This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 732064

This project is part of BDV PPP

DataBio: Advanced Visualisation of Big Data for Agriculture

Thanasis Poulakidas

Intrasoft International

DataBio project coordinator

EBDVF

Versailles, 22 November 2017

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DataBio project info

Project title: Data-Driven Bioeconomy

Project type: H2020 Innovation Action, in topic ICT-15-2016-2017 - Big Data PPP: Large Scale Pilot actions in sectors best benefitting from data-driven innovation

Duration: 1 Jan. 2017 – 31 Dec. 2019 (36 months)

Total budget: 16,2 M€

Partners: 48 partners, 70+ associated partners

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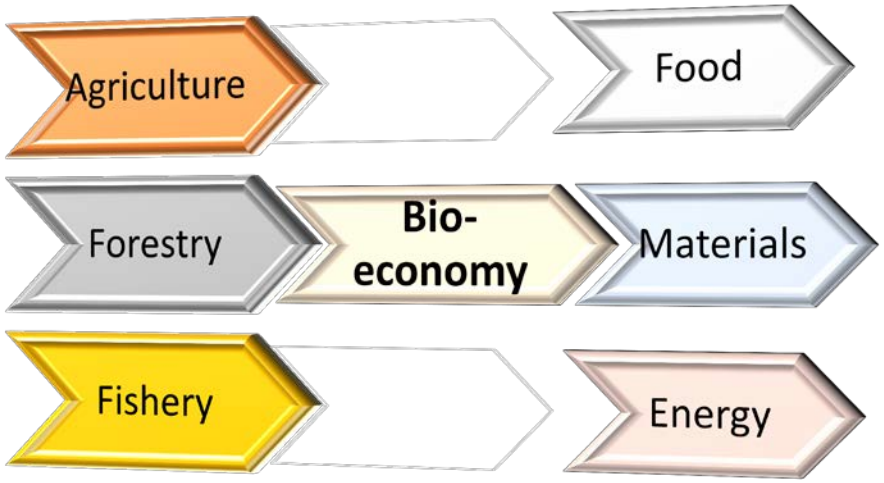
Project objectives

- Industrial domain: **bioeconomy**
  - Improve utilization of best possible raw materials from agriculture, forestry and fishery
  - Improve production of food, energy and biomaterials
- The opportunity: **bioeconomy can benefit from Big Data**
  - Farm machines, fishing vessels, forestry machinery and remote and proximal sensors collect large quantities of data
  - Big data technologies process data and create knowledge that increases performance and productivity in a sustainable way



- Project objectives
  - Build a versatile **DataBio platform** suitable for different industries and user profiles
  - Ensure effective **utilization of Big Data** datasets and technologies in bioeconomy
  - Open the possibilities for European **ICT and Earth Observation industries** in the bioeconomy market

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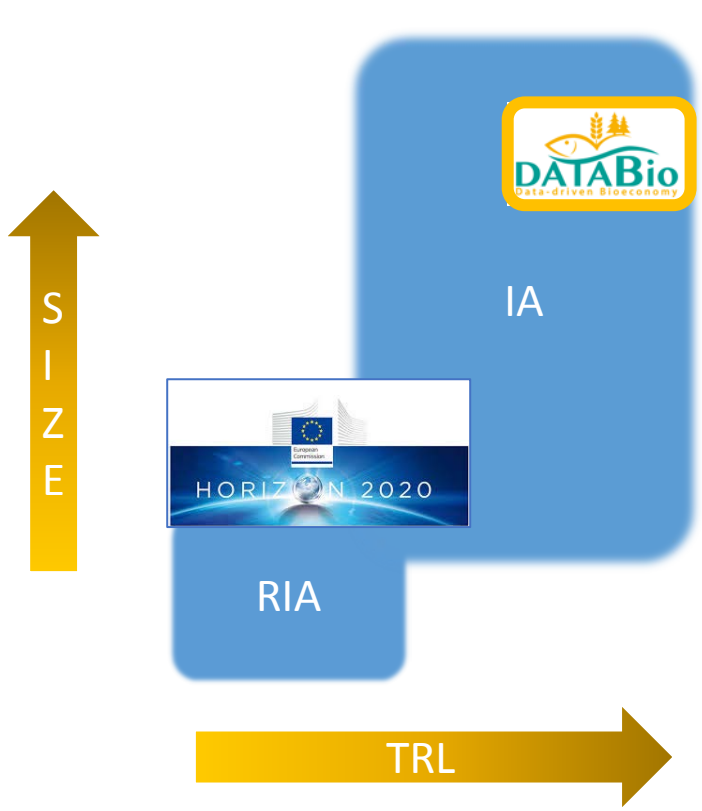
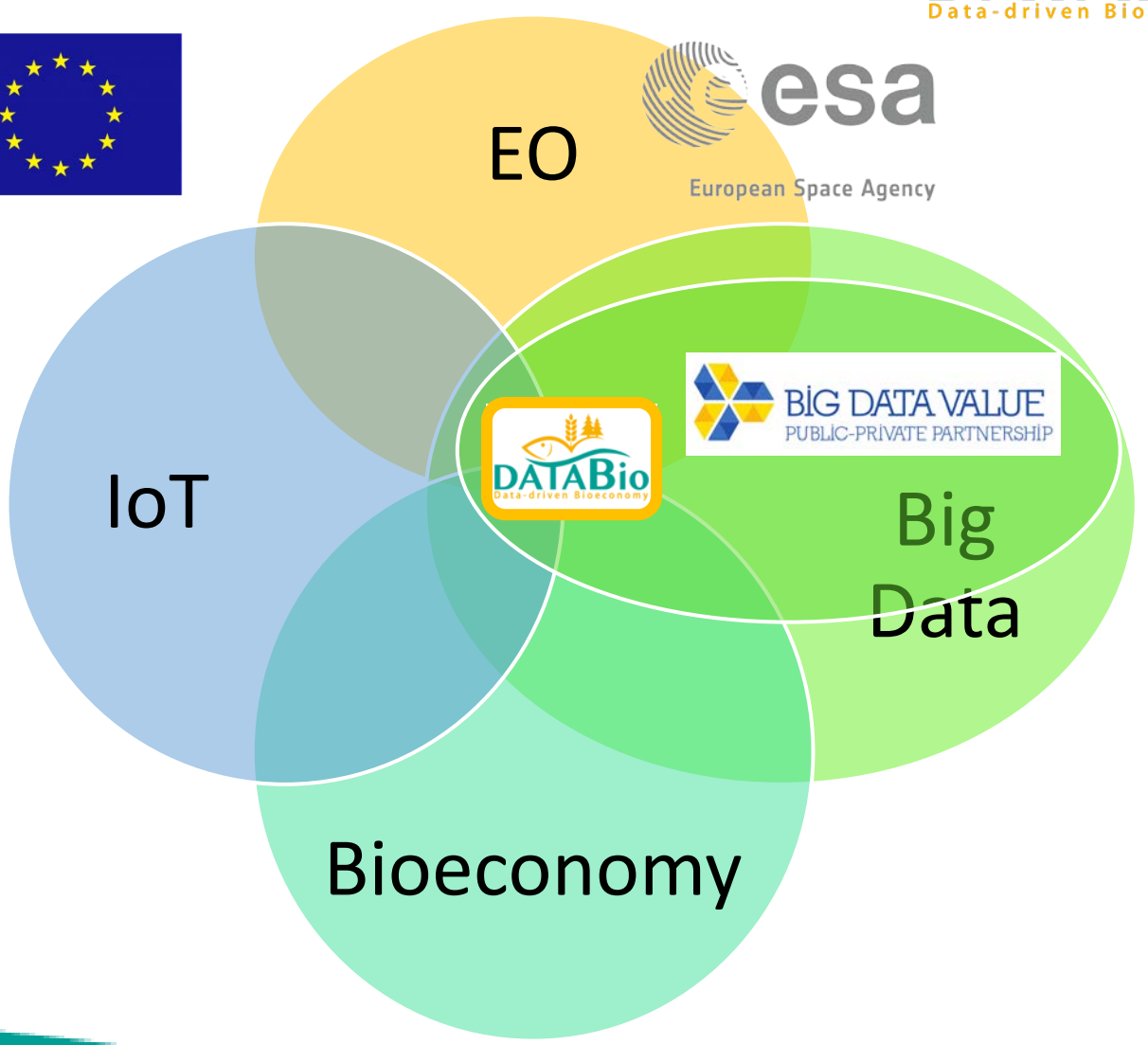
DataBio: a lighthouse project positioning





