EOSC Technical and Semantic Interoperability Task Force Terms of Reference

1 TF Background and Scope

The EOSC Technical and Semantic Interoperability Task Force (TF) focuses on enabling seamless access to high-quality, interoperable research outputs and services across EOSC, and brings together expertise on the technical foundations that connect users with data and services. The TF will liaise with EOSC projects, European infrastructures, ESFRIs, and the wider EOSC stakeholder community to identify compelling demonstrators for and strategic challenges to the implementation of EOSC. The TF combines the semantic and technical layers of interoperability and the architecture of Authentication and Authorisation Infrastructure (AAI) services. The TF will also explore the interoperability with the Simpl[1] middleware from the Data Spaces Initiative or Croissant[2].

Technical specifications, protocols, contracts and services enable communication across EOSC. They should ideally include specifications for the abstract exchange of information across nodes (e.g., service contracts, APIs, exchange formats, FAIR Digital Objects and a set of required operations). AAI is a key interoperability service that provides seamless authentication and authorisation (based on standard representations of user identities, permissions, and policies) for the services. Achieving semantic interoperability ensures that information is represented in a way that allows its meaning to be accurately understood and translated across the exchange (e.g., knowledge graph representations, semantic artefacts, mediation using mappings/crosswalks, and shared conceptualisations). Together, these aspects form the foundations for interoperability not only at the level of the protocols but also at the level of the data.

This TF is mainly aligned with the SRIA[3] Strategic Objectives SO7 (Operationalisation of EOSC Services) and SO5 (EOSC Interoperability Framework), and the Operational Objectives OO1 (Minimum Viable EOSC), OO10 (EOSC Authentication and Authorisation Infrastructure) and OO12 (Metadata interoperability). The TF is fully aligned with several priorities of the Multi-Annual Roadmap[4], such as the Liaison with HEU projects (in objective 1), the development of

[1] https://digital-strategy.ec.europa.eu/en/policies/simpl
[2] Croissant: A Metadata Format for ML-Ready Datasets: https://arxiv.org/abs/2403.19546
[3] https://eosc.eu/wp-content/uploads/2023/12/20231114_SRIA_1.2_final2.pdf
[4] https://eosc.eu/sria-mar/

EOSC Association AISBL
Rue du Luxembourg 3, BE-1000 Brussels, Belgium
+32 2 537 73 18 | info@eosc.eu | www.eosc.eu
Reg. number: 0755 723 931 | VAT number: BE0755 723 931

AAI in EOSC (in objectives 2 and 3), the enhancement of the EOSC Interoperability Framework and the use of Open Interfaces (in objective 2).

The TF will be organised into three closely coordinated sub-groups with independent sub-objectives and leaders. Each group is responsible for its output (e.g., deliverables). Deliverables are produced at the group level. The three groups depart from the previous configuration of former EOSC-A Task Forces and will bring together experts from across the corresponding areas:

- **Technical Interoperability**, focused on the interoperability of services supporting EOSC.
- **Semantic Interoperability**, focused on establishing an unambiguous mutual understanding of the exchanged data and metadata across a diverse set of thematic and regional nodes that will serve stakeholders across a wide range of scientific domains.
- **Authentication and Authorisation Infrastructure**, focused on the definition of the EOSC AAI architecture. The group will run under the Engagement Group for InfrastructureS (AEGIS)[5] of the Authentication and Authorisation for Research and Collaboration Community (AARC)[6] with direct support from the AARC-TREE project. The group participation will be open to all AAI experts and stakeholders.

The group leaders will be the TF co-chairs, who will regularly meet to coordinate their activities, identify synergies and define a common approach.

The TF will liaise with the EOSC EU Node, relevant EOSC Projects (e.g., OSCARS, EOSC Beyond, FAIRCORE4EOSC, FAIR-IMPACT) and other stakeholders.

1.1 Main Objective

The main principles and delivery objectives of the TF are:

- Gather feedback and requirements from the research communities and national initiatives, such as NFDI or EOSC CZ, for data and service interoperability.
- Facilitate interactions and common developments of EOSC-related projects and initiatives. Identify gaps and strategic challenges related to the TF's key focus areas.
- Identify high-value use cases that can help to define specifications that could be useful for a wide set of research communities.

[5] https://wiki.geant.org/display/AARC/AEGIS
[6] https://aarc-community.org/

EOSC Association AISBL
Rue du Luxembourg 3, BE-1000 Brussels, Belgium
+32 2 537 73 18 | info@eosc.eu | www.eosc.eu
Reg. number: 0755 723 931 | VAT number: BE0755 723 931

- Strategically survey and analyse the technical activities of EOSC projects and provide recommendations related to interoperability to the projects and the EOSC Association Board of Directors.

