



iImagine

D2.3 EOSC and 'AI on Demand' liaison and integration plan

31/March/2023

Abstract

The European Open Science Cloud (EOSC) and the AI on Demand (AIOD) are two large scale initiatives in Europe that are relevant for the scope of iImagine. EOSC provides a distributed environment where researchers, innovators, companies and citizens can publish, find, share and re-use data, tools, and services for research, innovation, education purposes. AIOD seeks to act as a resource to facilitate European research and innovation in AI. This deliverable provides an overview of these two initiatives, then outlines a plan for registering/integrating various types of assets from the project in the EOSC Portal and in the AIOD Platform.



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Introduction

iImagine has the overall objective to deploy, operate, validate, and promote a dedicated iImagine AI framework and platform. The platform connected to the EOSC and AIOD provides researchers in aquatic sciences with open access to a diverse portfolio of AI-based image analysis services and image repositories from multiple RIs. These services and repositories are of relevance to the overarching theme of ‘Healthy oceans, seas, coastal and inland waters’.

The project concept revolves around three main working blocks:

- A common **iImagine AI framework and computing platform**, facilitating the development, testing, training, hosting, and operation of AI-based image analysis services, following FAIR practices.
- **Five operational and three prototype AI-based image analysis services** with image repositories are developed with the iImagine AI platform and to be opened for users later in 2023 to provide open access and exploitation by researchers. They will be instrumental in demonstrating value and fostering further uptake by a large community of target users and beneficiaries.
- **Best Practices**, consisting of documentation and training materials, will be compiled giving practical guidance and examples to end-users on exploiting image datasets and analysis applications offered by the iImagine portfolio and serving as an example to whoever wishes to develop and deliver similar AI-based image analysis services and image repositories.

This deliverable provides a plan on bringing these three groups of assets into the European Open Science Cloud Portal (EOSC)¹, and into the ‘AI on Demand platform’ (AIOD)², two large scale initiatives in Europe matching the topics of iImagine.

Introduction to EOSC and AIOD

The European Open Science Cloud (EOSC) is a platform that hosts and processes research data to support European science. The aim of EOSC is to provide an environment where researchers, innovators, companies and citizens with a federated and open multi-disciplinary environment where they can publish, find, share and re-use data, tools, and services for research, innovation and education purpose³. EOSC ultimately aims to develop a ‘Web of FAIR Data and services’ for science in Europe upon which a wide range of value-added services can be built⁴.

¹ <https://eosc-portal.eu/>

² <https://www.ai4europe.eu/>

³ <https://eosc-portal.eu/about/eosc>

⁴

https://research-and-innovation.ec.europa.eu/strategy/strategy-2020-2024/our-digital-future/open-science/european-open-science-cloud-eosc_en

The AI-on-demand (AIOD) platform and ecosystem is an initiative of the European Commission (EC) to support linking activities across European countries focused on the enabling technology of AI. It started with a Horizon 2020 project – AI4EU – a three-year project finished at the end of 2021. The current AI4Europe is one of the projects, funded under the Horizon Europe programme, that is responsible for the management, development and facilitation of the AIOD Platform. Its main objective is, building from AI4EU’s work, to support and facilitate a sustainable digital platform and experimentation environment through the creation of open research channels and mechanisms that foster the European AI academic and industrial research and that maximise the academic, social, and industrial impact while it seamlessly integrates other projects, platforms, and solutions⁵.

Liasoning with EOSC and AIOD

The task of liasoning with EOSC and AIOD initiatives in the iImagine project falls under T2.3 with the objective to,

- Lead technical and procedural integration with EOSC and AIOD initiatives to make best use of these initiatives.
- Integrate these services with the EOSC Authentication–Authorisation Infrastructure (Federated identity management), Monitoring infrastructure (deployment of test probes), Accounting system (deployment of accounting log parsers for image data)
- Participates in relevant AIOD and EOSC Working Groups and Task Forces and will assess EOSC and AIOD services for adoption within the WP3 activities.
- Coordinates the work of the E-Infrastructure Consultation Panel for long-term sustainability of the service setups

This document is an important step in this liaison. It

- Introduces the EOSC and AIOD initiatives and the engagement opportunities these bring to iImagine.
- Defines a step-by-step plan on how iImagine aims to benefit from the EOSC and AIOD opportunities in the next 30 months.

