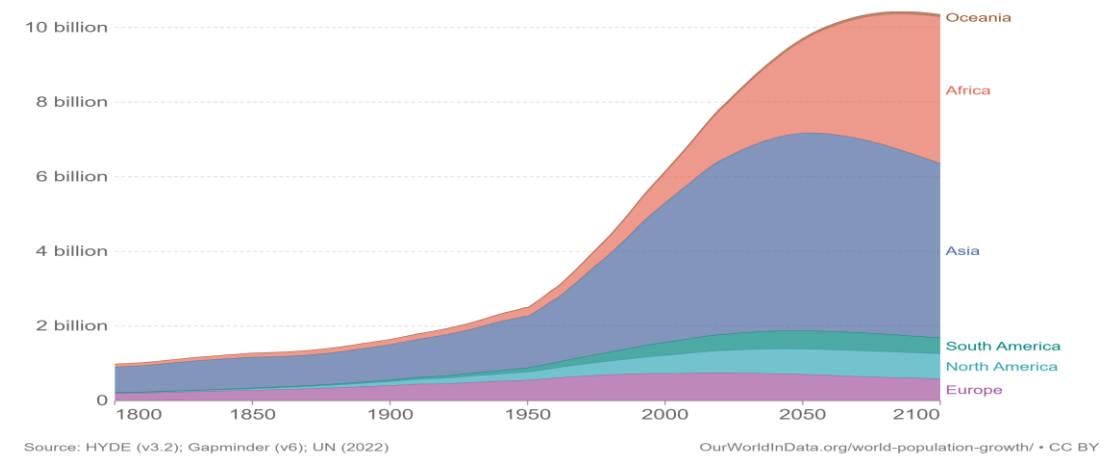
- Our three main objectives are to:
- Be a key player in ensuring that the UK grows its status as a world leader in **precision agriculture and engineering**.
- Operate a wide range of industry-led activities in **applied research** and development, demonstration, training and education.
- Ensure that the **knowledge** generated is translated and transferred to **relevant audiences**.



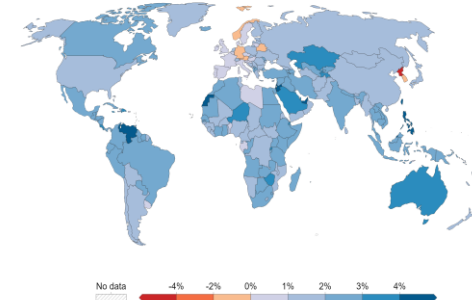
# UN Population growth

- The world's population could grow to:
  - 8.5 billion in 2030
  - 9.7 billion in 2050
  - 10.4 billion people during the 2080s
- Countries of sub-Saharan Africa are expected to contribute more than half of the increase anticipated through 2050.

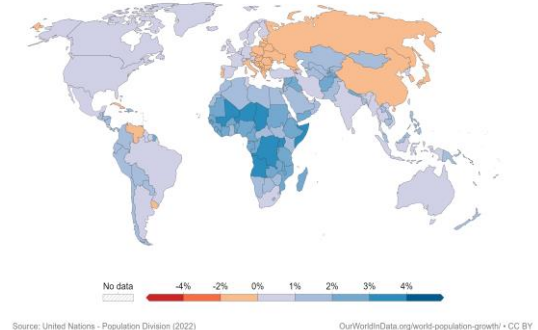
World population by region, including UN projections  
Future projections are based on the UN's medium-fertility scenario.



Population growth rate, 1950  
Annual rate of population change from 1950, including UN projections to 2100 based on its median scenario. This takes births, deaths and migration into account.