1.2 Key Focus Areas

The measurable Key Focus Areas (KFAs) contributing to the main objective are:

- Identify technical, semantic and interoperability aspects across EOSC at different "maturity levels".
- Impulse the evolution of the EOSC Interoperability Framework, with the definition of interoperability best practices and recommendations.
- Evolve the EOSC Core and EOSC Technical Architecture blueprint with the introduction of the concept of the EOSC Federation of Nodes, taking into account interdisciplinary and domain-specific user community requirements.
- Foster the development of practical implementations of interoperability guidelines, shared vocabularies and ontologies through use cases, dedicated projects and also by engaging with discipline-specific infrastructures and initiatives (e.g., ESFRIs and ERICs).
- Propose expanding the FAIR Digital Objects model[7] with relevant data and compatible services and operations, including policies for sharing data[8].
- Identify and assess requirements and gaps for the EOSC AAI.
- Recommend updates to the EOSC AAI Architecture and propose stakeholders within and outside of EOSC to be consulted as part of the approval process.

1.3 Membership

The TF is expected to raise the interest of experts from EOSC-related projects, Research Infrastructures, Thematic Clusters and e-Infrastructures, who jointly will gather the necessary skills required for the TF. Members are expected to have the support of their host organisation/project to make in-kind contributions of their time and effort to the TF during its remit.

1.4 Core Activities and Tasks

The core activities and tasks planned for the TF sub-groups are the following:

[7] https://fairdigitalobjectframework.org/
[8] https://www.researchobject.org/ro-crate/

EOSC Association AISBL
Rue du Luxembourg 3, BE-1000 Brussels, Belgium
+32 2 537 73 18 | info@eosc.eu | www.eosc.eu
Reg. number: 0755 723 931 | VAT number: BE0755 723 931

Technical Interoperability

Activity 1: Landscaping of Technical Interoperability activities in EOSC

Liaise with EOSC-related EU projects (e.g., EOSC Beyond, OSCARS), EOSC-A working groups (e.g., EOSC Federation Handbook), and other initiatives (e.g., EOSC EU Node) to develop a full picture of the ongoing activities related to EOSC Technical Interoperability, Interoperability Framework and Technical Architecture in the EOSC Federation of Nodes. Procedures, gaps and barriers for joining the EOSC Federation will be identified and highlighted. This work is based on the output of the previous EOSC-A Task Force on Technical Interoperability of Data and Services[9].

Output: Status of the Technical Interoperability in the EOSC Federation and initial gap analysis.

Activity 2: Technical aspects of the EOSC Interoperability Framework – gaps and recommendations

This activity will describe the technical aspects of the EOSC Interoperability Framework and its technical architecture with the introduction of the concept of the EOSC Federation of Nodes and produce a set of recommendations to facilitate the implementation of the EOSC Federation. This work will build upon and complement the outcome of multiple EOSC activities, such as the EOSC Federation Handbook[10] (that addresses the purpose, structure, governance, architecture and operations of the EOSC Federation), the EOSC Beyond project[11] (working on the EOSC Federation Technical Architecture, deploying EOSC Pilot Nodes and enhancing EOSC Core capabilities), and the EOSC EU Node[12] (first node of the EOSC Federation).

This activity will include a further analysis of gaps and barriers within the current implementation of EOSC and produce a set of recommendations (taking into account interdisciplinary and domain-specific user community requirements) to identify EOSC federating capabilities and, in turn, to revise accordingly the current set of EOSC Core capabilities. EOSC Exchange resources (e.g., data searching/access services, data analysis services, visualisation services, etc.) will be classified to identify the main technical areas that require interoperability guidelines. Various stakeholder perspectives, e.g., from infrastructure providers, EOSC-related EU projects, ESFRIs, and ERICs, will be taken into account. This activity will promote cooperation between entities for promoting a common vision for EOSC. Also, the TF subgroup will stimulate implementing EOSC interoperability standards and services by members of the EOSC Exchange and

[9] https://zenodo.org/records/8399710
[10] https://eosc.eu/eosc-federation-handbook/
[11] https://www.eosc-beyond.eu/
[12] https://open-science-cloud.ec.europa.eu/

EOSC Association AISBL
Rue du Luxembourg 3, BE-1000 Brussels, Belgium
+32 2 537 73 18 | info@eosc.eu | www.eosc.eu
Reg. number: 0755 723 931 | VAT number: BE0755 723 931

encourage interoperability developers to assess consumer's feedback for iteratively improving standards and services.