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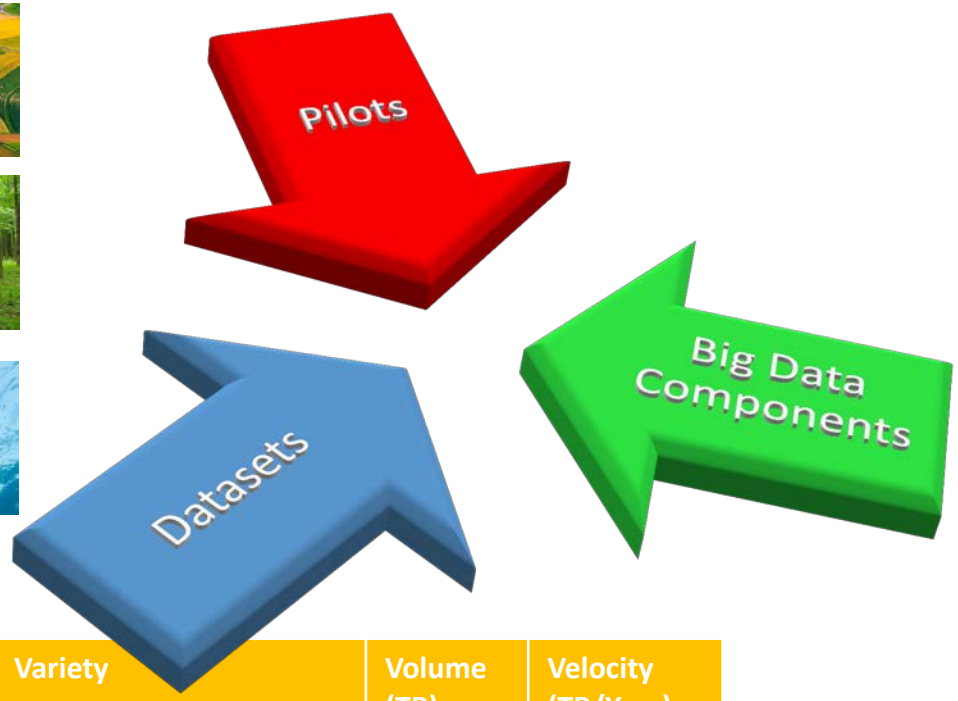
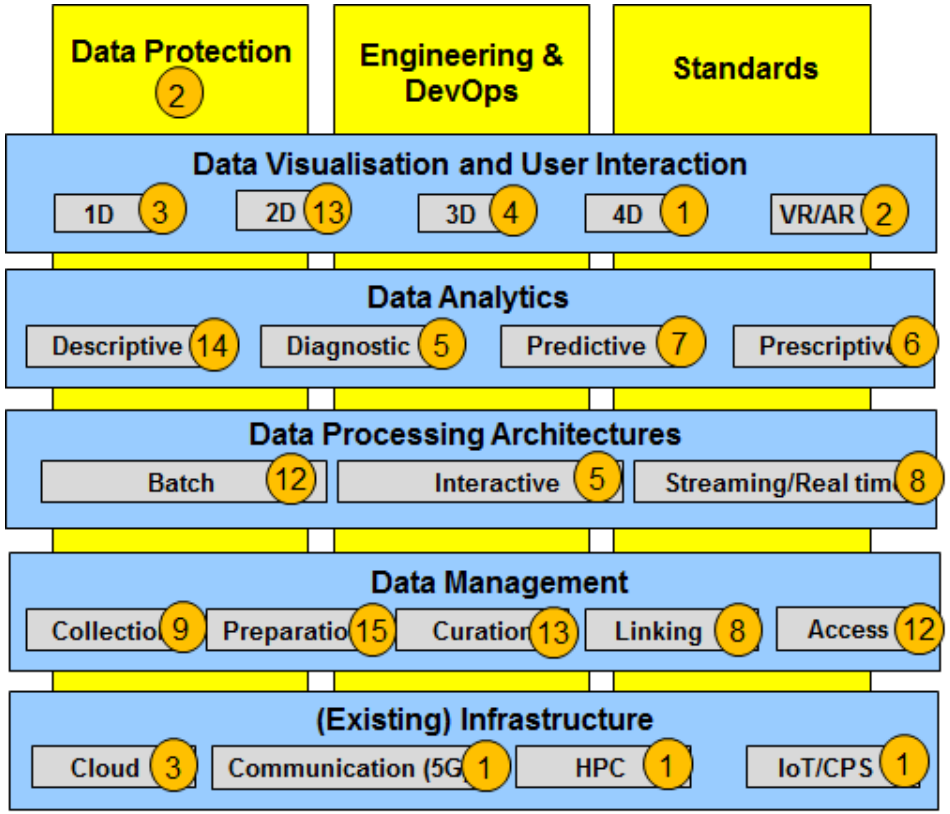
Combining drivers and assets

