ACTRIS ERIC

Project Charter

Version (V1)

ENVRI EOSC NODE

PROJECT SUMMARY

The ENVRI EOSC Node will participate in the EOSC Federation to provide coherent, interoperable access to high-quality **in-situ and derived** environmental research data and services operated by European environmental Research Infrastructures (RIs) and their communities. Its primary purpose is to reduce fragmentation across environmental domains and enable reuse of authoritative observational data within EOSC, supporting Open Science, interdisciplinary collaboration, and FAIR access across borders and disciplines.

The Node federates mature, production-ready repositories and services from environmental RIs spanning atmosphere, marine, terrestrial, freshwater, biodiversity, and solid Earth domains. These infrastructures deliver long-term observations and experiments essential for Earth system research, but remain distributed across heterogeneous standards and access mechanisms. The ENVRI EOSC Node addresses this by operationalising proven interoperability solutions and governance practices developed through the ENVRI, ENVRIplus, ENVRI-FAIR, and ENVRI-Hub NEXT projects, leveraging the ENVRI-hub as a lightweight integration layer for federated discovery and access.

The project scope focuses on federation, integration, and interoperability, not centralised data hosting. Core outputs include exposure of ENVRI repositories and services through EOSC-compatible catalogues; integration with EOSC Federated AAI via ENVRI ID (AARC-aligned); and delivery of thematic federating capabilities, notably the ENVRI Catalogue of Services and the LLM-enabled ENVRI Knowledge Base. All resources exposed to EOSC operate at TRL 7 or higher and are accessible Europe-wide under RI-defined access policies (“as open as possible, as closed as necessary”).

The Node will launch with five mature RIs (ACTRIS ERIC, LifeWatch, SIOS, IAGOS, EPOS) and a scalable onboarding framework for additional ENVRI RIs, subject to EOSC compliance. Through collaboration with EOSC EU Node, national and thematic Nodes, and operational support from EGI, the ENVRI EOSC Node will strengthen federation coherence by providing trusted reference observations, reusable interoperability building blocks, and reference multi-Node workflows supporting policy-relevant and societally impactful environmental science.

VALUE PROPOSITION

1. Overall Value to the EOSC Federation

The ENVRI EOSC Node will provide thematic federating capabilities enabling EOSC to integrate, access, and reuse environmental research data and services in a reliable, scalable, and standards-based manner. It will address structural fragmentation in the environmental domain by aggregating multiple Research Infrastructures (RIs) through a single EOSC-compliant entry point, reducing the need for individual RI integrations with the Federation.

Building on the ENVRI-hub, a mature integration platform delivering federated discovery, access, and interoperability components, the Node will expose authoritative in-situ and derived environmental data operated by distributed RIs through harmonised catalogues, shared information models, and interoperable service interfaces. Integration with EOSC Federated AAI ensures secure, policy-compliant access while preserving RI governance and stewardship responsibilities.

The Node will launch with five mature RIs (ACTRIS ERIC, LifeWatch, SIOS, IAGOS, EPOS), with a scalable framework allowing progressive onboarding of additional ENVRI RIs subject to EOSC compliance. The involvement of EGI ensures secure, high-availability computing resources and operational support for EOSC-compliant AAI services.

By delivering reusable thematic federation services—including catalogue, knowledge base, and interoperability frameworks—the ENVRI Node contributes building blocks that support other EOSC Nodes and cross-domain workflows. It will supply trusted in-situ reference data essential for climate, biodiversity, marine, and geoscience applications, complementing EOSC investments in Earth Observation, modelling, and compute without duplication.

2. Needs Addressed

The Node provides FAIR and EOSC-compliant access to high-value environmental datasets and services at scale. It enables cross-domain workflows combining environmental data with life sciences, health, and socio-economic domains. It supports reproducible, policy-relevant science and facilitates integration of Essential Climate Variables into modelling frameworks, digital twins, and AI-driven environmental applications.

3. Beneficiaries and Target Users

Primary beneficiaries include researchers in environmental and Earth system sciences and interdisciplinary users integrating environmental data with other domains. Research institutions, public authorities, and policymakers benefit from access to authoritative, traceable environmental data and services. Other EOSC Nodes gain reusable federation capabilities and trusted reference datasets. SMEs and the private sector may develop value-added services, while society benefits indirectly through improved environmental knowledge and sustainability solutions.