⁵ <https://www.ai4europe.eu/>

EOSC liaison and integration plan

EOSC Overview

As mentioned earlier, EOSC is an established federation of services, tools, data and other research objects ('Resources') from hundreds of providers at local, national, regional and European level with the aim of increasing discovery, access and reuse of Open Science resources from European research communities.

The EOSC platform architecture (Figure 1) has four main parts:

1. EOSC Exchange (blue) includes services and data sources onboarded to EOSC by research infrastructures, clusters and projects, serving the needs of one or more research communities as well as the general public and private sector.
2. EOSC Core (green) contains enabling services required to operate the EOSC and the coordination functions.
3. EOSC Interoperability Framework (dark green) identifies standards and guidelines that each service can and should comply with to increase the ability of users to connect services into more powerful and useful combinations.
4. EOSC Support activities (orange) complement the other services and include services such as training and the Digital Innovation Hub.

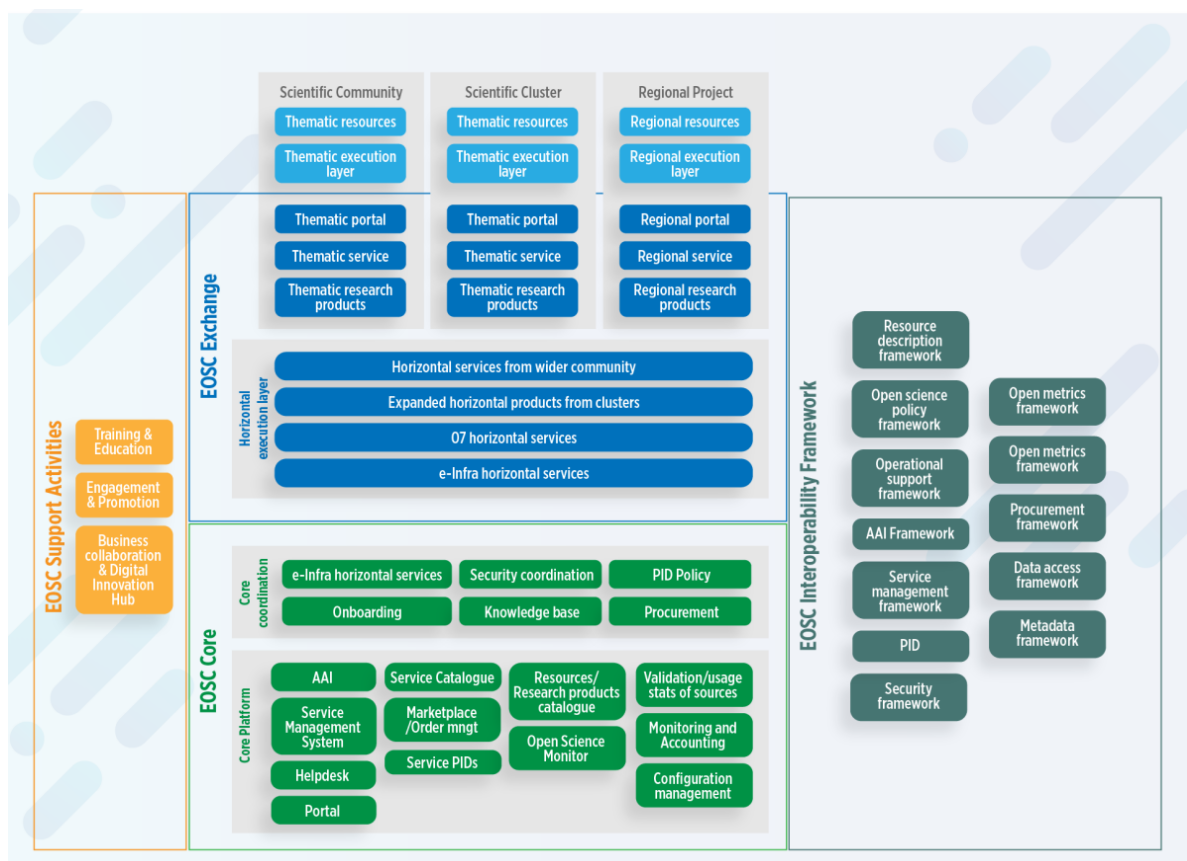


Figure 1: The EOSC architecture ⁶

EOSC Resources and EOSC Resource Provider

Within the context of EOSC, both services and data as well as other items like data collections, and training materials are referred to as “Resources”. The EOSC Catalogue and Marketplace facilitates sharing and discovery of, and access to these Resources, that are provided by EOSC Resource Providers. EOSC Resource Providers are part of the “EOSC Exchange” illustrated in the blue section of the architecture diagram above.