26 pilots, in 3 sectors x 3 thematic groups



Sector	Variety	Volume (TB)	Velocity (TB/Year)
Agriculture	8 sources, 4 types	53	197
Forestry	8 sources, 7 types	11,39	12,12
	Aerial/UAV		100 GB/h
Fishery	20 sources, 13 types	8,82	6,27



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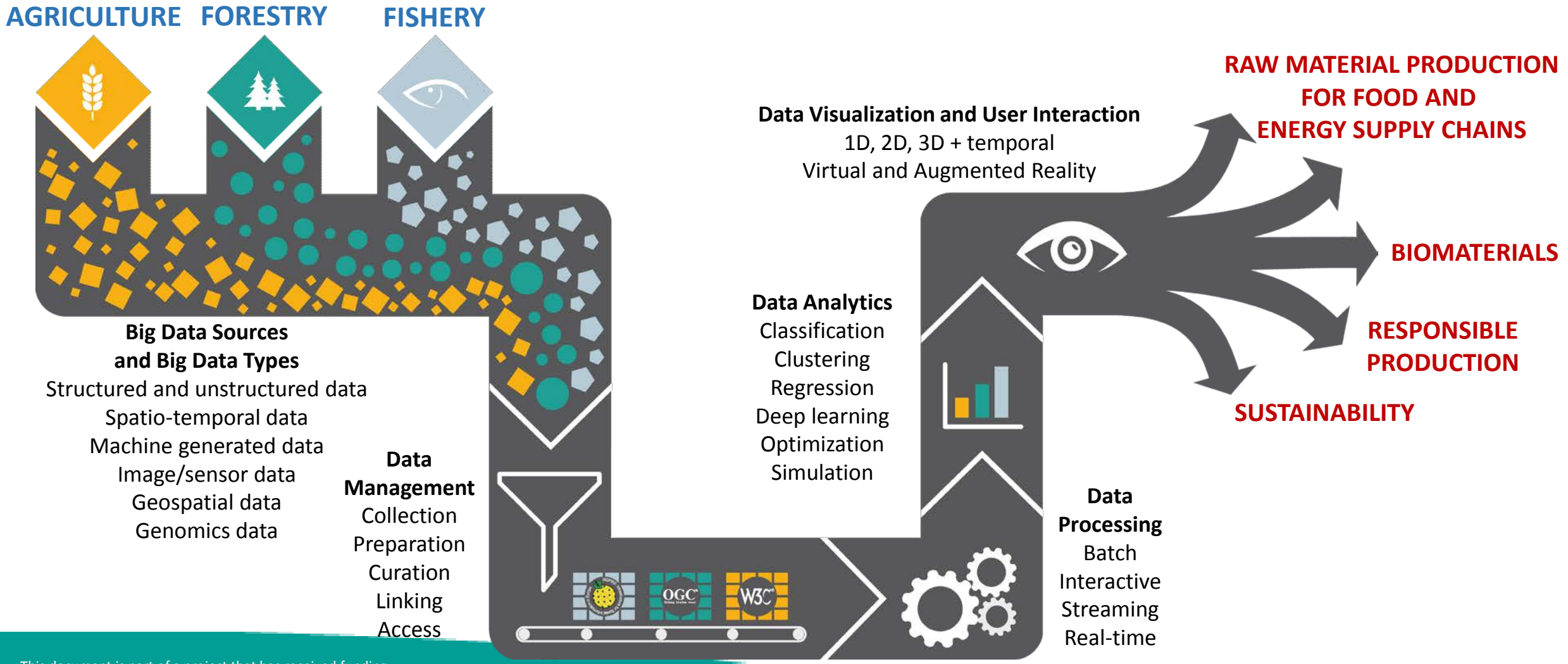
Big picture and expected outcomes



