Reinforcing the AI4EU Platform by Advancing
Earth Observation Intelligence, Innovation & Adoption

Introduction to AI and EO data

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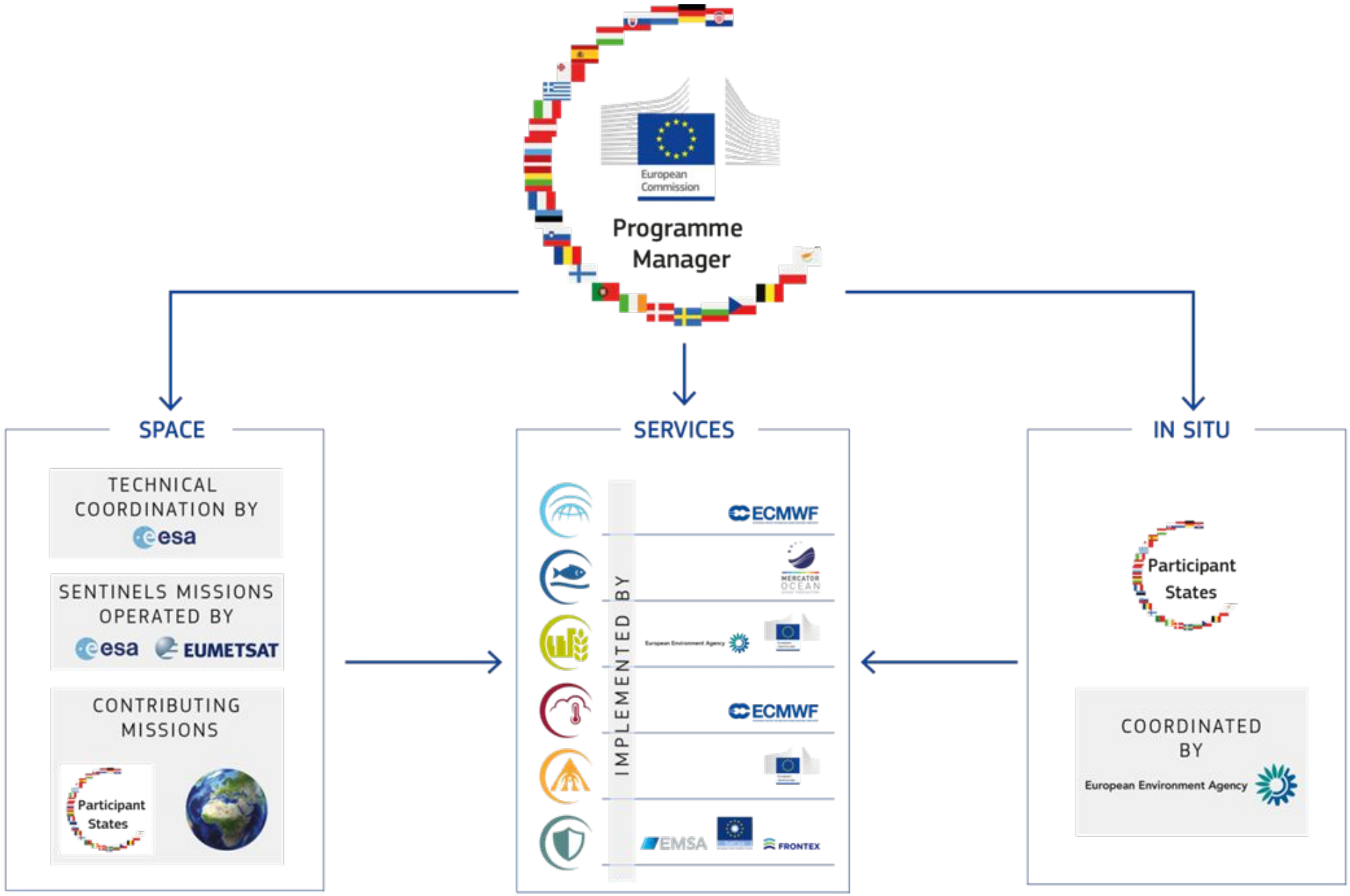
Copernicus – the European EO programme

