Food Systems Science Cluster
EC – Horizon 2020, Horizon Europe

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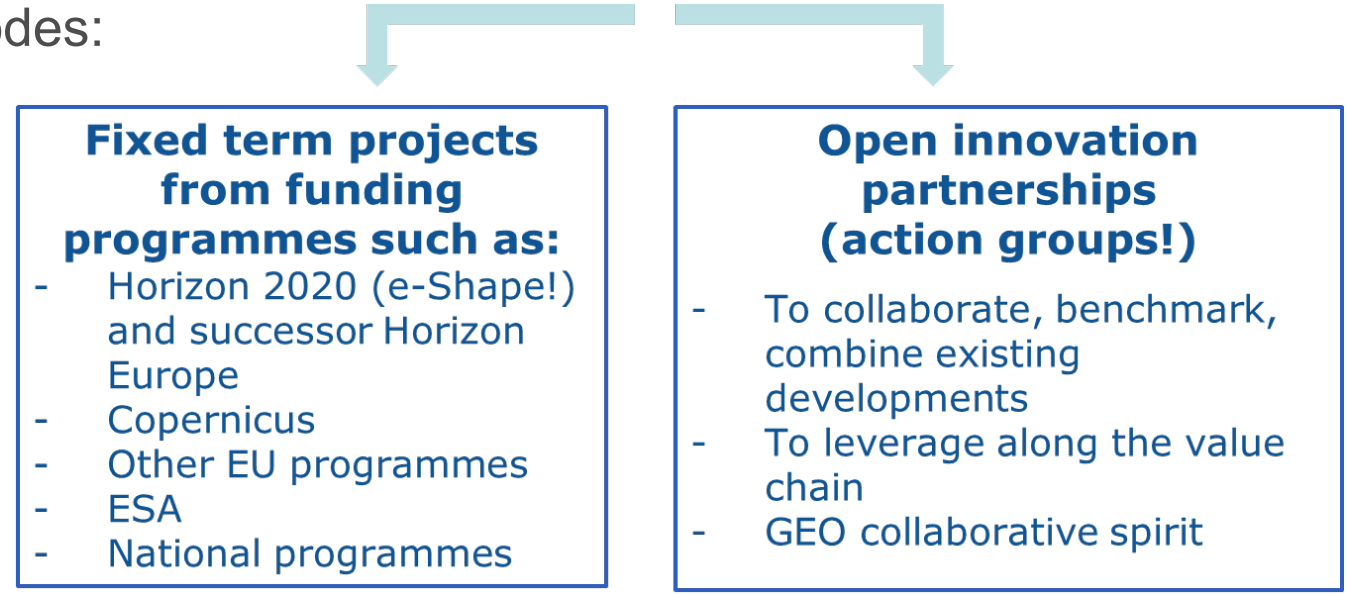
agriculture
e-shape
GEO GROUP ON EARTH OBSERVATIONS
EuroGEO
TWIGA
AfriCultuReS
envision
VITIGEOSS
NEXTLAND
NIVA
NEW IACS VISION IN ACTION
Horizon Europe

EuroGEO, the European Component of GEO

- Delivering an integrated European contribution to GEOSS and increasing GEOSS benefits for Europe
- Acting as an incubator in cooperation with Copernicus/European countries/organisations to promoting, scaling up and developing EO applications in association with users
- Building on Copernicus DIAS & H2020/Horizon Europe resources
- Implementation modes:



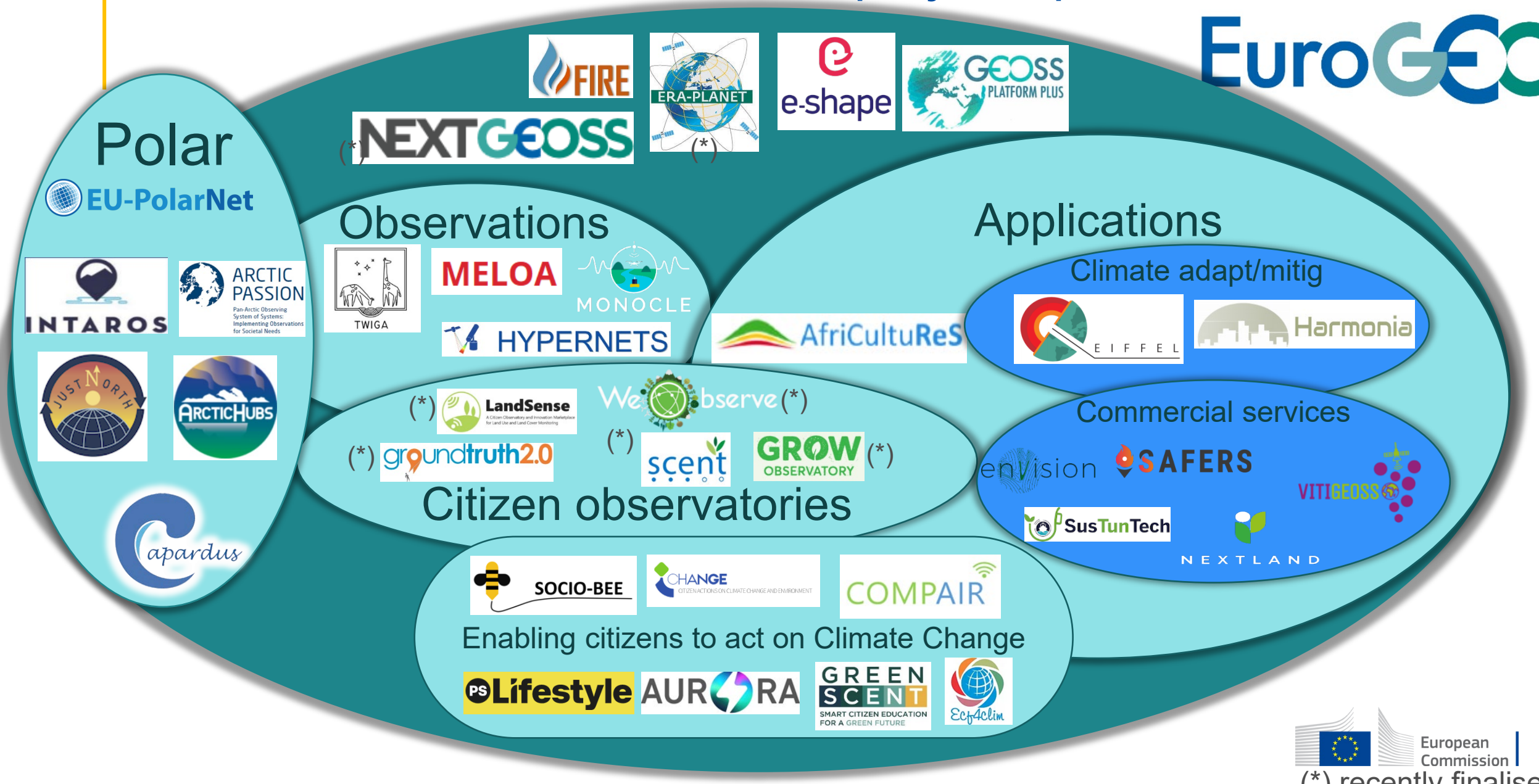
European Commission

Horizon Europe

Clusters	Areas of intervention	
Health	• Health throughout the life course • Non-communicable and rare diseases • Tools, technologies and digital solutions for health and care, including personalised medicine	• Environmental and social health determinants • Infectious diseases, including poverty-related and neglected disease • Health care systems
Culture, creativity and inclusive society	• Democracy and Governance • Social and economic transformations	• Culture, cultural heritage and creativity
Civil security for society	• Disaster-resilient societies • Protection and Security	• Cybersecurity
Digital, Industry and space	• Manufacturing technologies • Advanced materials • Next generation internet • Circular industries • Space, including Earth Observation • Emerging enabling technologies	• Key digital technologies, including quantum technologies • Artificial Intelligence and robotics • Advanced computing and Big Data • Low-carbon and clean industry • Emerging enabling technologies
Climate, Energy and Mobility	• Climate science and solutions • Energy systems and grids • Communities and cities • Industrial competitiveness in transport • Smart mobility	• Energy supply • Buildings and industrial facilities in energy transition • Clean, safe and accessible transport and mobility • Energy storage
Food, bioeconomy, natural resources, agriculture and environment	• Environmental observation • Agriculture, forestry and rural areas • Circular systems • Food systems	• Biodiversity and natural resources • Seas, oceans and inland waters • Bio-based innovation systems in the EU Bioeconomy