4. Unique Capabilities and Differentiation

The Node provides a dedicated focus on in-situ environmental Research Infrastructures delivering long-term, high-quality observational data not replicated elsewhere in EOSC or world wide.These data represent the Essential Climate Variables which are foundational inputs to model Earth systems, including digital Twins and AI foundational models, and drive evidence-based climate adaptation and mitigation policies.

It builds on proven interoperability solutions operationalised across multiple RIs over successive integration efforts (funded by ENVRI PLUS, ENVRI FAIR and ENVRI-Hub NEXT projects) and supported by deep domain expertise in observational data lifecycles, sensor networks, quality assurance, and long-term curation.

The governance framework aligns multiple pan-European RIs under shared technical and organisational structures while remaining extensible to additional infrastructures. The Node complements other European Common Data Spaces, particularly those related to climate, environment, biodiversity, and health, by supplying authoritative environmental reference data and thematic federation capabilities within EOSC.

Because of its cross-disciplinary vocation, the ENVRI node is uniquely positioned to collaborate with other existing thematic nodes to boost novel inter- and transdisciplinary approaches and methodologies combining environmental data with life sciences, health, or socio-economic research.

The Node offerings on environmental research data are particularly relevant to the Green Deal Data Space, with established collaborations via the SAGE project. Interoperability and data flows among data space participants will be explored to ensure that research in-situ observations can be exploited by the SAGE infrastructure or the broader EO sector such as the Copernicus Data Space.

These data pipelines are critical for high impact initiatives such as Destination Earth, Copernicus services or the newly established Sectoral Data Labs which co-exist with AI Factories to drive AI-powered environmental modelling.

The Node will extend this value to global aggregators such as GEO Knowledge Hub ensuring European excellence reaches a worldwide audience.

REPOSITORIES AND SERVICES DELIVERED

1 Repositories

The ENVRI EOSC Node federates access to distributed repositories operated by established environmental Research Infrastructures (RIs), managing long-term, high-quality in-situ and derived observational and experimental data across atmosphere, marine, terrestrial, freshwater, biodiversity, and solid Earth domains.These repositories operate under formal RI mandates, ensuring long-term stewardship of authoritative environmental data. Data management practices are FAIR-aligned, including persistent identifiers, provenance information, and rich metadata. Services are deployed in stable production environments suitable for EOSC-wide reuse and meet a minimum Technology Readiness Level (TRL) of 7. Access is available either directly through the individual RI or via the ENVRI Hub, which acts as an integrated access point providing harmonised discovery and access while preserving RI autonomy and governance responsibilities. Access conditions are generally open, subject to RI-specific policies; some datasets may require authentication or authorisation due to controlled-access or legal constraints.

2 Service Overview Table

Service ID	Service Description	Access Policies to the Service	Federation Contributions & Value to Users	TRL
ENVRI-SRV-01	ENVRI Catalogue of Services: federated discovery and access to data and services from multiple environmental RIs. It offers a GUI and standardized APIs.	Access via EOSC; open access for discovery; authenticated access for restricted resources via ENVRI ID	Enables unified discovery of distributed environmental data and services; complements EOSC catalogue with domain-specific aggregation	8
ENVRI-SRV-02	LLM empowered ENVRI Knowledge Base: dialogue based agent, and semantic discovery and indexing of research artefacts (datasets, services, workflows, documentation)	European-wide access; open for discovery; API access for EOSC Nodes and services	Supports multidisciplinary discovery, semantic linking, and application composition across EOSC Nodes	8
ENVRI-SRV-03	Competence Center	access via EOSC; open access for discovery; authenticated access for restricted resources via ENVRI ID	Provides thematic onboarding support, interoperability guidance, training	7
ENVRI-SRV-04	Virtual Research Environment: Jupyter , Galaxy or other VRE front end, workflow across federated cloud infrastructures, AAI integration	European-wide access for EOSC users; RI-managed authorisation policies enforced via ENVRI-ID/EOSC AAI	Support workflow execution across federated infrastructure	7
ENVRI-SRV-05	ENVRI ID: Federated AAI AARC Blueprint compliant. Integrates RI's AAIs.	European-wide access, assurance levels agreed by RIs.	Allows users Single Sign On across RI's and integrated services. This will widen to EOSC users after integration with EOSC AAI	8

3 Integration with EOSC Federated Capabilities

All ENVRI Node services will be **operationally integrated and interoperable with the EOSC EU Node**. This includes:

- Registration of services and resources in EOSC-compatible catalogues.
- Integration of ENVRI ID with EOSC AAI
- Alignment with EOSC monitoring, support, and operational frameworks.
- Interoperability, based on EOSC Interoperability framework
- Data Access and use
- Monitoring and Accounting
- Helpdesk

USE CASES

The proposed use cases involve collaboration with other EOSC Nodes and EOSC core federating capabilities, notably the EOSC EU Node. Each use case includes a realistic timeline and identifies the participating Nodes.

