

D7.1 Integration opportunities with awarded proposals in INFRAEOSC-07 v1.0



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Scholarly Communication Services for EOSC users

D7.1 – Integration opportunities with awarded proposals in INFRAEOSC-07 v.10

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[The report describes the potential lines of collaborations between OpenAIRE-Nexus and the other INFRAEOSC-07 projects: C-SCALE, DICE, EGI-ACE, and RELIANCE. The collaboration aims at driving technical developments of EOSC Future and the INFRAEOSC-07 projects to maximise the added value for EOSC users, based on use cases involving services of the different projects and communities from thematic clusters, in particular Science projects from ESCAPE, PaNOSC, SHOCC, EOSC-Life, ENVRI-FAIR.]

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Acronyms

EOSC	European open Science Cloud
EOSC IF	EOSC Interoperability Framework
WG	Working Group
RO	Research Object

Publishable Summary

INTEGRATION OPPORTUNITIES BETWEEN OPENAIRE NEXUS AND C-SCALE, DICE, EGI-ACE, RELIANCE

The specific challenge of the topic “Increasing the service offer of the EOSC Portal” (INFRAEOSC-07-2020) is to grow the offering available in the EOSC portal with state-of-the-art research enabling services useful to diverse thematic research communities for embracing Open Science practices at the different stages of their research workflows.

The five awarded projects C-SCALE, DICE, EGI-ACE, OpenAIRE-Nexus and RELIANCE contribute to this objective also thanks to a strong collaboration, which was made official with a multi-lateral agreement signed by the five projects and EOSC-Future. The projects collaborate on a set of topics: technical interoperability and integration, joint outreach and dissemination activities, training activities.

Focusing on technical interoperability and integration of services, we highlight the following collaboration opportunities:

- EOSC Interoperability Framework (IF): the projects will collaborate to the definition and implementation of the EOSC IF by:
 - Mutually participating to EOSC Future WP3 Working Groups. In particular, members of each project participate to the WG on “Research Product Publishing Framework” led by OpenAIRE-Nexus; while members of OpenAIRE-Nexus participate to the WG on “Compute Continuum” led by EGI-ACE.
 - Identifying use cases that requires integration between services and data provided by the different projects to be effectively implemented
- EOSC Exchange: the projects will onboard their research products into the OpenAIRE Research Graph and OpenAIRE-Nexus will extend its model to represent peculiarities of new types of objects, like RO-Crate from RELIANCE and Jupyter Notebooks from EGI-ACE, and their compatibility with services capable of processing them.

The projects also collaborate to support the implementation of the EOSC Future Science Projects of the thematic clusters ESCAPE, PaNOSC, SHOCC, EOSC-Life, ENVRI-FAIR. OpenAIRE-Nexus, in addition to support all clusters at onboarding their research products in the OpenAIRE Research Graph, coordinates the execution of the EOSC-Life science projects in collaboration with RELIANCE, and the PaNOSC Science projects in collaboration with EGI-ACE.

1 OVERVIEW OF INFRAEOSC-07 AWARDED PROPOSALS AND THE COLLABORATION FRAMEWORK WITH OPENAIRE-NEXUS

The specific challenge of the topic “Increasing the service offer of the EOSC Portal” (INFRAEOSC-07-2020) is to grow the offering available in the EOSC portal with state-of-the-art research enabling services (ranging from cloud computing, scholarly communication, and data management services) useful to diverse thematic research communities for embracing Open Science practices at the different stages of their research workflows.

The following proposals were awarded under the topic together with OpenAIRE Nexus:

- C-SCALE (Copernicus - eoSC AnaLytics Engine, <https://c-scale.eu>): the purpose of C-SCALE is to federate Earth Observation service providers and offer users the possibility to access, process, analyse and share Copernicus data, tools, resources and services through the EOSC Portal. C-SCALE will make the unique data resources and body of knowledge of the Copernicus community accessible in a more user-friendly way to new audiences and user communities through the EOSC portal. It will deliver a modular, open, and robust federation for data discovery, processing and exploitation of Copernicus and, in general, Earth Observation data.
- DICE (Data Infrastructure Capacity for EOSC, <https://www.dice-eosc.eu>): the project brings together a network of computing and data centres, research infrastructures, and data repositories to provide cutting-edge data management services and a significant amount of storage resources for the EOSC capable to serve communities in any research domain.
- EGI-ACE (EGI Advanced Computing for EOSC, <https://www.egi.eu/projects/egi-ace>): the main goal of the project is to implement the compute platform of the European Open Science Cloud and contribute to the EOSC Data Commons by delivering integrated computing platforms, data spaces and tools as an integrated solution that is aligned with major European cloud federation projects and HPC initiatives.
- RELIANCE (REsearch Lifecycle mAnagement for Earth Science Communities and CopErnicus users in EOSC, <https://www.reliance-project.eu>): RELIANCE extends the EOSC service offering with a set of industry-strong, innovative, interconnected services for research lifecycle management in accordance with FAIR principle based on Research Objects, Data Cubes and Text Mining. It also brings into EOSC more than 3,000 research objects from communities in the domains of Earth Science, Astrophysics and Bioinformatics.