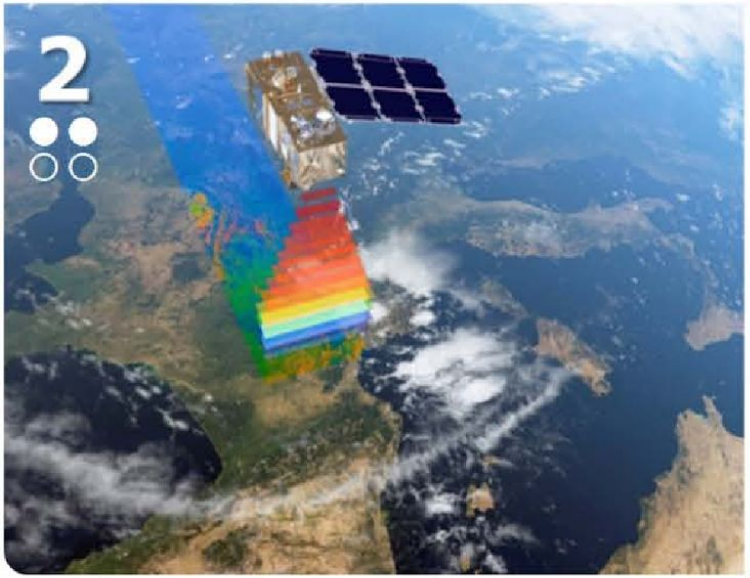
European Earth Observation System, led by the EU

European response to global needs:

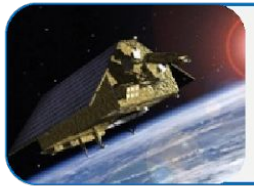
- to manage the environment
- to mitigate the effects of climate change
- to ensure civil security


European Commission
Programme Manager
SPACE
TECHNICAL COORDINATION BY
esa
SENTINELS MISSIONS OPERATED BY
esa
EUMETSAT
CONTRIBUTING MISSIONS
Participant States
SERVICES
IMPLEMENTED BY
ECMWF
MERCATOR OCEAN
European Environment Agency
ECMWF
EMSA
FRONTEX
IN SITU
Participant States
COORDINATED BY
European Environment Agency

Copernicus – European Leadership in EO



The Sentinels Explained

	**Sentinel 1** (A/B/C/D) **SAR Imaging**	All weather, day/night applications, interferometry
	**Sentinel 2** (A/B/C/D) **Multispectral Imaging**	Land applications: urban, forest, agriculture, ... Continuity of Landsat, SPOT
	**Sentinel 3** (A/B/C/D) **Ocean & Global Land Monitoring**	Wide-swath ocean colour, vegetation, sea/land surface temperature, altimetry
	**Sentinel 4** (A/B) **Geostationary Atmospheric**	Atmospheric composition monitoring, pollution; instrument on MTG satellites
	**Sentinel 5** (A/B/C) & Precursor **Low-Orbit Atmospheric**	Atmospheric composition monitoring; instrument on MetOp-SG satellites
	**Sentinel 6** **Jason CS (A/B)**	Altimetry reference mission

In-situ Observation

Earth Observation can be performed via Remote Sensing (satelites or aircraft-based sensors, i.e. without making physical contact), or via

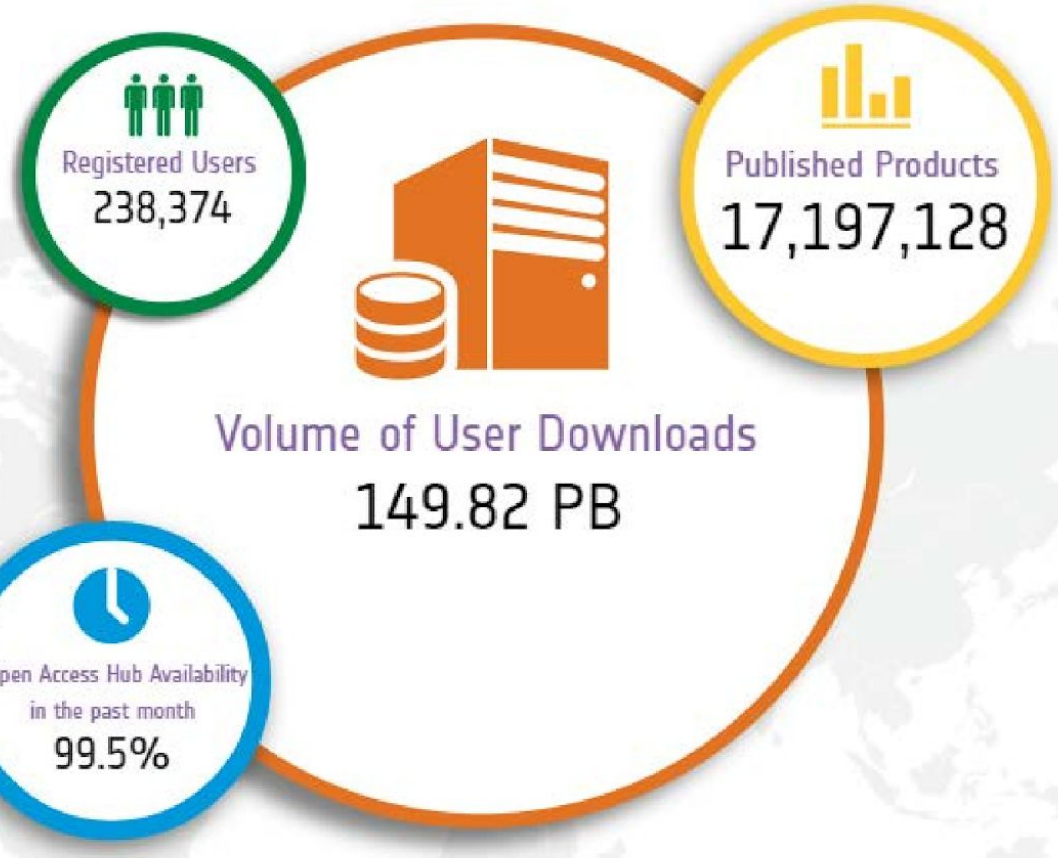
In-situ / On-site observation, with sensors in **ground-based, sea-borne or air-borne monitoring systems**.