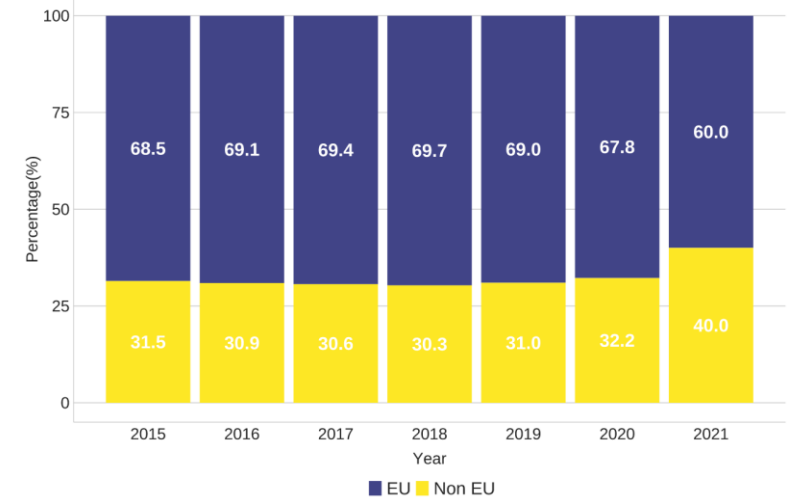


Population growth rate, 2021  
Annual rate of population change from 1950, including UN projections to 2100 based on its median scenario. This takes births, deaths and migration into account.



# UK Government - Food Security Report 2021

- In 2020, the UK imported 46% of the food it consumed.
- £48 billion of Food, Feed and Drink was imported
  - £21.4 billion was exported.
- The UK is largely self-sufficient in grain production
- In meat, milk, and eggs, the UK produces a roughly equivalent volume to what it consumes
- UK is a net importer of dairy and beef



# UK Government - Food Security Report 2021

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- Key natural capital assets for food production are soils.
- Estimates suggest soil degradation, erosion, and compaction are costing about £1.2 billion each year and reducing the capacity of UK soils to produce food.
- Whilst trends appear to be negative, **specific data is currently lacking.**


## J.P. Morgan - Tracey Allen - Agricultural Commodities Strategist

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- Increases in middle-class incomes in emerging economies such as China and India will drive food demand:
  - 50% increase in food crops
  - 70% increase in the amount of meat
- **Technology and a new age of precision farming are likely to hold the answer to growing demand.**
- Among the latest developments, manufacturers including **John Deere, CNH Industrial** and **AGCO** are competing to corner the multibillion dollar market in driverless tractors and agricultural robotics, ushering in the era of automated farming.

# Artificial Intelligence

artificial intelligence

/,ɑ:trɪfɪʃl in'telɪdʒ(ə)ns/ 

*noun*

1. the theory and development of computer systems able to perform tasks normally requiring human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages.

Powered by Oxford Dictionaries



"It is the science and engineering of making intelligent machines, especially intelligent computer programs. It is related to the similar task of using computers to understand human intelligence, but **AI does not have to confine itself to methods that are biologically observable.**"

- IBM - John McCarthy

# Artificial Insemination

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# Vertical Farming - Cambridge Consultants

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- Vertical farming promises a step change in production density, providing significant efficiency savings with the additional benefit of improved product quality.
- Vertical farming also presents the only viable option for growing crops within urban environments where geographic footprint is limited and demand for just-in-time delivery of produce ever increasing.
- However while capital investment in large vertical farms delivers economies of scale, operating costs dominate the total cost of ownership.



# Vertical Farming - Cambridge Consultants

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- Real time crop sensing, air management and crop manipulation, showing how the use of off-the-shelf systems designed for other purposes doesn't always provide a long-term solution.
- **Treating a vertical farm as a complete ecosystem** allows for a more efficient, cost effective and connected solution to be constructed, further enhancing crop production per square foot.