EOSC Rules of Participation

The Rules of Participation (RoP) for the EOSC state the standards and conduct required of EOSC participants⁷. Specifically resource providers must comply with the following requirements,

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<https://eosc-portal.eu/eosc-providers-hub/how-become-eosc-provider/how-become-eosc-provider-a-general-overview>

7

<https://op.europa.eu/en/publication-detail/-/publication/a96d6233-554e-11eb-b59f-01aa75ed71a1/language-en/format-PDF/source-184432576>

1. “Resources” must be onboarded by a legal entity. A legal entity may do so on behalf of a project or consortium in which they participate, with the agreement of those groups.
2. Providers aim to onboard resources to EOSC Exchange that target EOSC and EOSC communities, or are built on or leverage EOSC capabilities to serve another community outside of EOSC.
3. Providers must ensure that the resources offered will be effectively delivered.
4. Providers provide accurate information in English and keep it up to date.
5. Providers should be able to provide resources to EOSC users at least in English. Resource interfaces, documentation, instructions, technical support, helpdesk interactions, etc., must be supported at least in English.

Another prerequisite that must be kept in consideration for onboarding a new *service* in the EOSC portfolio is to have production level services with high Technology Readiness Levels (TRL ≥ 7)⁸.

EOSC Profiles

EOSC Profiles are metadata schemas for consistently describing EOSC Resources, so that they are accurately described and easily found in the EOSC Catalogue and Marketplace. There are five types of profiles,

1. Provider Profiles⁹: Providers are the organisations responsible for “providing” any of the other kinds of resources, and the Provider Profile details the data required to describe each Provider.
2. Resource Profiles (Service Profile)¹⁰: Resource Profiles describe various research services, including compute services, storage services and application services such as analytics.
3. Catalogue Profiles¹¹: The Catalogue Profile allows catalogues of resources from other communities to be linked with the EOSC Catalogue and Marketplace.
4. Research Product Profiles¹²: Research Products include publications, research data and research software, resulting from scientific efforts. *Note that Research Products are not directly onboarded to EOSC, but indirectly linked to EOSC through Data Sources that refer to them.*
5. Data Source Profiles¹³: Data Sources are special services that host and provide access to collections of Research Products (e.g. data repositories, thematic repositories, scientific databases, aggregators).

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https://ec.europa.eu/research/participants/data/ref/h2020/wp/2014_2015/annexes/h2020-wp1415-annex-g-trl_en.pdf

⁹ <https://wiki.eoscfuture.eu/display/PUBLIC/A.+v4.00+EOSC+Provider+Profile>

¹⁰ <https://wiki.eoscfuture.eu/display/PUBLIC/B.+v4.00+EOSC+Resource+Profile>

¹¹ <https://wiki.eoscfuture.eu/display/PUBLIC/C.+v4.00+EOSC+Multi-Provider+Catalogue+Profile>

¹² <https://wiki.eoscfuture.eu/display/PUBLIC/E.+v4.00+EOSC+Research+Product+Profile>

¹³ <https://wiki.eoscfuture.eu/display/PUBLIC/D.+v4.00+EOSC+Data+Source+Profile>

EOSC Onboarding Process

The EOSC Onboarding process has been designed to ensure that resources onboarded in EOSC have a certain level of interoperability and quality. This onboarding process is coordinated by the EOSC Portal Onboarding Team (EPOT) – a cross-project collaborative team which manages and operates the EOSC Onboarding processes, which populate the EOSC Exchange, using the EOSC Profiles and according to the EOSC Rules of Participation.

The basic onboarding of resources into EOSC has the following steps,

1. Register as a new EOSC Provider, if you are not a provider yet.
2. Onboard your first resource to the EOSC Catalogue and Marketplace. EPOT reviews this registration before approving the new resource.
3. Onboard additional resources as required. Once the first resource has been onboarded, Providers can add additional resources to the EOSC Catalogue and Marketplace on their own.

