



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



BIG DATA VALUE
PUBLIC-PRIVATE PARTNERSHIP

This project is part of BDV PPP

CREATING VALUE BY AI AND BIG DATA IN BIOECONOMY

Dr Thanasis Poulakidas

INTRASOFT Intl

DataBio Coordinator

IoTWeek

Bilbao, 4 June 2018

Experience from our DataBio project



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



BRINGING BIG DATA ADDED VALUE IN
Agriculture • Forestry • Fishery

100+ Actively involved organisations

48 Partners
17 Countries

90+ Big Data technologies deployed

26 Pilots applications

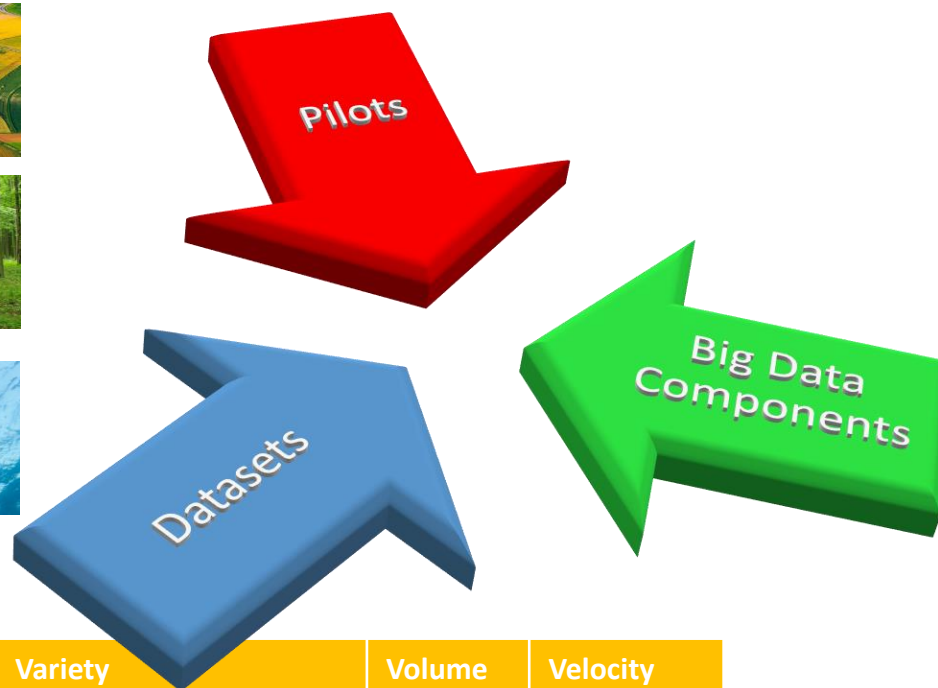
2017

2018

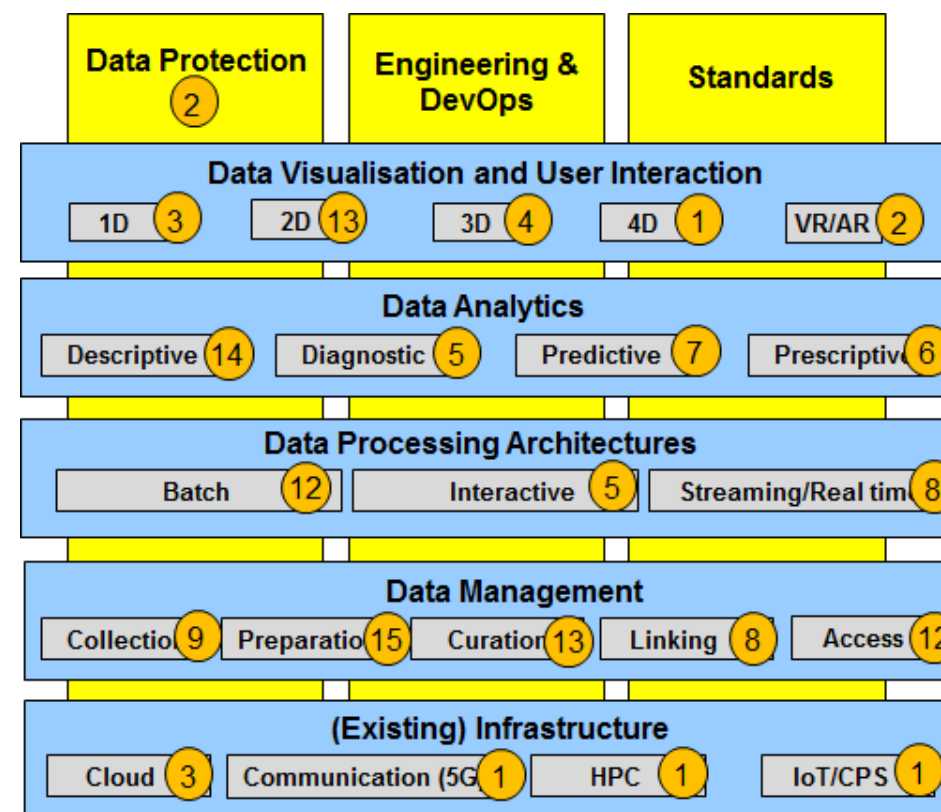
2019

Combining drivers and assets

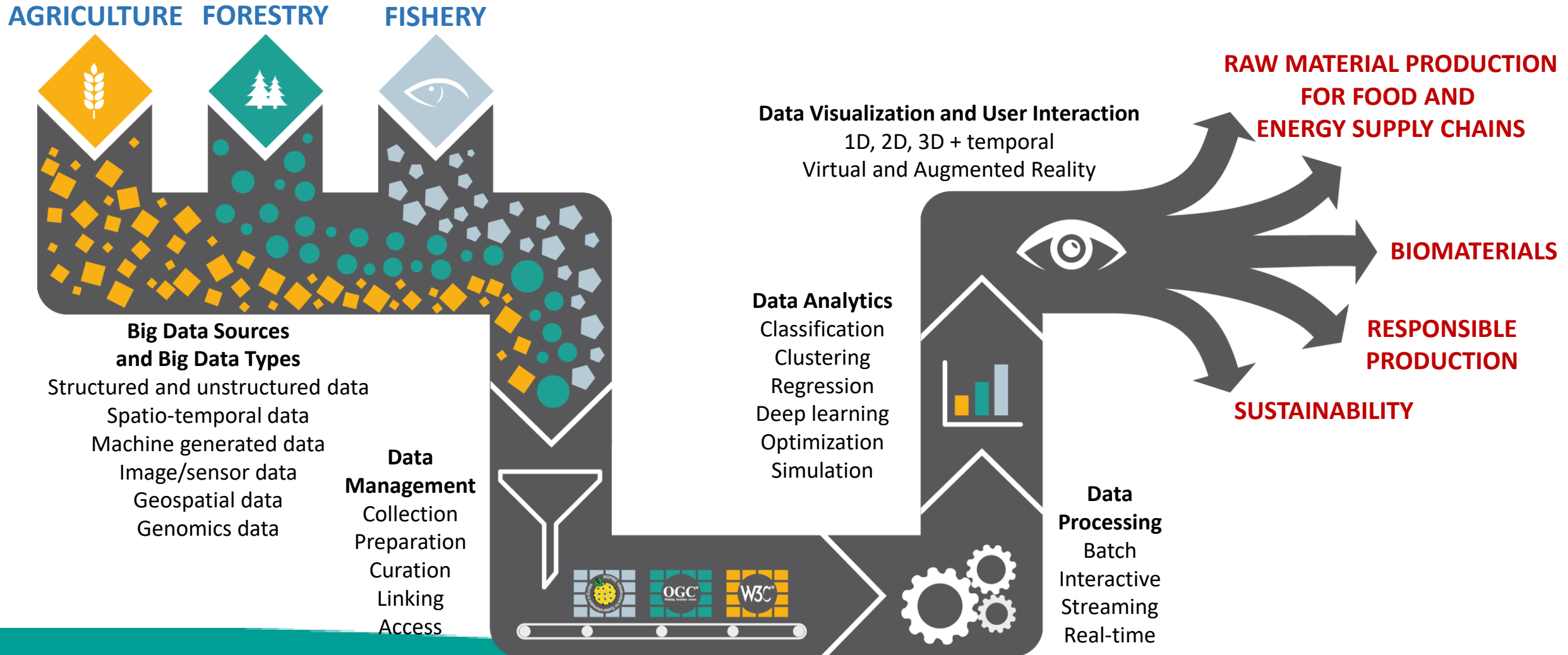
26 pilots, in 3 sectors x 3 thematic groups



