Climate-Adapt4EOSC Workshop – Task 1.2

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T1.2 Overview

- **Climate-Adapt4EOSC Onboarding Plan.**

- **Align project data and services with EOSC principles.**
  - **Ensure** project resources meet EOSC FAIR data, interoperability, and Rules of Participation (RoP).

- **EOSC Node Requirements.**

- **Use insights to refine EOSC integration plan, metadata schemas, and support strategies.**

- **Climate-Adapt4EOSC Onboarding Plan**
  - Prepare Resources: Inventory datasets, tools, and services to contribute.
  - FAIRify Data and Services: Add PIDs (DOIs/ORCIDs), rich metadata, open formats.
  - Technical Integration: Containerize applications, publish APIs with OpenAPI, enable AAI login.
  - Compliance: Align with EOSC RoP (legal entity, SLA, GDPR, sustainability).
  - Node Selection: Decide EU, national, or thematic EOSC Node for onboarding.
  - Refinement & Support: Pilot one onboarding, improve metadata schema, set up helpdesk/training.

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EOSC Integration Benefits

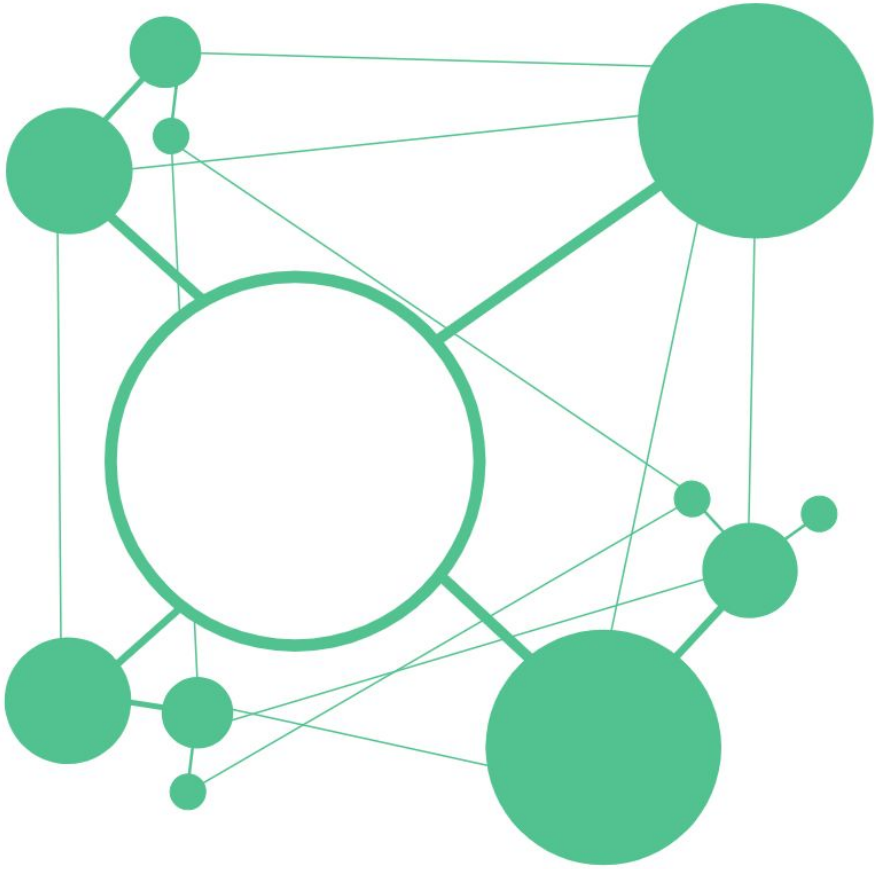
- **Enhanced Access and Use of Digital Resources**
  - Access to research data, metadata, publications, software, computing, and storage capacity, and analytical services.
- **Facilitated Research Reproducibility**
  - Integration of data, tools, and services into reproducible workflows, supporting Open Science practices.
- **Collaboration and Knowledge Sharing**
  - Community-driven collaboration across disciplines and borders.
- **Efficiency and Impact**
  - Accelerate research by reducing duplication, improving visibility, and promoting re-use and cross-domain integration.
- **Standardisation and Interoperability**
  - Adoption of common standards and best practices, improving data quality and compliance with EU and national regulations.
- **Support for Thematic Communities**
  - Enable the advancement and readiness of thematic communities within the EOSC ecosystem.

EOSC Federation and EOSC Nodes

EOSC policies and standards: A baseline should be defined to ensure that each node can have a minimum working set of features and supports a minimum set of policies. It is important to mandate compliance with protocols and standards, but to give freedom to each node on how to support them. (source: GEANT and NREN's position on EOSC Nodes)

EOSC Federation: Open and trusted federation of collaborative, autonomous infrastructures applying agreed, consensus-based EOSC policies and rules of participation, combined into a system of systems to enable European researchers to store, share, process, analyse, and reuse research digital objects (e.g. data, publications and software). (source: EOSC operations and evolution post-2027" supporting document by the EOSC-SB Policy subgroup)

EOSC Node: Data infrastructure system of variable nature (national, regional, institutional or thematic) with consensus-based policies, transparent ownership and clear responsibility, connected to the EOSC Federation to share information and resources within the EOSC community and to leverage common services. (source: EOSC operations and evolution post-2027" supporting document by the EOSC-SB Policy subgroup)