# National Robotarium - Dr Fernando Auat Cheein

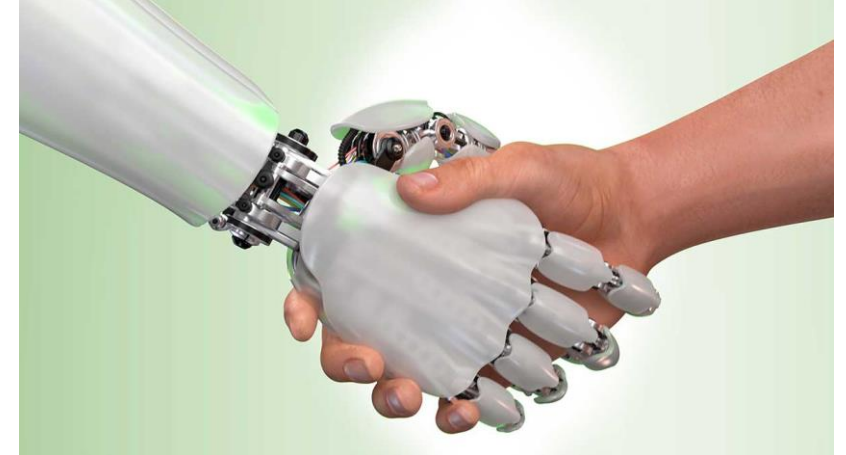
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- Ultimately, it's about using robotics, AI and data to make agriculture more efficient and deliver larger, better quality and more predictable crops. The world's population is growing and we need more food. In Europe, we're taking this into vertical farming, where the inputs are controlled in an industrial process. That's developing all the time, but **there is still so much robotics can do for traditional field agriculture.**

# National Robotarium - Dr Fernando Auat Cheein

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- Early “robots” in agriculture were actually automated harvesting machines. We’ve added intelligence and decision-making capability and now robots
  - Harvest
  - Plant
  - Seed
  - Prune
  - Herbicide Management
  - Monitor and observe the characteristics of crops



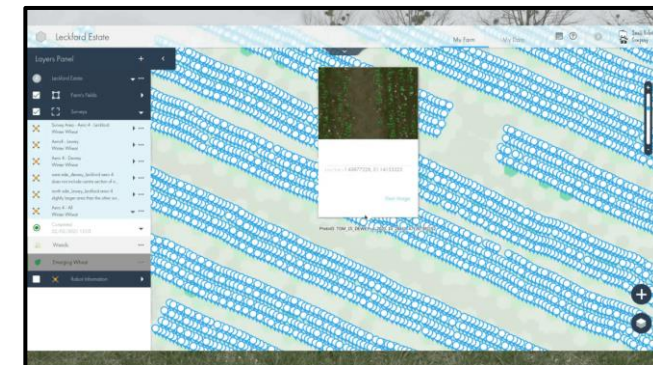
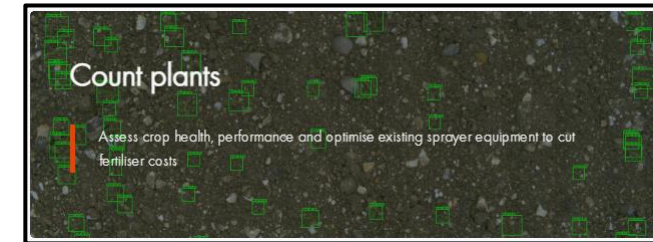
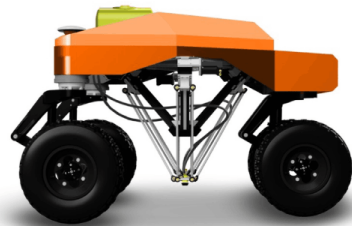
# Telecommunications - Cambridge Consultants

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- We believe that **telecommunications will be an AI pioneer.**
- Already highly digitised, the scale and scope of telecommunications data provides a huge opportunity for machines to continuously learn and improve – laying the perfect infrastructure for mass AI to take off.
- We forecast the growing complexity of communications networks and their dependence on **AI-powered autonomous infrastructure.**