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



Big picture and expected outcomes



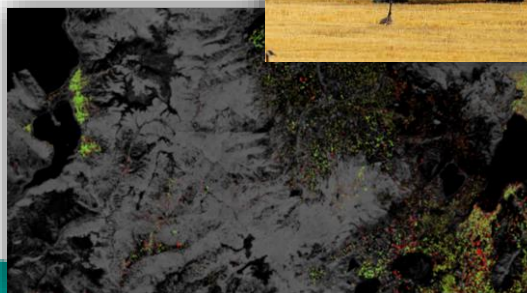
Creating value in Agriculture

- Scope
 - Olives, vine, peaches, seeds, potatoes
 - Genomics in greenhouses
 - Cereal, biomass and cotton
 - Agriculture machinery
 - Insurance and CAP support
- AI and Big Data analytics technologies
 - Holistic approaches combining Earth Observation, meteo, IoT (incl. drones and machinery) and genomic **data**
 - Descriptive and prescriptive analytics with anomaly maps for **irrigation, fertilization and pest management**
 - Predictive analytics for the development of **data-driven yield models**; predictive feedback (**monitoring**), **real-time** streaming data analytics to alert and provide operational recommendations
 - **Genomics prediction models**: predictive analytics for genetic merit
 - Descriptive and predictive analytics on optimized **tractor** utilization and fault prediction/detection
 - Diagnostic and descriptive **damage assessment** based on remote data
 - Precise **crop identification** using EO data



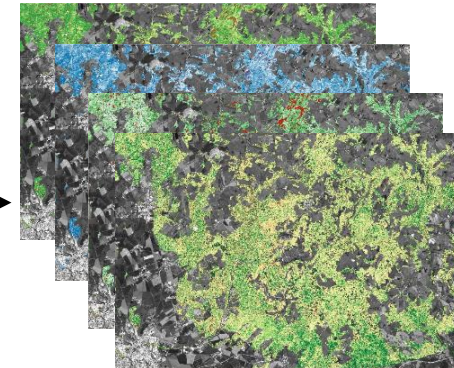
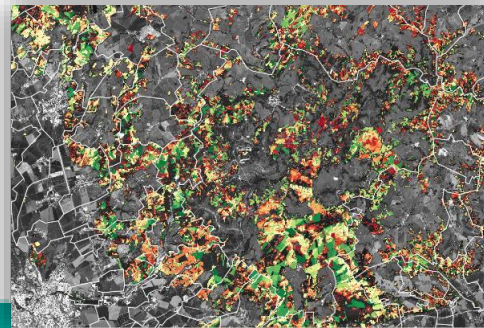
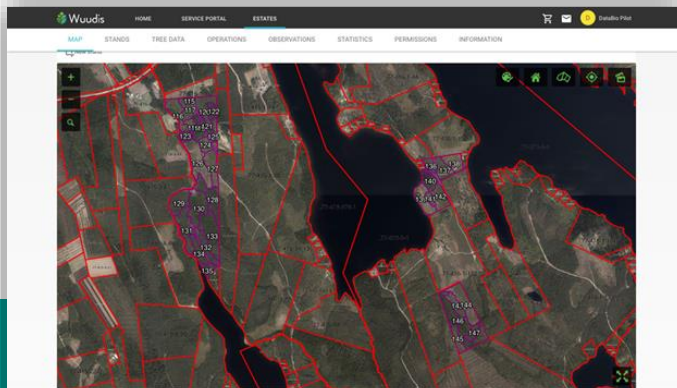
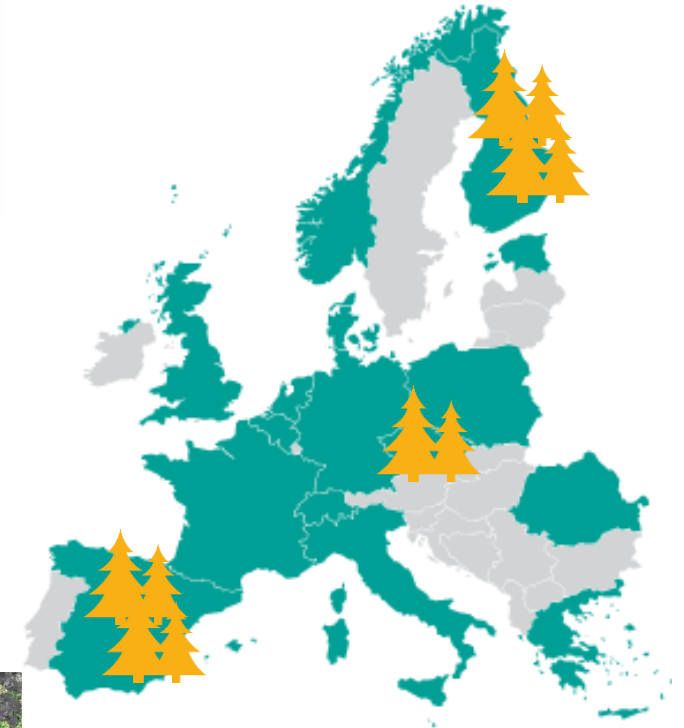
Creating value in Agriculture