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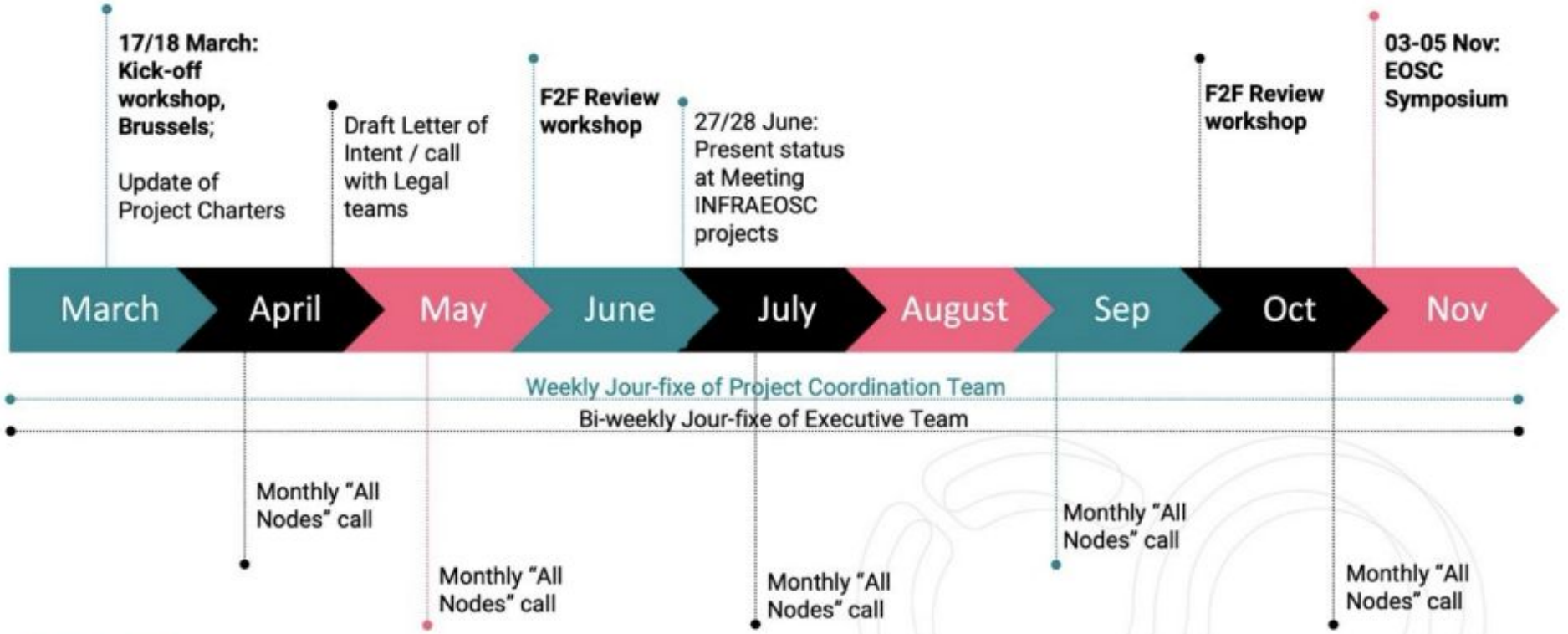
Tentative Timeline for build-up phase of the EOSC Federation (2025)



28 February 2025

The following diagram shows the current proposed timeline for going from the build-up phase to an operational EOSC Federation by November 2025.

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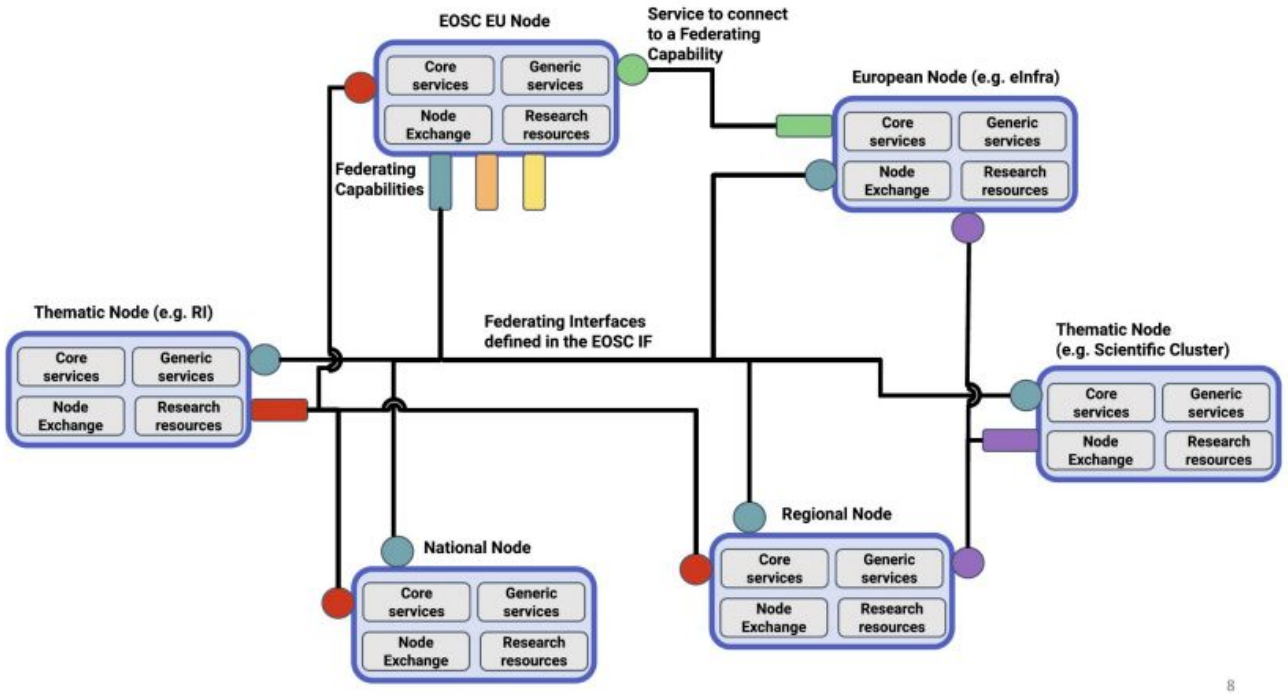
EOSC Node Architecture

