Artificial Intelligence for the #EOSC

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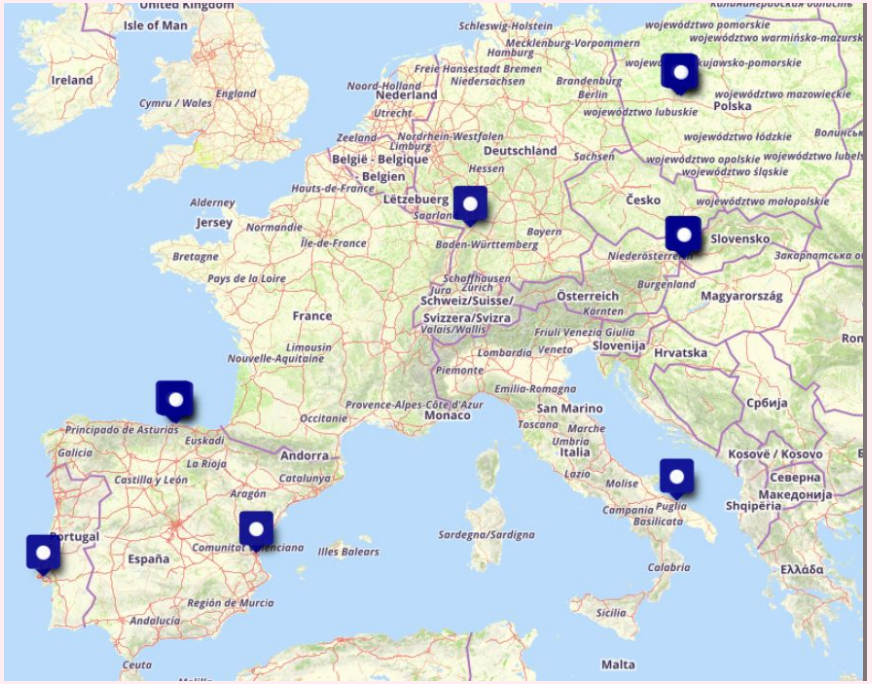

CSIC Consejo Superior de Investigaciones Científicas

KIT Karlsruher Institut für Technologie

LIP

Ústav Informatiky Slovenská akadémia vied

Universitat Politècnica de València

INFN Istituto Nazionale di Fisica Nucleare

PSNC

WODR

MicroStep-MIS

predictia

AI4EOSC

Artificial Intelligence for the #EOSC

- Evolution of the DEEP Hybrid DataCloud platform
- HORIZON-INFRA-2021-EOSC-01-04 call
- Runs September 1st 2022 – August 2025 (36 months)
- 7 academic partners
  + 2 SME
  + 1 non-profit organization

Advanced features for distributed, federated, composite learning, metadata provenance, MLOps, event-driven data processing, and provision of AI/ML/DL services

Objectives

Objective 1
Provide feature rich services and platform to build and deploy custom AI applications in the EOSC

Objective 2
Enhance existing cloud services to support AI on distributed datasets, with a particular focus on federated learning

Objective 3
Deliver methods to compose AI tools, enabling the development of complex data-driven composite applications

Objective 4
Deliver an AI exchange in the context of the EOSC, enhancing and increasing the application offer currently available

Objective 5
Extend the service offer and the capabilities being offered through the EOSC portal, with focus on AI

Goal
Foster an AI exchange in the EOSC context, with added value, innovative and easily customizable services

Background and ecosystem

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2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	…

INDIGO-DataCloud
PaaS-based cloud solution for e-Science

uDocker
PaaS Orchestrator
Infrastructure Manager
Identity and Access Manager

DEEP 1 platform
DEEP 2 platform

DEEP-Hybrid-DataCloud
AI/ML/DL PaaS and services, with transparent access to GPUs

DEEP Platform and services

AI4EOSC
Enhanced AI Platform for the EOSC

DEEP 3 will become AI4EOSC 3 platform release

iMagine
AI-based imaging applications for aquatic sciences

AI Compute platform for the EOSC Compute Platform

EGI-ACE
AI services for the EOSC Compute platform exploited by additional use cases

Support to SME support in EOSC DIH

EOSC-Hub
Industry and innovate SME support

DEEP evolves in…	AI4EOSC
Training on single site, centralized dataset expected	Federated learning, split learning, gossip learning, making possible training on decentralized datasets
Single AI application, self deployed or on serverless computing	Composite AI for complex AI tools and applications through function composition and serverless computing
Central management of onboarded sites, complex on-premises deployment	Enhanced onboarding of resources, easier deployment on-premises