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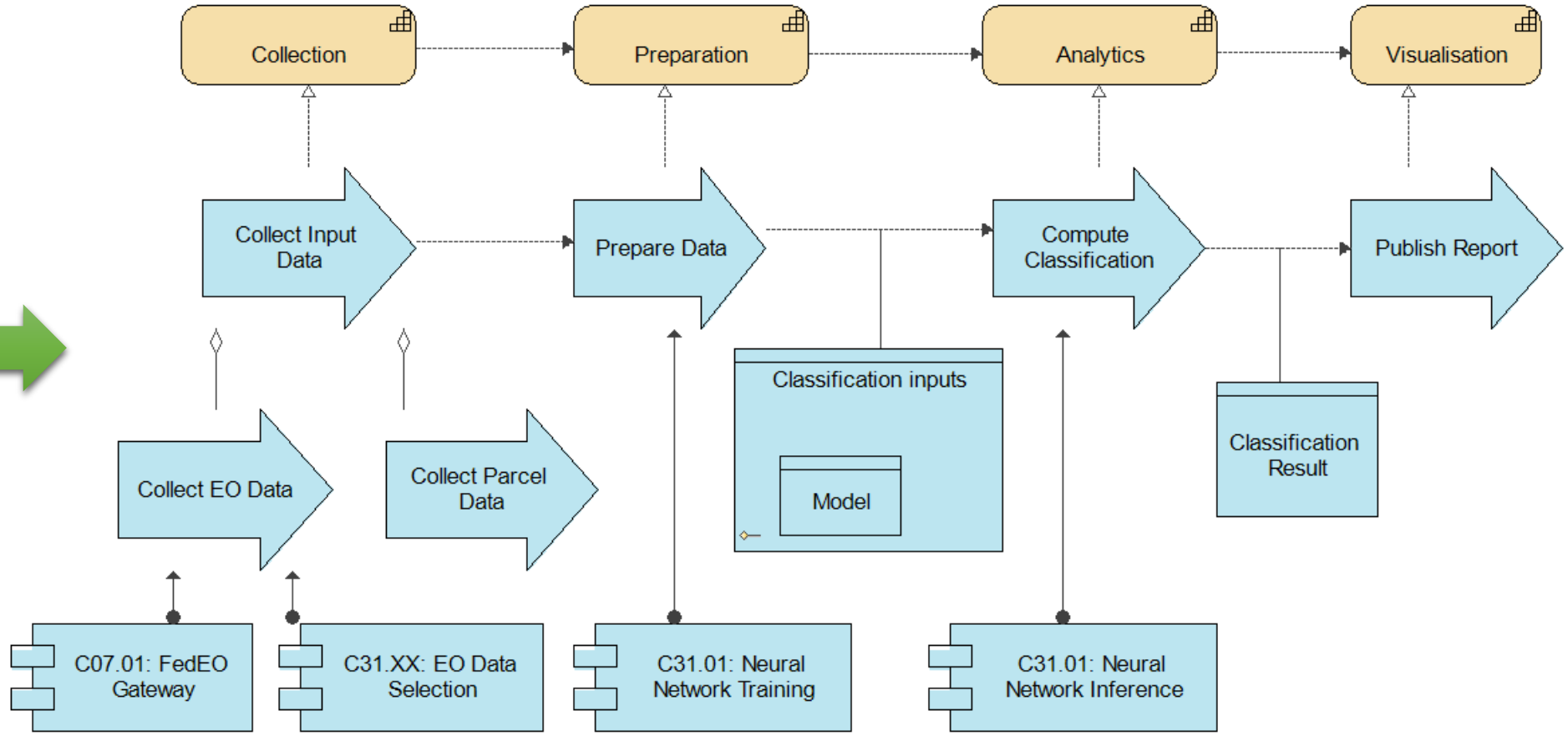
Design scope (through example)

- Full Big Data **pipelines** of components
  - Example from precision agriculture pilot
- Shaping **common** pipelines and interfaces, driving the **DataBio platform** design



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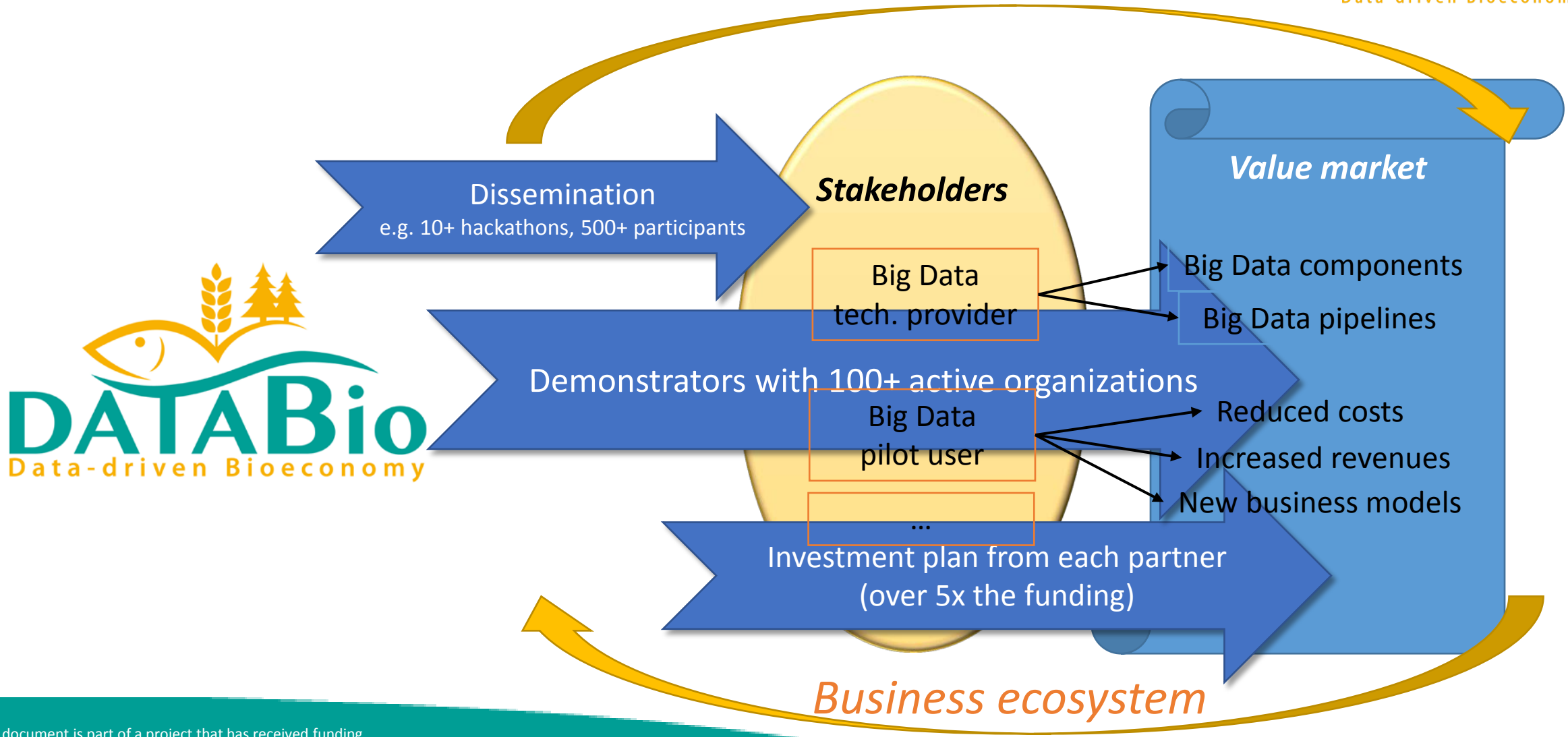
Impact activities



