

CAPACITY BUILDING FOR COPERNICUS RESOURCES EXPLOITATION

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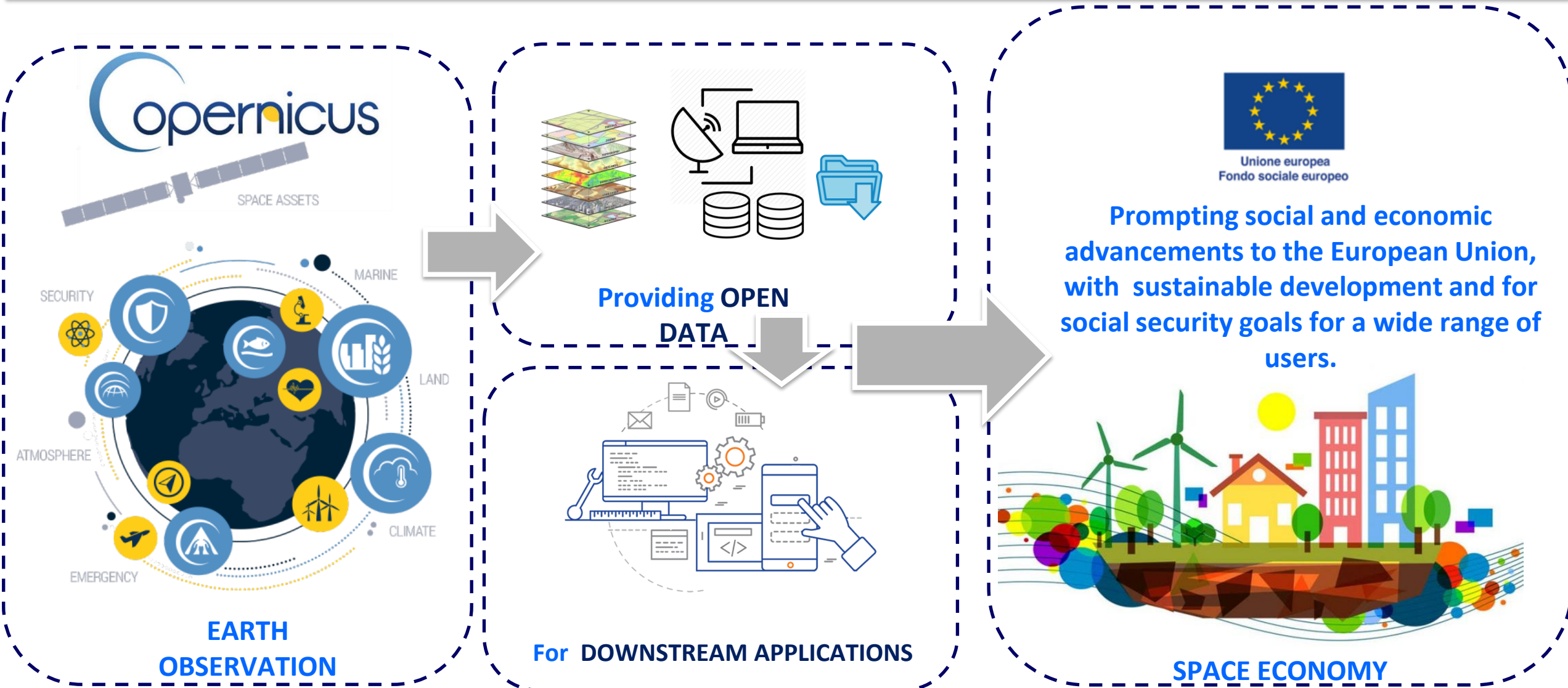
National Research Council, Genoa, Italy

