WHEN SPACE MEETS AGRICULTURE

14-15 November 2016 | Matera, Italy

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"Unmanned Aerial Vehicles (UAVs) for UK Agriculture: creating an invisible precision farming technology

Whitepaper

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Image from ESA Sentinel

REGIONE BASILICATA

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network of european regions using space technologies

in collaboration with

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and the support of

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european farmers | european agri-cooperatives

ERIAFF Network
European Regions for Innovation in Agriculture, Food and Forestry

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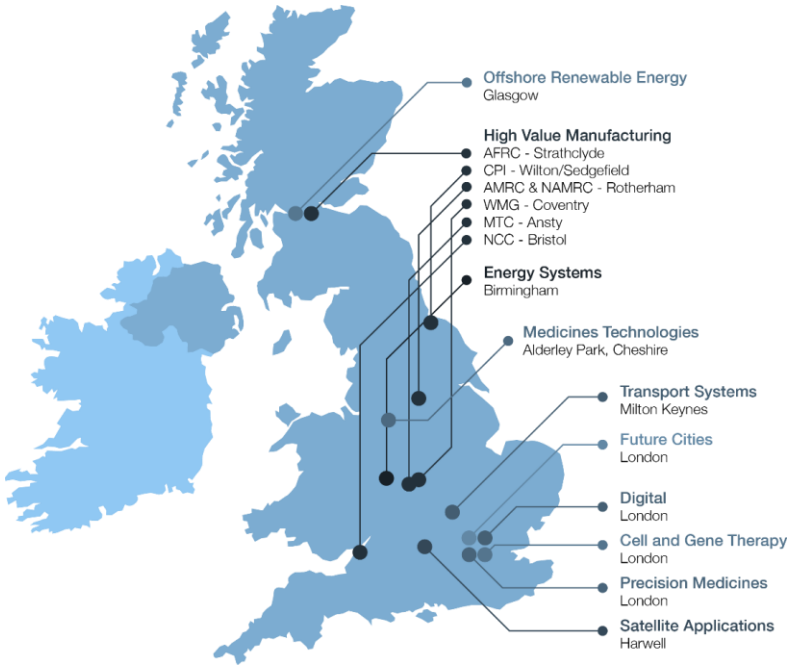
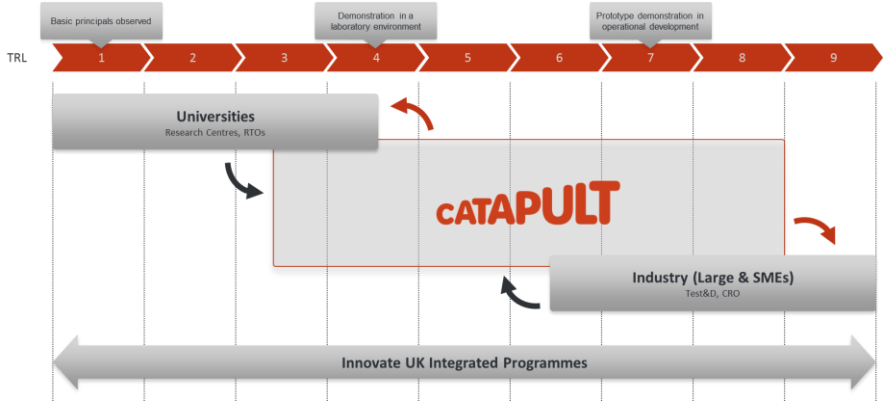
- An independent, not-for-profit organisation with a unique company with our position as a neutral convener
- We act as a connector to bring innovators together to collaborate *(end users, universities, satellite industry, SMEs…)*
- Support business in the use of space services & applications
- Transfer innovation between Space and non-space organisations
- Help space sector engage with markets





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UAVs for UK Agriculture – White paper