European Commission

Environmental Observations projects portfolio – H2020



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(*) recently finalised

Horizon Europe call 2021

Innovative governance, environmental observations and digital solutions in support of the Green Deal

✓ Eight projects starting between June - November 2022

✓Total EU contribution of 44,2 million Euro

- ❑ User-oriented solutions building on environmental observation to monitor critical ecosystems and biodiversity loss and vulnerability in the European Union
- ❑ Preparing for pre-commercial procurement (PCP) for end-user services based on environmental observation in the area of climate change adaptation and mitigation
- ❑ Tools to support the uptake and accessibility/exploitability of environmental observation information at European and global level
- ❑ Common European Green Deal data space to provide more accessible and exploitable environmental observation data in support of the European Green Deal priority actions

European Commission

AI-augmented ecosystem for Earth Observation data accessibility with Extended reality User Interfaces for Service and data exploitation– EO4EU

- 17 partners – 8,2 MEUR EU contribution – June 2022 till May 2025
- Coordinated by National and Kapodistrian University of Athens (EL)
- Pilot « Food Security »:

  - **Impact analysis**, based on observation data (ground, satellite, production and climatic time series)
  - **Risk of loss or damage estimation**, through the development of predictive algorithms, forecast data and impact estimates
  - **Identification of new areas with favorable climate conditions for specific crops**
  - **Identification of crops suitable for new climate conditions**.

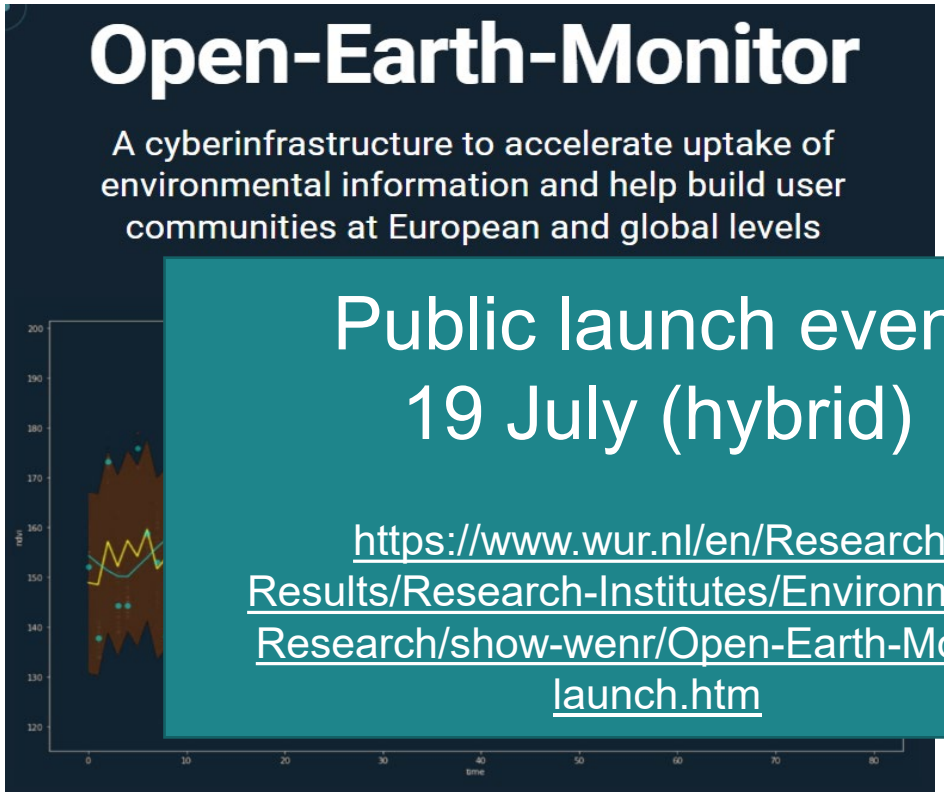
EO4EU **supports the wider exploitation of EO data** by delivering:

1. **Machine Learning (ML) methodologies for Semantic Annotation** of data sources
2. **Semantically enhanced knowledge graphs** to structure content around topic areas
3. **Data fusion techniques**
4. **Augmented and Virtual Reality** for interactive user experience
5. **Advanced data analytics visualizations** for improved learning and evidence-based interpretations of observations.