(some) New features

Integration with privacy tools (differential privacy, anonymity checks)

Community standards for models API (Kserve) following OpenAPI specifications

ML pipeline composition and workflows

Enhanced web user interface for applications

MLOps tools to monitor deployed models (drift detection, concept drift, accuracy and performance

Improved development environment (VS Code, JupyterLab)

AI4EOSC conceptual diagram

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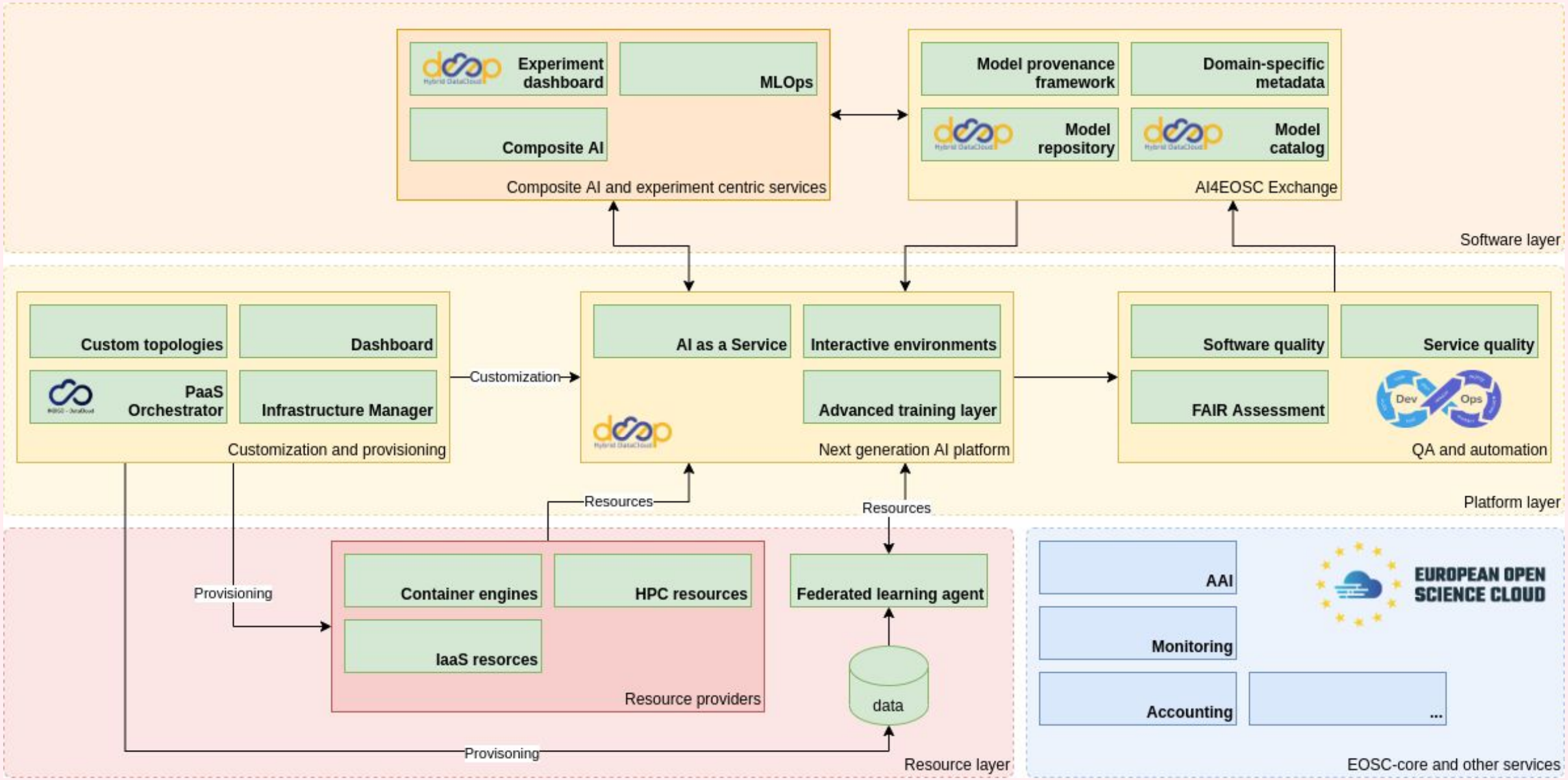