# Small Robot Company

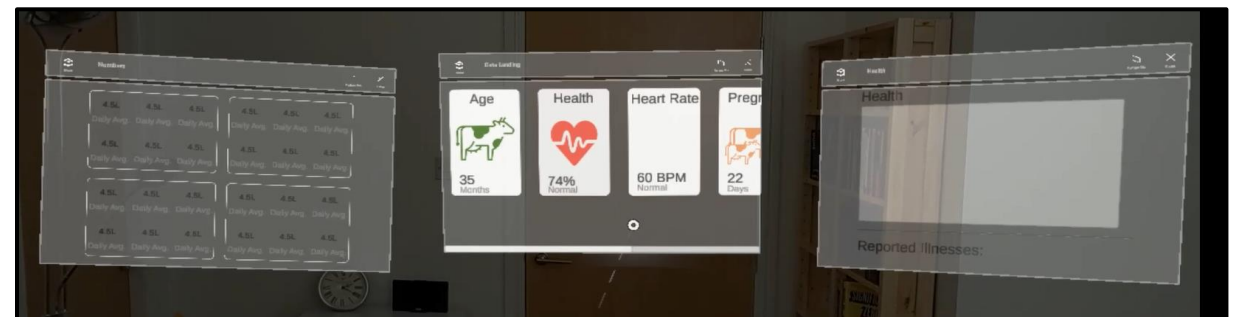
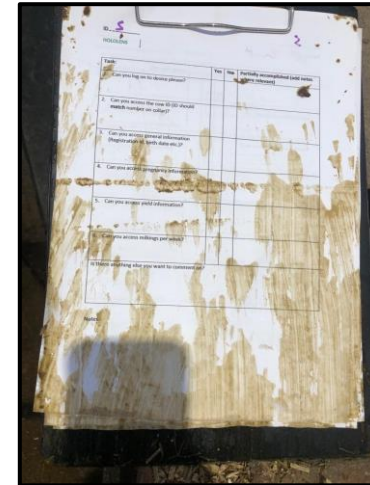
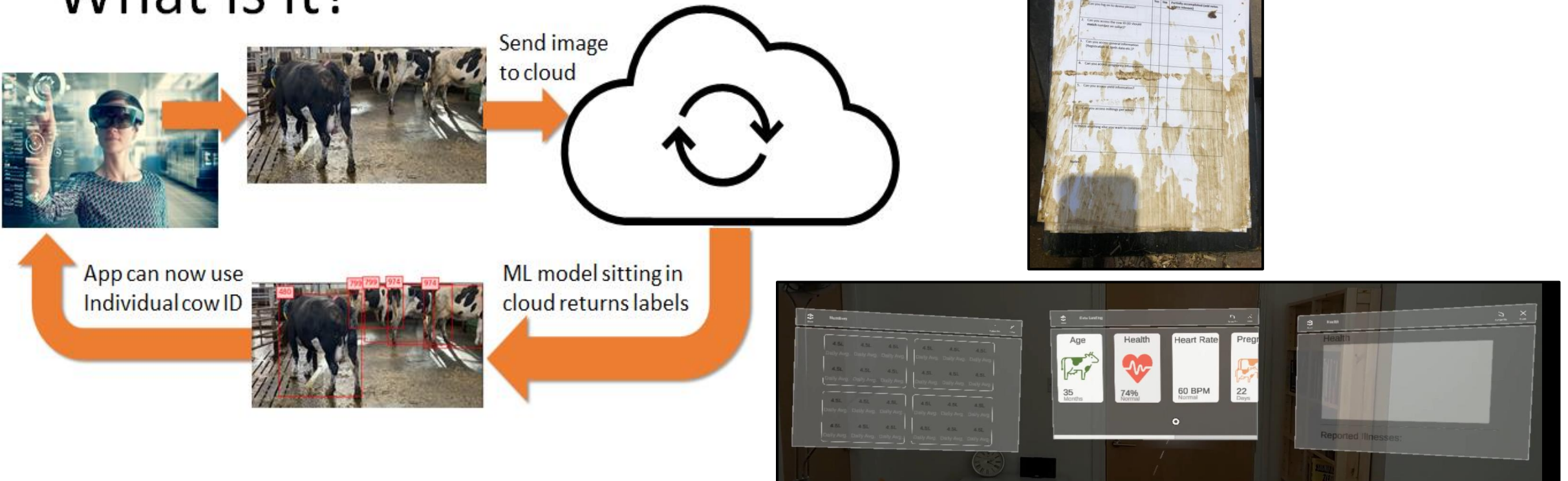
- Tom, Dick & Harry
- Wilma – A.I.