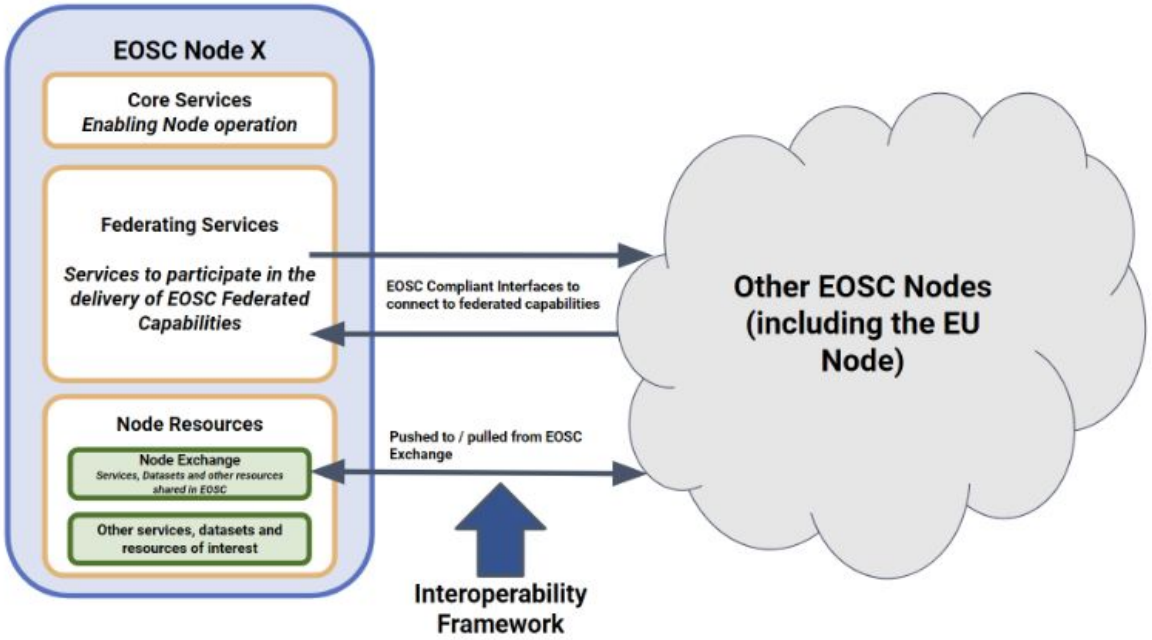


EOSC AAI Federation Requirements

- **Mandatory Registration**
  - Nodes must be in the *EOSC AAI Federation Registry*
  - At least one Infrastructure Proxy per Node
- **Optional**
  - Nodes may add one or more Community AAIs
- **Single Entry Point**
  - Federation provides one access gateway
  - Proxies/AAIs cannot be registered by multiple Nodes
- **Registry Metadata**
  - Includes security contacts, logos, privacy policies, etc.

EOSC Node Architecture

- **Node Core** capabilities that enable the operations of the Node (e.g. AAI, Helpdesk, Monitoring, etc.).
- **Node Resources:** services, data & research products accessible to end-user:
  - Node Generic Capabilities: cross-discipline tools (e.g. data transfer, cloud infra)
  - Node Research Resources: domain-specific datasets & services.
  - Node Exchange: subset shared with EOSC Federation, contributing to the EOSC Exchange.
- **Services enabling or participating in Federating Capabilities. (e.g. act as a federator, a Node enabling a federation of cloud resources)**