13° WORKSHOP TEMATICO TELERILEVAMENTO APPLICATO AI PROCESSI DI
CONOSCENZA E GESTIONE DEI TERRITORIO

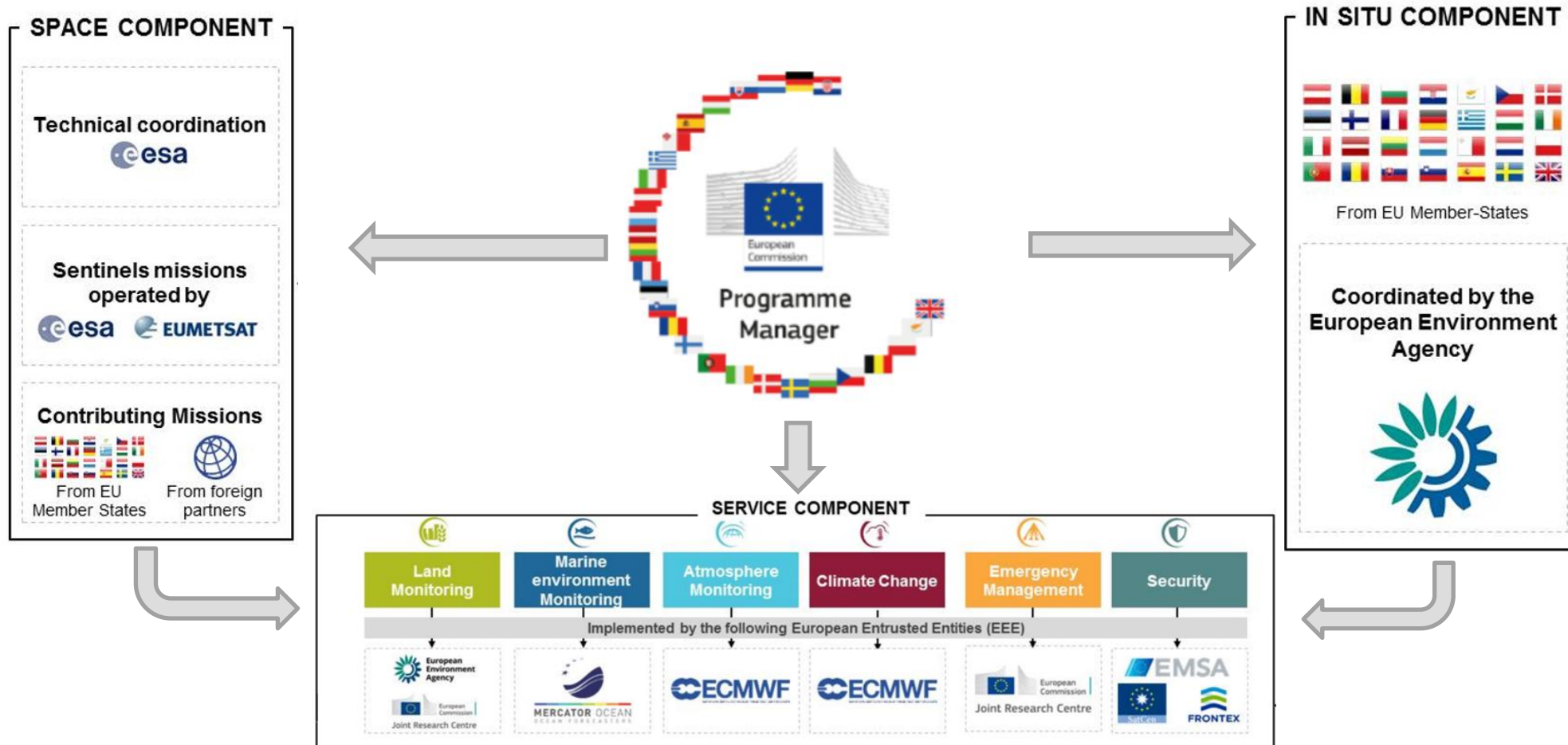
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What is Copernicus?



