EOSC Interoperability Framework

Outcomes of the EOSC-Association Task Force for Technical Interoperability of Data and Services

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Co-Chair of the EOSC-TF Technical Interoperability Data and Services
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20 September 2023
Task force

Technical Interoperability of Data and Services

Web page:

https://www.eosc.eu/advisory-groups/technical-interoperability-data-and-services

A landscape overview of the EOSC Interoperability Framework Capabilities and Gaps

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In publication

DOI 10.5281/zenodo.8109528
The Potential of Research Data: How Research Infrastructures Provide New Opportunities and Benefits for Society, Lund, Sweden, 20 June 2023, Michael Arentoft, Head of Unit for Open Science and Research Infrastructure, DG RTD
The EOSC IF defines the interfaces that allow nodes to communicate.
EOSC Interoperability Framework (EOSC IF)

- EOSC IF provides a **flexible framework of interoperability guidelines** (IGs) to support the interoperability and composability of resources (services, datasets and other research products) in the EOSC Core and EOSC Exchange.

- EOSC IF empowers the **EOSC Federation Model**:
  - provide Interfaces (APIs/Protocols) to connect nodes/services/datasets and other resources in EOSC.
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**9 Recommendations to establish, implement the EOSC IF enabling service and data composability**

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**A landscape overview of the EOSC Interoperability Framework Capabilities and Gaps**

**Authorship Community:**

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**TF Deliverable in publication**
Establishment of the EOSC IF

1. Establish the EOSC IF adopting a **bottom-up approach** aiming to put together, in a **unique framework**, the results of the most relevant initiatives that are working on Interoperability in the ERA
   - General purpose e-infrastructures (EGI, EUDAT, GEANT, OpenAIRE), RIs, Thematic Clusters, RDA, etc

2. The EOSC IF should embed a library of **Interoperability Guidelines (EOSC IGs)** to promote the branding and adoption of standards and common best practices in EOSC
   - The EOSC Interoperability Guidelines should specify the APIs, the metadata format of the exchanged data (the **EOSC Profiles**) and all the processes required to really make two resources interoperable
   - The EOSC IF should include IGs for EOSC Core and EOSC Exchange (horizontal and thematic) services.
EOSC IF – Recommendations from the TF

Implementation of the EOSC IF

3. The EOSC Interoperability Guidelines should be recorded in a curated EOSC IF registry/repository
   - A common metadata structure should be adopted to describe IGs
   - Technical governance

4. The EOSC Resource Catalogue should gather information about IGs from the EOSC IF Registry and annotate resource descriptions with the guidelines they comply with
   - Enables an interoperability-driven overlay of EOSC resources across different disciplines
   - Enables the discovery of resources based on interoperability features
Enabling Machine Composability

5. **Machine composability** requires that IGs are annotated with configuration templates, structured metadata profiles through which providers can describe the actual access parameters of their services for a given guideline
   - A provider can declare the actual parameters to access a given interface of its service together with the compatibility with a certain IG

Enabling Data Interoperability

6. **IGs for Data interoperability** should ensure that datasets can be exchanged between systems such that datasets can be understood, combined, processed and analysed by various EOSC services
   - Data should be machine-readable and available in suitable forms with enough contextual information to be interpretable and meaningfully composed with other data.
Interoperability with Data Spaces

7. Coordinate with the **Data Space Support Centre (DSSC)**, and through the DSSC with other Data Spaces
   - Ensure that such interoperation is possible through the technical, governance, access and use, and semantic interoperability mechanisms that EOSC will implement

8. EOSC initiatives should collaborate with the **SIMPL open-source community**
   - co-design approach to ensure compatibility and interoperability

Interoperability with EuroHPC

9. Develop gateways to ensure the **interconnection between world-class supercomputing systems** and EOSC
   - serve research communities leveraging both EOSC and EuroHPC infrastructures
## 8. Recommendations

This section summarises the main recommendations provided by this document.

<table>
<thead>
<tr>
<th>Area</th>
<th>Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Establishment of the EOSC Interoperability Framework</td>
<td>The EOSC Interoperability Framework has to be established adopting a bottom-up approach aiming to put together, in a unique framework, the results of the most relevant initiatives that are working on interoperability in the ERA, such as general-purpose e-Infrastructures (EGI, EUDAT, GEANT, OpenAIRE), thematic cluster communities, as well as through global and cross-domain initiatives like the Research Data Alliance, AARC/AEGIS, GO-FAIR and CODATA.</td>
</tr>
<tr>
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<td>The EOSC IF should embed a library of Interoperability Guidelines (EOSC IGs) to promote the branding and adoption of standards and common best practices in EOSC. The EOSC Interoperability Guidelines should specify the APIs, the metadata format of the exchanged data (the EOSC Profiles) and all the processes required to really make two resources interoperable. The EOSC IF should include IGs for EOSC Core and EOSC Exchange (horizontal and thematic) services.</td>
</tr>
<tr>
<td>Implementation of the EOSC Interoperability Framework</td>
<td>The EOSC Interoperability Guidelines should be recorded in a curated EOSC IF registry/repository. A common metadata structure should be adopted to describe IGs, this will make information on interoperability best practices available in a homogeneous way facilitating the discovery, sharing and reuse.</td>
</tr>
<tr>
<td>Implementation of the EOSC Interoperability Framework</td>
<td>The EOSC Resource Catalogue should gather information about IGs from the EOSC IF Registry and annotate resource descriptions with the guidelines they comply with. This mechanism enables an interoperability-driven overlay of EOSC resources across different disciplines and the discovery of resources based on interoperability features.</td>
</tr>
</tbody>
</table>