Department for Transport

Civil Aviation Authority

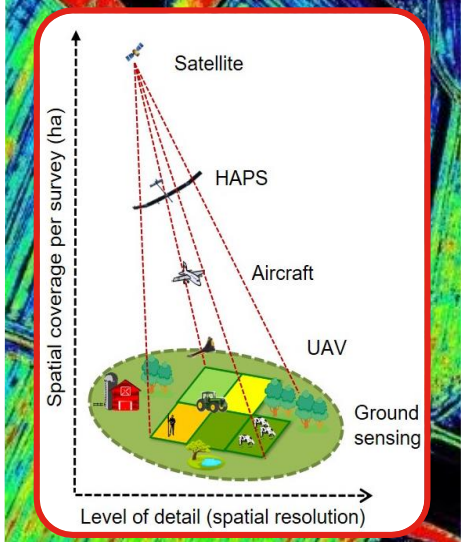
MINISTRY OF DEFENCE

Systems, Infrastructure & Platforms

Sensors, Data and Information Services

Products & Applications

Users and benefits



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Drones and farming – Rapid growth

age last updated at 00:07 GMT, Friday, 8 August 2008 01:07 UK

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Robot plane sweeps over UK fields

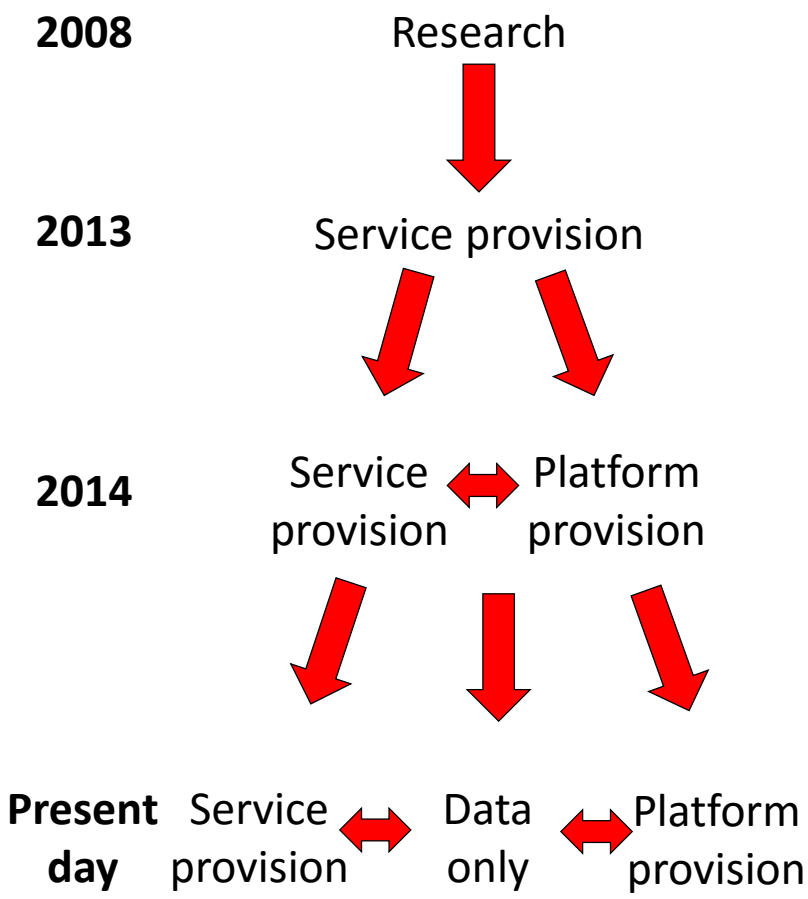
By Jonathan Amos
Science reporter, BBC News

The robot plane can stay aloft for about an hour on battery power

The first flights have been conducted of an autonomous unmanned aerial vehicle (UAV) to monitor UK farmland.

The robot plane flew over fields in England and Wales to map the nitrogen levels in soil, to determine whether fertiliser applications were needed.

The UAV missions were part of a joint research project between tech firm Qinetiq and Aberystwyth University.



