

# DIONE



## DIONE TOOLBOX IDEA – Components, Products & Business



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No.870378.

# DIONE FACTS & FIGURES

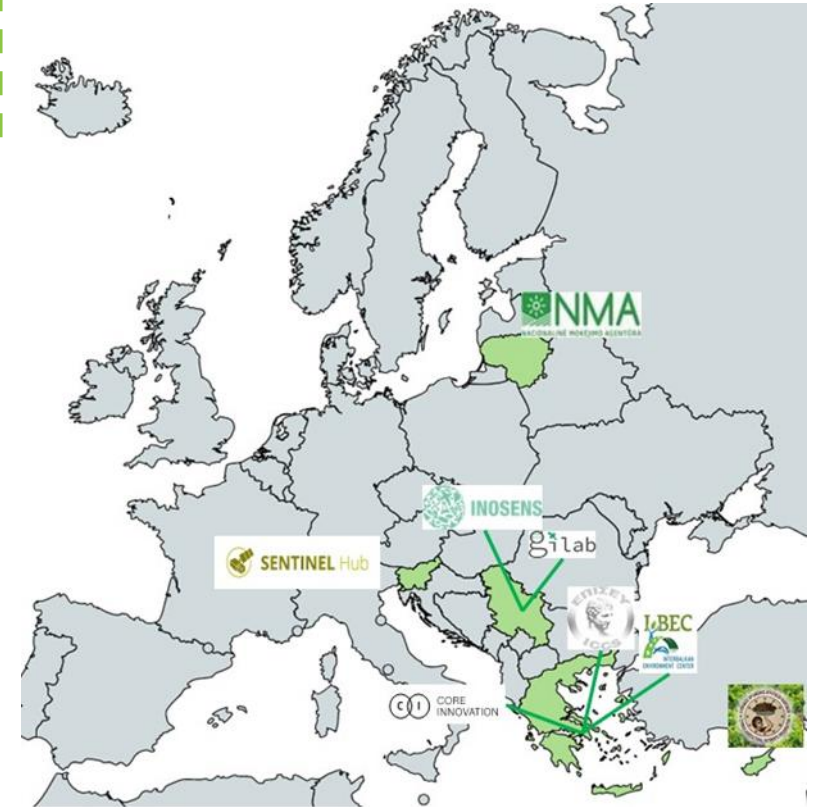
Implementing an integrated EO-based toolbox for modernising CAP area-based compliance checks and assessing respective environmental impact