The projects started to collaborate since their very start, having regular meetings to discuss possible collaborations and synergies and alignment on common challenges. The topics included technical interoperability and integration, joint outreach and dissemination activities, training activities, and administrative issues. The teams have also established communication channels via mailing list and a collaboration space on Microsoft Teams where it is possible to work on shared documents and launch/follow discussion threads.

An initial set of collaboration paths were discussed at the OpenAIRE-Nexus public launch event (<https://www.openaire.eu/openaire-nexus-public-launch-event>) on 10th March 2021.

Since M6, the collaboration continued in the framework of the EOSC Future project with the objective of driving technical developments of EOSC Future and the INFRAEOSC-07 projects to maximise the added value for EOSC users, based on use cases involving services of the different projects and communities from thematic clusters, in particular Science projects (EOSC Future WP6) from ESCAPE, PaNOSC, SHOCC, EOSC-Life, ENVRI-FAIR.

The activity resulted in a multi-lateral collaboration agreement among EOSC Future and INFRAEOSC-07 projects, in which OpenAIRE Nexus commits to contribute to the technical roadmap of EOSC, to the composability demonstrators and pilot solutions that show how EOSC users can use resources for more providers in a combined manner. The projects also agreed to jointly work on articles that highlight how the INFRAEOSC-07 projects are complementary and how they differently contribute to the EOSC ecosystem, and on the promotion of training and training materials, preparing communication material that can be used across all projects’ web sites with the goal of engaging new potential EOSC users.

In October 2021 OpenAIRE-Nexus participated to the call for EOSC Future WP3 working groups, leading the writing of a successful proposal for an EOSC Future WP3 Working Group on “[Research Product Publishing Framework](#)” endorsed by members from RELIANCE, EGI-ACE, DICE, C-SCALE and thematic clusters and projects like NEANIAS and CS3MESH4EOSC. OpenAIRE-Nexus also endorsed and contributes to the “Compute Continuum” Working Group led by EGI-ACE. Both proposals were accepted. The working groups are operational since November 2021 and January 2022, respectively, with a roadmap of six months.

2 POTENTIAL LINES OF COLLABORATIONS

2.1 C-SCALE

In this section, the potential lines of collaborations at integrating services within the EOSC to provide added value to EOSC users are described for each INFRAEOSC-07 project. Table 1 summarises the services that have been identified for integration or adoption.

The potential collaboration activities have been identified to reach the objectives of the multi-lateral agreement signed by the INFRAEOSC-07 projects with EOSC Future, in particular to deliver composability demonstrators that show case to EOSC users how resources from different providers can be combined to implement research workflows that embed Open Science practices.

OpenAIRE	C-SCALE	DICE	EGI-ACE	RELIANCE
Research Graph			EGI Notebook	ROHub

	EODC JupyterHub for global Copernicus data			Datacube
EXPLORE				
PROVIDE		Data repositories		ROHub
ZENODO		Data management services		ROHub

2.2 C-SCALE

EOSC Interoperability Framework: data-service compatibility

The potential line of collaboration between OpenAIRE-Nexus and C-SCALE focuses on the implementation of actionable data, that is connecting the service capable of processing a dataset within the landing page of the dataset on OpenAIRE EXPLORE.

The activity is related to the EOSC Interoperability Framework and the possibility to define a framework for identifying which datasets available in the OpenAIRE Research Graph are “compatible” with the EODC JupyterHub for global Copernicus data provided by C-SCALE. Such a framework would enable OpenAIRE EXPLORE to offer users the possibility to reach the compatible service from the landing page of the dataset. Thanks to the compliance with the AAI, the user will have a seamless experience jumping from one OpenAIRE service to the C-SCALE service.