- **Currently** some high tech values are offered to farmers for a number of crops but not with strong AI/Big Data analytics technologies
- The agriculture DataBio pilots aim to demonstrate about a **30% productivity increase**, which in 5 year perspective means more than a double annual growth rate
- Added value stories
 - **Smart farming advisory services** to increase farm profitability and promote sustainable farming practices
 - **Predict the maturity** of seed crops
 - Provide the farmers information during the **growing season** about the potential and actual yield predictions and the actions they can take
 - Improve farming practices by providing **benchmark information** to the farmers
 - Predict horticultural species **genetic merit**
 - Develop accurate **irrigation and vigor maps**
 - Monitor **biomass** crops and predict yields
 - Analyze **integrated agricultural machinery data and farm data**
 - Provide **damage assessment** information through an automated holistic framework
 - Services for more accurate and complete control of the farmers' **CAP** declarations




Creating value in Forestry

- Scope
 - Multisource and data crowdsourcing
 - Forest health
 - Forest management
- AI and Big Data analytics technologies
 - Apps accessing forest damage from IoT and remote sensing data
 - Feedback analysis of work quality
 - Analytics on combos of remote data for detecting pests
 - Analytics combining EO data with ecological and ecosystem factors for risk assessing
- Added value
 - Increase the use of forestry **ICT services**
 - Better **monitoring and decision support** systems
 - Early detecting **pests** affecting forests
 - Geolocated risk assessment for **invasive alien species**



Creating value in Fishery

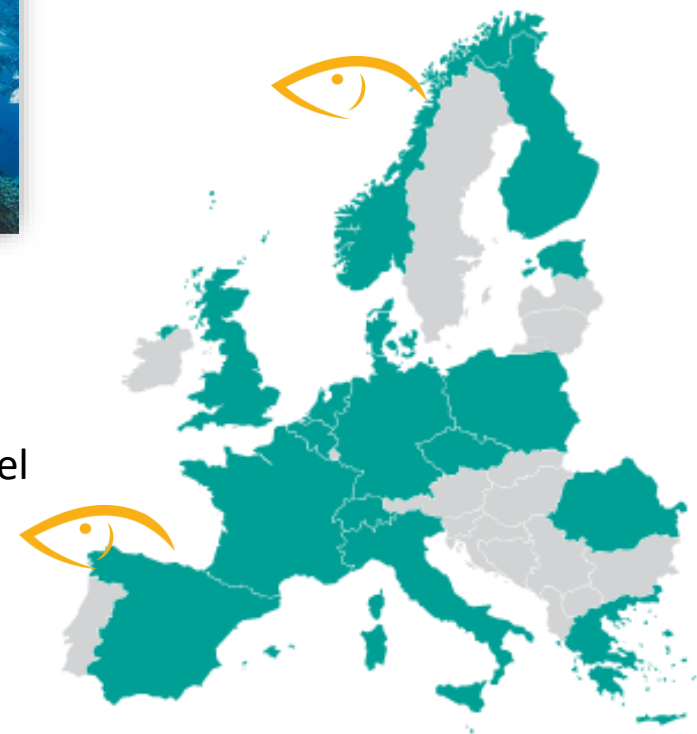
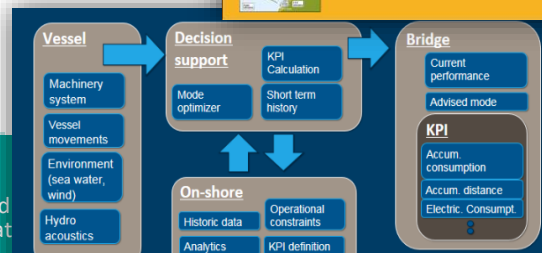
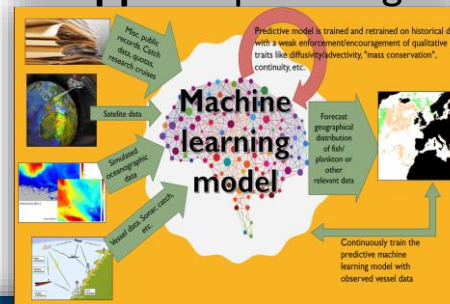
- Scope:

	Oceanic tuna fisheries	Small pelagic fisheries
OPERATION	A1 Oceanic tuna fisheries immediate operational choices	A2 Small pelagic fisheries immediate operational choices
PLANNING	B1 Oceanic tuna fisheries planning	B2 Small pelagic fisheries planning
SUSTAINABILITY		C1 Pelagic fish stock assessments C2 Small pelagic market predictions and traceability



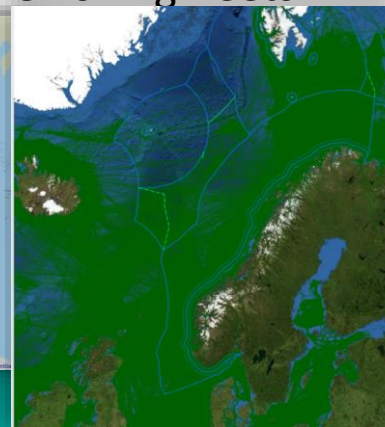
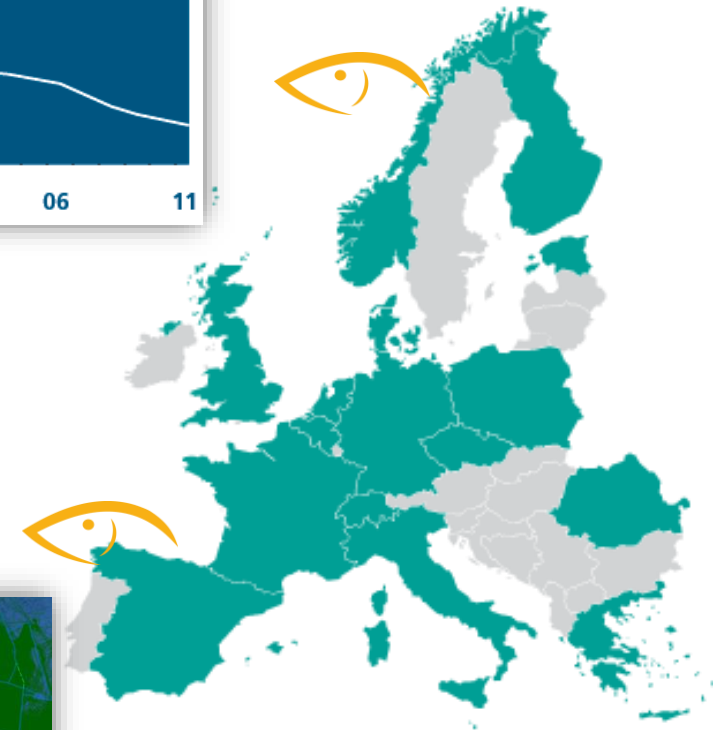
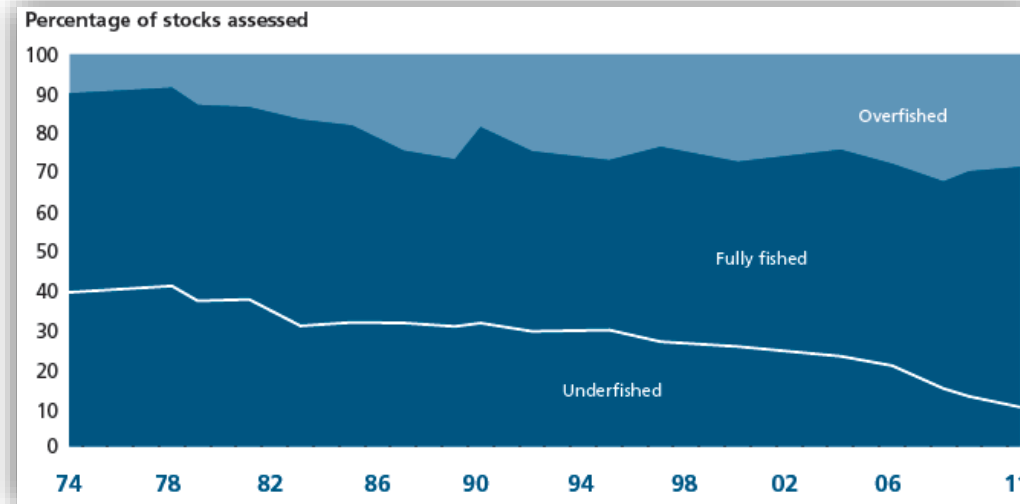
- AI and Big Data analytics technologies