European Commission

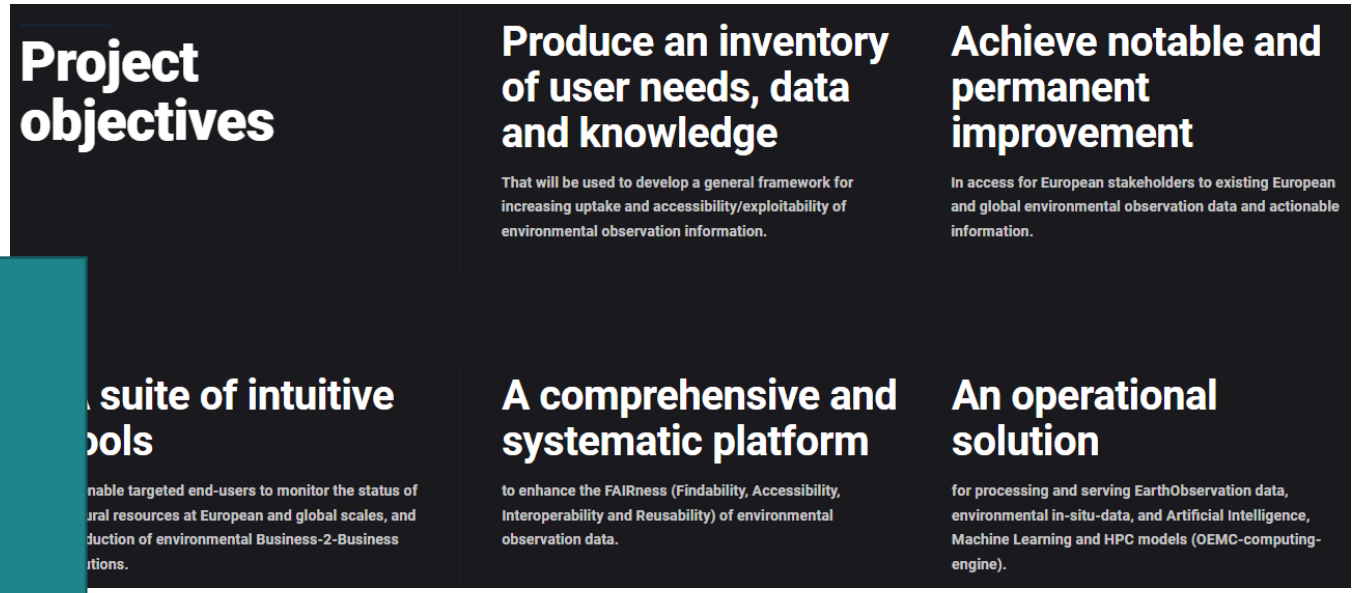
Open Earth Monitor Cyberinfracture - OEMC

- 23 partners – 12.7 MEUR EU contribution – June 2022 till July 2026
- Coordinated by OpenGeoHub (NL)
- Pilot « crop monitor for tropical countries – GEOGLAM »



Public launch event
19 July (hybrid)

https://www.wur.nl/en/Research-Results/Research-Institutes/Environmental-Research/show-wenr/Open-Earth-Monitor-launch.htm



European Commission

e-shape

EuroGEO Showcases: Applications Powered by Europe

- 68 partners
- 37 pilots in 7 show cases
- Horizontal activities « shaping EuroGEO »

European Commission

Show case ‘Agriculture

- GEOGLAM
- EU-CAP support
- Vegetation-index crop-insurance in Ethiopia
- Agro industry
- Linking EO and farm IoT for Automated decision Support
- Service for SDG 2.4.1 and 15.3.1
- DynaCrop – unlocking EO intelligence across the food value chain

Some highlights ‘GEOGLAM’:

- Services for monitoring Essential Agricultural variables – ‘global’
- Automated emergence and harvest detector
- FAIR access to in-situ data: AGROSTAC

Big issue:

- Getting good reference data: re-share data – correct MD – reliability of data – FAIR access

AfriCultuReS - Enhancing Food Security in African AgriCultural Systems with the support of Remote Sensing