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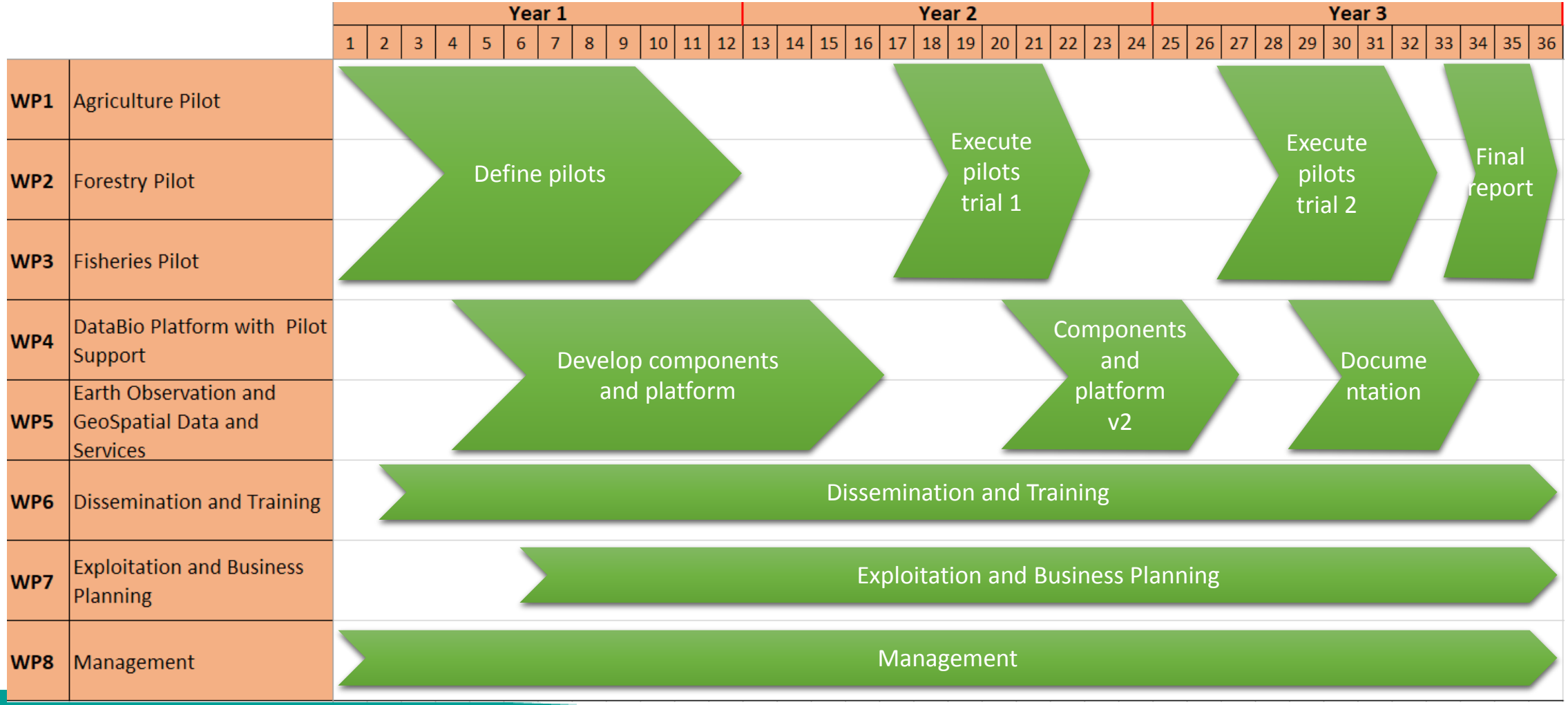
Project implementation phases



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Pilots

Precision Horticulture including vine and olives	Precision agriculture in olives, fruits, grapes (@Greece)
	Precision agriculture in vegetable seed crops (@Italy)
	Precision agriculture in vegetables -2 (Potatoes, @Netherlands)
	Big Data management in greenhouse eco-systems (@Italy)
Arable Precision Farming	Cereals and biomass crops 1 (@Spain)
	Cereals and biomass crops 2 (@Greece)
	Cereals and biomass crops 3 (@Italy)
	Cereals and biomass crops 4 (@Czech Republic)
	Machinery management (@Czech Republic, Italy)
Subsidies and insurance	Insurance (@Greece)
	Farm Weather Insurance Assessment (@Italy)
	CAP Support (@Italy, Romania)
	CAP Support (@Greece)