Copernicus Components

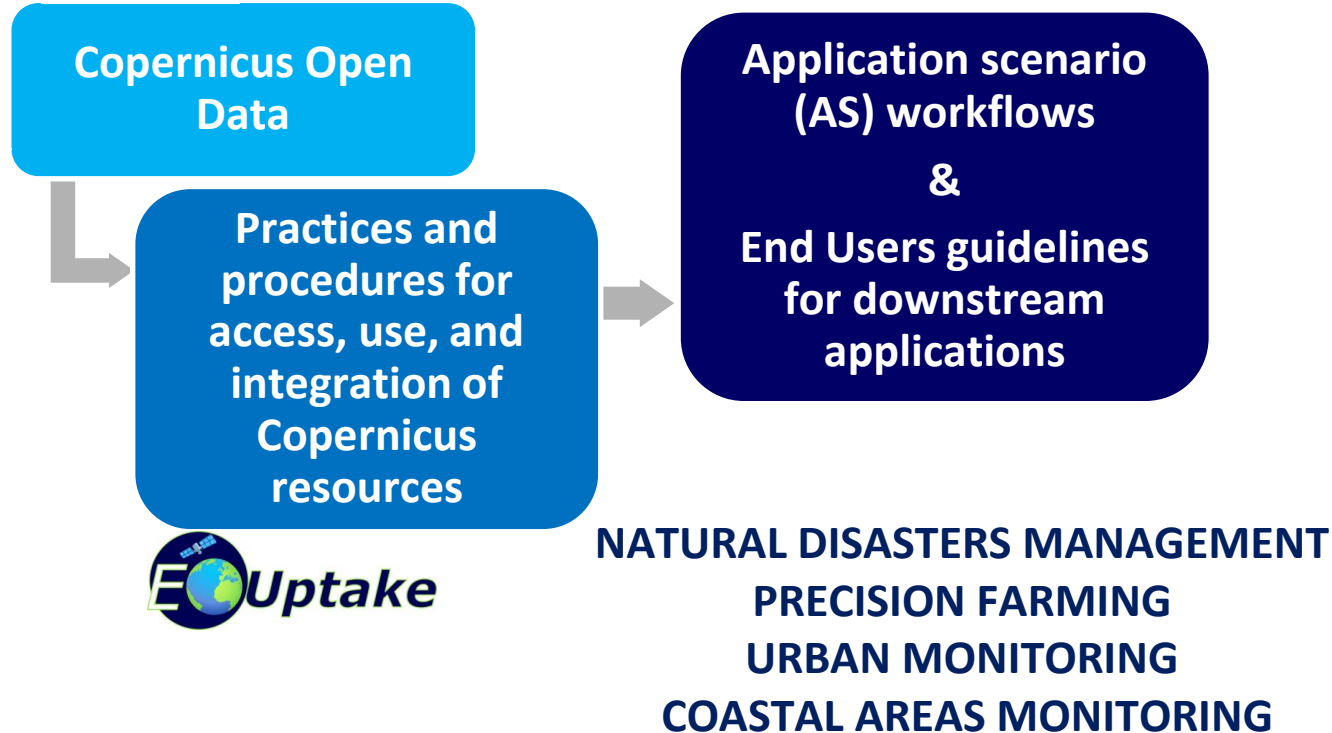


The European Copernicus Programme (www.copernicus.eu) is one of the main Earth Observation (EO) open data sources, supporting the social and economic development and the EU progress. Copernicus provides a vast amount of satellite data acquired from six Sentinel missions, and six types of services that provide ready-to-use information on different topics: atmosphere (CAMS), land (CLMS), climate (C3S), oceans (CMEMS), and security (CSS).

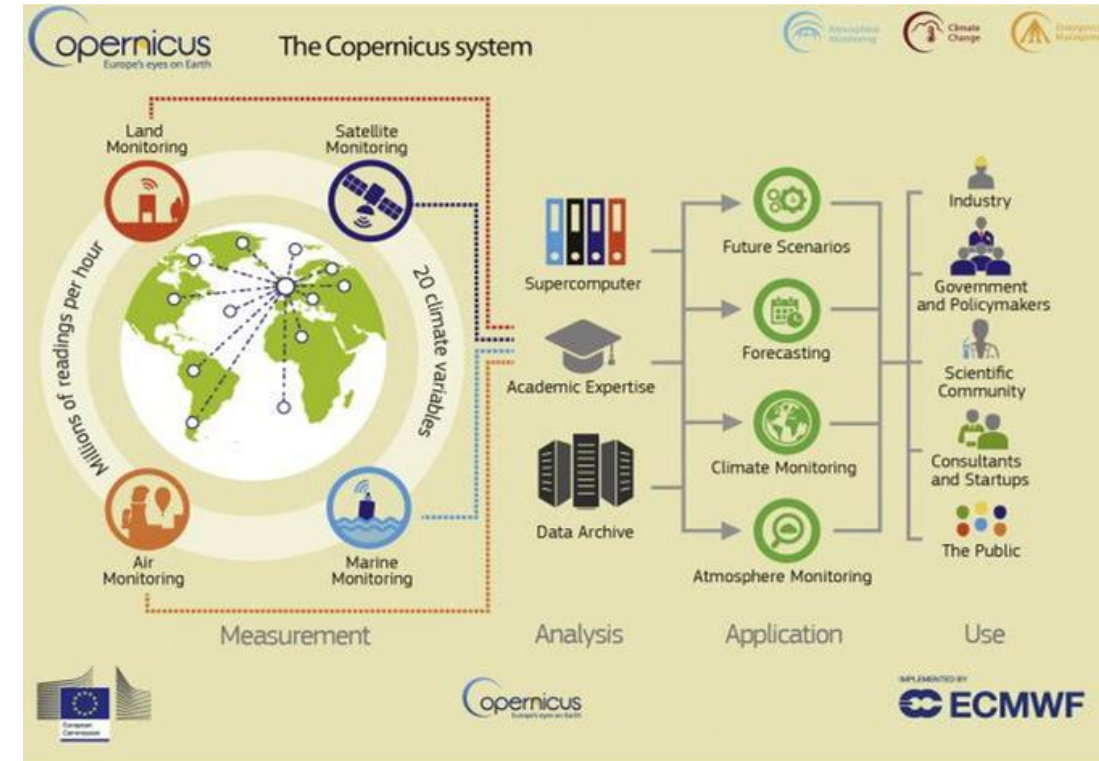
EO-Uptake Outcomes



1. "What applications can one build with Copernicus data?"