AI4EOSC challenges

Integration of disparate resources from different providers across EU e-Infras

Community adoption of best practices for AI code development and sharing

Data access and privacy-preserving model training on sensitive data

Correct handling of metadata and quality aspects of AI/ML/DL assets

Related task forces: FAIR metrics and data quality, semantic interoperability, Infrastructures for quality research software, Technical interoperability of data and services

AI4EOSC: use cases

Agrometeorology

Integrated plant protection

Automated thermography

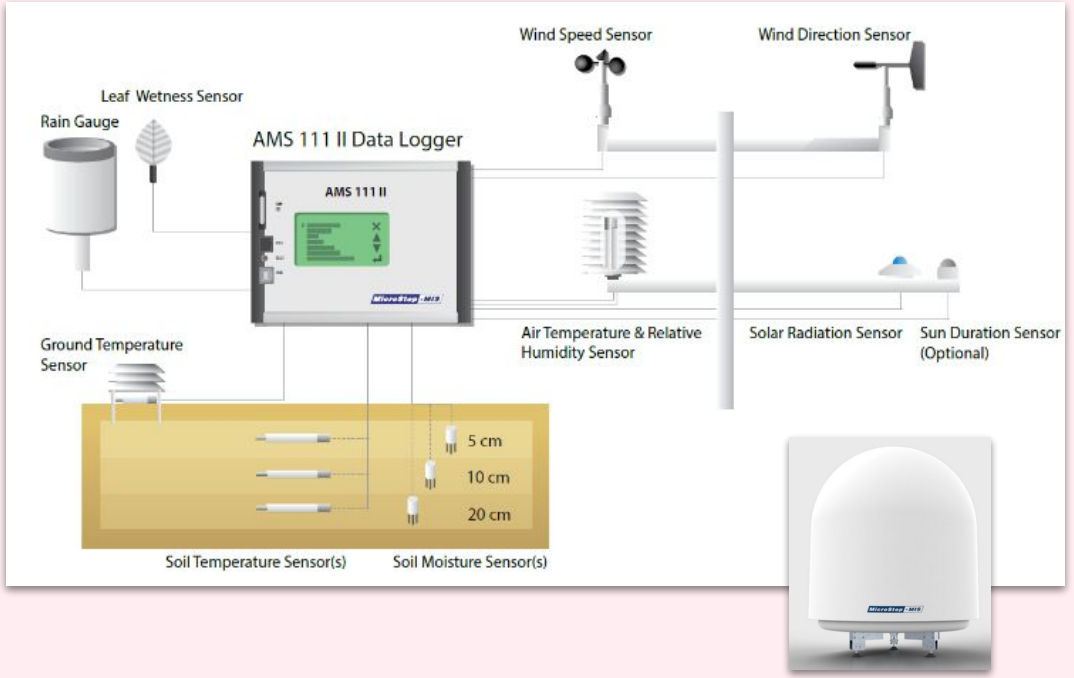
Agrometeorology

Aim: Usage of satellite imagery, in-site measurements, and weather forecasts to generate added-value products for improving farmers activity: e.g. prediction of phenological or pest development stages.

Currently: Measurement system - TRL9, prediction system - TRL3

Within AI4EOSC: Enhancement of the prediction subsystem following a Composite AI approach to combine the different machine learning models used for the different data sources

Partners: Microstep, IISAS, Predictia



Integrated plant protection

Aim: To determine the risk of disease and pests in agricultural crops and determine the phases of plant growth and the condition of crops. The developed AI models are going to be integrated into existing national advisory platforms, operated by WODR and PSNC.

Currently: WODR and PSNC operate a national advisory platform for farmers (eDWIN), which includes a network of meteorological ground stations, the Farm Management System, and ground observations of the occurrence of diseases and pests. The current solutions are based on predictive mathematical models.

Within AI4EOSC: The plan is to replace current mathematical models with ML/DL-based models in order to improve the precision. At the same time, they would be enhanced with greater precision by using satellite data.

Partners: WODR, PSNC

Automated Thermography

Aim: To identify heat losses and thermal bridges in buildings and infrastructures using drone-based images and ML/DL approach in order to provide a corresponding automated AI-based service.

Currently: The group owns a dataset of drone-based images on urban districts and drone-based thermal images on a campus district (ca. 0.8TB). The identification of thermal bridges on roofs is already possible using DL (TRL 4). The identification of leakages in district heating networks is possible too (TRL 5/6).

Within AI4EOSC: Targets enlargement of the training dataset, AI model improvement, optimisation of the workflows, and creation of a cloud-based automated service

Partners: KIT (IIP, SCC)

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ai4eosc.eu

↑↑ Reach us! ↑↑

Thank you for your attention

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