- AfriCultuReS services and pilots

Services on climate, crops, drought, land, livestock, water & weather (AfriCultuReS platform)

Pilots on:

- Crop monitoring & yield forecasting (Tunisia, Ghana, Mozambique, Kenya, Ethiopia)
- Crop index insurance (Rwanda, Kenya)
- Irrigation (Mozambique, Kenya, Ethiopia)
- Livestock (Niger, South Africa)
- Climate & flood & drought monitoring (cross-cutting)

European Commission

TWIGA - Transforming Water, weather and climate Information through in situ observations for Geo-services in Africa

TWIGA

• TWIGA services

- How humid is my environment: use of local weather stations to give advice on use of fertilisers and pest control measures
- Map your crop: combination of drones and photos the check crop condition
- Your local and timely weather forecast: local weather forecasts for small farmers
- Soil index for crop insurance
- Digital platform for index insurance distribution
- Short-term prediction for solar energy
- Does it drain? Use of sensors to detect waste (plastic) in rivers in urban environments to prevent floods
- Water balance: management of dams and reservoirs
- International water control room: IT-platform for international management of watersheds
- Emergency management early warning systems for heavy rains: early warning for floods in an urban setting
- Heat stress indices for livestock
- Drought monitoring
- GNSS service for flood plains & atmospheric moisture: cheaper & better prediction of convective tropical rainfall

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R&I in EO in support of CAP implementation

- Monitoring approaches based on Sentinel-data in combination with data technologies can support CAP implementation leading to e.g. a reduced number of on-the-spot controls
- SEN4CAP launched in 2017 under ESA responsibility develops and tests solution in cooperation with paying agencies.
- Horizon 2020 project NIVA launched in 2019 involves paying agencies at partners and – among others – further develops some of the SEN4CAP results.

ENVISION

Monitoring of Environmental Practices for Sustainable Agriculture Supported by EO

Toolbox of services for continuous & systematic monitoring of sustainable agricultural practices, enabling monitoring organisations to adapt to requirements stemming from the EU policy reform.

Value proposition

- Automated monitoring of a wide territory instead of individual fields
- Continuous monitoring throughout the year, instead of checks on specific moments
- Lower monitoring cost
- 3 different customized solutions
  - ENVISION Web Interface (PAs & CBs), ENVISION mobile app (Farmers), ENVISION Add-on Development Tool (Developers)
- 6 EO-based and ML-empowered products:
  - **1)** Cultivated Crop Type Maps, **2)** Soil Organic Carbon, **3)** Vegetation Status, **4)** Crop Growth (distinction of organic – conventional farming), **5)** Grassland Mowing/Ploughing, **6)** Soil Erosion