- A Framework of knowledge for different thematic areas
- Definition of application scenario & users requirements
- Data integration with GIS local databases (Compliance with standards e.g. INSPIRE)



AS – 1: Assessment of flood risk in rural environments

The workflow presents the methods for land cover supervised classification of an area characterized by the presence of a dam and an artificial lake. The accuracy of the classification method is also tested. The aim is to assess the risk to human activities arising from potential flooding due to breakage or overflow.

•Sentinel 2 Multi Spectral Imager (MSI - Optical)

- **TEMPORAL RESOLUTION** 5 days
- **SPATIAL RESOLUTION** 10-60 meters (depending on band)

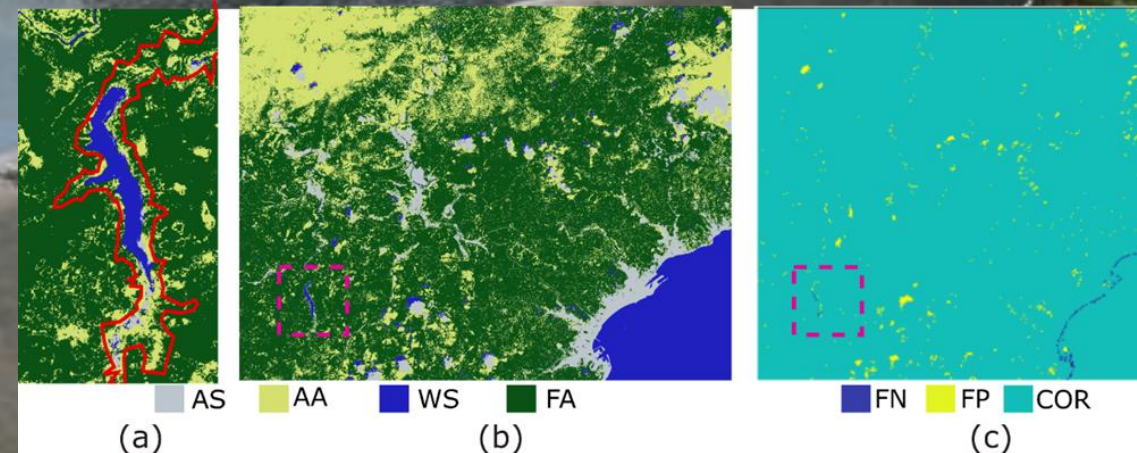
•INPE Hydrographic Dataset

- Drainage networks and basins,
- The raster map of the target location and spatial extent of potential inundation.

•Copernicus Core Services

- **Corine Land Cover – CLMS**

AOI: Osiglia Lake, SV, Italy



AS – 2: - Precision agriculture for vineyard monitoring

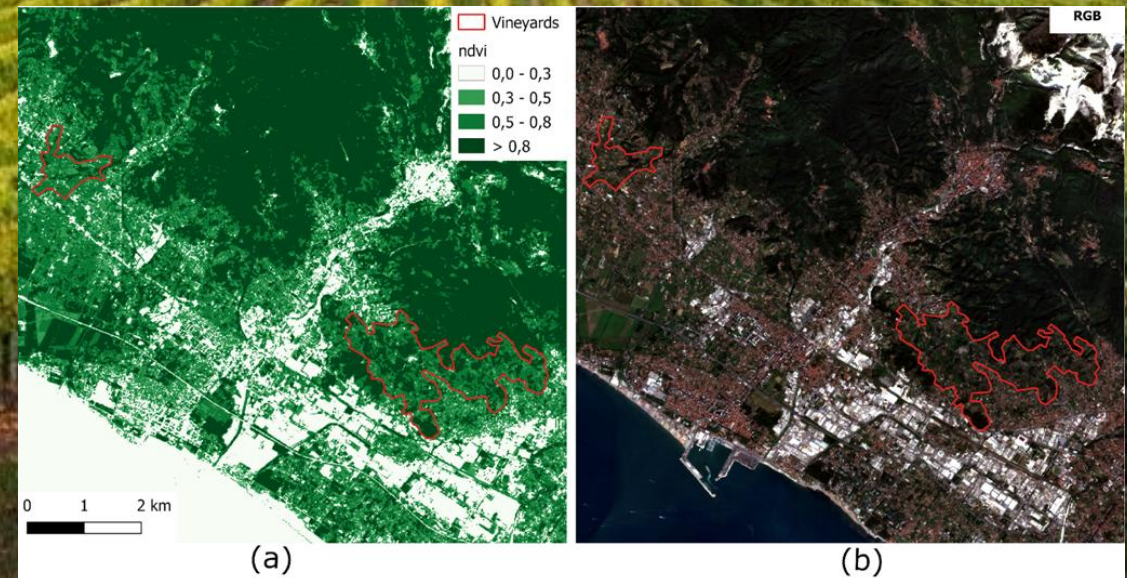
The workflow presents the methods for the calculation of vegetation indexes from Copernicus S-2 data and, eventually, the data collected by land drones, to evaluate the health status of the vineyards. The objective is to perform an extensive crop monitoring to facilitate the management of resources to support farmers.