Trainings and Useful Documentation

1. EOSC Providers Hubs: <https://eosc-portal.eu/eosc-providers-hub>
2. Onboarding of a Provider: <https://youtu.be/wWGN7WzNuCQ>
3. Validating/auditing of a Provider: <https://youtu.be/FW1ly-IE3Gs>
4. Onboarding of a Resource: <https://youtu.be/nsWPW7Qjcs>
5. Validating/auditing of a Resource: <https://youtu.be/nHULTPs5SI8>

EOSC Integration Plan

Considering the previous sections, the project envisions the following resources of the project will be onboarded into EOSC:

1. What: The iMagine AI platform;
When: Q3 of 2023
Who: CSIC (Provider Profile)
How: Onboard Service (EOSC Resource Profile)
2. What: The 5 mature and operational marine services – The integration of these services will happen after the end of the integration phase, when the services are opened for external users (the exact timelines are presented in D3.¹⁴):
 - a. UC1 Marine litter assessment

¹⁴iMagine deliverable D3.1 – Technical development roadmap for the AI image analysis use cases: <https://zenodo.org/record/7760413#.ZCHdZnYeND8>

- When: Q1 2024
 - Who: DFKI (EOSC Provider Profile)
 - How: Onboard Service (EOSC Resource Profile)
 - b. UC2 Zooscan – EcoTaxa pipeline
 - When: Q2 2024
 - Who: Sorbonne University (EOSC Provider Profile)
 - How: Service (EOSC Resource Profile)
 - c. UC3a EMSO–Azores site
 - When: Q2 2024
 - How: Onboard service (EOSC Resource Profile)
 - (Note: Ifremer is already registered as a provider)
 - d. UC3o EMSO–Obsea site
 - When: Q2 2024
 - Who: UPC (Provider Profile)
 - How: Onboard service (EOSC Resource Profile)
 - e. UC3s EMSO–SmartBay site
 - When: Q2 2024
 - Who: Marine Institute (EOSC Provider Profile)
 - How: Onboard service (EOSC Resource Profile)
 - f. UC4 Oil spill detection
 - When: Q2 2024
 - How: Onboard service (EOSC Resource Profile)
 - (Note: CMCC is already registered as a provider)
 - g. UC5 Flowcam plankton identification
 - When: Q2 2024
 - How: Onboard service (EOSC Resource Profile)
 - (Note: VLIZ is already registered as a provider)
3. iImagine deliverables, publications and other similar outputs are made available through Zenodo¹⁵. As Zenodo is already onboarded as a Data Source in the EOSC, all iImagine research products from Zenodo are made available in EOSC automatically.
4. Another resource from iImagine that could be onboarded to EOSC is the imaging dataset available in each use case. A subset of the use cases are already sharing their data in Zenodo (thus these are visible in EOSC). The additional use cases have the choice to make their (training) datasets available in EOSC either by (1) uploading them into a data repository that is already registered in EOSC, or by registering their own data repository in EOSC and then exploding datasets from it to EOSC. As the use cases advance the project will explore the most suitable option with the providers.

¹⁵ iImagine project documents in Zenodo: <https://zenodo.org/communities/imagine-project>

EOSC Liaison Plan

The EOSC Core services are operated by the EOSC Future project until October 2023. The operation of these core services will be done by a consortium to be selected until October through the LOT1 of the tender for Managed Services for the European Open Science Cloud Platform¹⁶. On the other hand, a series of INFRAEOSC calls will continue to develop EOSC into OPERATIONAL, OPEN AND FAIR ECOSYSTEM by delivering next generation capabilities¹⁷. This may have implications in the integration of iImagine resources into EOSC as the onboarding process may change and/or previously unforeseen opportunities may arise related to new capabilities of the EOSC Core.

There are also 13 EOSC Task Forces¹⁸ (EOSC TF) that are currently working towards addressing key areas of EOSC implementation. The output of the EOSC TFs may not only impact the integration activities but could create new opportunities for the iImagine project results. For example, in the Financial Sustainability Task Force Progress report, *“Towards Sustainable Funding Models for the European Open Science Cloud November”*, the TF is exploring the possibility of funding some of the services in the EOSC Exchange. If this recommendation is implemented, it may represent a avenue for sustainability for some of the iImagine service especially the iImagine AI platform¹⁹.

Therefore, the project board and T2.3 will keep a close eye on the developments in the broader EOSC ecosystem. It will also provide inputs to any consultations released by the various EOSC-related entities in matters that are closely related to the project and its outputs.