- Predictive analytics for **engine performance and energy consumption**, based in weather and sea condition predictions using also ship models
- Predictive analytics for data-driven **near-real-time decision support** optimizing vessel operations
- Machine learning for predicting best **fishing grounds**
- Real-time **CEP to optimize fish catch** / fuel consumption
- Hybrid analytics (data-driven + first principles + simulations) for accessing **fish stock** from multiple data sources
- Predictive analytics for data-driven projection models of **price trends**



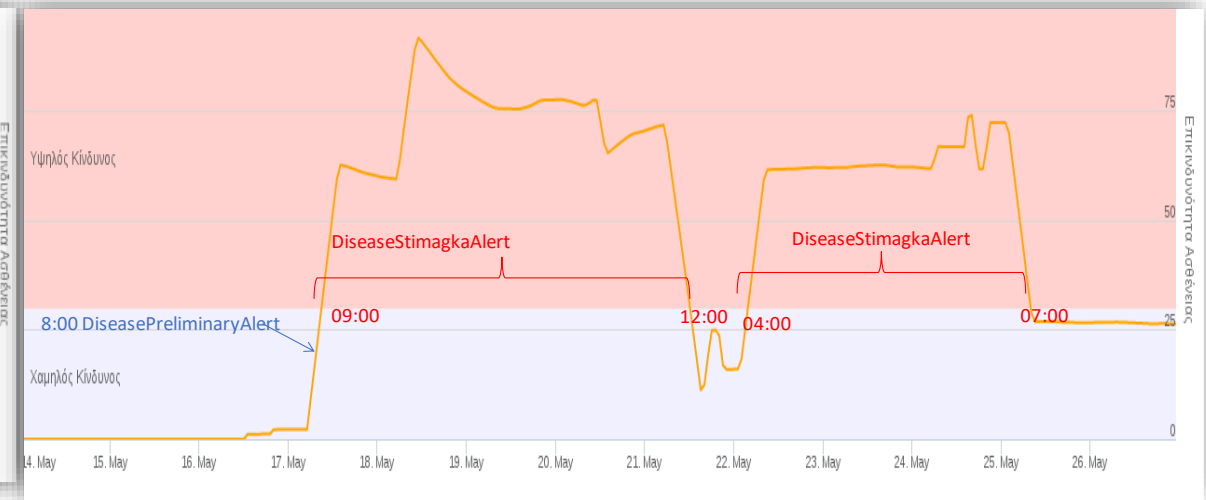
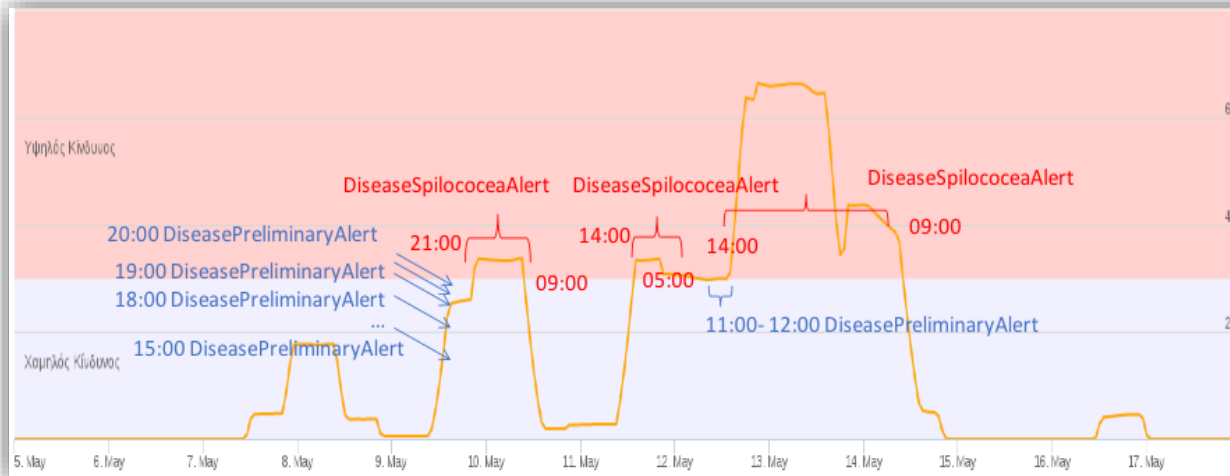
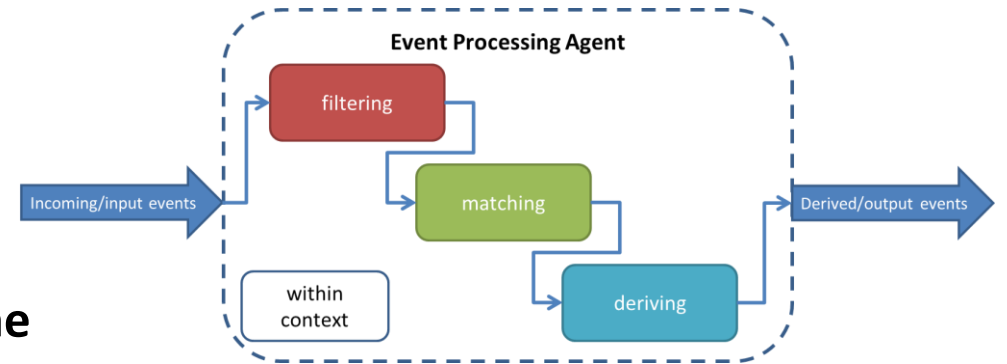
Creating value in Fishery