New sources of in situ data, include sensors and imagery gathered by drones and information collected by crowdsourcing (OpenStreetMap).

Copernicus Open Access Data Hub

Registered Sentinel Users

The real number of users is much higher but unknown due to the free, full & open data policy.

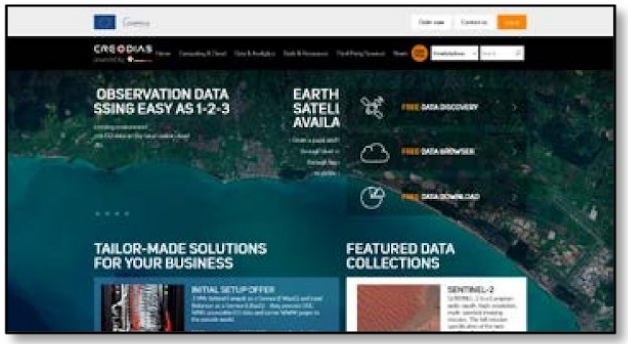


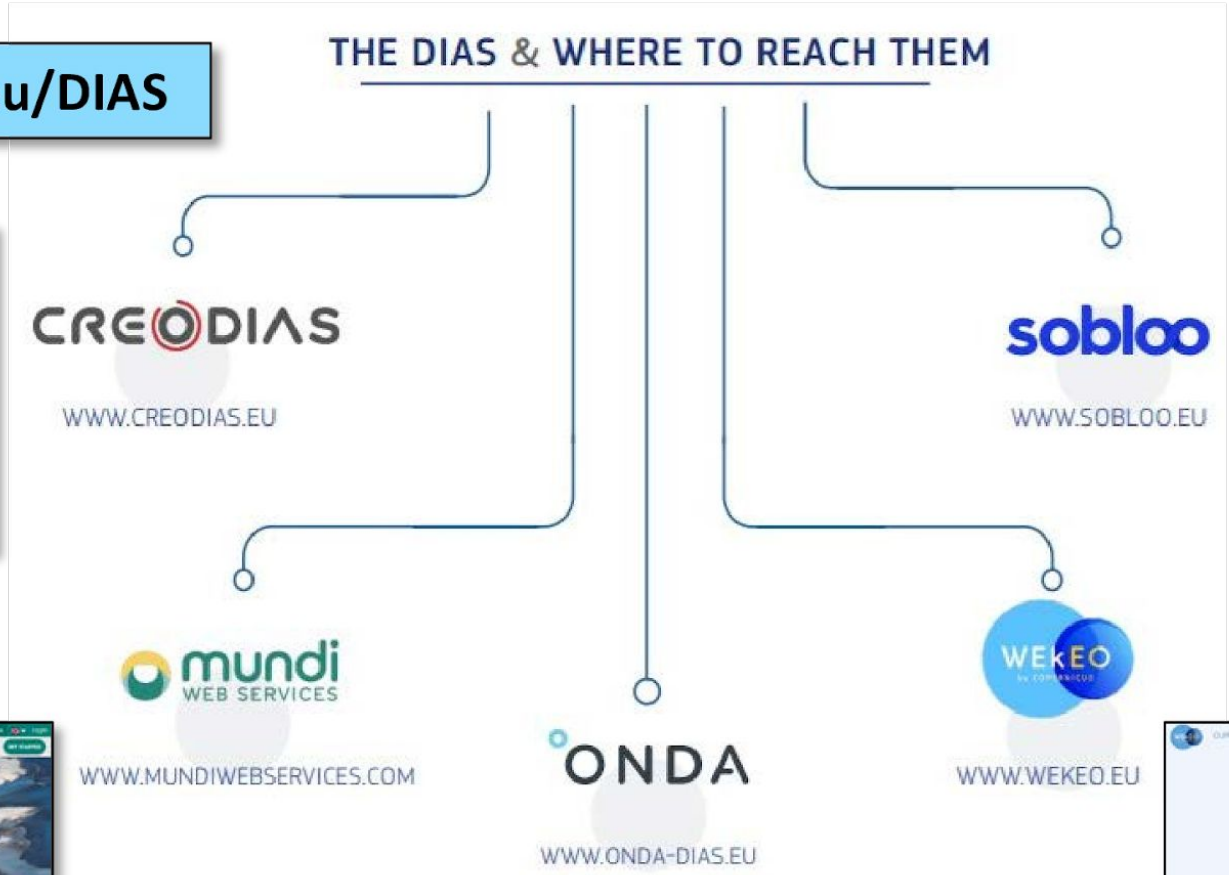
Sentinel Scientific Data Hub

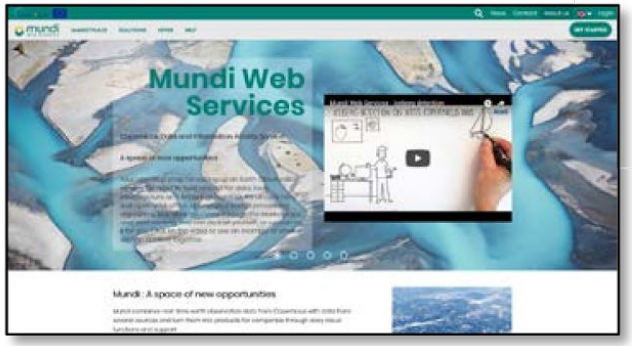
Statistics on 28 Jun 2019

Data and Information Access Services (DIAS)

e.copernicus.eu/DIAS







esa

Φ-lab

"AI for Earth Observation (AI4EO) has great potential that remains largely untapped. [...] While today, AI4EO is mainly computer vision applied to very high-resolution satellite imagery, there are many areas of Earth