59th Panta Rhei Conference

Ljubljana, Slovenia 2023

ENVISION – Earth Observation Data Products

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24/05/2023

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 869366.

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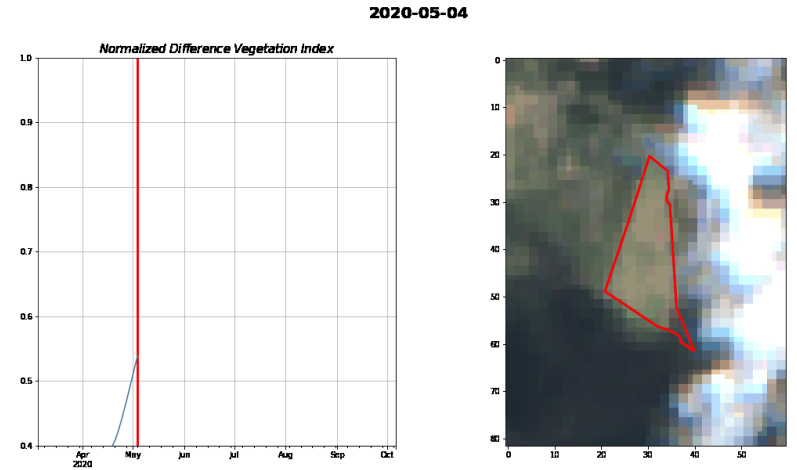
ENVISION EO Data Products

- Cultivated Crop Type Maps
  - Dynamic Crop Type Maps
  - Alert Mechanism (traffic light system)
  - Supervision of Cross-Compliance (Greening I)

- Grassland Mowing Events Detection
  - Accurate Reconstruction of NDVI (tackles extended cloud coverage)
  - Mowing Events Identification

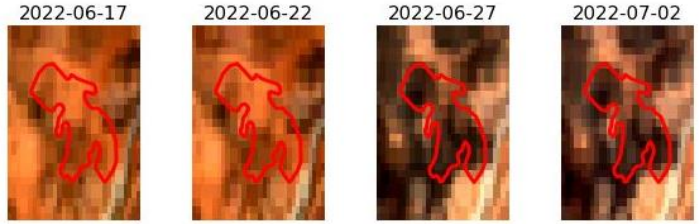
- Analytics on Vegetation and Soil Index Time Series
  - Monitoring of GAECs and SMRs (stubble burning, soil erosion, etc.)
  - Harvest Events Monitoring and Detection of activity on Natura2000 regions
  - Comprehensive GIS and Analytics Tools

Crops classification map based on declaration polygons, describing each crop category with different colors.



Mowing events detection based on reconstructed NDVI series.

Monitoring of NATURA2000 regions activity using NDVI



Stubble burning events detection using multi-spectral time series.

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Infrastructure cost-benefit analysis

Final Decision

- Review Offers (Limited Budget → 25.000€)

- Attractive offers:
  - **CREODIAS**: Full scenario, 18 months, 2 VMs
  - **WEkEO**: Full scenario, 18 months, 1 VM & HPC

- **CREODIAS** → best-fit solution in terms of budget and the offered services

CREODIAS				
Data Access	All the Sentinel archive available via S3 or NFS			
	Selected Offer 1	Price	Selected Offer 2	Price
Full Scenario 18 months	VM with 40c/112GB RAM equipped with GPU (GeForce RTX 2080Ti), 2x1000 GB SSD And 20 TB HHD	19314.00	Same as offer 1, but with 2 VMs	26316.00
Full Scenario 24 months		24192.00		32976.00
Standard Scenario 18 months	VM with 40c/112GB RAM equipped with GPU (GeForce RTX 2080Ti), 2x1000 GB SSD and 15 TB HHD	16434.00	Same as offer 1, but with 2 VMs	23436.00
Standard Scenario 24 months		20592.00		29376.00
Light Scenario 18 months	VM with 8c/64GB/256GB SSD and 15 TB HHD	12171.58		
Light Scenario 24 months		15299.04		

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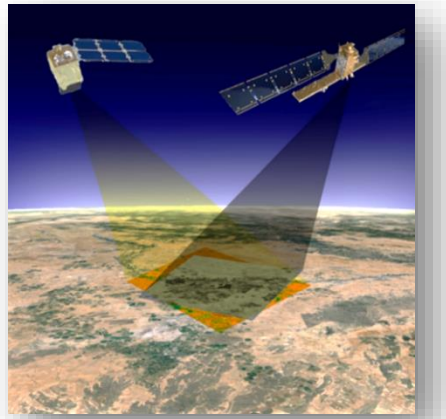
Data requirements

Satellite Imagery

Copernicus EO data
(Sentinel 1/2)

Optical + Radar
Information



Metadata
(*necessary for calibration*)

- Crops Validations (OTSC, RS, etc.)