- Added value stories
 - Optimize load, route and propulsion mode for fuel consumption
 - Predict mechanical failures
 - Locate the best fishing grounds
 - Better fish stock assessments
 - Predict and correlate operations with market demand
- The world's marine fisheries expanded continuously to a production peak of 86.4 million tonnes in 1996 but have since stabilized
- Assessed stocks fished within biologically sustainable levels has exhibited a decreasing trend (FAO)
- Fisheries are an underperforming global asset (World Bank, FAO)
- It is estimated that its production could be increased by \$50 billion per year, if one could achieve better management and less overcapitalization of the fishing fleets
- Sensors cover wide areas but cooperation is lacking



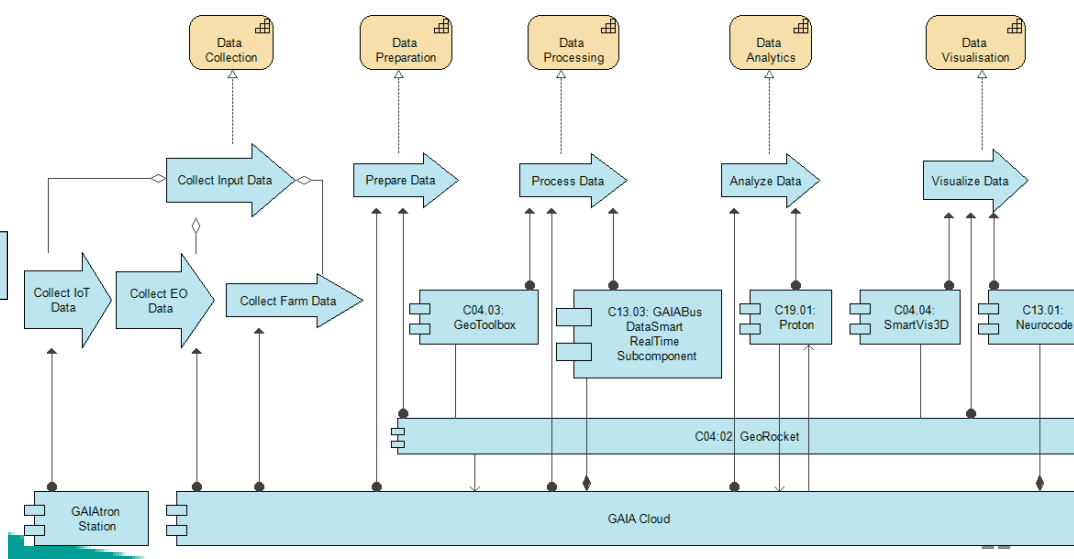
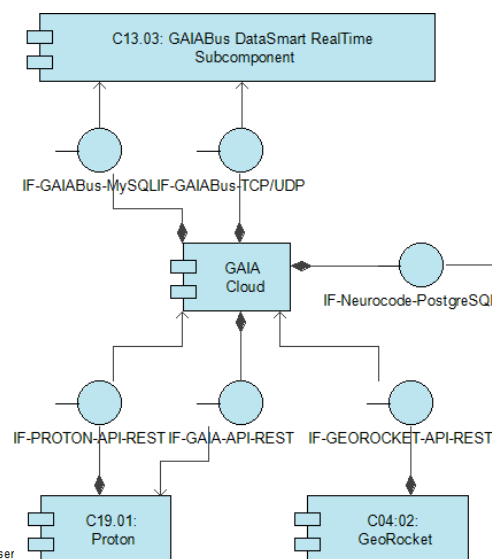
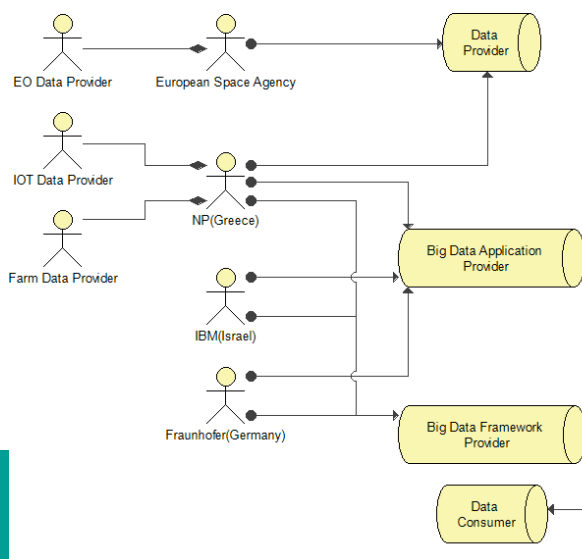
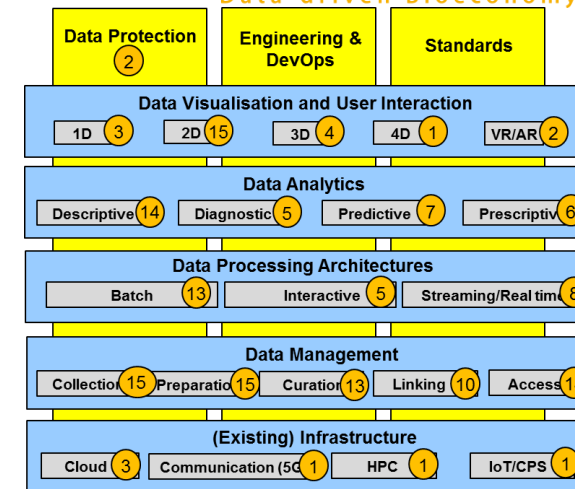
One example: Prediction and real-time alerts of diseases and pests breakouts