Multisource and data crowdsourcing /e-services	Easy data sharing and networking
	Monitoring and control tools for forest owners
Forest Health / Remote/Crowd sensing, Invasive species/damage	Forest damage remote sensing
	Monitoring of forest health
	Invasive alien species control and monitoring
Forest data management services (forecast/predict)	Web-mapping service for the government decision making
	Shared multiuser forest data environment

Fishing vessels immediate operational choices	Oceanic tuna fisheries immediate operational choices
	Small pelagic fisheries immediate operational choices
Fishing vessel trip and fisheries planning	Oceanic tuna fisheries planning
	Small pelagic fisheries planning
Fisheries sustainability and value	Pelagic fish stock assessments
	Small pelagic market predictions and traceability

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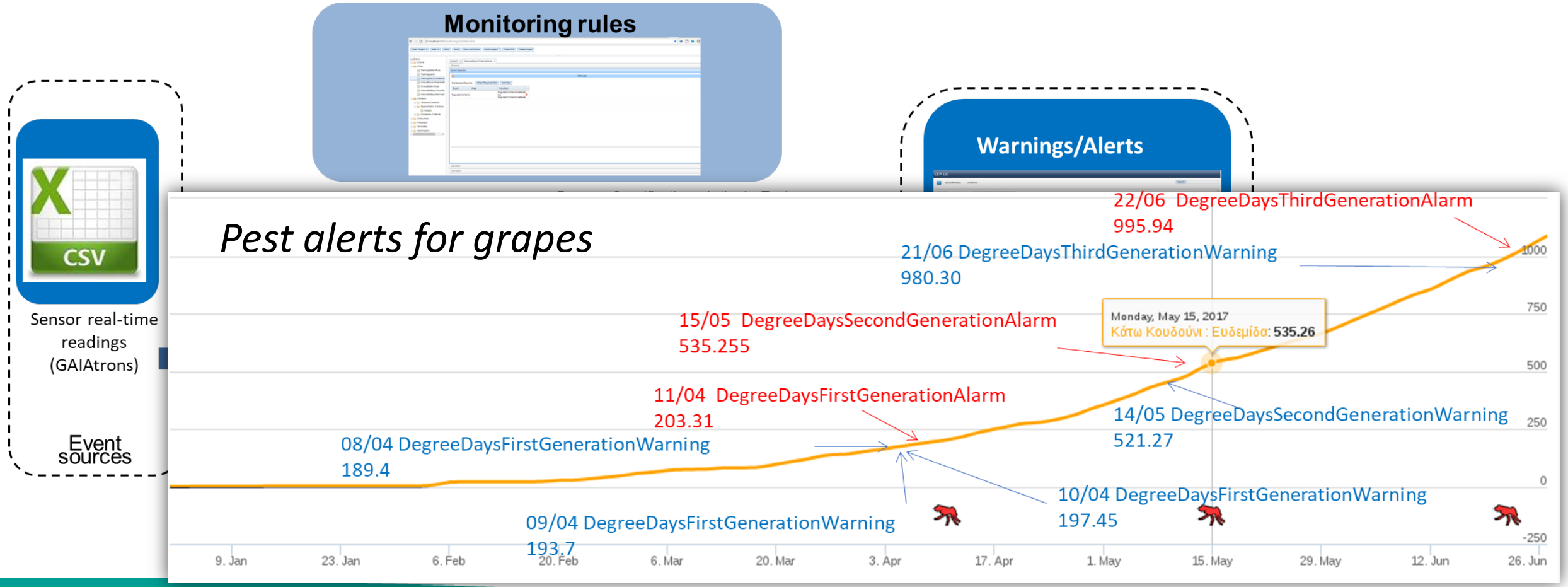
Example of Big Data component use in pilot

Using PROTON for detecting crop diseases in Precision Agriculture



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Added value of using Big Data in agriculture

- **Currently** some high tech values are offered to farmers in a few nations for a number of crops:
  - new elite varieties
  - Big Data such as weather, soil, crop (phenotypic data), and other environmental data are routinely collected and meta-analyzed
  - farm telemetry or utilization of satellite data (Earth Observation)
  - technological and managerial services
- … but not with a big data analytics technology level
- **Big data analytics** can provide highly localized plans:
  - descriptive (better and more advanced way of looking at an operation)
  - prescriptive (timely recommendations for operation improvement, i.e. seed, fertilizer and other agricultural inputs application rates, soil analysis, and localized weather and disease/pest reports, based on real-time and historical data)
  - predictive (use current and historical data sets to forecast future localized events and returns)
- **The agriculture DataBio pilots will demonstrate** improvement that can reach 30% of Total Productivity Factor over 5 years
- The **DataBio results can be replicated** because
  - we use standard technologies and best practice solutions at all system levels
  - we account for both small and bigger farms, with agriculture data gathered art both a finer and a larger scale
- Big Data in agriculture is currently a **hot topic** worldwide, especially in the USA, and is heavily industry driven
- **Market gap**: currently there are no (or limited) Big Data based commercial services for agricultural professionals in several European countries