science that could benefit from AI. The EO research and business communities are awakening to these opportunities, calling for European collaborative effort to: [...] Provide a digital environment for researchers and innovators to rapidly prototype new AI4EO applications, including tools, clean quality-controlled training data sets, computing power and easy access to EO data, training material and expertise"

"Towards a European AI4EO Research & Innovation Agenda", Report, Φ-Lab, ESA

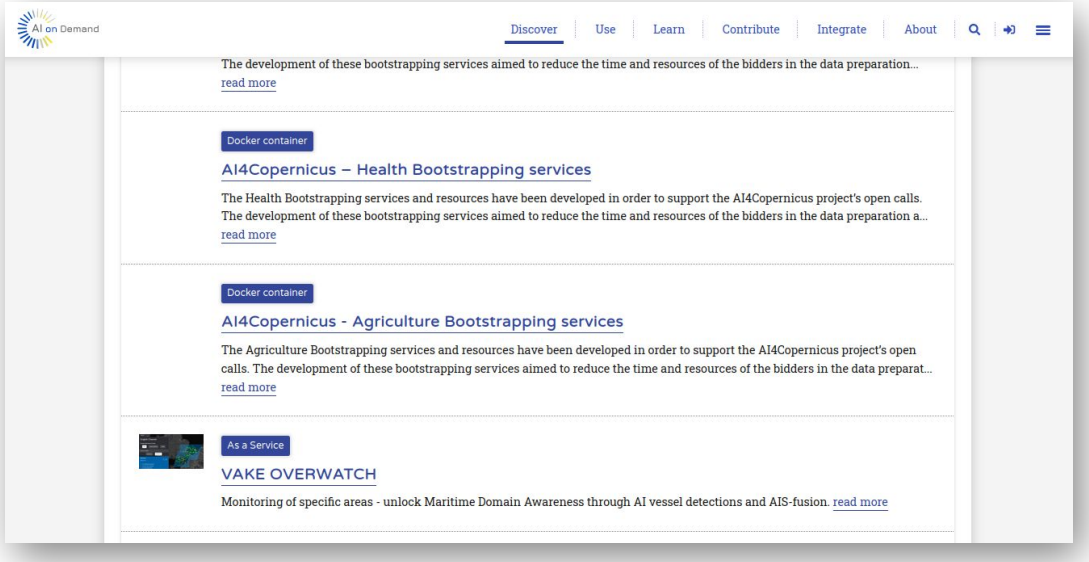
The AI-on-Demand Platform

- Widely accessible AI infrastructure
- Primarily targeting researchers, SMEs and other end-users
- Shared repository of AI knowledge, tools and resources
- Streamlining collaboration, innovation and tech transfer