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Drones and farming – Lucrative market

Markets and Markets report (2016) projects the use of UAVs within agriculture to increase at a compound annual growth rate (CAGR) of **42.25%** between 2015 and 2020, reaching a market value of around **$5.6 billion**.

'Agriculture is expected to emerge as a lucrative application sector over the forecast period. These UAVs aid farmers by taking snapshots of a **vast** array of fields and providing **crucial** data pertaining to soil and crops, thereby **assisting** in crop management'

Source: Radiant Insights (2015)

Are drones delivering for UK agriculture?

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Current perspectives

'The use of UAVs is **not commercial** at present, it's been used as a **research tool** and has **yet to be proven** as a useful piece of farm machinery'

Dr David Nelson - Technical Director - Branston Potatoes

'User **expectations** are generally on a level **much higher** than is **realistic**, especially if they have done a trawl of **UAV advertising**'

Nigel King – Managing Director, Quest UAV

'The technology [hardware and software] works well; the **barrier** is in realising an **economic benefit** [increased yield and/or decreased costs] from the information produced by the UAV. Most potential adopters would like to see examples of how **margins have improved** before investing in these technologies or services'

Dr Eric Ober – Senior Research Scientist and Crop Physiologist, NIAB

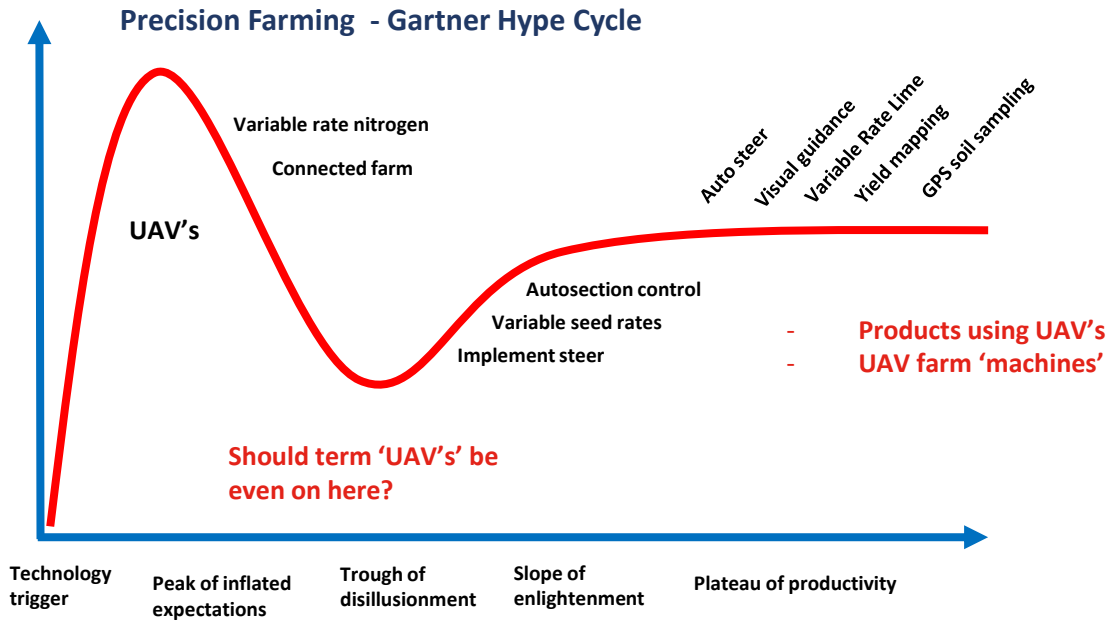
*'I would like to see **more automation** regarding data collection on a **more frequent basis**, and then to start to **look at trends** in the data collected rather than the absolute numbers'*