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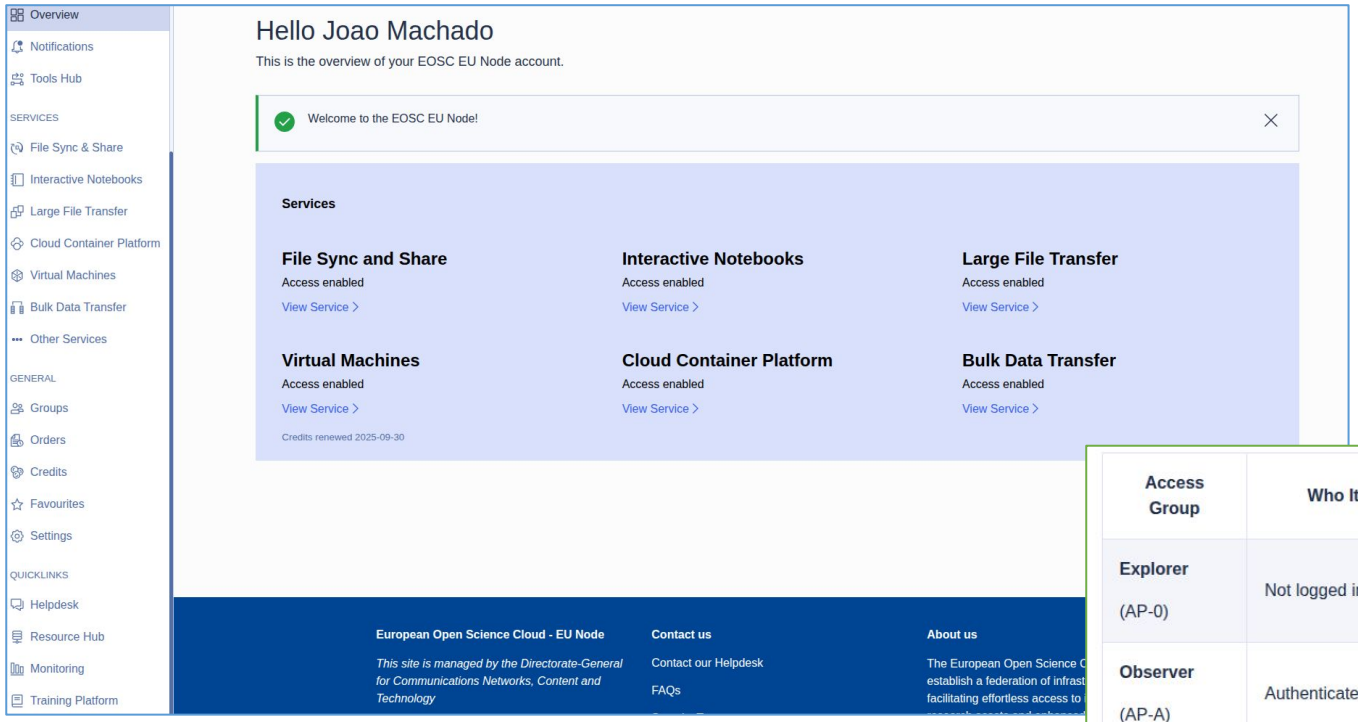
EOSC EU Node



- EOSC EU Node is intended to serve as a reference implementation for federated access to scientific resources, enabling researchers and institutions to seamlessly share and access data and services.
- Access to the EU Node services is enabled in a federated manner and regulated via credits.
- Any service on EOSC Federation must belong at least to a node.

Access Group	Who It's For	Individual Credits	Group Credits	Key Capabilities
Explorer (AP-0)	Not logged in	Not applicable	Not applicable	Browse public content and open access resources
Observer (AP-A)	Authenticated users	0 credits	0 credits	View personalized dashboard
Collaborator (AP-A1)	Institutional employee or staff	500 credits	0 credits	Run Notebooks, VMs, and Containers, use Application Services
Investigator (AP-B)	Academic researcher (faculty)	1500 credits	3000 credits	Full access to all services including GPU resources, manage groups with unlimited members

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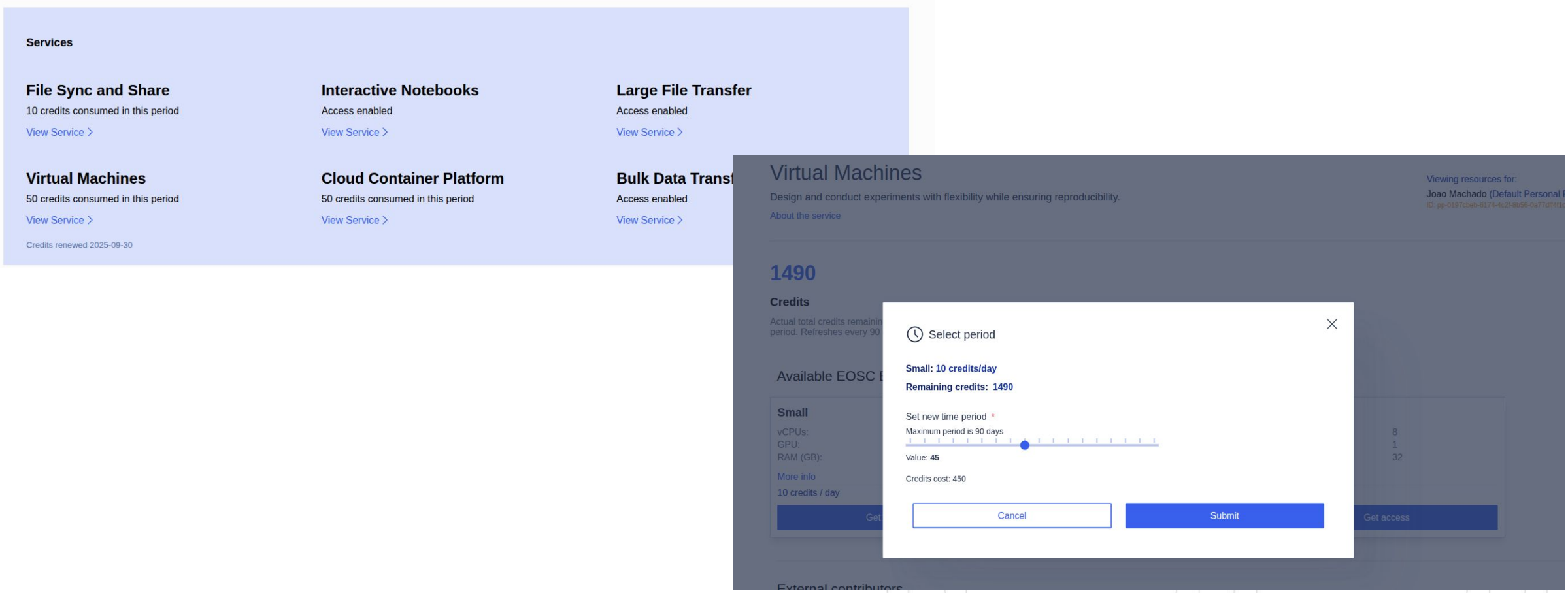
EOSC EU Node