# SmARtview



## What is it?



# Crover

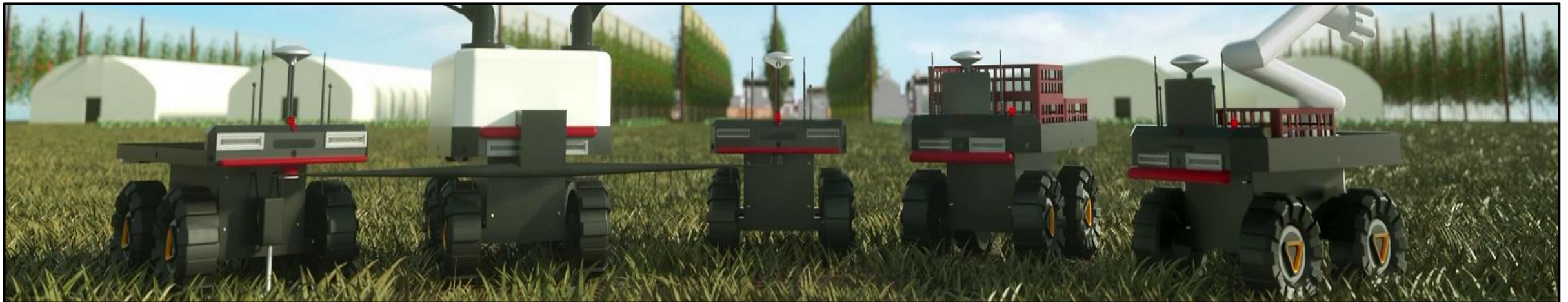
- Swims through grain
- Reduces Crusting
- Measures
  - Temperature
  - Moisture
  - Quality (Development)
- Produces 3D Map





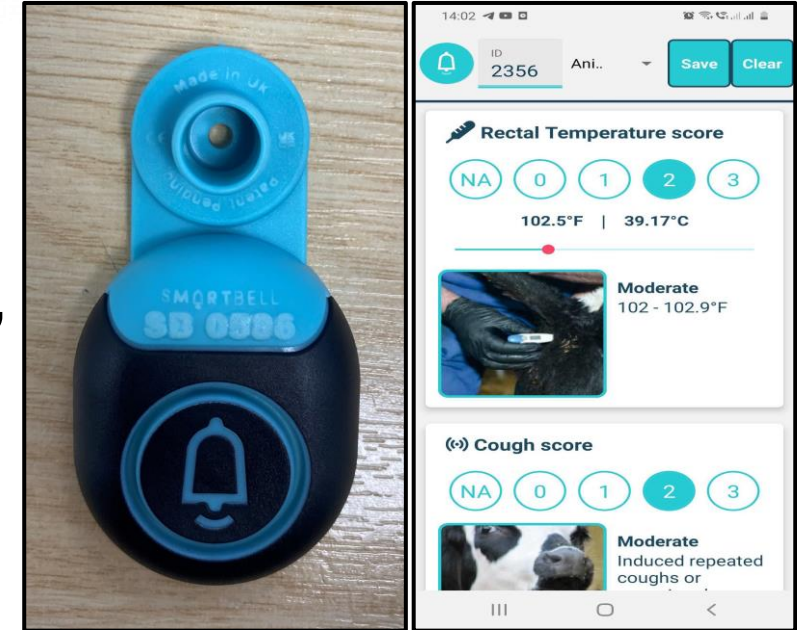
# Antobot

- Identify Individual Fruit
  - Growth Stage
  - Health
- Predict Yield



# Smartbell

- Fully automated system includes distress alerts, herd analysis
- Early health interventions
- Reduce antibiotics
- Tracking across the value chain

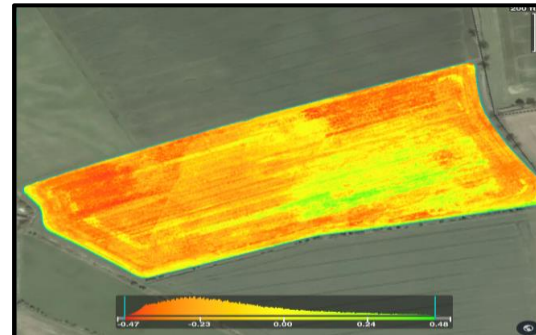


HandsFree  
Farm

HandsFree  
Hectare

# Hands Free Hectare / Farm

- Hands Free Hectare
  - 1 Ha
- Hands Free Farm
  - 35 Ha - Fully Autonomous Farming
- Preparation
- Planting
- Spraying
- Harvesting





# Thank-you

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