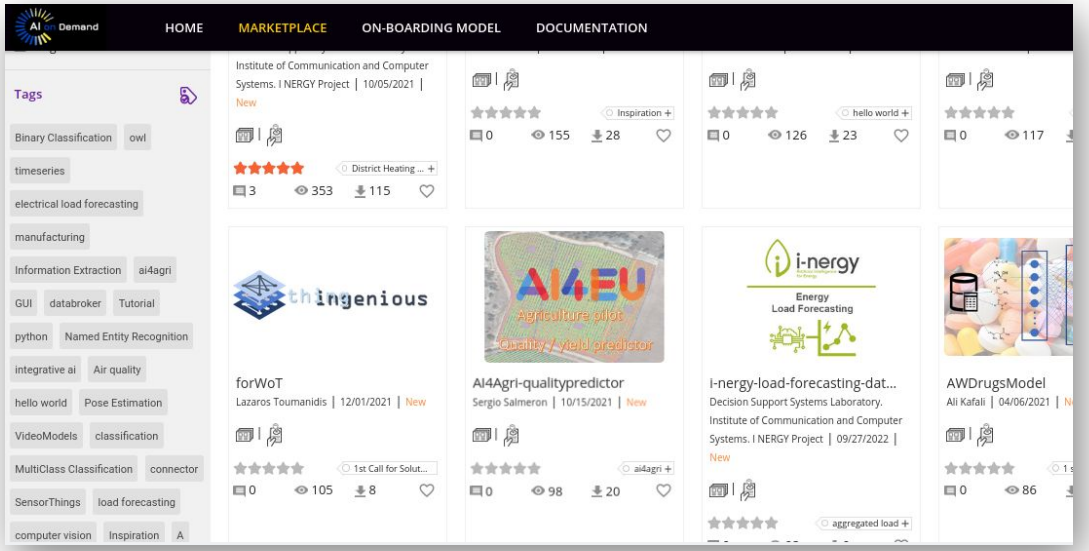
AI on Demand
Knowledge and services for the AI community

- Bring together existing and new AI-related assets
  - computational resources, data, algorithms, software, services, platforms, and expertise
- Bring together different communities within Europe's AI landscape

The current version of the AIoD Platform



AIoD Catalogue



AI4Experiments

AI & EO Initiatives

- https://destination-earth.eu/ an ambitious initiative of the European Union to create a digital twin – an interactive computer simulation – of our planet.
- https://ai4eo.eu/ an initiative of ESA Φ-lab dedicated to organising cutting-edge AI-based challenges. These challenges not only promote the growth and engagement of the AI4EO community, but also provide a platform for researchers and coders to showcase their work and make a tangible impact in solving some of society's most pressing challenges.
- https://deepcube-h2020.eu/ aims to unlock the potential of big Copernicus data with AI and Semantic Web technologies, with the objective to address problems of high environmental and societal impact.
- https://www.eo4eu.eu/ the EO4EU platform aims to make EO data more accessible than ever by providing an AI-augmented ecosystem with improved user interfaces for EO services and data.
- https://ai4copernicus-project.eu/ aims to bridge AI with EO world by making the AI-on-demand platform, the digital environment of choice for users of Copernicus data, for researchers and innovators.