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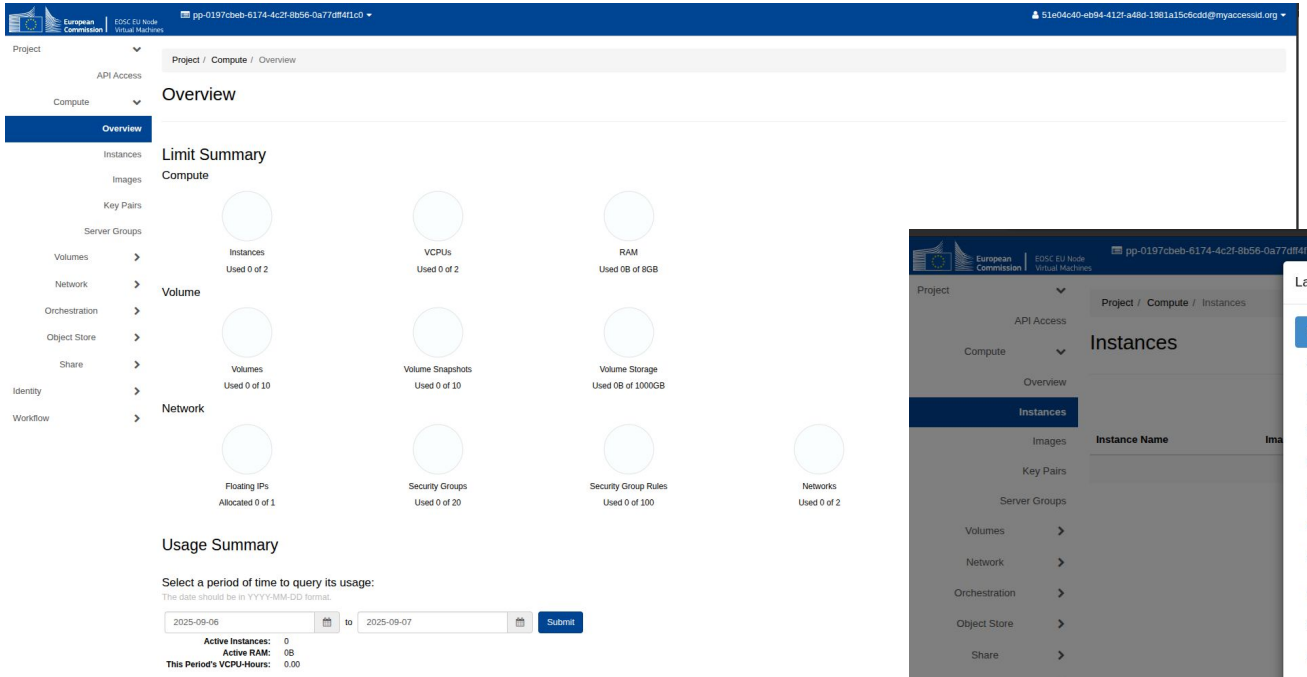
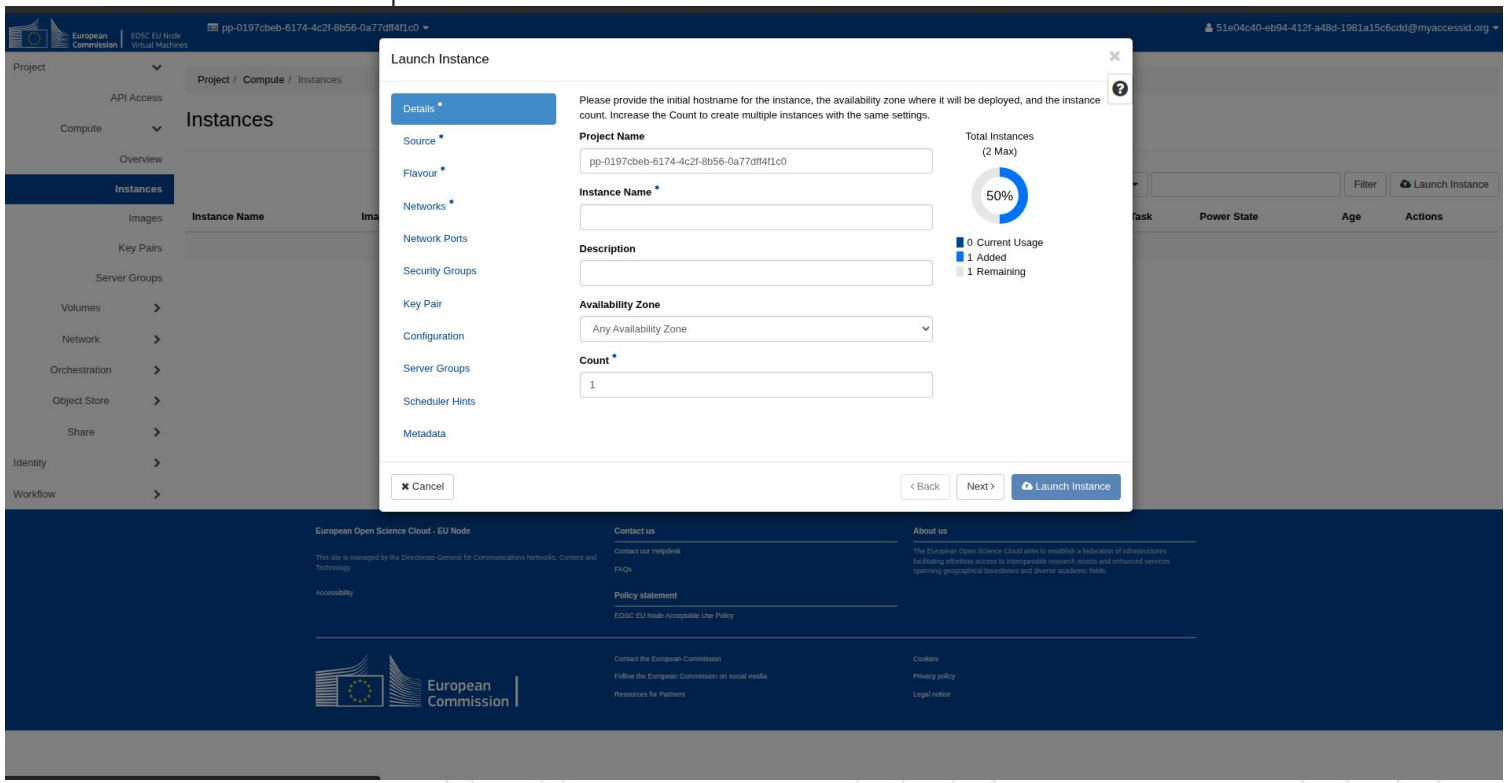
EOSC EU Node