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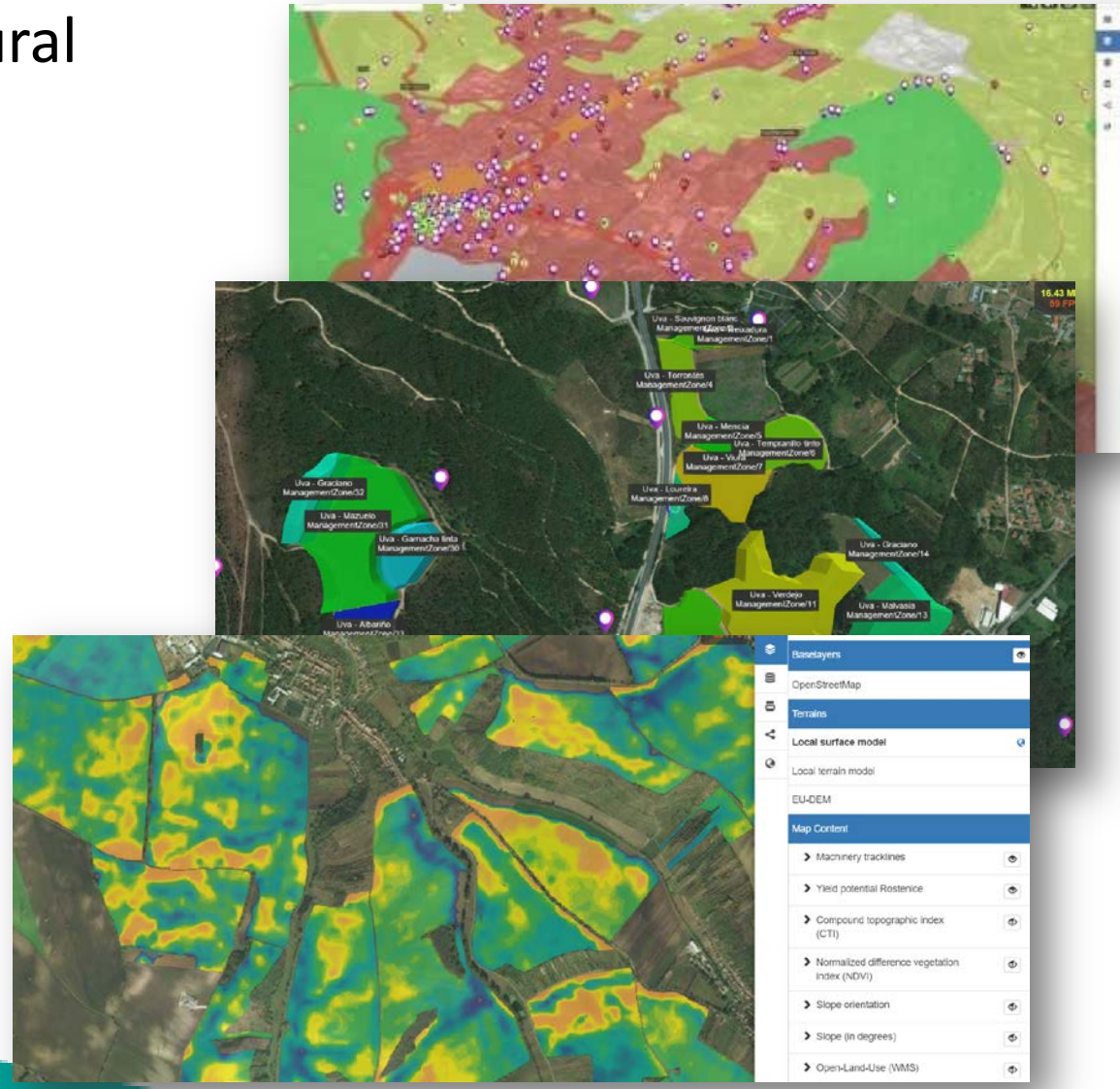
Demo: Integration of geographic and linked data into a 3D web environment

- 3D visualisation and analysis of agriculture, rural development data and agriculture linked data
- Over web interface, open to extensions
- Very large datasets, e.g.
  - Open Land Use: coverage of most of Europe, ~45M objects
  - Smart POI: worldwide coverage, >27M objects
  - Open Transport Map: coverage of Europe, ~45 objects
- Enable the user to
  - explore an area of interest in more natural way
  - explore several factors (yield potential, topography, slope, orientation, topography wetness index etc.)
  - easily navigate deeply through huge linked info



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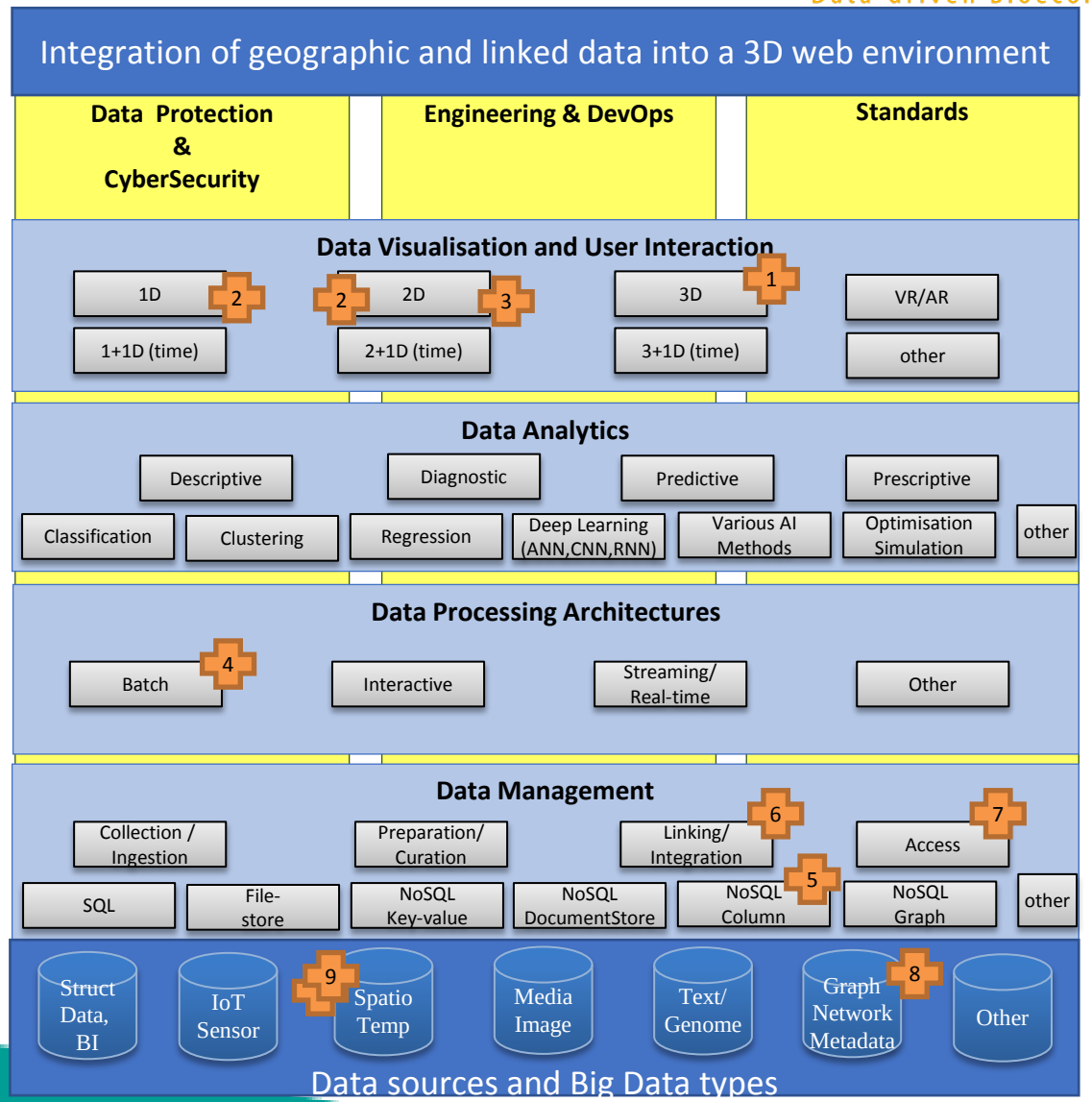
Components used in demo