- Process
 - Collect, validate and store **farm IoT data**
 - Combine with **EO** and **historical farm data**
 - Perform initial processing, monitoring and cross-checking on the raw data
 - Push the validated values to **CEP** for further analysis (temporal reasoning) for triggering **early alerts in real-time**
- Early experiments with olives (left) and grapes:



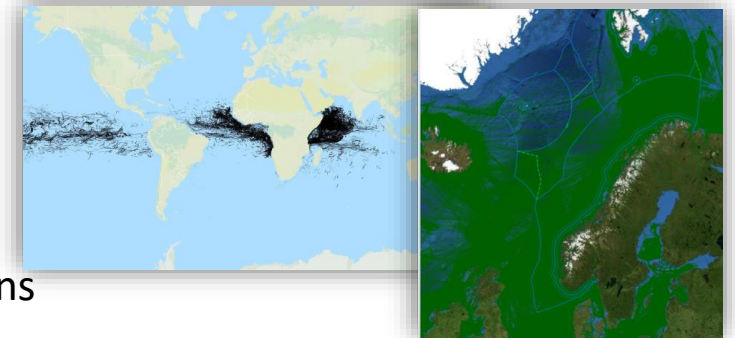
Creating platform synergies

- DataBio software development **platform**, providing a Big Data toolset, offering functionalities for services primarily in agriculture-forestry-fishery
- 91 technology **components** (currently)
- Formed 13 reusable and deployable **pipelines** (currently)
 - Sets of components, with clear mutual interfaces linking them together and to the platform environment, fulfilling specific pilot functionalities
 - Example (roles, pipeline and lifecycle views):



Final notes

- **Big data and AI-assisted services** may accelerate the bioeconomy market penetration
 - E.g., provide insight to the confused user who is overwhelmed by data
- Some **other** relevant AI technologies:
 - Natural Language Processing; AI interfaces (conversational, HMI)
 - Autonomy and robotics
 - ...
- **Data sharing** (and management) is very important for high quality localized analysis
 - Competition is fierce, but **sharing of knowledge** allows for better-informed decisions
- Platform synergies, not just for stacking components, but synthesizing **flexible pipelines** with feedback control and easy **cloud-edge-local deployment**
- **Recognizable ecosystem** building, with continuous effort and long-term vision
- Transparency and fairness are key to adoption:
 - End users have to **trust advise**, especially on common resources
 - Offer certification capabilities and allow independent verification?



Thank you for your attention!

W www.databio.eu

E info@databio.eu

 agriXchange / DataBio

 @DataBio_eu

 DataBioProject