Use Case ID	Use Case Description	Federation Contributions & Value to Users	List of the Participating Organisations	List any other Nodes Involved	Timeline of Realisation of the Use Case
UC-1	Federated discovery of environmental data across the Earth system domains	Enables interdisciplinary research by integrating authoritative in-situ environmental observations with Earth system data and service ecosystems through shared discovery and interoperability mechanisms.	ENVRI RIs;	Data-Terra Node; Digital Twin of the Ocean Node; EOSC EU Node; (EOSC Italian Node)	Month 16-24
UC-2	Cross-node semantic discovery and application composition	Provides federation-level semantic discovery and supports composition of cross-domain applications and workflows	ENVRI consortium; participating thematic Nodes	EOSC EU Node; additional thematic Nodes (TBC)	Month 16-24
UC-3	Environmental Data Analysis using workflows cross node federated capabilities (such as Galaxy, D4Science or other computing capabilities from the federation)	Delivers scalable, reproducible scientific analysis by combining ENVRI data with Galaxy workflows and computing resources	ENVRI RIs; Galaxy service providers;	EGI ; Galaxy-based EOSC services; EOSC EU Node NFDI Node DataTerra	Month 6-16
UC-4	Environmental impact of volcanic eruptions	Analyse the environmental impact of volcanic eruptions by integrating multi-domain data. The scientific challenge lies in combining heterogeneous datasets - from satellites, in situ measurements, and numerical models - and making them interoperable within a unified framework in EOSC	ENVRI RIs;	DataTerra node	Month 6-16

Use Case 1: Federated discovery of environmental data across the Earth system domains

This multi-Node use case demonstrates cross-domain discovery and reuse of in-situ environmental observations available through the ENVRI Node alongside complementary Earth system datasets provided by other EOSC thematic Nodes. It enables interdisciplinary research addressing climate impacts, ocean–atmosphere interactions, and ecosystem dynamics.

High-Level Description: The ENVRI Node exposes in-situ environmental datasets through its Catalogue of Services and Knowledge Base, while the Data-Terra Node and Digital Twin of the Ocean Node provide complementary Earth system and marine data services. Additional datasets are exposed via the Italian Node. Through EOSC catalogue services and shared interoperability mechanisms, users can discover and reuse datasets across Nodes within a coherent federation framework.

This use case demonstrates practical interoperability between thematic Nodes while preserving their distinct mandates and avoiding duplication of data or services.

Added Value to the EOSC Federation

- Demonstrates concrete multi-Node interoperability across environmental, climate, and marine domains.
- Enables interdisciplinary scientific workflows combining in-situ environmental observations with climate and marine data.
- Promotes reuse of thematic federating capabilities and shared discovery services across EOSC Nodes.

Nodes and Capabilities Involved

• ENVRI Node • Data-Terra Node • Digital Twin of the Ocean Node • EOSC EU Node • Italian Node	**Core capabilities:** EOSC AAI, EOSC Catalogue, PID services, Federated Search. **Generic capabilities**: Cloud compute (for metadata harvesting/indexing), Online storage. **Thematic capabilities:** ENVRI Catalogue of Services, ENVRI Knowledge Base, Data-Terra discovery services, DTO data access services.

Indicative Timeline

- Alignment of metadata, scope, and discovery requirements across Nodes: Month 16–18
- Cross-node catalogue and interoperability integration: Month 19–22
- Demonstration of cross-node discovery and reuse use case: Month 23–24

Use Case 2: Cross-Node Semantic Discovery and Application Composition

This use case focuses on a federation-level capability: semantic discovery and application composition across multiple EOSC Nodes. It demonstrates how the ENVRI Knowledge Base can be reused by other Nodes to enable multidisciplinary discovery and composition of scientific applications.

High-Level Description: Research artefacts (datasets, services, workflows) from the ENVRI Node and other participating EOSC Nodes are indexed using semantic technologies. Users can discover related resources across Nodes and compose cross-domain applications using shared descriptions and interfaces.