Andrew Williamson – Nuffield Scholar/ Farmer

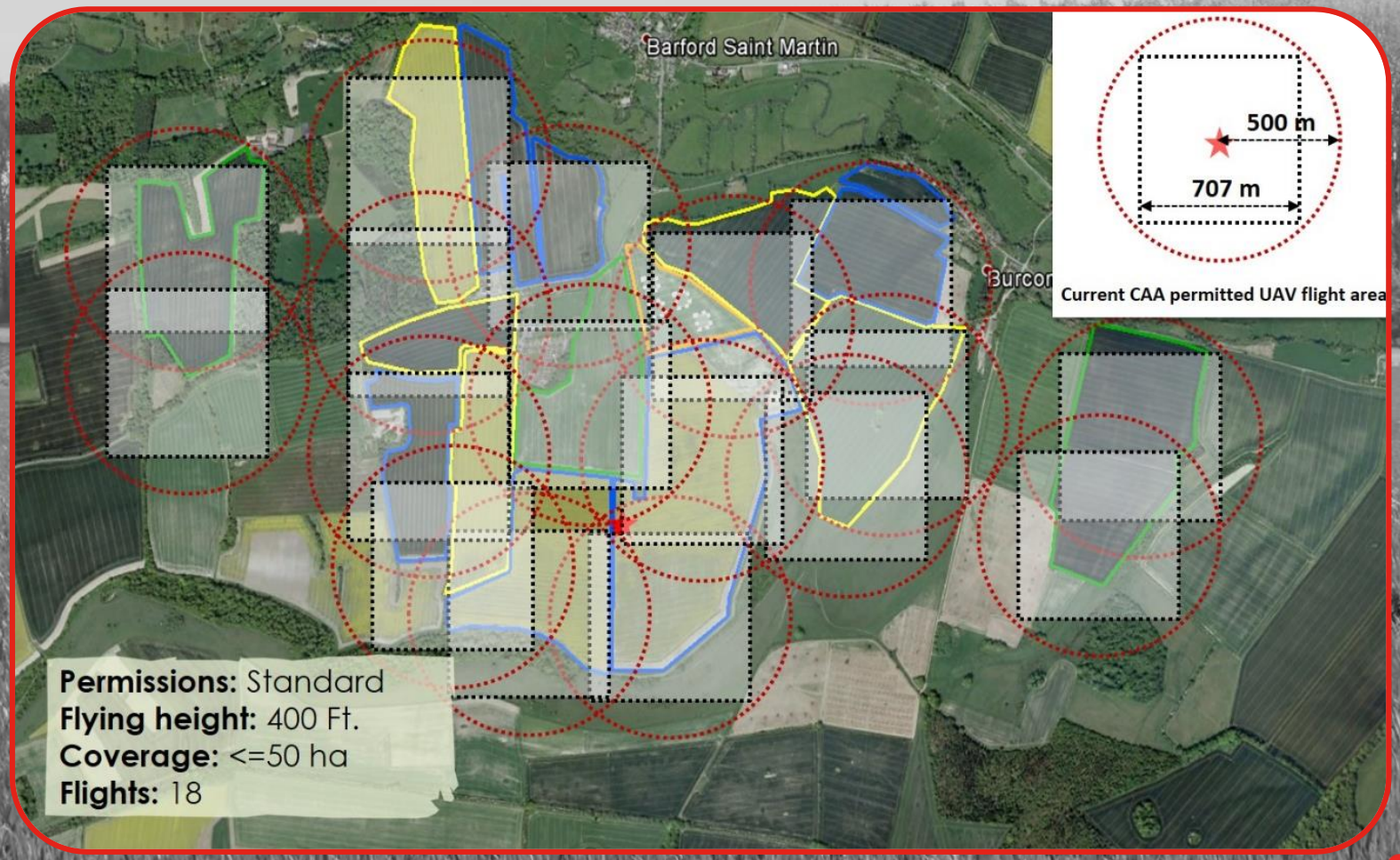
Current technology readiness

‘Growing improved crops without agronomy is like running a sports car on gravel roads’

Bram Govaerts (2016)



Regulatory and operational barriers



‘Farm to fork’ supply chain

Precision farming providers

Advisory & agronomy

Producers and farmers

Processors & aggregators

Supermarkets

Government, academia, research organisations and agri-centres of excellence

Technology providers

Measurement challenge example

Black-grass weed

- Major problem to UK farmers
- Yield penalties are severe
- Just 12 plants/m^2 can reduce yield by 5%.
- Particularly problematic on heavy soils or where drainage is poor and soils are wet.