DEEP CUBE

EO4EU
Earth Observation Data & Service Accessibility

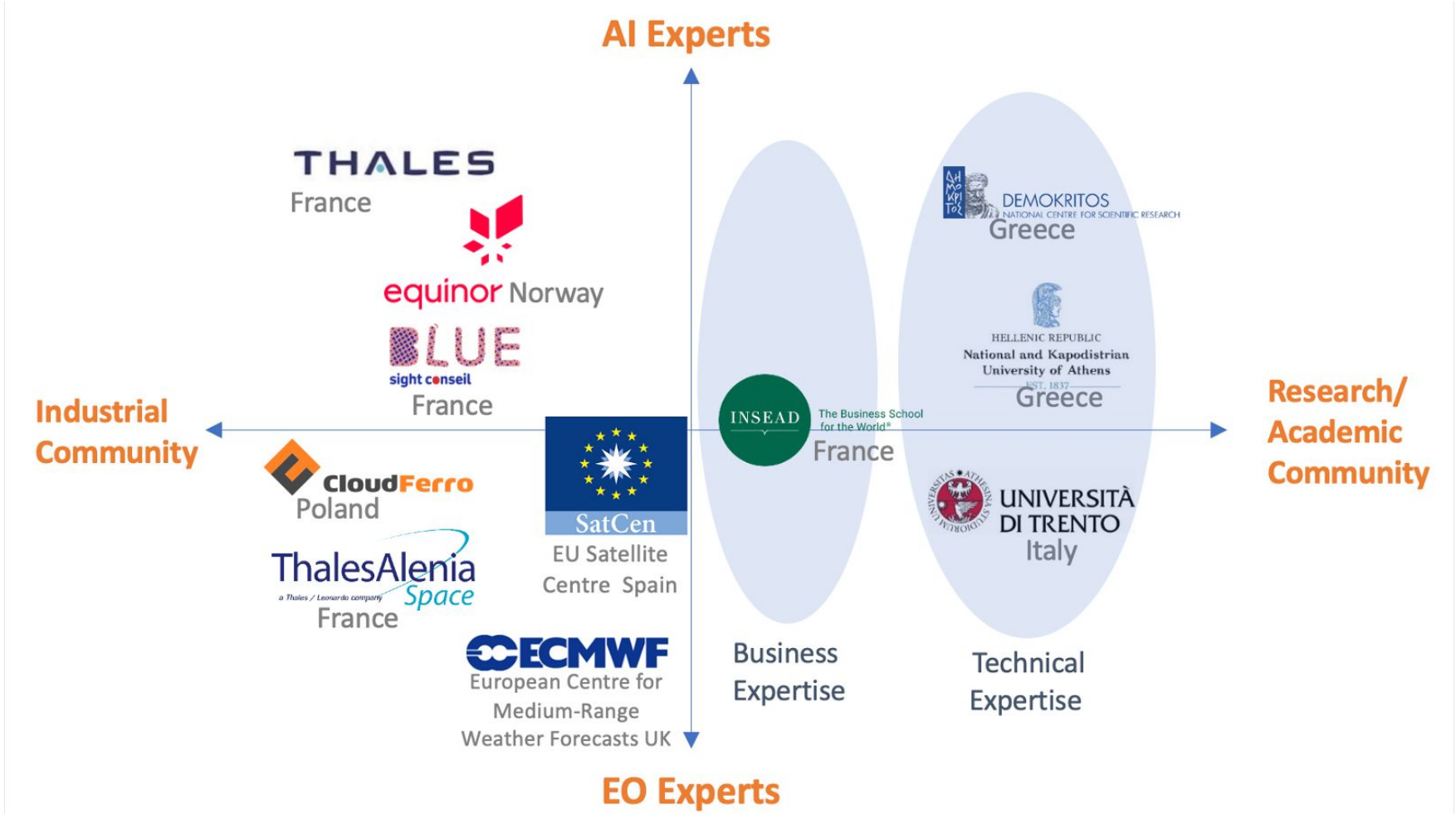
AI4 copernicus

AI4Copernicus in a nutshell

AI4Copernicus aims to bridge these two worlds:

Make the AI on Demand Platform, the platform of choice for users of Copernicus data along the value chain (scientists, SMEs, non-tech sector)

AI4Copernicus consortium



Main objectives

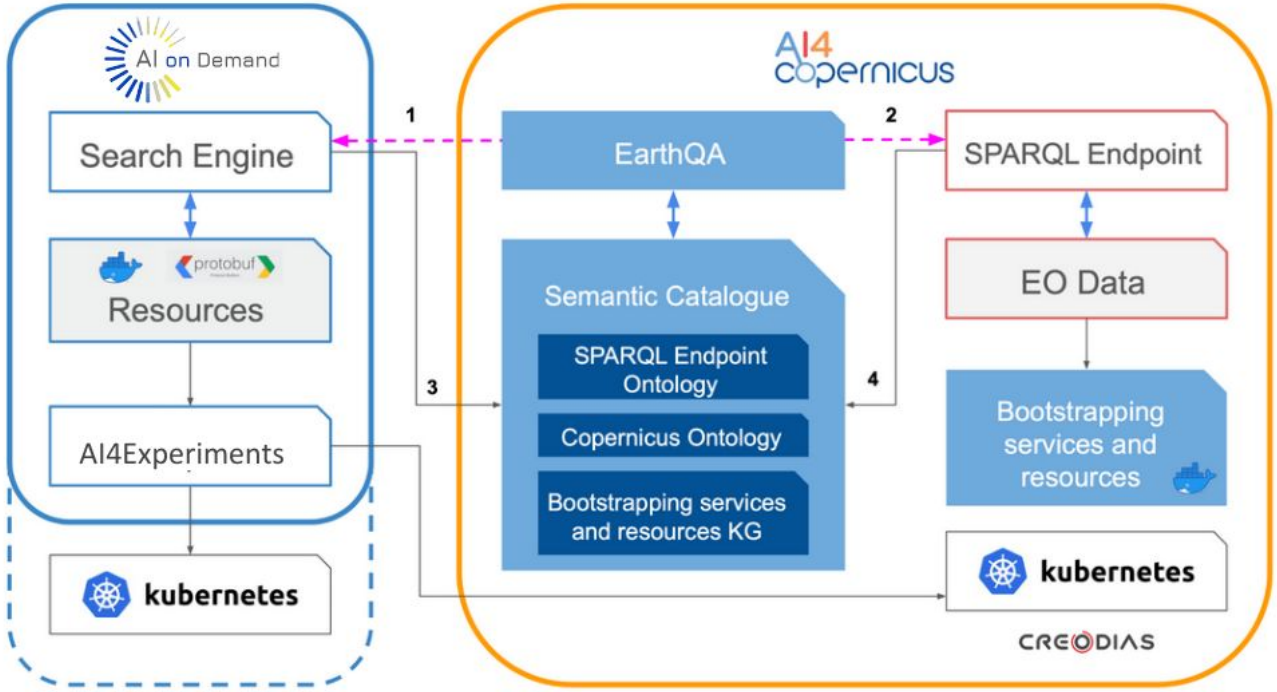
- Expand and deepen the integration of AIoD with DIAS platforms to enrich the AIoD service offering and enable far-reaching innovation.