- Events Timestamps (Mowing, Harvest, Stubble Burning etc.)

- National CAP Strategic Plans (GAECs, SMRs)

Land Cover data

LPIS
(farmers declarations, parcel geometries)

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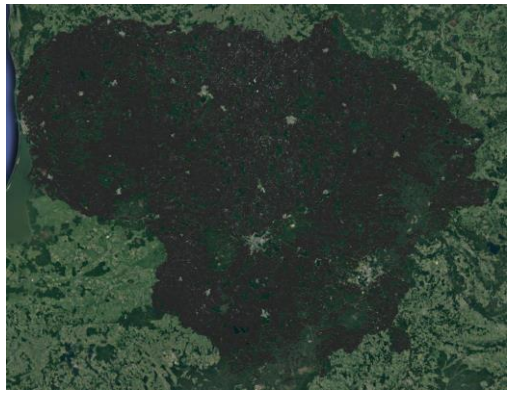
ENVISION methodology

BC.1: Lithuania

~ 1.100.000 cases



BC.2: Cyprus

~325.000 cases

- Data volume (2 pilot cases)
  - Lithuania (NMA) → 2.6 TB (S1:0.5, S2:2.1) for each year
  - Cyprus (CAPO) → 0.9 TB (S1:0.3, S2:0.6) for each year
- Processing and pre-processing demands
  - calibration, buffering, filtering, conversion, segmentation, **machine learning**
- Heterogeneity
  - Sensors, orbits, overlap, cloud coverage, type etc.
  - Need for automated processing on normalized and gridded datasets
- Design the methodologies based on the data availability frame under operational scenario considerations

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Beyond the state-of-the-art

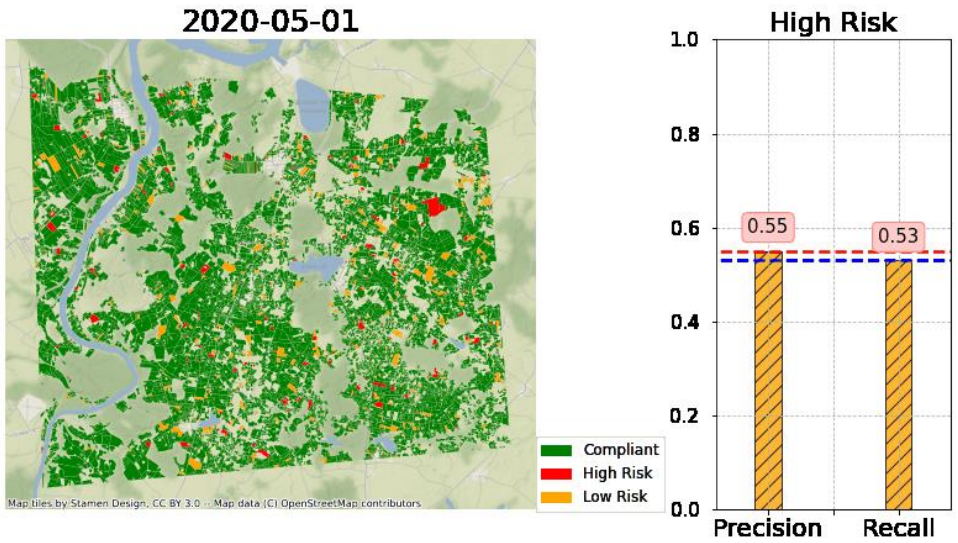
- Crops Classification
  - Pixel-wise approach (small parcels < 0.3 ha)
  - Combination of different ML models (stacking ensembles)
  - Hierarchical Classification
  - Smart Sampling of OTSCs