Increasing prevalence of grassweeds in cereals can be attributed to a shift in farming practice including:

- Movement towards more profitable autumn cropping
- A trend towards earlier drilling
- A reduction in rotations and spring cropping
- The straw burning ban

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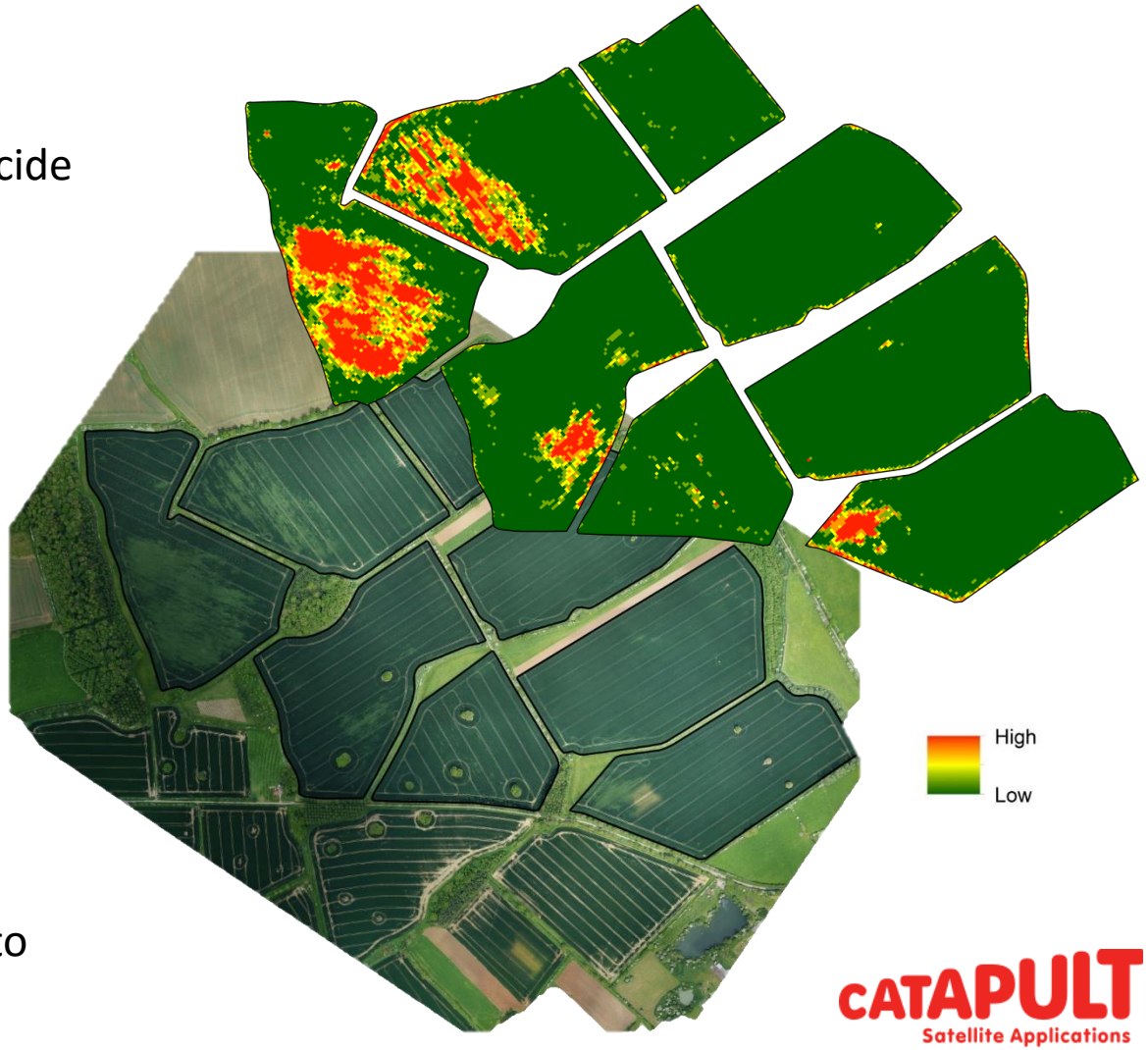
Current solution