The project will also showcase its contributions to EOSC and its exploitation of the EOSC ecosystem at the EOSC Symposium, the main EOSC annual event, to be held in 2023 in Madrid, Spain on 20-22 September.

¹⁶ <https://digital-strategy.ec.europa.eu/en/funding/managed-services-european-open-science-cloud-platform>

¹⁷ https://sciencebusiness.net/sites/default/files/inline-files/HORIZON-INFRA-2023-2024_07_13_2022.pdf

¹⁸ <https://www.eosc.eu/task-force-faq>

¹⁹ <https://www.eosc.eu/sites/default/files/2022-11/financial-sustainability-tf-progress-report-nov-2022.pdf>

AIOD liaison and integration plan

AIOD overview

The AI on-demand (AIOD) platform and ecosystem is a younger initiative than EOSC. Its predecessor, the 'AI4EU' three-year project finished at the end of 2021 and delivered two main tools:

1. A CMS²⁰ (Content Management System) enabling access to AI research assets
2. A tool for experimentation: AI4EU experiments²¹

The AI4Europe project, currently responsible for the management, development and facilitation of the AIOD Platform, has recently started and, by building on the AI4EU work, its main objective is *“to support and facilitate a sustainable digital platform and experimentation environment through the creation of open research channels and mechanisms that foster the European AI academic and industrial research and that maximise the academic, social, and industrial impact while it seamlessly integrates other projects, platforms, and solutions, aiming to make the AIOD Platform a renowned channel for AI-related resources, services and tools.”*

AIOD Contribution Gateway

The current AIOD platform provides a contribution gateway page²², defined by the predecessor project, AI4EU. The gateway allows the registration of:

- Organisations
- Case studies
- AI assets
 - As a Service
 - Dataset
 - Docker Container
 - Executable
 - Jupyter Notebook
 - Library
 - ML Model
 - Tutorial
- Projects
- News
- Events
- Open Calls
- Education Content
- Research Bundle

²⁰ <https://www.ai4europe.eu/>

²¹ <https://aiexp.ai4europe.eu/>

²² <https://www.ai4europe.eu/collaboration>

Once published, the content is shown in filtered pages where the user can browse through the different categories or can be discovered through the search form. The AI4Europe project aims to review these categories and enhance the publication process through an API that may allow to automate the synchronisation between the different projects and build new services relying on the AIOD ones. Before being published, the content goes through a review process as described in the following paragraphs.

AIOD Onboarding Process

The governance of the AI-on-demand platform, defined in the AI4EU project, involves four primary roles: users, editors, reviewers, and publishers. Once the users submit their content, the editors receive a notification and assign a reviewer and a publisher.

The reviewer then assesses the content to ensure that it meets specific criteria, including relevance to AI. If the content meets all the requirements, the reviewer recommends publication and passes it on to the publisher for a final decision.

If the content does not meet the requirements, the reviewer provides feedback on the outstanding items or improvements required in the review comments section. If amendments can be made, the reviewer recommends them and initiates another review. If amendments cannot be made, the reviewer recommends rejection of the content.

The publisher then reviews the assessment. If the reviewer recommends publication, the publisher either agrees and publishes the content or disagrees and refers the decision to the editor. If the reviewer recommends review, the publisher either agrees and sends a notification to the user to revise the content or disagrees and refers the decision to the editor. If the reviewer recommends rejection, the publisher either agrees and rejects the content or disagrees and refers the decision to the editor.

Finally, the user receives a notification indicating whether they need to revise their content, if their content has been rejected, or if it has been approved.

The process and structures for contributions to incorporate the work undertaken within the different projects, research labs and the community are under review by the AI4Europe project and first outcomes are expected during this year. This may have a significant impact in the integration of iMagine resources into the AIOD platform as the contribution process may change and/or new opportunities may emerge resulting from advancements in the capabilities of the AIOD Core. There are also over 50 projects contributing to the platform that may have an impact on the structure for managing the contributions but could also lead to new opportunities for the iMagine project outcomes.

AI4Europe is currently defining its internal processes to help integrate internal as well as external assets, and it is looking at relevant external initiatives such as EOSC and its Rules of Participation (RoP).