## 8 partners from 5 countries

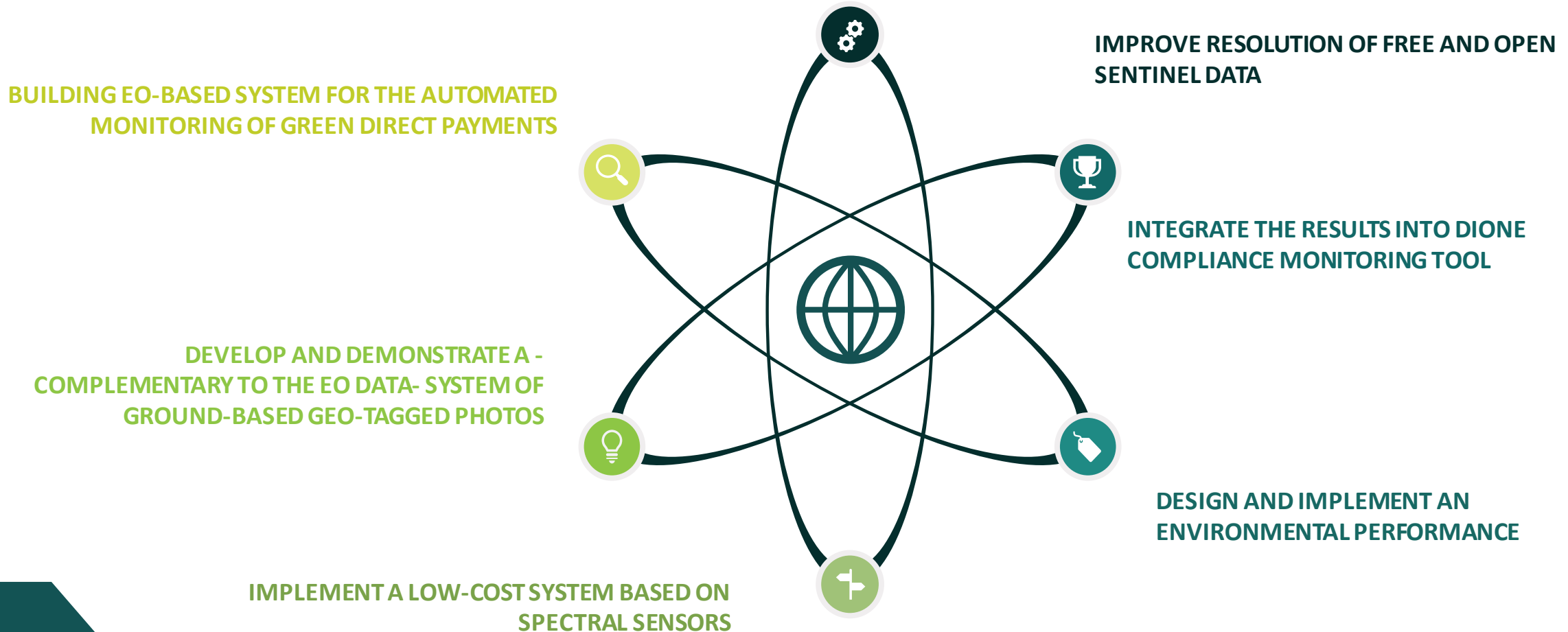
- Institute of Communication and Computer Systems (Project Coordinator)
- 2 Paying agencies (NPA (Lithuania), CAPO (Cyprus))
- 4 SMEs (SINERGISE, GILAB, CORE, INOSENS) with orientation to EO, ICT fields & agriculture domain
- 2 Research institutes (ICCS, i-BEC)