Added Value to the EOSC Federation

- Promotes reuse of shared semantic and interoperability services.
- Enables scalable, cross-domain application composition.
- Demonstrates how thematic federating capabilities can be shared across Nodes.

Nodes and Capabilities Involved

• ENVRI Node • EOSC EU Node • One or more additional thematic EOSC Nodes (TBC)	**Core capabilities**: EOSC AAI, EOSC Catalogue, PID services. **Generic capabilities:** Cloud compute for semantic indexing and API deployment. **Thematic capabilities:** ENVRI Knowledge Base (semantic enrichment and indexing), shared ontology frameworks, cross-node metadata mapping services.

Indicative Timeline

- Agreement on scope and participating Nodes: Month 0–3
- Semantic alignment and indexing: Month 4–9
- Federation-level demonstration: Month 10–14

Use Case 3: Environmental Data Analysis using workflows cross node federated capabilities (such as Galaxy, D4Science or other computing capabilities from the federation)

This multi-Node use case demonstrates how environmental data federated by the ENVRI Node can be analysed at scale using shared EOSC workflow and compute services, enabling reproducible and reusable scientific pipelines.

High-Level Description: Researchers access in-situ environmental datasets through the ENVRI Node and process them using Galaxy-based workflows deployed on federated EOSC compute resources. The ENVRI Node provides curated data and metadata, while Galaxy and federated infrastructure enable scalable execution. Workflows are accessed via EOSC services, allowing cross-disciplinary reuse without requiring local infrastructure.

Added Value to the EOSC Federation

- Demonstrates a concrete, end-to-end scientific workflow spanning data federation, analysis platforms, and compute resources.
- Shows reuse of existing EOSC Nodes rather than duplication of capabilities.

- Enables scalable, reproducible environmental data analysis accessible to a broad research community.

Nodes and Capabilities Involved

• ENVRI Node • Galaxy-based EOSC services • EOSC EU Node	**Core capabilities:** EOSC AAI, EOSC Catalogue, PID services. **Generic capabilities:** Cloud compute, Notebooks, Online Storage, Galaxy workflows, CernVM-FS (where applicable). **Thematic capabilities:** ENVRI Catalogue of Services, ENVRI Knowledge Base, domain-specific workflow templates.

Indicative Timeline

- Definition of representative scientific workflows and datasets: Month 12–15
- Integration of ENVRI data access with Galaxy workflows: Month 15–20
- Deployment and demonstration on federated compute resources: Month 20–24

Use Case 4: Environmental impact of volcanic eruptions

This use case assesses the environmental impact of volcanic eruptions by federating in-situ measurements, satellite observations, and numerical models across ENVRI and Data Terra Nodes. It implements automated, scalable workflows demonstrating how EOSC core and generic capabilities enable reproducible cross-domain analysis.

High-Level Description: Satellite data, in-situ observations, and dispersion models are integrated through automated workflows performing co-location, anomaly detection, modelling, and visualisation. Deployed across ENVRI and Data Terra infrastructures, the workflows use EOSC core and generic services to support scalable, multi-event analyses and improve coverage and robustness through pan-European data integration.

Added Value to the EOSC Federation

- Validates end-to-end integration of **EOSC Core Capabilities (AAI, Catalogue, PID)** within a real multi-Node workflow combining ENVRI and Data Terra services.
- Demonstrates orchestration of **thematic (ENVRI Catalogue, Knowledge Base), generic (Cloud Compute, Notebooks, Galaxy, CernVM-FS, Storage), and core EOSC services** in a unified, automated analysis pipeline.
- Provides a **reusable, scalable workflow template** for cross-domain environmental hazard analysis, deployable across EOSC infrastructures.
- Tests interoperability and performance of federated resources under **data-intensive, multi-event execution scenarios**, supporting reproducibility and federation-level scalability.

Nodes and Capabilities Involved

• ENVRI Node • Data Terra Node	**Core capabilities:** AAI, Catalogues, Federated Search Engine, and PID; **Generic capabilities:** Cloud Compute, Notebooks, Online Storage, CernVM-FS and Galaxy; **Thematic capabilities:** ENVRI Catalogue of Services and ENVRI Knowledge Base.