- Kickstart the innovation cycle by incentivising diverse communities pertinent to the AIoD platform and Copernicus to solve real problems of business and societal value.

- Drive the evolution, uptake and impact of all involved platforms (AIoD, WEkEO, CREODIAS).

AI4Copernicus architecture

- ✔ Provision of services & resources (e.g., preprocessing tools, ML algorithms and models for EO data) to bootstrap the development of AI+EO applications
- ✔ Option to use AI4Experiments to create deployable AI pipelines, which users can deploy directly on DIAS
- ✔ Copernicus ontology, Semantic Web tools, and EarthQA question answering engine for annotating and discovering Copernicus data and services.

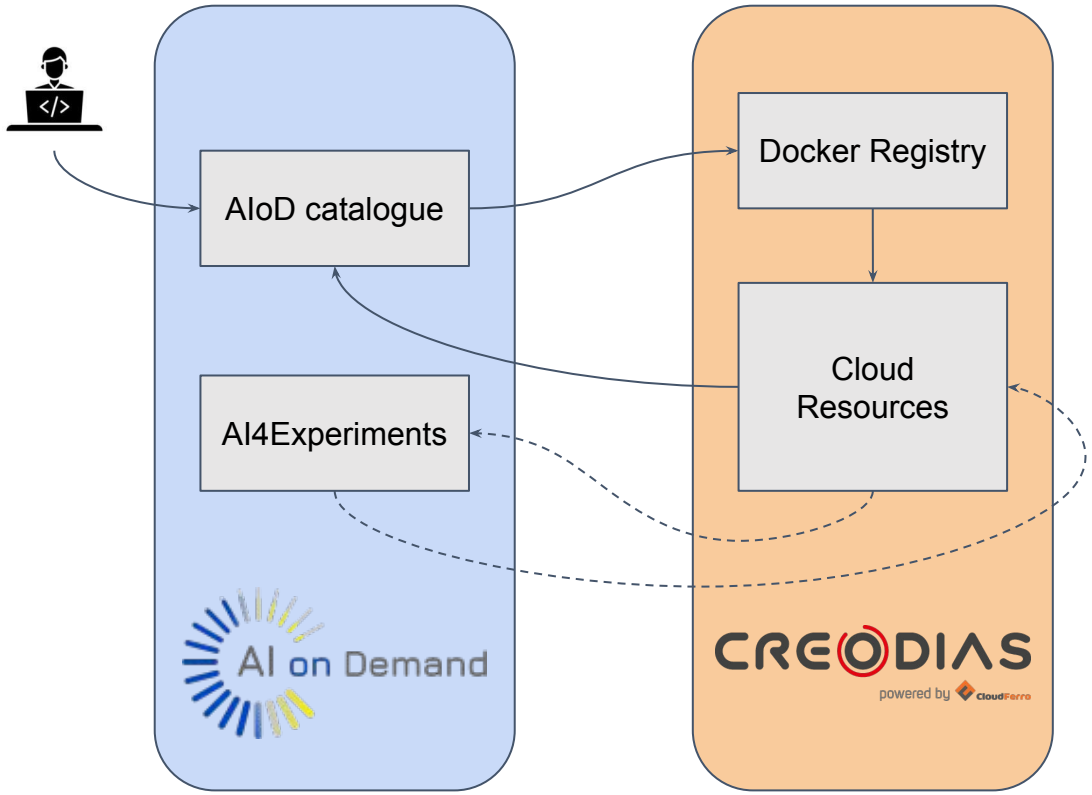


AI4Copernicus Bootstrapping Services

Energy & General-purpose Bootstrapping services	Agriculture Bootstrapping services	Health Bootstrapping Services	General Purpose Semantic Services
Sentinel-1 GRD pre-processing **Sentinel-1 SLC** pre-processing **Sentinel-2** pre-processing **Sentinel-1 Change detection–** Amplitude Change Detection and Multi-temporal Coherence **Sentinel-2 Change detection**	**Deep network** for pixel-level classification of S2 patches **Harmonization** of pre-processed