Duration: **30 months (01/2020 - 06/2022)**

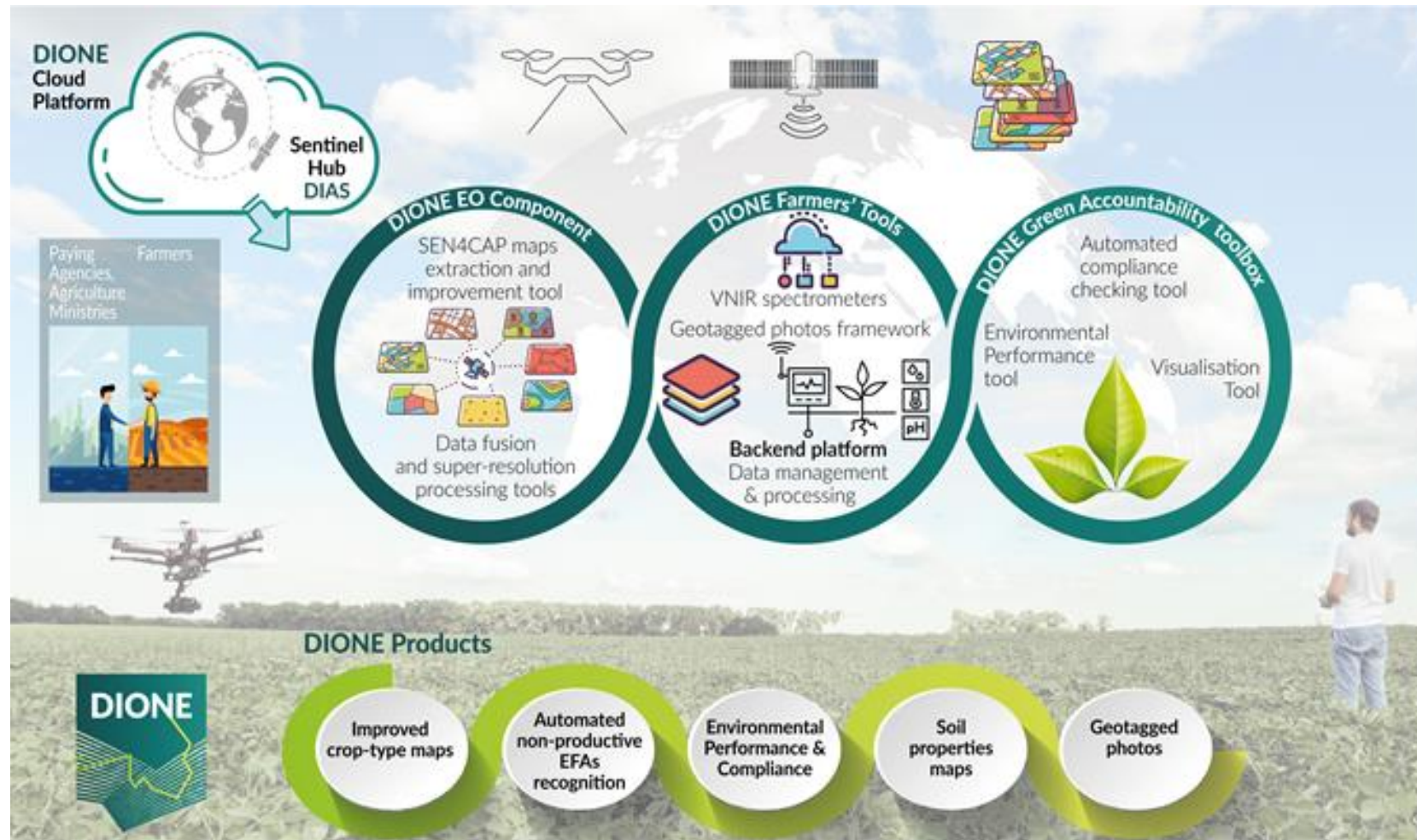
EU funding: **1,999,837€**



# DIONE OBJECTIVES



# DIONE CONCEPT





# DIONE IDEA

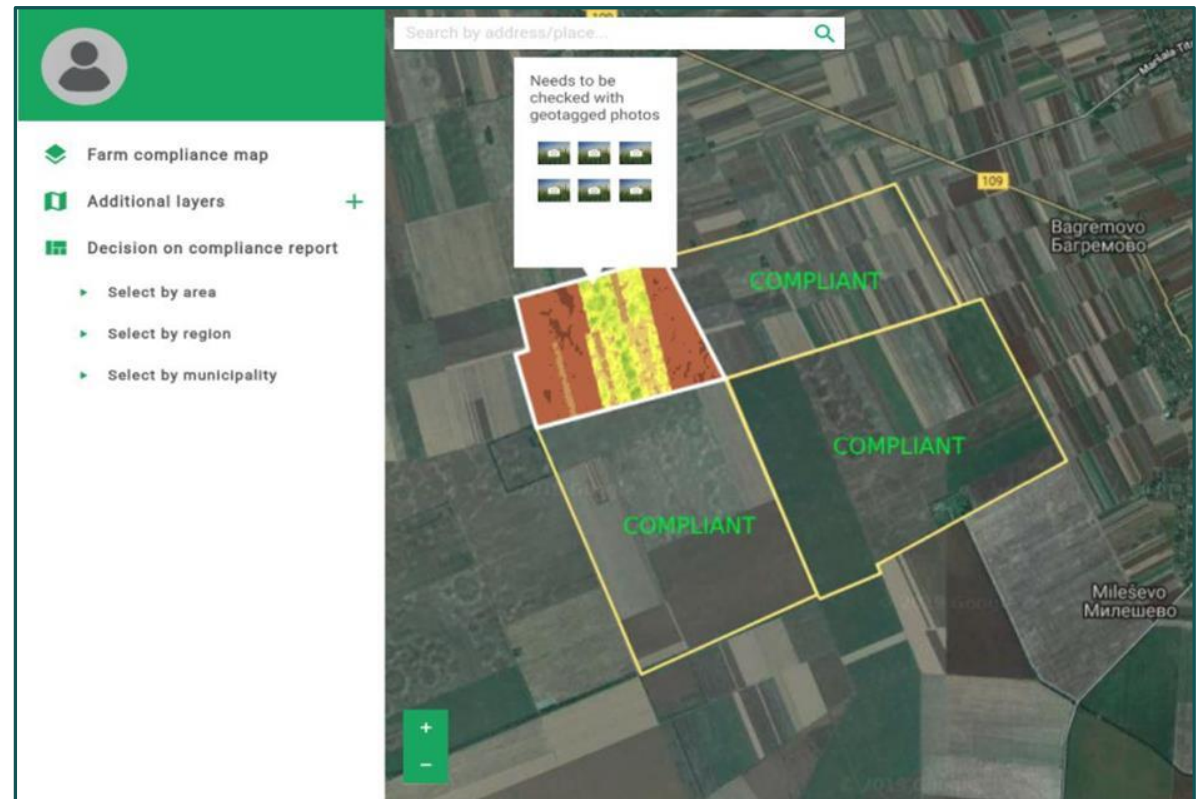
## Farmer's compliance monitoring tool

Web interface component is to provide paying agency officers:

1. **Access to the spatial information** generated by the DIONE tools and reports generated by the reporting component;

- Crop type maps
- Non-productive EFAs (fallow land, hedges, trees, buffer strips, ponds, ditches, and other landscape features)
- Grassland mowing/ploughing
- Improved resolution (super resolution) Sentinel-2 data for monitoring of crop production