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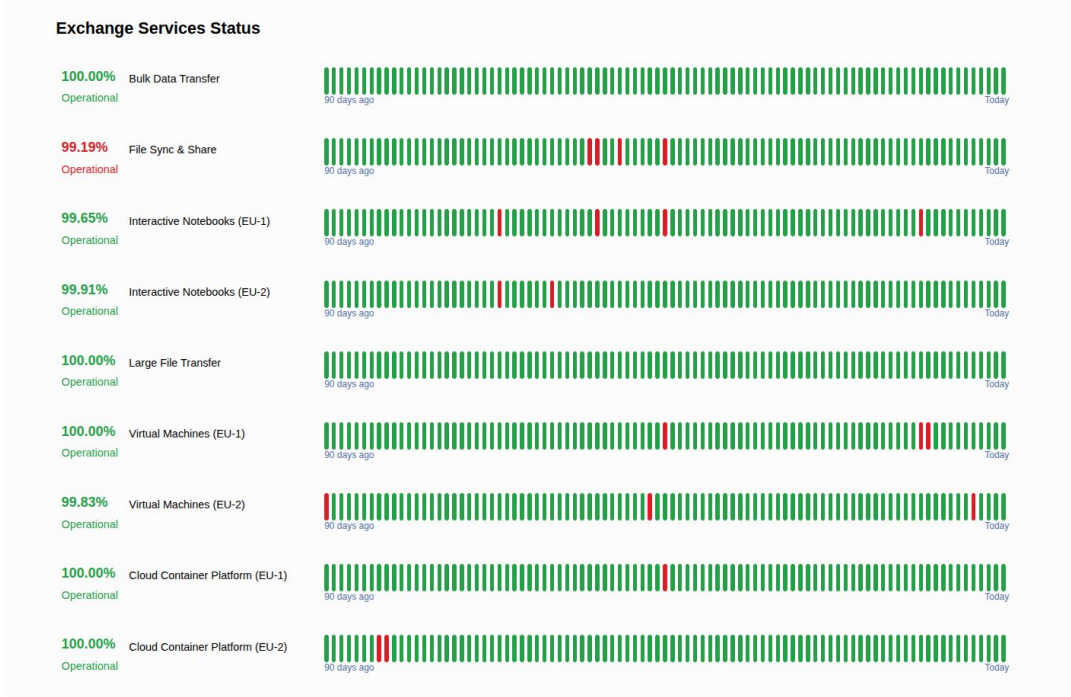
EOSC EU Node



Key Roles in the EOSC Nodes

- **Coordinator**
  - Represents the Node in the Federation.
- **Operations Manager**
  - Contact for daily operations with the EOSC Federation.
- **Technical Coordinator**
  - Manages technical integrations and liaises with the Technical Coordination Team.
- **Security Officer**
  - Oversees security policies, incident response, and compliance.
- **Scientific Officer (for Thematic Nodes)**
  - Represents the Node's scientific content and priorities.
- **Legal/Privacy Officer**
  - Handles legal, privacy, and data protection issues.

EOSC Node Core Capabilities

- **Resource Catalogue & Registry**
  - Central catalogue of data, services, and tools accessible via search.
- **AAI (Authentication & Authorization Infrastructure)**
  - Federated login for seamless access (eduGAIN, OpenID Connect).
- **Helpdesk**
  - Centralized support for incidents and service requests.
- **Service Monitoring**
  - Tracks availability and quality of services.
- **Accounting**
  - Usage metrics for resources and services.
- **Order Management**
  - Framework to define, request, and manage resources.
- **Configuration Management**
  - Internal documentation to maintain consistency.
- **User Dashboard**
  - Personalized portal for easy access to Node resources.
- **Workflow Management**
  - Orchestration of services, data, and tools for reproducible workflows.
- **Resource Provisioning**
  - Support for assigning resources to projects efficiently.