• Sentinel 2 (MSI - Optical)

- **TEMPORAL RESOLUTION** 5 days
- **SPATIAL RESOLUTION** 10-60 meters (depending on different bands)

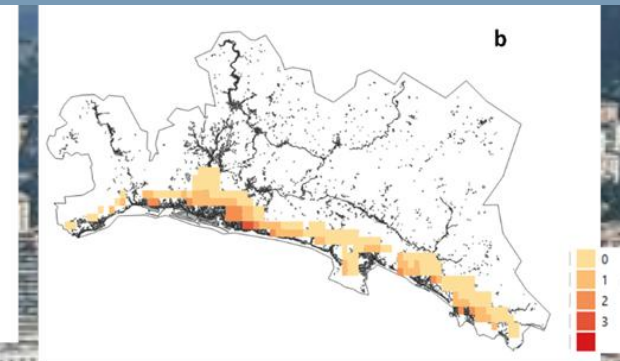
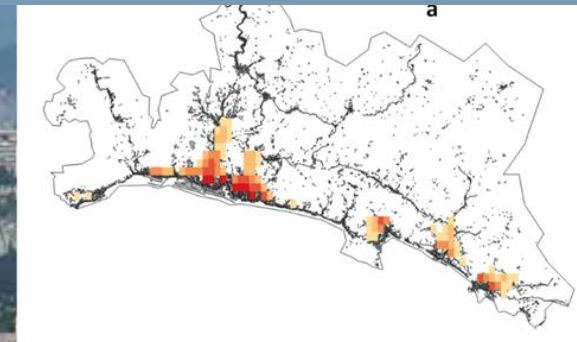
• Land Drone data integration and calibration (not developed)

AOI: La Spezia, Italy



AS – 3: Monitoring of the surface heat island effect

The workflow presents the practices to evaluate the daily and nightly heat island effect for summer 2020 in the metropolitan area of the city of Genoa; the aim is to provide an estimate of the thermal variation due to the presence of large urban agglomerations.



•Sentinel 3 SLSTR (Sea and Land Surface Temperature Radiometer - thermal images

- **TEMPORAL RESOLUTION** 1 day
- **SPATIAL RESOLUTION** 1 km

•Copernicus Core Services

- **Corine Land Cover – CLMS**

•Local database

- Ligurian geoportal for altitude maps and administrative borders.

AOI: Genoa, Italy



AS – 4: Coastal bathymetries derivation

This workflow presents an open data approach to derive bathymetries with Sentinel 2 optical images in a study area along the coast of the Liguria region and evaluate the accuracy with in situ sample data freely available from the Regione Liguria Geoportal.

Approach by Richard Stumpf (2003)

Merge the blue-green bands into a log-based regression, measuring the rate of attenuation of light in water, which is dependent on wave length