Provisional DIONE user interface for farmer's compliance monitoring tool



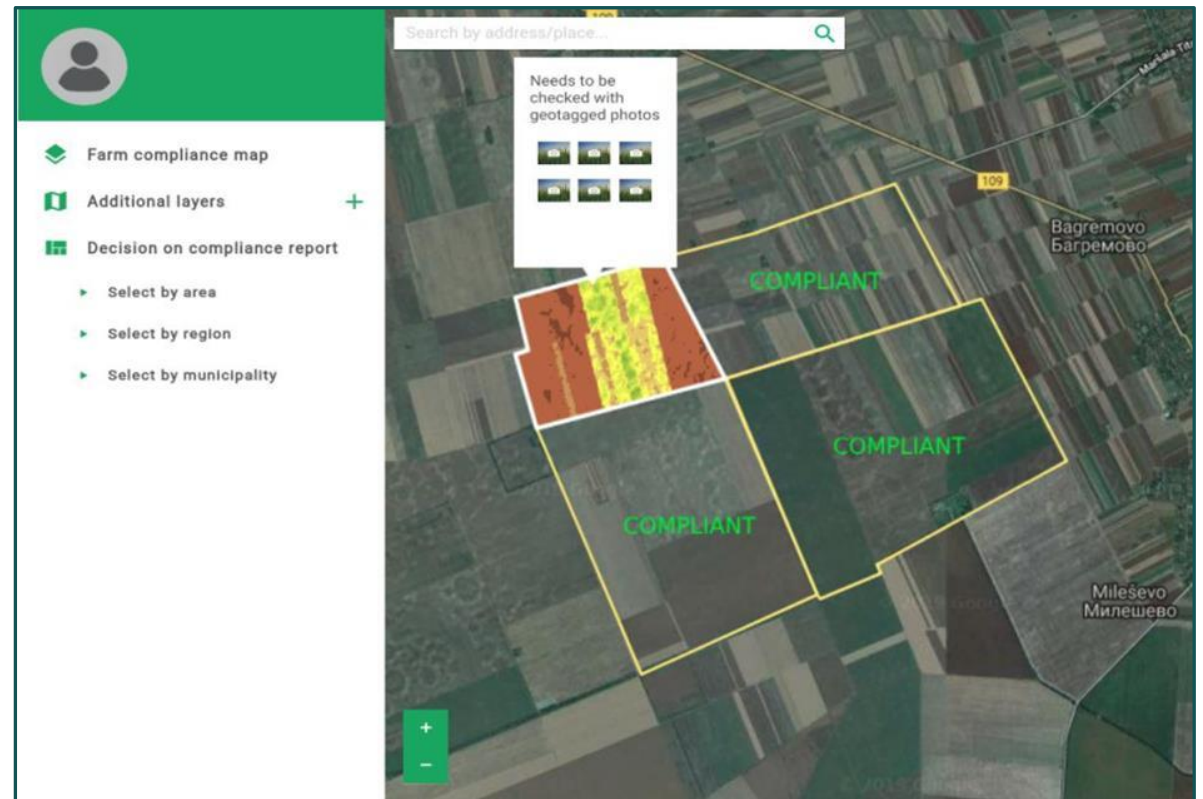
# DIONE IDEA

## Farmer's compliance monitoring tool

Web interface component is to provide paying agency officers:

2. **automated decisions on the farmers' compliance** and intermediate-products of the process based on EO recognition of crop types, permanent grassland and EFAs;
3. **geo-tagged photos** from the farmers;
4. **automated reports** standardised according to the paying agency requirements.

Provisional DIONE user interface for farmer's compliance monitoring tool



# DIONE IDEA

Improved resolution maps of crop-types and EFA types through machine learning & data fusion

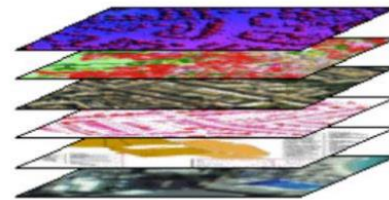
Increase resolution of coarser Sentinel 2 bands (20-60m) to the resolution of the finer band (10m)

## Harnessing Copernicus DIAS

### Recognition of:

- permanent pastures
  - crop-types
  - non-productive EFA types,
  - the calculation of grassland mowing/ploughing
- in surfaces larger than 100m<sup>2</sup>

Open EO data - Sentinel-1, Sentinel-2, Landsat, etc.



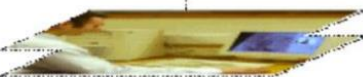
Commercial EO data – WorldWind, GeoEye,...



Aerial imagery (drone, plane)



Other raster data



Machine learning

WMTS

WMS

WCS

API



Cloud GIS



Web / Mobile apps



Desktop (QGIS, ArcGIS...)



Scripting (Python, R, ENVI...)

# DIONE IDEA

## DIONE LC/LU image datasets from aerial sources (UAV/drones targeted flights)

- Problematic cases, such as over regions of small land parcels (Southern Europe) or where significant cloud cover (Northern Europe)
- DIONE shall exploit the use of drone-based image capture next to the remote sensing technology.
- The drone image acquisition will create an orthomosaic from which LC/LU can be easily mapped.