Key time to control/ reduce black-grass problems is in the Autumn/ early spring period through pre/post emergence herbicide application

Market need of mapping black-grass

Current approaches from drones enabling mid-season detection only

- Is this of value?
- Is this actionable?
- Can we advance black-grass detection to an ‘earlier’ stage – meeting the market need?



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Enabling an invisible technology

Systems, Infrastructure & Platforms

- Platforms
- Resilient systems
- HAPS

Sensors, Data and Information Services

- Technology selection
- Sensors
- Data capture
- Data storage and transfer
- Artificial intelligence
- IoT

Products & Applications

- Image analytics
- Data science
- Product creation
- Information services

Users and benefits

- Image analytics
- Data science
- Product creation
- Information services

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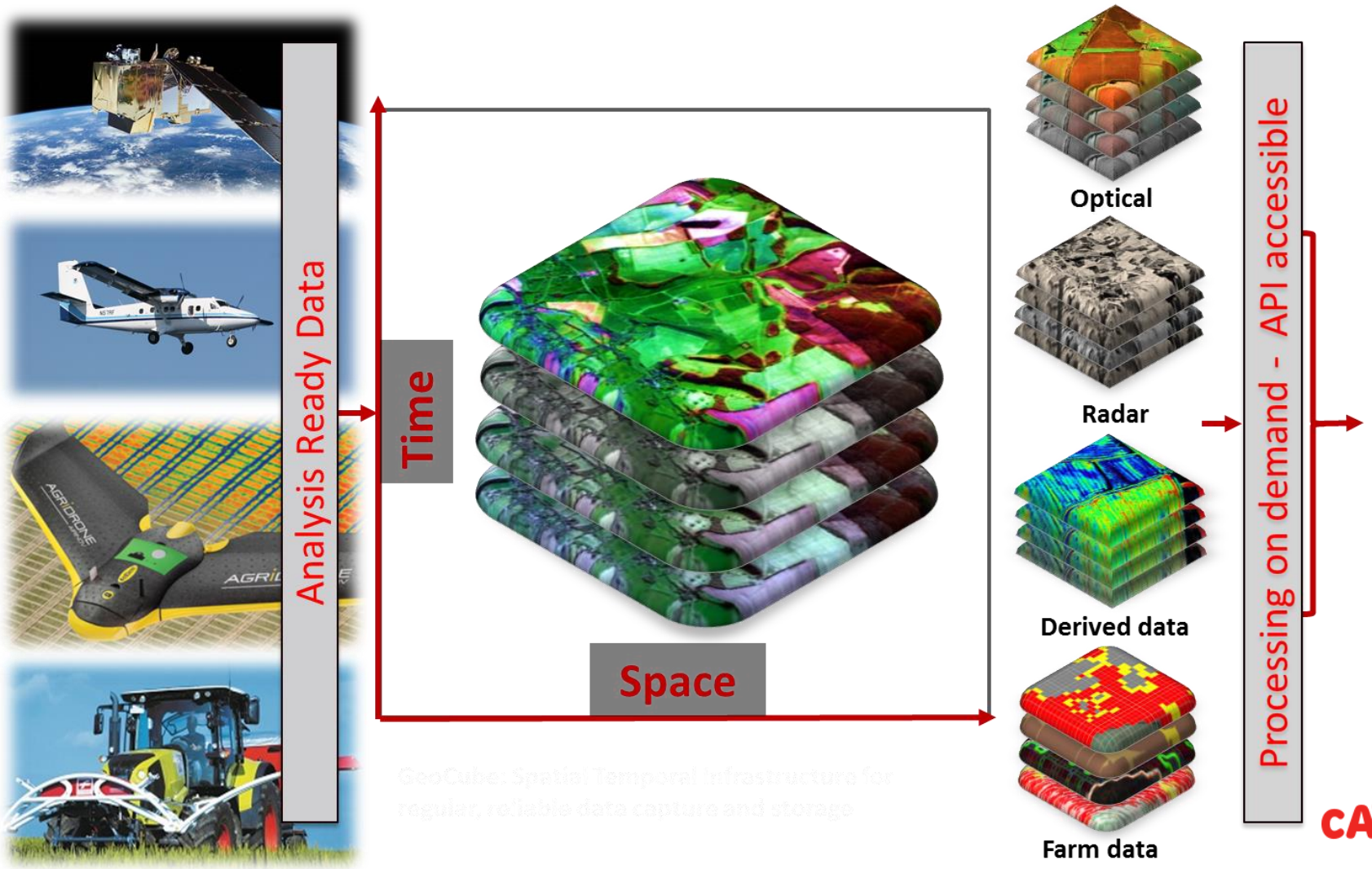
Integrated data solutions