2.3 DICE

EOSC Exchange: onboarding research products

DICE brings to the EOSC data repositories that can be included in the OpenAIRE Research Graph. OpenAIRE-Nexus and DICE can collaborate to ensure the repositories are compliant with the OpenAIRE guidelines. Furthermore, the guidelines could be extended to include the possibility to explicitly specify in the dataset metadata the link to the service that was used to generate it.

EOSC Interoperability Framework: research product publishing

Another line of collaboration is to extend DICE data management service to enable the deposition of results in multiple repositories, including Zenodo. The results from the EOSC Future WG on the IF for Research Product Publishing would be very useful for an effective and sustainable implementation of this activity.

2.4 EGI-ACE

EOSC Future Science Project: PaNOSC

The two projects jointly oversee the Science project of PaNOSC. In this context, OpenAIRE-Nexus will contribute to the project by improving the findability of data and software thanks to their inclusion in the OpenAIRE Research Graph.

EOSC Interoperability Framework: data-service compatibility

The second line of collaboration is about the EOSC Interoperability Framework and the possibility to define a framework for:

- Identifying which notebooks can be used with the EGI Notebook service
- Identifying which datasets available in the OpenAIRE Research Graph are “compatible” with which Jupyter Notebook and can be therefore processed with the EGI Notebook service.

A preliminary demo of the first case was also presented during the EOSC-Future 1st review meeting and can be summarised with the following steps:

- 1| A user deposit on Zenodo a Jupyter Notebook that can be opened by the EGI Notebook service
- 2| The object is fed to the OpenAIRE Research Graph and available for discovery in OpenAIRE EXPLORE
- 3| Thanks to high-quality metadata, the Jupyter Notebook is related to the EGI notebook service. OpenAIRE EXPLORE shows this opportunity to the user, who can easily jump to the EGI Notebook service
- 4| The user loads the Jupyter Notebook on the EGI service to perform analysis
- 5| The results of the analysis are published on Zenodo

Support analysis on the OpenAIRE Research Graph

A final use case that requires the collaboration with EGI-ACE was presented at the EGI Conference 2021 (<https://indico.egi.eu/event/5464/contributions/15673/>). The idea is to offer community of researchers who research on research (e.g. research impact, altmetrics, research assessment) with pre-defined/customised EGI notebooks to analyse the OpenAIRE Research Graph.

2.5 RELIANCE

OpenAIRE-Nexus and C-SCALE identified 3 main potential lines of collaboration.

Support discoverability

The first line of collaboration is about extending the OpenAIRE data model to represent Research Objects, RO-Crate, and Datacubes. ROHub is already integrated with Zenodo, where several RO-Crate can be found in the RELIANCE Zenodo community (<https://zenodo.org/communities/reliance>). However, the objects and detailed metadata available in the RO-Crate are only available within the RO-Crate itself and, therefore, do not contribute to the OpenAIRE Research as they could. With this line of collaboration, OpenAIRE-Nexus and RELIANCE will experiment on how to maximise the information provided by ROHub to Zenodo and, consequently to the OpenAIRE Research Graph.

EOSC Exchange: onboarding research products

Related to the second line of activity, the projects will collaborate to make ROHub compliant with the OpenAIRE guidelines, so that all research objects it hosts will be available in the OpenAIRE Research Graph and not only those that were published on Zenodo on request by the user.

The collaboration could also include the implementation of a use case that extends the one reported above for EGI-ACE with the inclusion of RO-Crate objects from ROHub:

- 1| A research object (RO) is created in ROHub and published on Zenodo
- 2| The RO is fed to the OpenAIRE Research Graph and available for discovery in OpenAIRE EXPLORE
- 3| The researcher also publishes on Zenodo the Jupyter Notebook that is capable of processing the RO, with a link to the RO and to the EGI Notebook service
- 4| The Jupyter Notebook is fed into the OpenAIRE Research Graph and is available for discovery in OpenAIRE EXPLORE
- 5| Thanks to high-quality metadata, OpenAIRE EXPLORE can show to user that the RO is processable with a notebook and that he/she can run it on the EGI Notebook service. The user can easily jump to the EGI Notebook service
- 6| The user loads the RO and its related Jupyter Notebook on the EGI Notebook service to perform analysis
- 7| The results of the analysis are published on Zenodo

EOSC Future Science Project: PaNOSC

The two projects also jointly coordinate the EOSC Future Science projects of EOSC-Life which address the topics of climate, geohazard, and sentinel data.