Image of the DJI S1000 multicopter



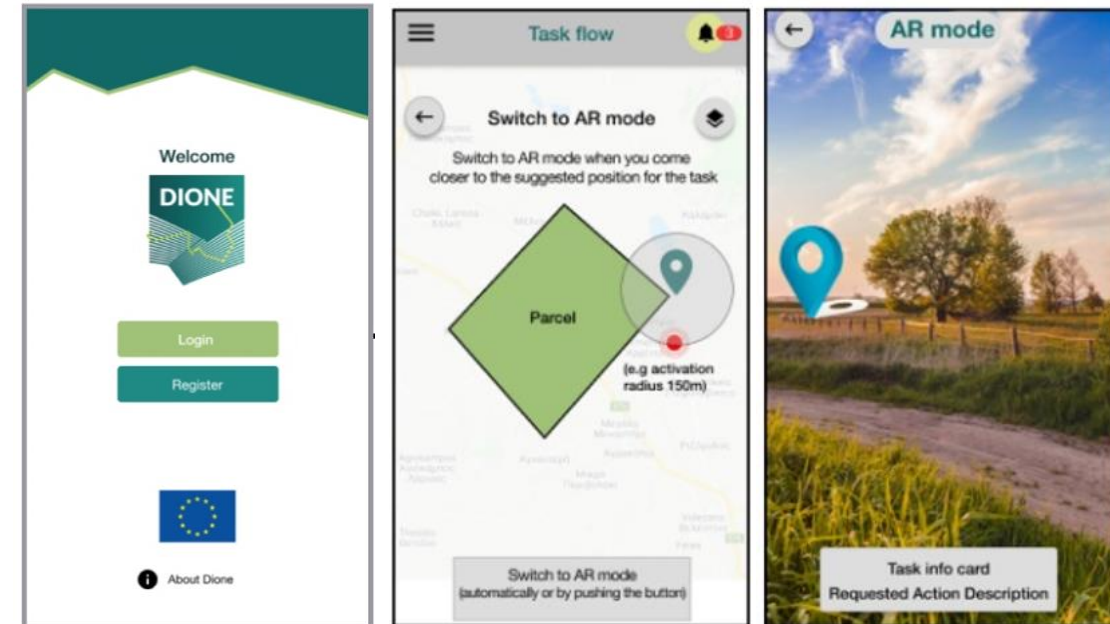


# DIONE IDEA

## DIONE farmer's geo-tagged photos framework

Capture of geo-tagged photos from the farmers with **high degree of quality and trust**.

1. Maximum positional and time accuracy
2. Maximum reliability image forensics techniques
3. Maximum trust level (a secure light-weight digital signature scheme facilitates the transmission of the data to the paying agency's monitoring tools)
4. Offline work regime

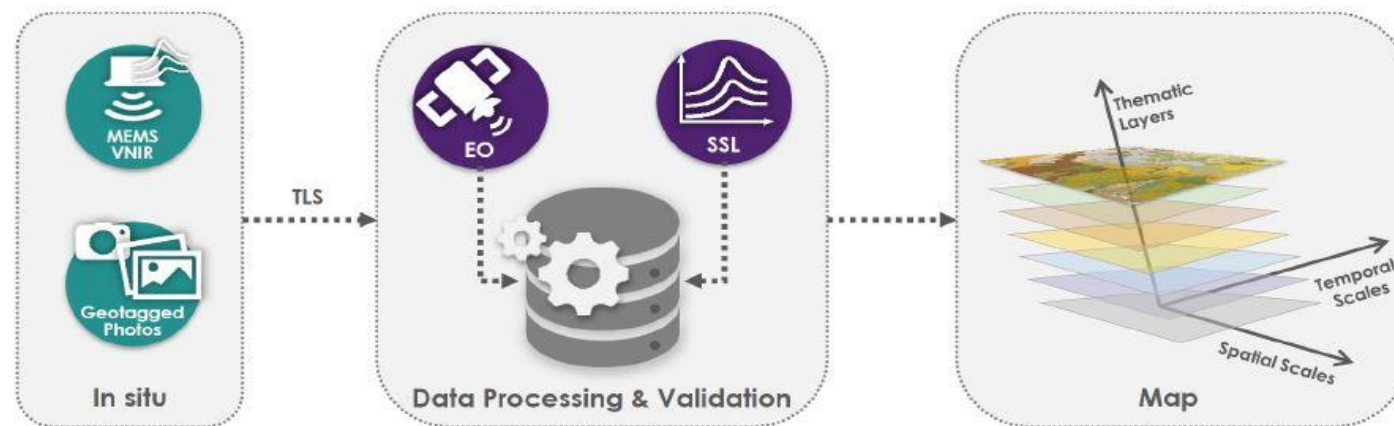


Data collection using AR (Augmented Reality) features

# DIONE IDEA

## DIONE low-cost sensors for evaluating land-degradation

- **Field surveyors of the paying agencies** will carry a handheld **miniaturized VNIR spectrometer** which can be operated with a simple button press through a mobile device (e.g. smartphone).
- The data and associated metadata (i.e. location, timestamp, operator, etc., in addition to a geotagged photo of the sample) will then be securely sent (TLS) to a central database. The data is transformed from simple VNIR spectra into **key soil properties and indicators of soil health**, using novel machine learning models.