**Area** | **Recommendations**
--- | ---
Enabling machine composability via the EOSC Interoperability Framework | **Machine composability** requires that IGs are annotated with configuration templates, structured metadata profiles through which providers can describe the actual access parameters of their services for a given guideline. In such a way, a provider can declare the actual parameters to access a given interface of its service together with the compatibility with a certain IG. |
Enable data interoperability via the EOSC Interoperability Framework | The EOSC IF will also include IGs for Data interoperability. These IGs should ensure that datasets can be exchanged between systems such that datasets can be understood, combined, processed and analysed by various EOSC services. This requires data to be machine-readable and available in suitable forms with enough contextual information to be interpretable and meaningfully composed with other data. |
Interoperability with Data Spaces | EOSC initiatives (EOSC-A, EOSC related projects, etc.) have to coordinate with the Data Space Support Centre (DSSC), and through the DSSC with other Data Spaces, to ensure that such interoperation is possible through the technical, governance, access and use, and semantic interoperability mechanisms that EOSC will implement. |
| Interoperability with Data Spaces | EOSC initiatives should join the SIMPL open source community to work with the SIMPL project through a co-design approach to ensure compatibility and interoperability. |
Interoperability with EuroHPC | It may be necessary to develop gateways to ensure the interconnection between world-class supercomputing systems from EuroHPC and EOSC services to serve research communities leveraging both infrastructures. |
EOSC IF – EOSC Future Implementation

- **EOSC IF Governance:** technical governance to oversee the process of proposing, accepting, publishing and promoting EOSC Interoperability Guidelines (IGs)
- **EOSC Core Tools supporting the EOSC IF:** IF registry and links to EOSC Resource Catalogue & Marketplace
- **Populating the EOSC IF with Interoperability Guidelines:** IGs for Core services and Exchange services (horizontal and thematic)

The EOSC Interoperability Framework

The EOSC Interoperability Framework is a set of policies and guidelines that enable interoperability of resources and services, and will facilitate service compositability. The guidelines could be documents, procedures, workflows, scripts, code, datasets, formats, and guidelines used in science.

### About the EOSC Interoperability Framework (EOSC-IF)

Enabling interoperability across resources and services is essential for building a European Open Science Cloud that is federated and fit for purpose. In turn, interoperability guidelines are necessary to facilitate the cross-discipline collaboration of researchers, providers and research communities.

<table>
<thead>
<tr>
<th>Body</th>
<th>Responsibility</th>
<th>During EOSC Future</th>
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</thead>
<tbody>
<tr>
<td>EOSC Interoperability Advisory Board (EIAB)</td>
<td>Oversees the EOSC IF as a whole (plus tools, procedures); accepting proposed guidelines, based on the recommendations of the EIAC</td>
<td>EOSC Future Technical Coordination Board</td>
</tr>
<tr>
<td>EOSC Interoperability Area Chairs (EIAC)</td>
<td>Performs the initial assessment of the proposed guidelines; to make recommendations for inclusion/exclusion to the EIAB</td>
<td>EOSC Future WP3 task leads, calling in experts to help with the review as needed.</td>
</tr>
<tr>
<td>EOSC Interoperability Core Guideline Owners</td>
<td>Contributes Interoperability Guidelines for EOSC-Core Services, reviews Interoperability Guidelines proposed for the EOSC.</td>
<td>Service owners for core components</td>
</tr>
</tbody>
</table>
EOSC IF – EOSC Future Implementation

EOSC Core IGs
- EOSC Profiles
- Resource Catalogue
- Helpdesk
- Monitoring
- Research Product Accounting
- Service Accounting
- Order Management
- Messaging
- AAI
- PIDs

EOSC Horizontal IGs
- Data Transfer
- Data Publishing and Open Data
- Compute Continuum
- Machine Learning

Browse EOSC Marketplace Resources

Filters
- Status
  - Operating (15)
  - Accepted (3)
- Domain
  - Generic (15)
  - Engineering & Technology (1)
  - Other (1)
- Guideline Type

18 search results Interoperability Guidelines

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- Providers →

EOSC Security Operational Baseline 2022
- Interoperability Guideline

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Provider: nikhef

To fulfill its mission, it is necessary for the European Open Science Cloud (EOSC) to be protected from damage, disruption, and unauthorized use. This Security Baseline supports these goals by defining minimum expectations and requirements of the behavior... Show more

https://search.marketplace.eosc-portal.eu/search/guideline?q=*
Next steps
EOSC Technical Architecture and IF

• Preparatory work for the final TF deliverable **EOSC Technical Architecture and Interoperability Framework** (ongoing)
  • Presentations of the main technical outputs of the current EOSC Projects
  • Discussions on how to integrate all the contributions in the EOSC Technical Architecture
  • **GAPS** in the current EOSC Architecture and EOSC Core (what does researchers need? what is missing in the current EOSC Core?)

• Final TF deliverable “**EOSC Technical Architecture and Interoperability Framework**” (in preparation)
  • Writing: ongoing
  • Consultation: Nov 2023
  • Finalization: Dec 2023