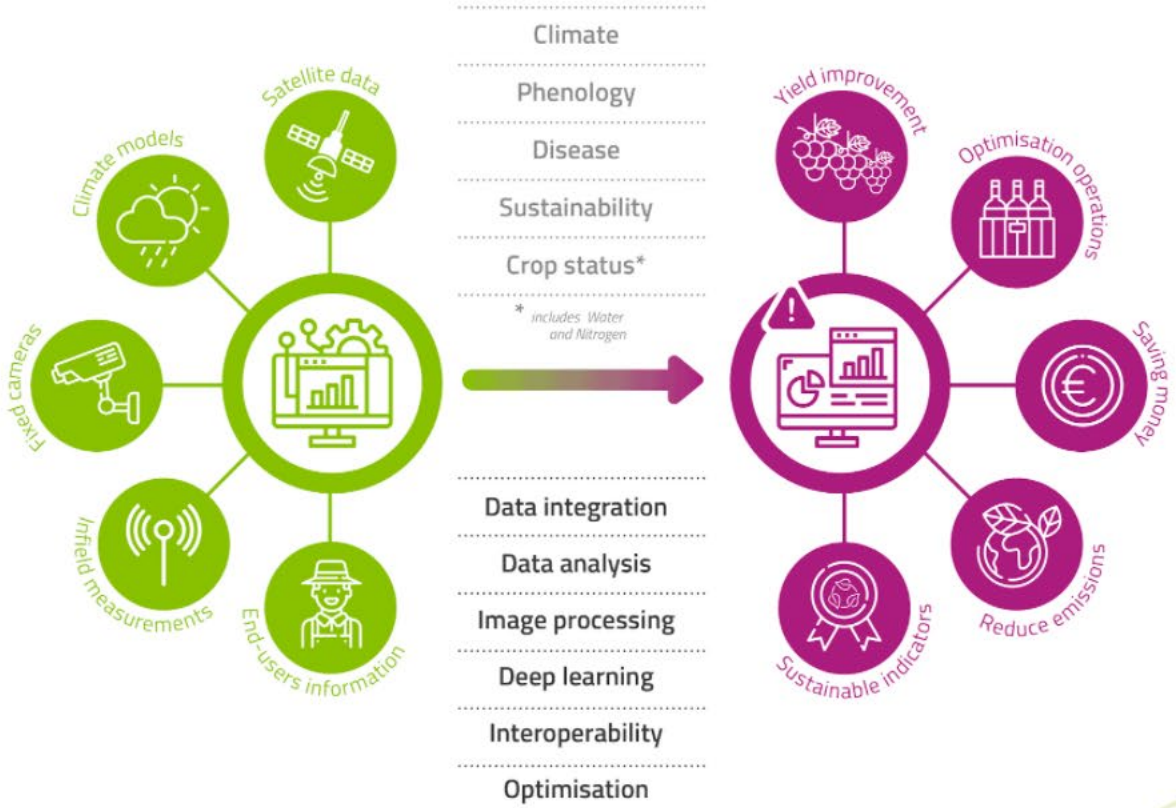
VITIGEOSS

Vineyard Innovative Tool based on the InteGration of Earth Observation Services and in-field Sensors

Providing forecasts, estimations and recommendations to optimise vineyard management processes

- The VitiGEOSS project develops an **innovative vineyard management solution based on the integration of Earth Observation services and in-field sensors** to increase the resolution and reliability of satellite information applied to the viticulture sector.

- VitiGEOSS **contributes to a responsible production of wine by minimising the use of chemical fertilisers and pesticides** and offering tools for a **better management and optimisation of resources for greater sustainability.**



NextLand

Next Generation Land Management services for Agriculture & Forestry

NEXTLAND

Provide **15 commercial innovative agriculture and forestry midstream services co-designed with users** under a **common service delivery platform** based on Copernicus and GEOSS data

deimos elecnor group

TERRAQUE

Centralised operations | High Service Availability | Scalable services | Customer support

The 15 NextLand services per partner

AGRICULTURE	AGRICULTURE & FORESTRY	FORESTRY
• Crop Type Classification (vito)	• Vegetation Indexes (vito, deimos)	• Change Detection (Deforest. & Single Tree Cut) (deimos)
• Crop Productivity Trends Analysis (vito)	• Anomaly Detection (deimos, vito)	• Forest Fire Burn Scar (deimos)
• Crop Phenological Cycle Typical Characterization (vito)	• Soil Moisture	• Forest Density & Statistics (vito)
• Crop Water Needs (DHI GRAS)	• Vegetation Water Content (vito)	• Tree Health Indices (deimos)
	• Potential and Actual Evapotranspiration (DHI GRAS)	• Forest Classification (deimos)

soilessentials precision farming solutions | Bodemkundige Dienst van België vzw

s[&]t | CERTH CENTRE FOR RESEARCH & TECHNOLOGY HELLAS | EFI | NOVA NOVA SCHOOL OF BUSINESS & ECONOMICS

European Commission

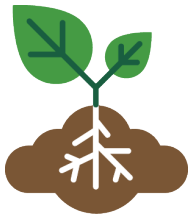
EUROPEAN UNION

EU MISSIONS
SOIL DEAL FOR EUROPE

R&I Missions

Linking EU's research and innovation to major societal needs with a strong visibility and impact

A mission is a portfolio of actions across disciplines intended to achieve a **bold and inspirational and measurable goal** within a set timeframe, with **impact** for society and policy making as well as relevance for a significant part of the European population and wide range of European citizens.