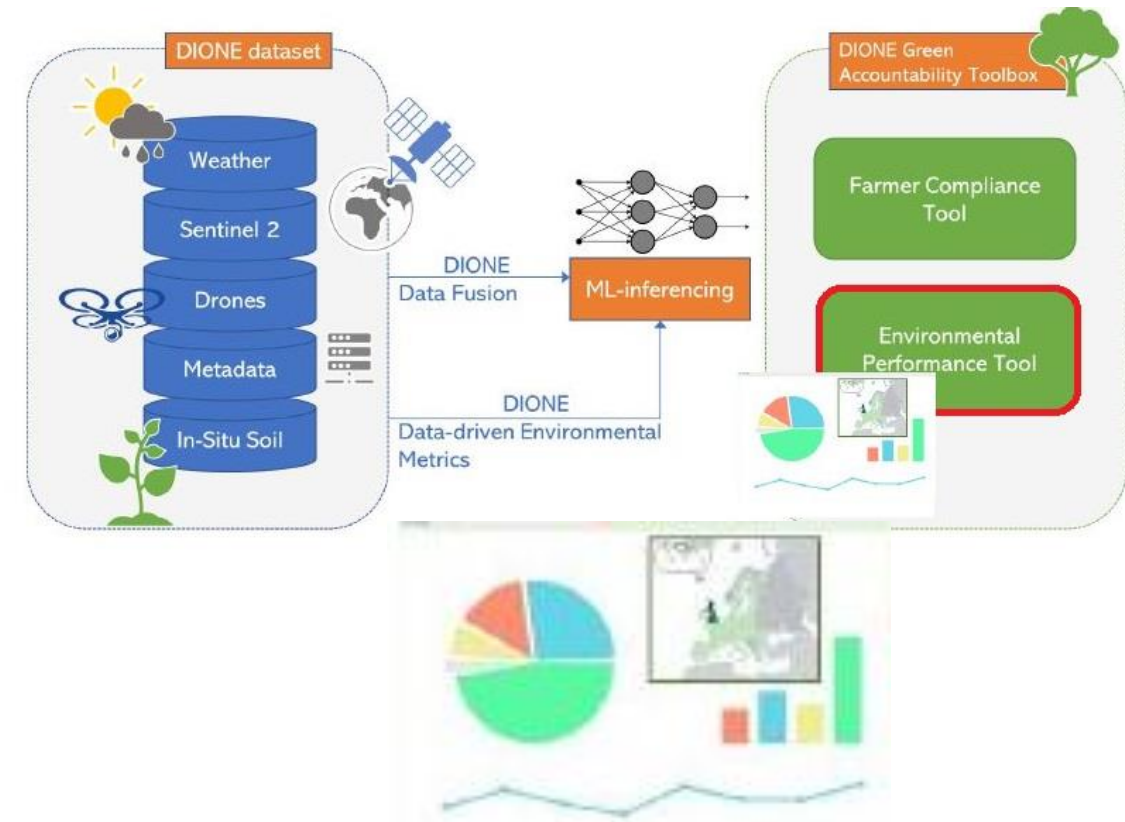


# DIONE IDEA

## DIONE Environmental Performance tool – a tool for impact-based evaluation of greening

DIONE aims to develop an Artificial Intelligence (AI) enabled tool:

- Methodological framework for KPI-based environmental impact assessment of greening
- Meaningful analysis in a dynamic way, correlating data from various sources
- Multitude of information as inputs: Open EO data (Sentinel-1, Sentinel-2, etc.). Commercial EO (WorldWind, GeoData, etc.), Aerial imagery (drones, planes) and other raster data. This type of image-based analysis will be combined with data from the low-cost sensors that evaluate land degradation.





# DIONE Business proposition

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*The integrated **EO-based DIONE' toolbox** delivers clear economic value to key targeted customers – Paying Agencies, estimating to lower **administrative and operational costs to 30%** of the current ones **related to CAP area-based compliance checks and assessment of respective environmental impacts.***

***Check the DIONE creation process and join!***

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**&**

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# DIONE



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