AIOD Integration Plan

Considering the current contribution gateway available in the AIOD platform, the project envisions the following resources of the project will be registered into AIOD,

1. The iImagine project
When? Q2 2023
Who: EGI Foundation (Organisation)
2. The iImagine AI platform
When: Q2 of 2023
Who: CSIC (Organization)
What:
 - The iImagine AI platform as a service (AI Asset)
 - The iImagine AI platform user guide (Education Content)
3. The 8 use cases of the project:
When: Q2 of 2023
Who: Use case owners with the support of the EGI Foundation
How:
 - As “Case studies”²³ in the ‘Maritime sector’
 - As “Research bundles” that give you a space in the AI on-demand platform where you can collect and publish the outputs of a small research project in a compact way. A research bundle collects in a single place all the assets (code, data, tutorials, examples, ...) produced by your project and published on the AI on-demand platform. Of course, you can also put links to assets published elsewhere, like Github or Zenodo.
 - As “AI services” after the end of the development testing phase, when the services are opened for external users (the exact timelines are presented in D3.1).
4. The open call for new use cases to support with the iImagine platform
When: Q2 2023
Who: EGI Foundation
What: Open Call (Open Call)
5. iImagine good practice guides for the development/adoption of AI/ML in aquatic sciences
When: Q2 2025
Who: EGI Foundation
What: Documents/presentations (Education resources)

During the course of the AI4Europe project, the ability to include references to publications having to do with AI will most likely be added. As soon as that functionality is available, references to deliverables, publications, and other similar outputs of the

²³ <https://www.ai4europe.eu/business-and-industry/case-studies>

iImagine project that are available on Zenodo will be included, unless as for EOSC, Zenodo is automatically included among the publications resources of the AIOD platform. The above integration plan will be reviewed and updated accordingly to the reviewed and added functionalities that will be made available by the AIOD platform.

AIOD Liaison Plan

The AI4EU project established an Open Distributed Development Process to allow interested parties to contribute to the platform by implementing valuable features. Several working groups, open to communities outside AI4EU, have been working on various topics such as technical governance and ontology. The AI4Europe project is also adopting this process to drive the development of AIOD, with the Technical Coordination Board (TCB) overseeing the progress of technical contributions. The TCB also moderates discussions on technical issues and facilitates connections between technical platform experts and contributors. The TCB terms of reference are currently being finalised, and may also lead to the creation of thematic Working Groups applicable to the AIOD contributions. In the meanwhile we are participating in the previously Technical Governing Board (TGB), that it's still running, and will participate in the TCB, once it starts, as well as in all relevant WGs and engagement activities that may start, promoting the iImagine project as potential stakeholder, while monitoring the evolution of the AIOD platform and its development process, including the sustainability mechanism for the external projects that AIOD aims to provide.

The EGI Foundation, coordinator of the iImagine project, is involved in 3 projects that contribute to the AIOD platform, therefore will receive first hand information about new features and opportunities that will become available in AIOD in the coming years:

1. AI4Europe²⁴: supports and facilitates a sustainable digital platform and experimentation environment through the creation of open research channels and mechanisms that foster the European AI research ecosystem, academic and industrial, and that maximises the academic, social, and industrial impact while it seamlessly integrates other projects, platforms, and solutions.
2. Pre-PAI: providing the blueprint for the further development, deployment, and operation of the European AI-on-demand platform. The project will carry out a comprehensive requirement analysis for different stakeholder groups, mainly SMEs, industrial sectors, and public administration. These requirements analyses will lead to an overall roadmap and plan to build and consolidate the AI-on-demand platform.
3. StairwAI: targets low-tech users with the goal of facilitating their engagement on the AI on-demand Platform. This will be achieved through a new service layer enriching the functionalities of the on-demand platform and containing a multi-lingual interaction layer enabling conversations with the Platform in the user's own language, a horizontal matchmaking service for the automatic

²⁴ <https://www.ai4europe.eu/ai-community/projects/ai4europe>

discovery of AI assets (tools, data sets, AI experts, consultants, papers, courses etc.).

Acronyms

AI	Artificial Intelligence
AIOD	AI-on-demand
API	Application Programming Interface
CMS	Content Management System
EC	European Commission
EOSC	European Open Science Cloud
EPOT	EOSC Portal Onboarding Team
RI	Research Infrastructure
RoP	Rules of Participation
TCB	Technical Coordination Board
TF	Task Force
TGB	Technical Governing Board
TRL	Technology Readiness Level
WG	Working Group