The reflectance ratio for two different wavelengths is a function of the depth

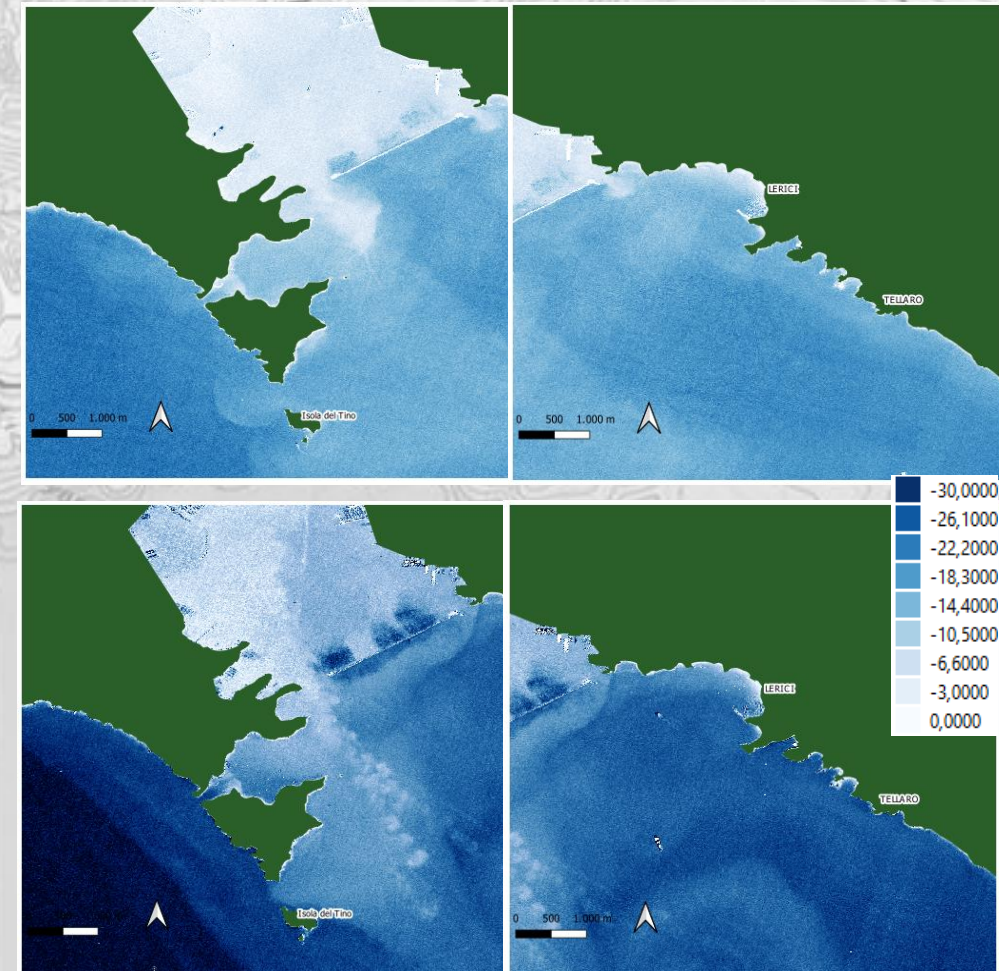
• Sentinel 2 (MSI - Optical)

- TEMPORAL RESOLUTION 5 days
- SPATIAL RESOLUTION 10-60 meters (depending on band)

Local database

- Ligurian geoportal for isobaths

AOI: La Spezia, Italy



AS – Recommendations for End-Users

In the development of such ASs we collected a set of indications addressed to a non expert end user, concerning:

- The temporal and the spatial scale of the studied phenomenon
- The availability of open data and resources in the Copernicus Ecosystem and in other EO organizations
- Data integration practices
- The possibility to evaluate commercial solutions

Knowledge framework outcomes

2.”Which tools are available to access and process RS data?”

3.”What are the main features of these tools?”

Knowledge framework:

- overview of Copernicus [data access hubs](#)
- overview of [processing tools](#) for satellite products and thematic resources

**Features comparison to support users in developing satellite applications based on
Copernicus data**

Copernicus Data

- Satellite products



- Thematic resources

How to access and process Copernicus data

- **Access hubs for satellite products**

- Copernicus Open Access (COA)
- EUMETSAT Data Centre
- Google Earth Engine (GEE)
- Sentinel Hub