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Research Resources Categories

- **Publications**
  - Textual outputs of scientific research (peer-reviewed or preprints).
- **Research Data Sources**
  - Databases, repositories, and archives providing APIs or direct access to query and retrieve data.
- **Research Data**
  - Scientific research data referenced by PIDs, curated under FAIR principles.
- **Research Software**
  - Software for analyzing research data; includes notebooks and workflows.
- **Research Tools**
  - Analytical and visualization tools.
- **Research Services**
  - Services for data management, processing, analytics, DMPs, and high-performance computing resources.
- **Research Training**
  - Courses, webinars, workshops.
- **Research Interoperability Guidelines**
  - Standards and protocols for metadata and data sharing to ensure interoperability across systems.
- **Research Competence Centres**
  - Virtual hubs for knowledge transfer, mentoring, and promoting cross-disciplinary collaboration.
- **Research Resources & Services Discovery**
  - Search engines for resources and services, tailored for researchers.

Minimal requirements for ‘candidate EOSC Nodes’

- **Legal entity:** must formally represent the Node and have authority to sign agreements with EOSC.
- **Sustainability:** commit sufficient financial and human resources to guarantee operations for at least **24 months**, ideally **5+ years** for long-term stability.
- **Operational capacity:** demonstrate the technical expertise and infrastructure to ensure services are **robust, reliable, secure,** and at a sufficiently high **Technology Readiness Level (TRL).**
- **Data & Services:**
  - Must be **findable and accessible** to all registered EOSC users.
  - Should align with **FAIR principles** to ensure usability and interoperability.
  - Provide **compute and storage resources** in sufficient quantities to serve **multiple user groups** simultaneously.

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Potential European, National & Thematic EOSC

Thematic / Research Infrastructure Nodes

- BBMRI ERIC
- CERN
- CNRS (Data Terra)
- Life Science Research Node
  (ELIXIR, EMBL, Euro-BioImaging ERIC, Instruct-ERIC)
- ESRF (PaNOSC)

National Nodes

- CNR (Blue-Cloud 2026) – Italy
- CSC – IT Center for Science – Finland
- CVTI SR – Slovakia
- NCN – Poland
- NFDI – Germany

E-infrastructure Nodes

- EUDAT
- SURF – Netherlands
- Foundation ICSC – Italy

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EOSC Onboarding Process

- Choose an EOSC Node for onboarding (e.g. the central EU node or a national/regional/thematic node).
- Prepare required info: Detailed service description, metadata records, support contacts, access policy, etc. (per EOSC onboarding guidelines).
- Engage with Node support: Contact EOSC Node operators early to clarify technical integration (metadata upload via form or API, validation steps).
- Submit resource entry: Register your resource via the Federated EOSC Catalogue through the appropriate Node (EU, national, or thematic).
- Maintain the record: Keep metadata up-to-date (new versions, URLs) and comply with any monitoring or usage reporting required.

General service onboarding for all providers will open once multiple Nodes are enrolled.

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EOSC Keys Changes

- “Marketplace” deprecated → use EOSC Federated Resources Catalogue
- Updated RoP compliance and metadata alignment.
- Interoperability and standards: e.g. DCAT-AP 3.0.0, OpenAPI/Swagger.
- Federated AAI (OIDC/OAuth2) integration mandatory at Node level.

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EOSC Integration Overview

Steps to onboard

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Data Preparation

- Inventory all datasets/services the project will contribute and document them.
- FAIRify data: Provide rich metadata (keywords, description, license) for each dataset.
- Assign persistent identifiers (PIDs) (e.g. DOIs for datasets, ORCID for authors).
- Machine-readable metadata as mandatory.
- Use open, common formats (CSV, NetCDF, GeoTIFF, etc.) for data files.
- Containerization of applications for portability.
- If needed, migrate data to trusted repositories (e.g. Zenodo) to ensure findability.

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Service Preparation

- Standardize interfaces for tools, models, and data services (use widely adopted APIs).
- Document APIs: Publish an OpenAPI/Swagger specifications or similar for each service.
- Containerize applications (Docker/Singularity) to ensure portability across platforms.
- Implement common protocols: e.g. OGC standards (WMS/WFS) for geospatial services, RESTful HTTP APIs with JSON/XML formats.
- Provide machine-readable endpoints (e.g. SPARQL or OAI-PMH) for service metadata.

AAI Integration

- Enable EOSC Single Sign-On: Support EOSC Federated AAI (eduGAIN) for user login.
- Use standard auth protocols (OIDC/OAuth2 (AARC-compliant)) for compatibility.
- Register the service with EOSC AAI federation or connect via an EOSC Proxy IdP.
- Ensure users can log in with institutional credentials (no new accounts needed).
- Usage policies: Prepare clear Terms of Use/Acceptable Use Policy (AUP) that comply with EOSC rules (presented at login).

By end of 2025, Node-level AAI integration will be mandatory.