GeoCube: Spatial Temporal Infrastructure for regular, reliable data capture and storage

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Creating insights and actions

Data

Software and systems

Data Science

Knowledge and expertise

Statistics and measurements

Models

Insights

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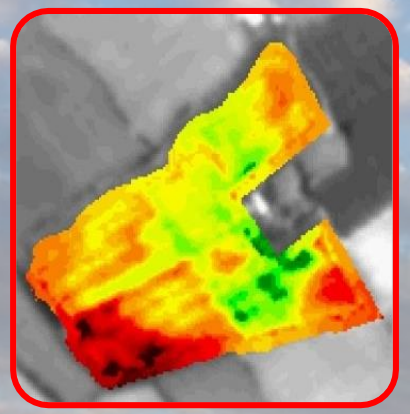
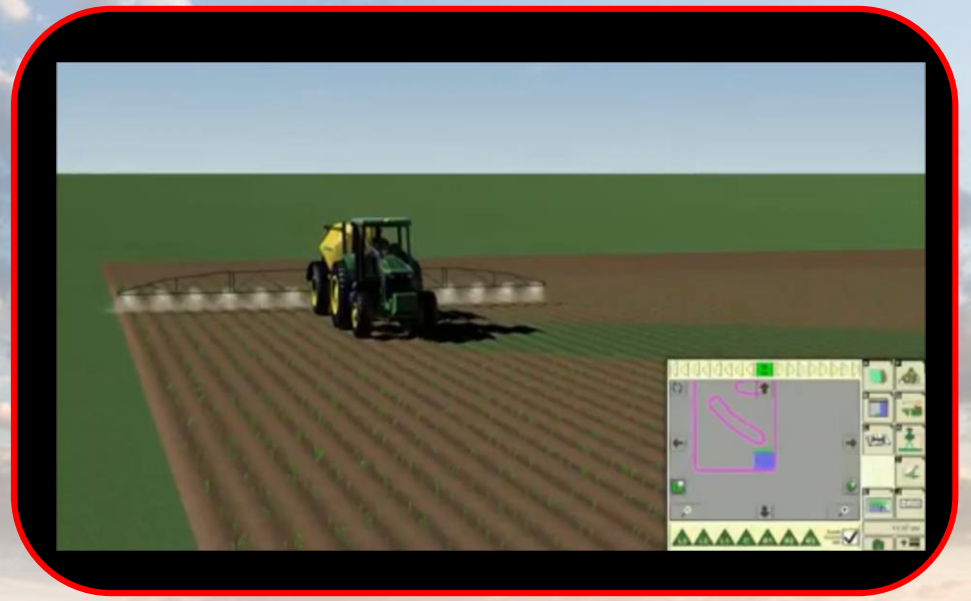
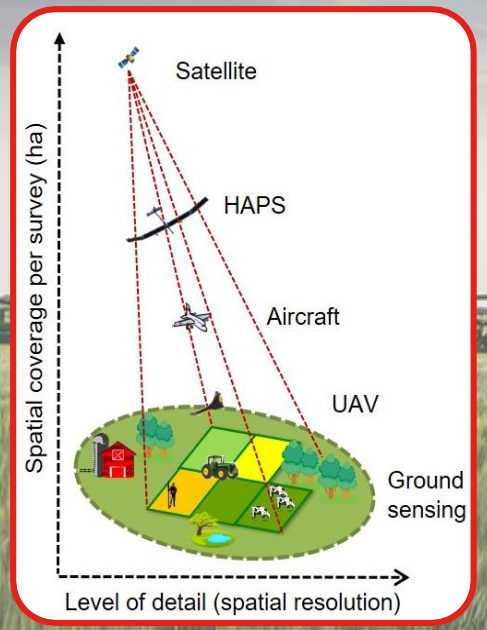
Enabling exploitation – Proactive farming