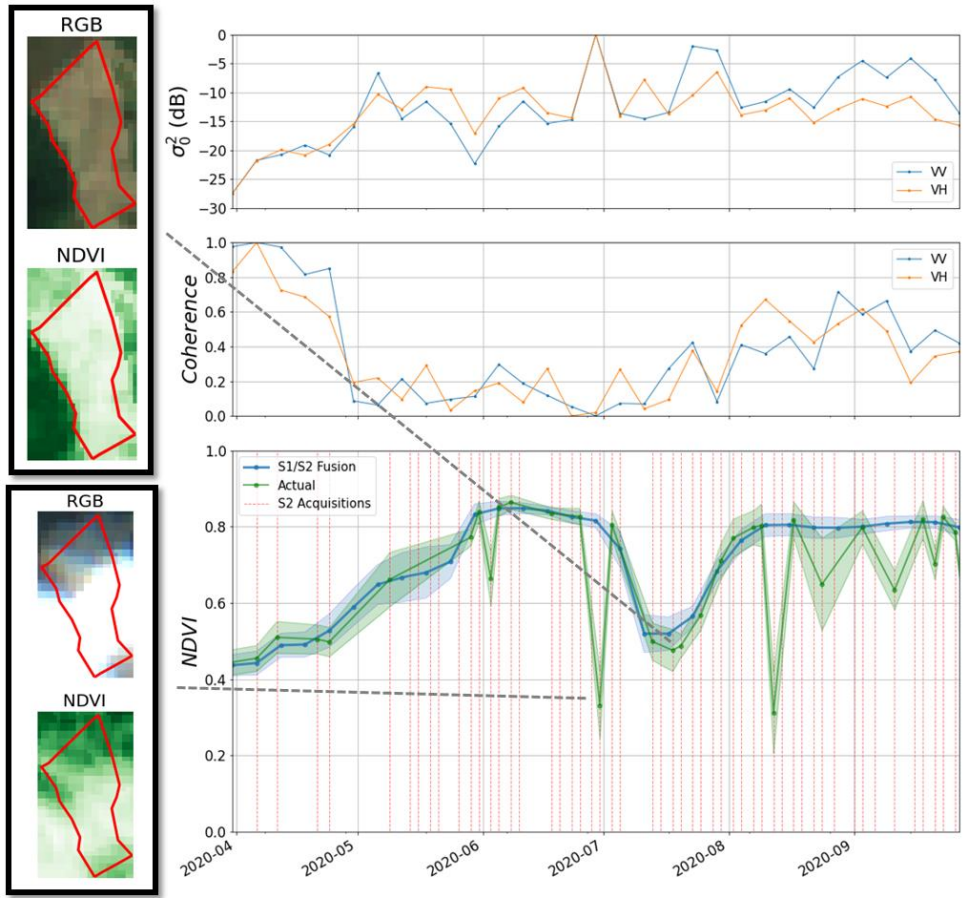
- Mowing Events Detection
  - Reconstruction of NDVI based on S1 data (Cloud Coverage)
  - Sophisticated DL architecture

Accuracy

~ 90%

~ 80%





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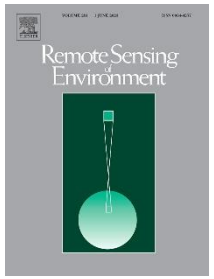