Time Series of Sentinel-2 data **Long Short-Term Memory Neural Network** for Sentinel-2 for crop type classification Pre-Trained Long Short-Term Memory for crop type classification	**Probabilistic downscaling** of CAMS air quality model data	**Semantic & Linked Data tools** - GeoTriples - Strabon - JedAI, JedAI-spatial - Semagrow - Sextant **EarthQA question answer engine**

User Journey in AI4Copernicus

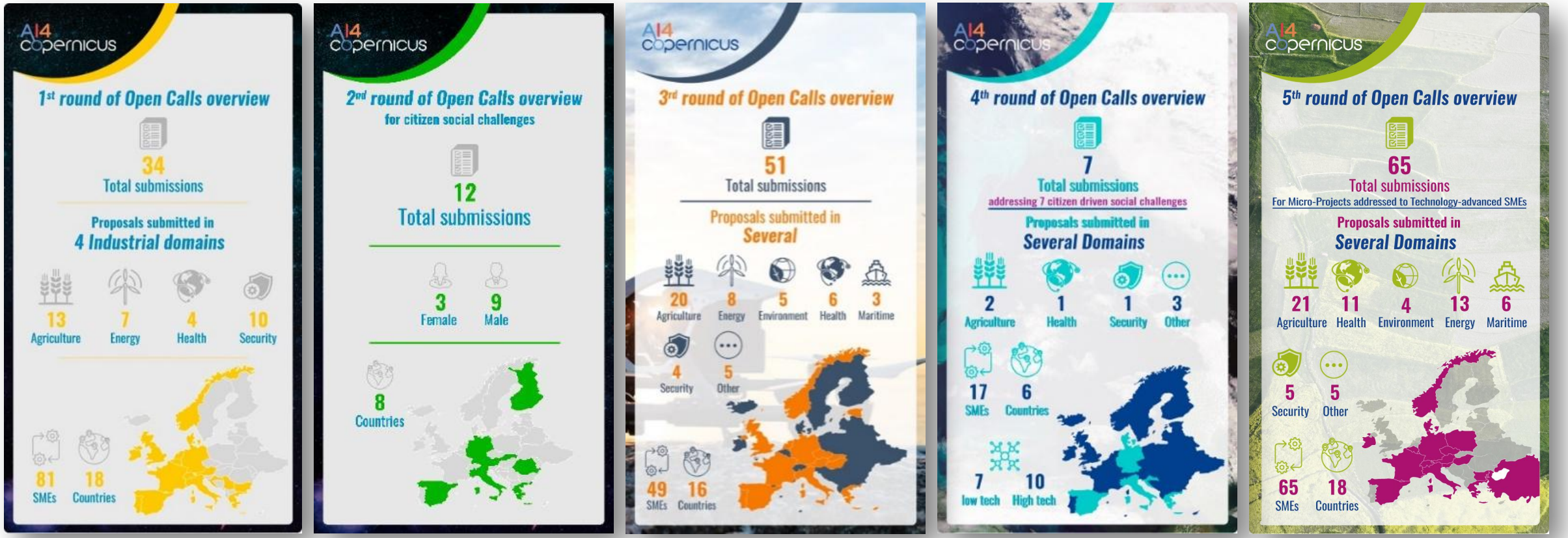
1. Discover the appropriate AI asset on the AIoD catalogue
2. Access the AI assets through CREODIAS Docker Registry
3. Develop on CREODIAS/WEkEO
4. Onboard onto AI4Experiments, possibly making use of additional resources
5. Deploy the solution on CREODIAS
6. Publish the solution and/or derivatives onto the AIoD catalogue



Open calls


Open Calls for Use Cases in 4 Industrial Domains
30th Sept. 2021 € 150K
1st
Open Call for Citizen Social Challenges
31st Oct. 2021 €5K
2nd
Open Call for Experiments
30th Apr. 2022 €80K
3rd
Open Call for Use Cases based on the Citizen Social Challenges
30th Apr. 2022 € 150K
4th
Open Call for Micro-Projects
31st Mar. 2023 €30K
5th

Open Calls Results



Thank You!

AI4 copernicus

Any Questions?

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