- **Copernicus Core Services access points for thematic resources**



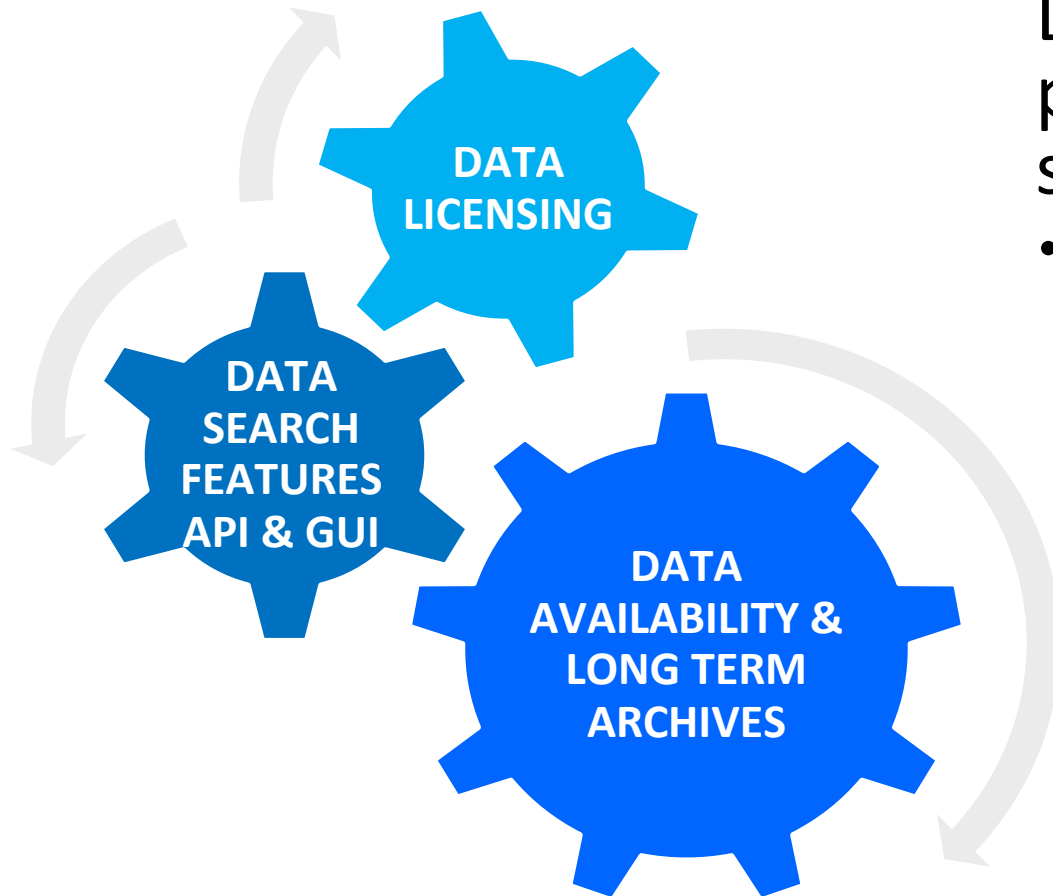
- **Processing tools**

- Sentinel Application Platform (SNAP)
- GEE
- EO-Browser
- Quantum GIS (Q-GIS)



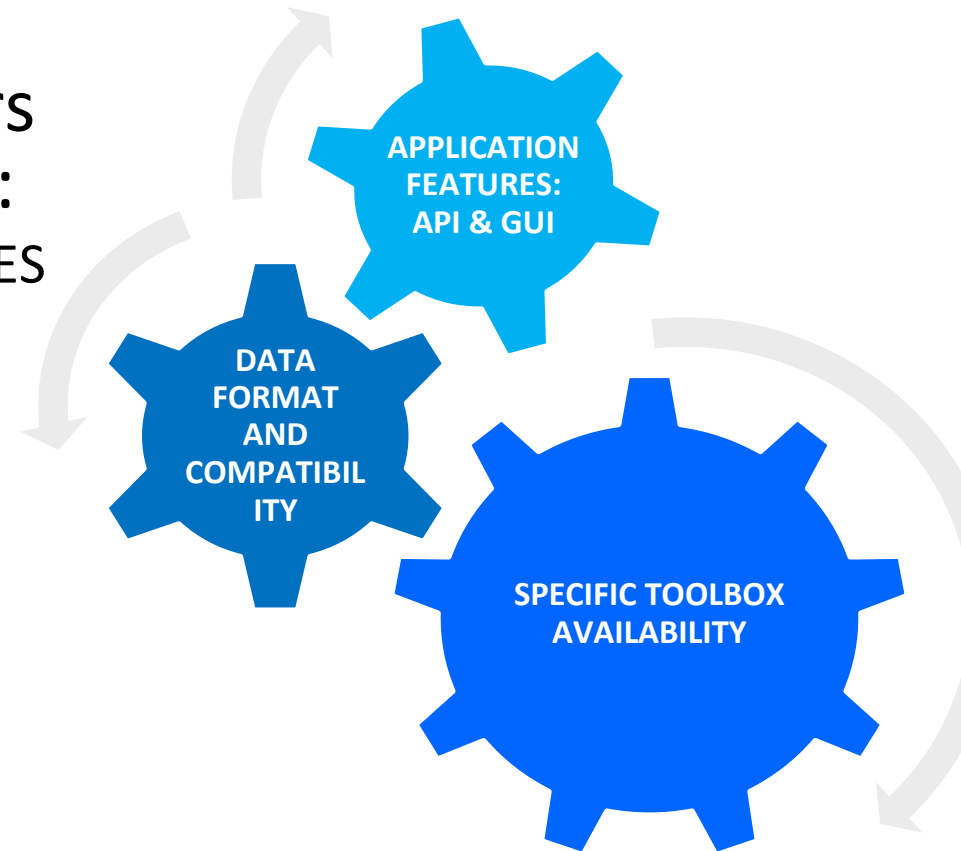
USERS' PERSPECTIVE: HUBS & TOOLS COMPARISON