Output: Provisional report on the technical aspects of the EOSC Interoperability Framework, EOSC Federation Technical Architecture, and implementation recommendations.

Activity 3: Enhancement and validation of the technical models

This activity will disseminate the results of Activity 2 and gather feedback from a wide group of stakeholders to refine and enhance the technical models developed by the subgroup. It will also foster the population of the EOSC Interoperability Framework via recommendations to implement several interoperability guidelines through use cases, dedicated projects, and also by engagement with discipline-specific infrastructures and initiatives (e.g., ESFRIs and ERICs). Additionally, it will identify weaknesses and gaps and promote the guidelines throughout the EOSC ecosystem. It will also foster the development of use cases in projects, research infrastructures, and other initiatives to validate the EOSC Federation Technical Architecture and the results of the subgroup.

Output: Final report on the technical aspects of the EOSC Interoperability Framework, EOSC Federation Technical Architecture and implementation recommendations.

Semantic Interoperability

Activity 1: Landscaping of Semantic Interoperability activities in EOSC

This activity will liaise with EOSC-related EU projects (e.g., EOSC Beyond, OSCARS, FAIRCORE4EOSC, FAIR-IMPACT), EOSC-A working groups (e.g., EOSC Federation Handbook) and other initiatives (e.g., EOSC EU Node) to develop a full picture of the ongoing EOSC Semantic Interoperability activities, and to help them refine the EOSC Interoperability Framework as part of the common operational framework of the Federation. A literature review (primarily based on the previous EOSC-A interoperability TF[13,14] and on recent project deliverables) of shared concepts and identified problem areas will inform this overview. Special focus will be put on mediation across the emerging EOSC Nodes and the wider EOSC stakeholder community to discuss practical aspects of semantic interoperability.

Output: Status of the Semantic Interoperability in EOSC Federation.

Activity 2: Semantic aspects of the EOSC Interoperability Framework

This activity will define the semantic aspects of the EOSC Interoperability Framework and introduce the concept of the EOSC Federation of Nodes. This will take into account

[13] https://zenodo.org/records/8102786
[14] https://zenodo.org/records/10012280

EOSC Association AISBL
Rue du Luxembourg 3, BE-1000 Brussels, Belgium
+32 2 537 73 18 | info@eosc.eu | www.eosc.eu
Reg. number: 0755 723 931 | VAT number: BE0755 723 931

interdisciplinary and domain-specific user community and legal or organisational requirements (e.g., licences, terms of use) to identify the main areas that require the development of semantic interoperability guidelines. Various stakeholder perspectives, e.g., from the view of infrastructure providers, scientific users, the data life cycle, etc., will be taken into account. Technical aspects of data interoperability and its facilitation of data exploitation will be explored. This activity will promote cooperation between entities to produce a common vision of EOSC semantic interoperability. Also, the TF subgroup will promote adoption of EOSC interoperability standards and services, and complement the EOSC Interoperability Framework with a framework for, and references to, curated resources including interoperability case studies and common use cases to support the practical uptake of semantic interoperability aspects within the EOSC Federation.

Output: Provisional report on the semantic aspects of the EOSC Interoperability Framework.

Activity 3: Enhancement and validation of the semantic interoperability models

This activity will disseminate the results of Activity 2 and gather feedback from a wide group of stakeholders to refine and enhance the semantic models developed by the subgroup. It will foster the population of the EOSC Interoperability Framework via recommendations to implement several interoperability guidelines through use cases, dedicated projects and also by engagement with discipline-specific infrastructures and initiatives (e.g., ERICs and the ERIC Forum as a cross-ERIC initiative). It will create a knowledge base of semantic interoperability best practices and recommendations for current and future EOSC stakeholders. The activity will develop recommendations on how to enhance semantic interoperability in future work programmes. And it will foster the development of use cases in projects and other initiatives to validate the results of the subgroup.

Output: Final report on the semantic aspects of the EOSC Interoperability Framework.

Activity 4: Landscaping of other aspects of interoperability activities in EOSC, and the exploration of the connection with other Data Spaces

This activity will liaise with EOSC-related EU projects (e.g., EOSC Beyond, OSCARS), EOSC-A working groups (e.g., EOSC Federation Handbook), other initiatives (e.g., EOSC EU Node) and communities beyond EOSC that are working on solutions to support similar use cases, including the research communities related to semantic technologies, standardisation bodies, and public sector initiatives, such as Interoperable Europe/SEMIC, to develop a full picture of other activities relevant to EOSC Interoperability. A special focus will be on cooperation with the Data Spaces Support Center to discuss the link between EOSC interoperability activities and Data Spaces interoperability activities.