1. HsLayer NG 3D-OLU
   - Integrates Cesium 3D
2. HsLayer NG
   - JS web mapping library
3. Metaphactory
   - graph data visualization
4. D2RQ
   - transforms relational DB to virtual RDF graphs
5. Virtuoso
   - to store the semantic datasets
6. Silk
   - for discovering links
7. Sparql
   - for quering semantic data
8. Farming data model and ontology
9. Datasets:
   a. Yield potential
   b. Open Land Use
   c. Smart POI
   d. Terras Gauda



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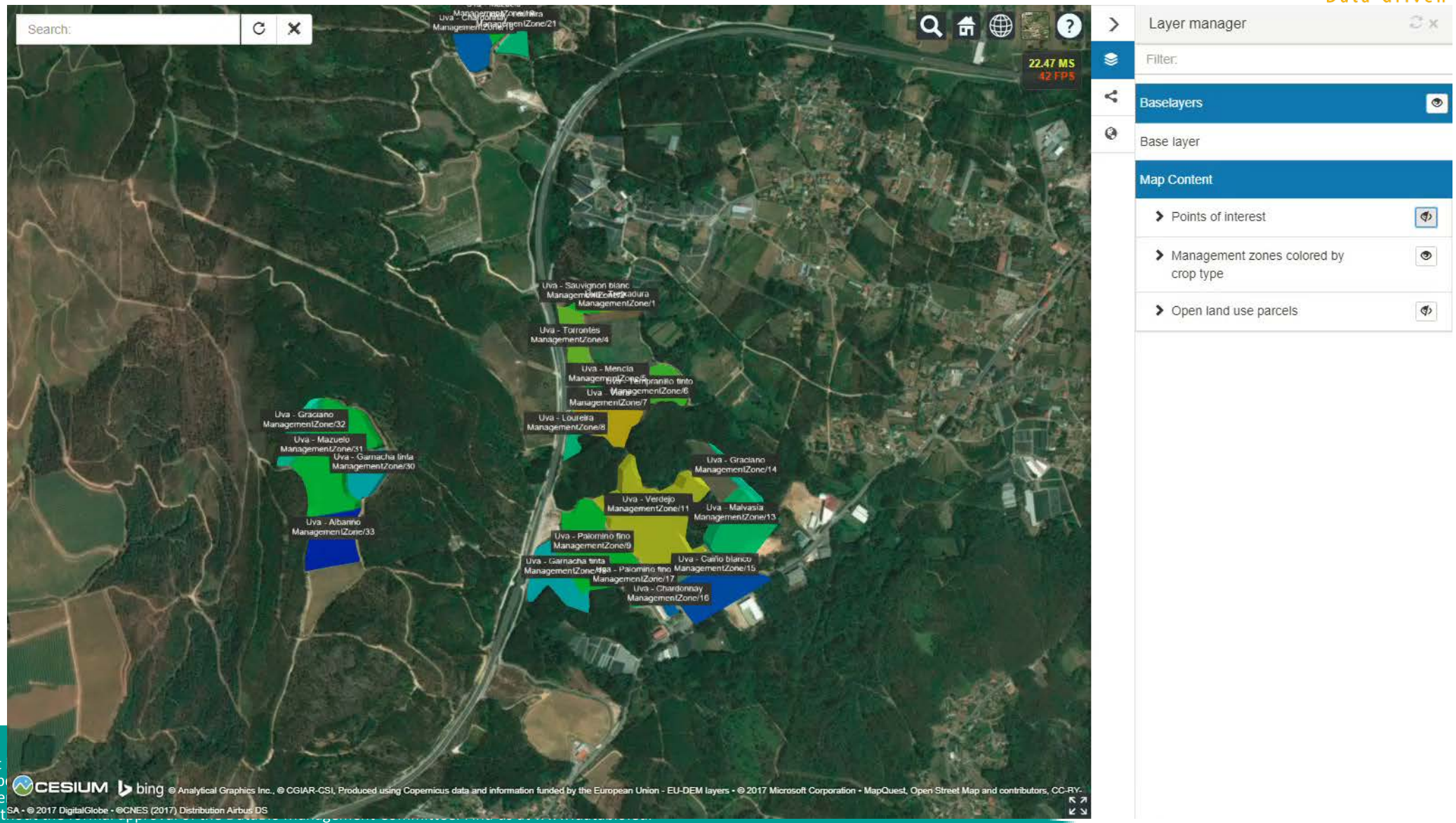
Demo



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