During data browsing and selection users should account:



During data processing users should account:

- CRUCIAL FEATURES SUCH:
 - CLASSIFIERS
 - BAND MATH CALCULATORS
 - PLUGIN AVAILABILITY
 - BATCH PROCESSING

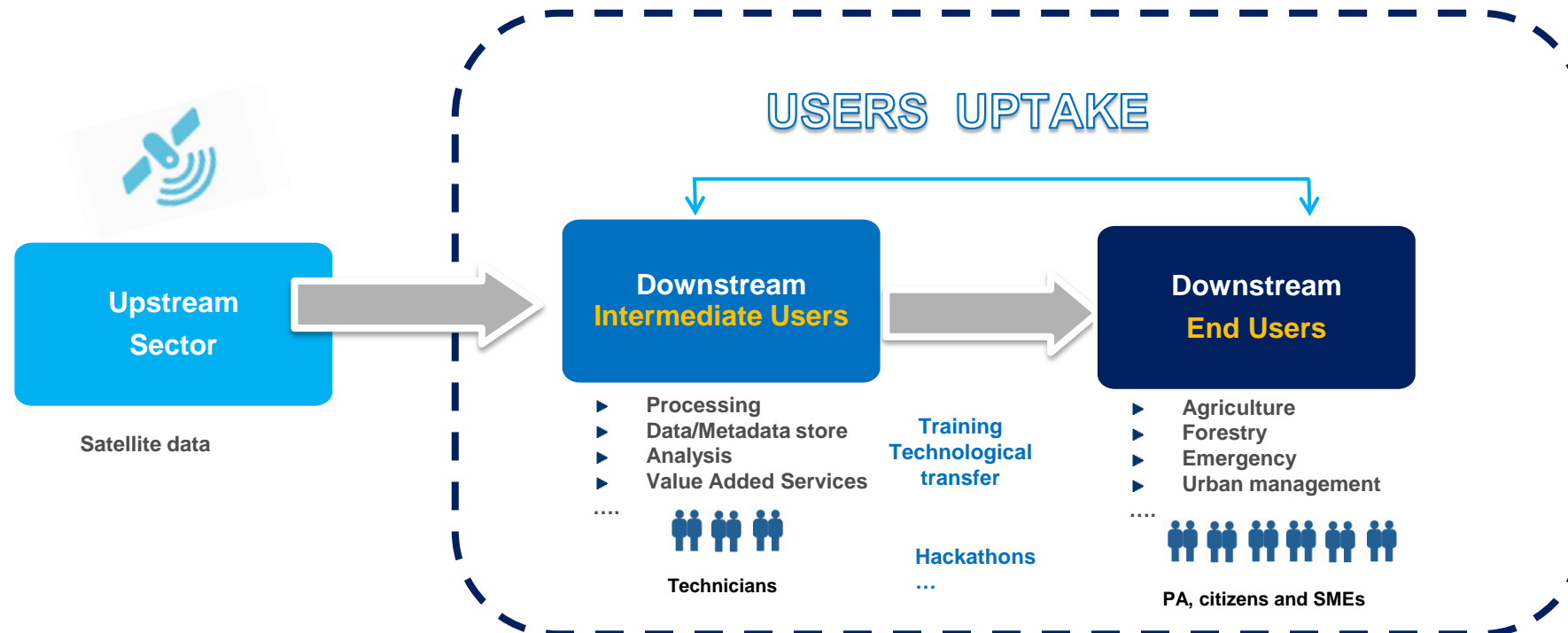


CONCLUSIONS

We provide a short user guide showing how to recognize and exploit the resources for Earth Observation goals:

- Satellite-based applications can be carried out with different approaches, depending on the level of computer skills and technical knowledge of the users

Users should be aware of the available tools to discover, access, and process Copernicus' information assets.





THANKS FOR YOUR ATTENTION

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Collaborations:

INPE: Instituto Nacional de Pesquisas Espaciais,
Brazil

Infosolution S.P.A.

Civil, Chemical and Environmental Engineering
Department, University of Genoa

Works:

- Analysing the Surface Urban Heat Island Effect with Copernicus Data
- User Uptake of Copernicus Resources: A Use Case for Land Monitoring
- Copernicus Users Uptake: An Overview of Downstream Applications
- Copernicus User Uptake: from Data to Applications.
- Exploiting Copernicus data via access hubs and processing tools.