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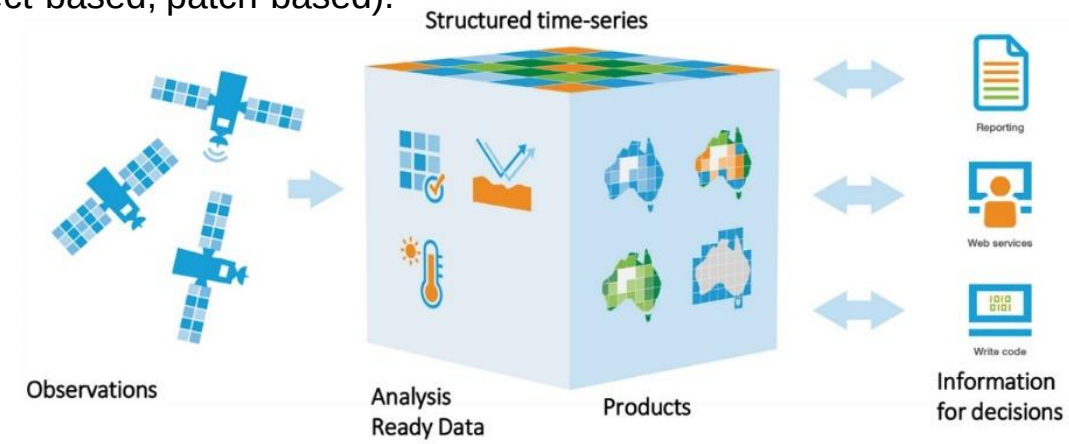
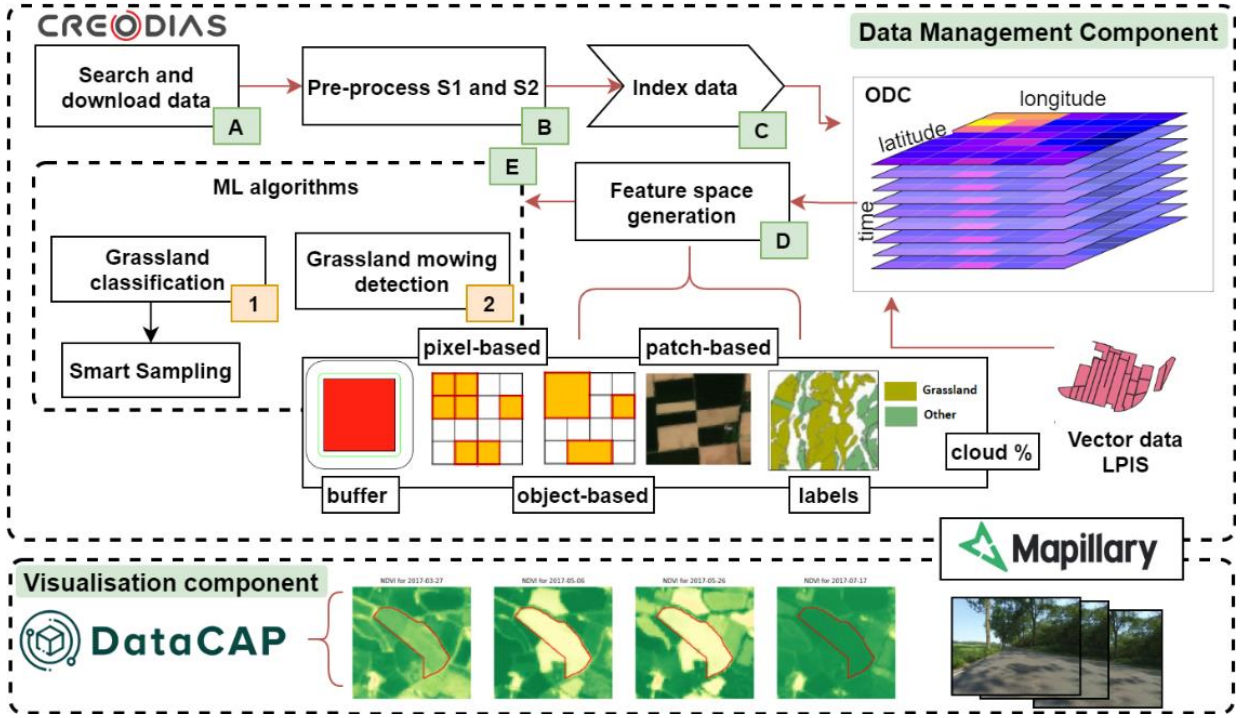
On-Demand Access to the data

- **DataCube API**: Scalable Geospatial MS Knowledge-Base Datasets:
  - Stores and provides of various dataset, from Sentinel missions to LPIS.
  - Enables direct retrieval of data in the form of plots and graphics.
    - Allows users to construct geospatial queries based on custom parameters and functionalities (images time series on request).
    - Provides multidimensional time-space statistics for monitoring and visualizing agricultural practices and land use.
  - ENVISION services results directly to users' in-house infrastructures via FTP.
  - Generates various feature spaces from the same data (pixel-based, object-based, patch-based).





Scan me!

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PAs Advantages

Scalability
precise results at any scale, from small AoIs to entire countries.

Advanced Algorithms
sophisticated Machine Learning and Deep Learning based routines for accurate results.

Customizable Analysis
Our services offer a variety of customizable analysis tools to meet specific needs and requirements.

Constant Direction
continuous guidance throughout the cultivation period, helping PAs monitor mowing events in real-time and make informed decisions.

Generalization Performance
reliable information across diverse regions, helping PAs make informed decisions about agriculture management.

Cloud Coverage Resilient
combination of Sentinel-1 and Sentinel-2 data to ensure higher accuracy, even in areas with extended cloud coverage and adverse weather conditions.

Cost-Effective
Our services reduce the need for costly manual field visits, saving time and resources for PAs.

Enhanced Monitoring
continuous monitoring of vegetation and soil over time, helping to detect potential problems early, decision-making and validations.