Adaptation to Climate Change	Cancer	Climate-neutral and Smart Cities	Restore our Ocean and Waters	Soil Deal for Europe
				

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EU MISSIONS
SOIL DEAL FOR EUROPE

Life on Earth depends on healthy soils

- Soils deliver **vital, interconnected ecosystem functions** (e.g. water regulation, hosting biodiversity, climate mitigation and adaptation) and are the **basis for nutritious and safe food**
- Soils provide clean water, are habitats for biodiversity, contribute to climate resilience ➔ key for food system resilience.
- Soil is a **scarce, non-renewable resource**
- **WE NEED TO ACT NOW!**
  - **60-70% of all soils in Europe are unhealthy** as due to current management practices, pollution, urbanisation and the effects of climate change
  - **Costs associated with soil degradation in the EU exceed 50 billion € per year**

EUROPEAN UNION

EU MISSIONS
SOIL DEAL FOR EUROPE

Goal of mission “Soil Deal for Europe”: 100 living labs and lighthouses to lead the transition towards healthy soils by 2030

Specific objectives

1. Reduce **desertification**
2. Conserve **soil organic carbon stocks**
3. Stop **soil sealing** and increase re-use of **urban soils**
4. Reduce **soil pollution** and enhance **restoration**
5. Prevent **erosion**
6. Improve soil structure to enhance **soil biodiversity**
7. Reduce the **EU global footprint on soils**
8. Improve **soil literacy** in society

Each specific objective is backed by **one or more quantified targets** and **measurable indicators**. Objectives apply to **all types of land use**.

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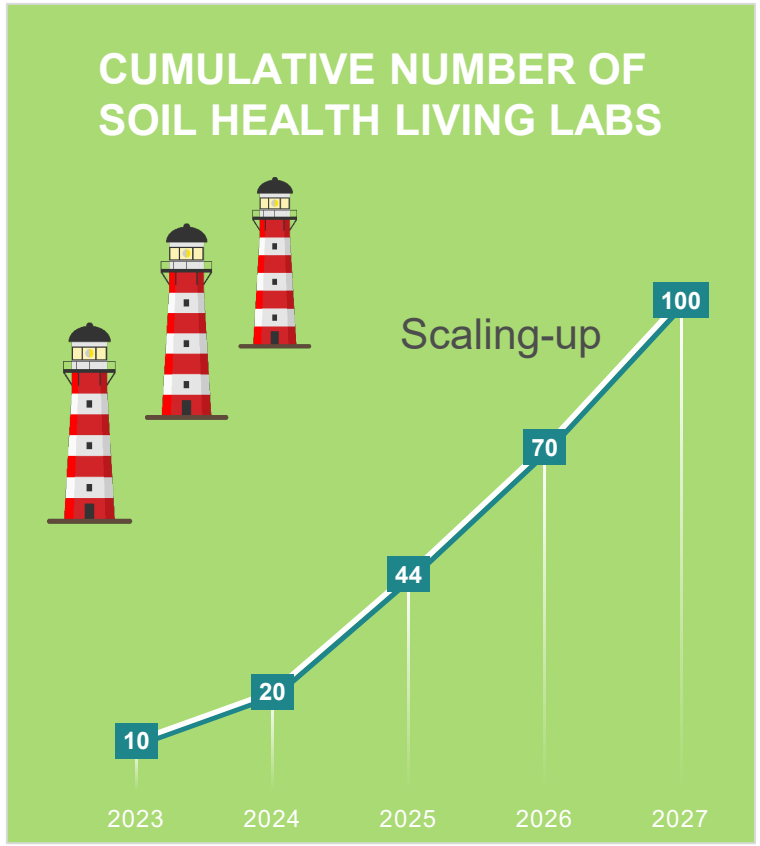
SOIL DEAL FOR EUROPE

100 Living Labs and Lighthouses

- **Living labs are a core element of the mission** – participatory, interdisciplinary, intersectoral research!
- **Living labs (LLs)** will correspond to a cluster of sites working together at regional or sub-regional level.
- **Lighthouses** are individual places to showcase good practices. Can be from within or outside LLs.

- **Network of living labs** to be gradually established through consecutive calls for living labs under the various Work Programmes of Horizon Europe.
- Specific criteria for living labs have been developed under the mission to ensure **common approach and comparability of data and experiences.**



- ❑ *HORIZON-MISS-2021-SOIL-02-02: Validating and further developing indicators for soil health and functions*
- ❑ *HORIZON-MISS-2021-SOIL-01-01: Preparing the ground for healthy soils: building capacities for engagement, outreach and knowledge*

Thank you

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