EOSC Association AISBL

Rue du Luxembourg 3, BE-1000 Brussels, Belgium
+32 2 537 73 18 | info@eosc.eu | www.eosc.eu
Reg. number: 0755 723 931 | VAT number: BE0755 723 931

Output: Report on other possible interoperability aspects of the EOSC Federation, with a special focus on the Data Spaces initiative.

Authentication and Authorisation Infrastructure

Activity 1: Engage with stakeholders to identify new use cases and requirements

Through liaison efforts with other bodies, and collaboration with the Task Force members, this activity will identify and assess use cases, requirements and gaps. There will be two versions:

- Requirements for the EOSC AAI v2024, due in Q1 2025, which will drive the work for the EOSC AAI Architecture v2025.
- Requirements for the EOSC AAI v2025, due in Q1 2026, which will drive the work for the EOSC AAI Architecture v2026.

Output: Report on the requirements for the EOSC AAI (v2024 and v2025).

Activity 2: Develop the next version of the EOSC AAI Architecture

This activity will continue to evolve the EOSC AAI Architecture, following the AARC Blueprint Architecture[15], the AARC Interoperability Guidelines[16] and the AARC Tree[17] landscaping activity. There will be three versions:

- EOSC AAI Architecture v2024, due in Q4 2025, which will focus on updating v2022 to capture the developments that have taken place since the end of the work of the previous EOSC-A interoperability Task Force, and to address existing challenges and gaps.
- EOSC AAI Architecture v2026, due in Q3 of 2026, which will focus on the identified challenges and gaps from the "Requirements for the EOSC AAI v2026".

Output: EOSC AAI Architecture (v2025 and v2026).

1.5 Deliverables and Milestones

The Technical and Semantic interoperability sub-groups will work independently on their deliverables, which are all due at the same time. Once these deliverables are well advanced, the two sub-groups will assess the feasibility of merging them into a single document for each activity.

[15] https://aarc-community.org/architecture/
[16] https://wiki.geant.org/display/AARC/AARC+Documents+Approved+by+AEGIS
[17] https://aarc-community.org/aarc-tree-project/

EOSC Association AISBL
Rue du Luxembourg 3, BE-1000 Brussels, Belgium
+32 2 537 73 18 | info@eosc.eu | www.eosc.eu
Reg. number: 0755 723 931 | VAT number: BE0755 723 931

Technical Interoperability

Month	Type of outcome	Title
Q2 2025	Deliverable 1	Status of the Technical Interoperability in the EOSC Federation and initial gap analysis
Q4 2025	Deliverable 2	Provisional report on the Technical aspects of the EOSC Interoperability Framework, EOSC Federation Technical Architecture and implementation recommendations
Q3 2026	Deliverable 3	Final report on the Technical aspects of the EOSC Interoperability Framework and EOSC Federation Technical Architecture and implementation recommendations

EOSC Association AISBL
Rue du Luxembourg 3, BE-1000 Brussels, Belgium
+32 2 537 73 18 | info@eosc.eu | www.eosc.eu
Reg. number: 0755 723 931 | VAT number: BE0755 723 931

Semantic Interoperability

Month	Type of outcome	Title
Q2 2025	Deliverable 1	Status of the Semantic Interoperability in the EOSC
Q4 2025	Deliverable 2	Provisional report on the semantic aspects of the EOSC Interoperability Framework
Q3 2026	Deliverable 3	Report on other possible interoperability aspects of the EOSC Federation with a special focus on the Data Spaces initiative
Q4 2026	Deliverable 4	Final report on the semantic aspects of the EOSC Interoperability Framework

Authentication and Authorisation Infrastructure

Month	Type of outcome	Title
Q1 2025	Deliverable 1	Requirements for the EOSC AAI v2024
Q4 2025	Deliverable 2	EOSC AAI Architecture v2025
Q1 2026	Deliverable 3	Requirements for the EOSC AAI v2025
Q4 2026	Deliverable 4	EOSC AAI Architecture v2026

EOSC Association AISBL

Rue du Luxembourg 3, BE-1000 Brussels, Belgium
+32 2 537 73 18 | info@eosc.eu | www.eosc.eu
Reg. number: 0755 723 931 | VAT number: BE0755 723 931