Quality Assurance & Support

- Service reliability: Define availability and performance expectations (uptime, response times)
- Set up user support channels (helpdesk contact, issue tracker) for assistance
- Prepare basic Service Level Agreements (SLAs) or support statements for users
- Maintain a changelog or version history to document updates and changes
- Implement backup & recovery procedures for data and services to prevent loss

Interoperability & Standards Compliance

- Align with the EOSC IF (four layers: technical, semantic, organizational, legal)
- Technical: Use open APIs/protocols and comply with EOSC architecture guidelines
- Semantic: Adopt shared vocabularies and metadata standards (e.g. DCAT-AP for catalog records, ISO 19115 for geospatial metadata)
- Organizational: Ensure policies (data licensing, access conditions) align with EOSC norms; establish any agreements needed to join the federation
- Legal: Meet data privacy and security requirements (e.g. GDPR compliance for any sensitive data)
- Use globally resolvable identifiers (DOI, etc.) and expose metadata in standard formats (e.g. schema.org) to enhance discovery
- Benefit: Promote that Climate-ADAPT4EOSC resources can be reusable across EOSC services and future-proof as EOSC evolves

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Compliance & Maintenance

- Maintain up-to-date metadata and documentation
- Schedule periodic reviews and validations
- Provide TRL evidence (≥7)
- Plan for decommissioning or handover

Sustainability Planning

- Plan for longevity: Ensure each service/dataset will be maintained for 3–5 years minimum after onboarding (assign responsibility and funding for upkeep)
- EOSC sustainability expectations: EOSC Nodes commit to >5 years operation; project should similarly guarantee its resources won't vanish post-project
- Identify institutional support or funding to keep services running (EOSC itself doesn't fund resources; it federates what providers sustain)
- Stay updated and engaged: Follow EOSC policy updates (e.g. new data privacy or security requirements) and join EOSC forums/working groups on sustainability
- Participate in EOSC initiatives (open calls, pilot integrations) to stay aligned with the latest developments

EOSC Governance & Node Integration

- EOSC governance is evolving: Current EOSC Partnership (2021–2027) will transition to a new model post-2027.
- EOSC Gravity (2025–27): EU project guiding the shift to post-2027 governance and an expanded network of EOSC Nodes.
- Federated Nodes: EOSC is a distributed network (EU central node + many national/thematic/regional nodes); any service onboarded in one Node is visible across all.
- Design the project's services for decentralization: avoid reliance on any single platform, ensure they can interoperate with multiple EOSC Nodes or migrate if needed.
- Open-source & open standards: Use these to guarantee future EOSC operators or institutions can adopt and maintain the services beyond the project lifetime.
- Climate-ADAPT4EOSC outputs should aim to remain integrable under future EOSC structures and governance changes.

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Open Questions

- **What are the biggest challenges to onboard into EOSC?**
  - Very large and heterogeneous datasets?
  - Differing formats and standards?
  - Quality of metadata?

- **Are the proposed metadata standards adequate?**
  - Conventions help but local adaptations might be needed?

- **How can we ensure interoperability across services and data sources?**
  - Harmonize vocabularies?
  - Use common data models?
  - Adopt community ontologies?

Open Questions

- **How can we best support users post-project (training, documentation, helpdesk)?**
  - Establish user support channels?
  - Clear SLAs?
  - Training resources?
  - Planed assign of support roles?

- **What improvements do you suggest for the onboarding/FAIRification process?**
  - Simplify metadata submission?
  - Tools for providers to check metadata?

- **Any additional feedback on interoperability or sustainability plans?**
  - Ideas for community involvement?
  - Governance alignment?
  - Long-term funding models?

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Further Information:

- "Solutions for a Sustainable EOSC" (FAIR Lady Report) Solutions for a sustainable EOSC - Publications Office of the EU
- EOSC Rules of Participation (Final Draft) EOSC rules of participation - Publications Office of the EU
- EOSC Persistent Identifier (PID) Policy A Persistent Identifier (PID) policy for the European Open Science Cloud (EOSC) - Publications Office of the EU
- EOSC Interoperability Framework (Draft v1.0) EOSC Interoperability Framework (v1.0) 3 May 2020 Draft for community consultation
- EOSC Federating Core – Briefing Paper (v2.0) Briefing Paper – EOSC Federating Core v2.0
- EOSC Architecture WG "Minimum Viable EOSC" Report EOSC architecture working group view on the minimum viable EOSC - Publications Office of the EU
- EOSC Partnership Memorandum of Understanding Memorandum of Understanding for the Co-programmed European Partnership for the European Open Science Cloud (EOSC)
- EOSC Strategic Research and Innovation Agenda (SRIA) v1.0 Strategic Research and Innovation Agenda (SRIA) European Open Science Cloud (EOSC)
- "Delivering for EOSC: Key Exploitable Results of H2020 Projects" Key Exploitable Results of Horizon 2020 EOSC-related Projects
- EOSC Multi-Annual Roadmap 2023-2024 EOSC Multi-Annual Roadmap 2023-2024
- EOSC SRIA v1.2 Strategic Research and Innovation Agenda (SRIA) of the
- EOSC Financial Sustainability Report Recommendations for a Financially Sustainable Post-2027 EOSC
- EOSC Steering Board Opinion "EOSC and the Fifth Freedom" European Open Science Cloud (EOSC)
- EOSC Federation Handbook EOSC Federation Handbook
- EOSC Federation: Architecture and Federating Capabilities EOSC Federation: Architecture and Federating Capabilities
- EOSC Tripartite Policy Narrative "Why EOSC is Pivotal…" Why EOSC is Pivotal to European Competitiveness
- EOSC AAI Architecture 2025 EOSC AAI Architecture 2025