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Thank you for your attention!

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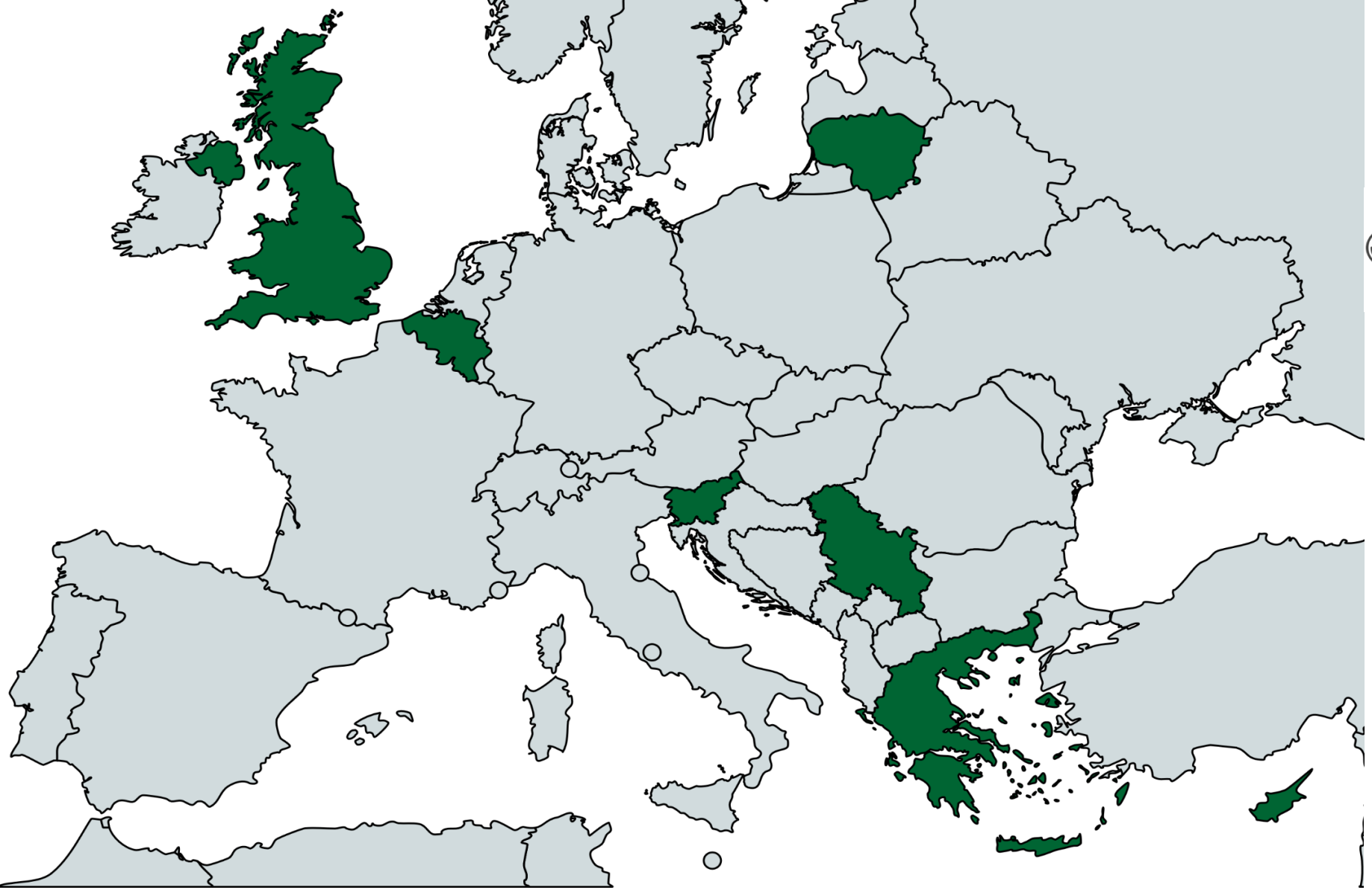

envision

DRAXIS ENVIRONMENTAL TECHNOLOGIES

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OCS Organic Control System

ILVO Flanders research institute for agriculture, fisheries and food

LEAF LINKING ENVIRONMENT AND FARMING

University of Reading

ITC INOVACIJSKO TEHNOLOŠKI GROZD · INNOVATION TECHNOLOGY CLUSTER

AGRIFOOD DIGITAL INNOVATION HUB

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