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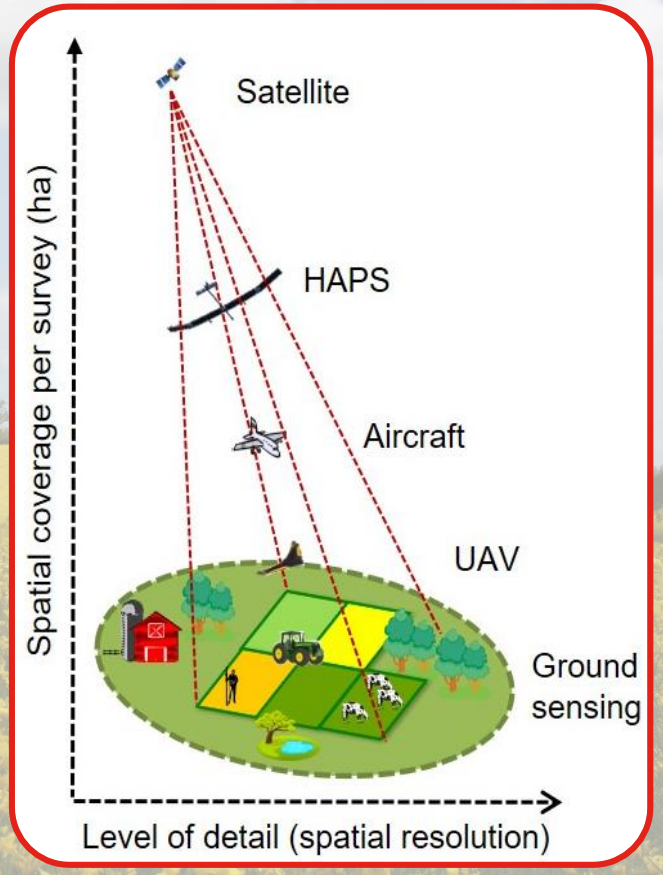
White paper – Summary

- The role of geospatial information in agricultural management will be critical to supporting farmers in overcoming production and environmental challenges.
- With appropriate use, regulatory change (legal, regulatory framework and policy) and developments around artificial intelligence and full autonomy, UAV technologies will become an ‘invisible’ precision farming tool.
- UAVs will be exploitable by different users across the agricultural supply chain providing vital spatial, agronomic information in a proactive manner.
- Technology will range from simple UAVs that capture aerial photographs to drone-based farm machines such as sprayers. Different users will be able to routinely exploit the technology without having to think about it.
- UAVs are just a technology, the user shouldn’t have to consider where information comes from.



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Thank you!

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