Indicative Timeline

- Automate workflows (satellite–in situ co-location, anomaly detection, visualisation). M10-14
- Integrate plume and dispersion models and bioinformatics workflows. M14-16
- Deploy on nodes. M16-18
- Test scalability. M18-20
- Connect outputs to EOSC federation services. M20-22
- Demonstrate multi-event reproducibility M22-24

In Scope and Out of Scope for the Use Cases

IN SCOPE

The ENVRI Node will deliver operational, production-ready capabilities addressing concrete scientific and federation-level needs within EOSC.

In scope:

- Multi-Node scientific workflows and demonstrations reusing ENVRI in-situ environmental data with services from other EOSC Nodes.

- Operation of ENVRI thematic federating capabilities (Catalogue of Services, Knowledge Base, interoperability and access services).
- Federated access to ENVRI repositories via participating RIs or the ENVRI-hub.
- Integration with EOSC core services (AAI, catalogue, monitoring) ensuring trusted access and discoverability.
- Application of FAIR principles and shared interoperability standards.

Stakeholder Support

The use cases support researchers in environmental and interdisciplinary domains, universities and research institutions, collaborating EOSC Nodes, public authorities and funders, and SMEs developing value-added services based on federated environmental data.

Integration Focus

The use cases prioritise reuse of EOSC core services, interoperability through shared standards and APIs, and practical collaboration between thematic and horizontal Nodes.

OUT OF SCOPE

- Development of new remote sensing or modelling capabilities.
- Provision of generic compute or HPC resources.
- Long-term production services beyond the defined demonstrations.
- Bespoke end-user applications.

Limitations and Dependencies

Use cases focus on federation value rather than full-scale production services and apply at European level. Delivery depends on availability of EOSC core services, collaboration with participating Nodes, and continued engagement of ENVRI Research Infrastructures.

COMPLIANCE WITH TECHNICAL REQUIREMENTS

The EOSC-ENVRI Node **confirms its commitment to comply with all mandatory technical specifications and policies required for integration into the EOSC Federation**, as defined in the *EOSC Federation Handbook* and associated onboarding documentation.

This chapter explains how the ENVRI Node fulfils the minimum technical and organisational requirements to operate as an EOSC Node. It focuses on governance readiness, integration with the EOSC Federated AAI, exposure of resources in the EOSC catalogue, and implementation of the Node Core Capabilities.

Compliance goes beyond initial onboarding and includes continuous operational alignment, monitoring, and policy updates throughout the Node lifecycle. The ENVRI Node acts as a thematic federating layer, integrating mature services from European Environmental Research Infrastructures (RIs) and ensuring that all exposed capabilities meet EOSC minimum technical requirements (TRL ≥ 7) and federation standards.

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1 Governance and Operational Readiness

The ENVRI Node is built upon a mature governance model established through successive European projects (ENVRI, ENVRIplus, ENVRI-FAIR, ENVRI-Hub NEXT) and long-standing collaboration among European environmental Research Infrastructures.

Key elements of governance and operational readiness include:

- Clearly defined roles and responsibilities for coordination, technical operations, security, and community engagement.
- Established decision-making and escalation procedures aligned with EOSC governance expectations.
- Operational processes for service onboarding, lifecycle management, incident handling, and user support.

These arrangements ensure that the ENVRI Node is capable of sustained, reliable operation within the EOSC Federation.

Governance is organised at two levels:

- **Node coordination**, responsible for EOSC integration and compliance.
- **RI service ownership**, responsible for operational stability and domain policies.

An escalation framework ensures traceability and alignment with EOSC governance.

Service lifecycle procedures (onboarding, validation, integration, updates, and withdrawal) maintain compliance with evolving EOSC specifications.

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2 Integration with EOSC Federated AAI

The ENVRI Node will integrate fully with the **EOSC Federated Authentication and Authorisation Infrastructure (AAI)** to provide secure, trusted, and seamless access to its repositories and services.

Integration with EOSC AAI includes:

- Support for EOSC-approved authentication mechanisms and identity providers,including federated identities via eduGAIN where applicable.
- Federation of access policies defined by participating Research Infrastructures.
- Enforcement of authorisation rules at service and repository level using EOSC AAI attributes.

The ENVRI ID service, aligned with the AARC Blueprint Architecture, connects RI identity systems to the EOSC Federated AAI. It uses standard protocols (OIDC and SAML) to ensure interoperability across EOSC Nodes.
Authorisation follows role- and attribute-based models for fine-grained access control, while logging complies with EOSC security policies and GDPR. Responsibilities for identity assurance and attribute release are clearly defined between EOSC AAI providers, ENVRI ID, and participating RIs.

3 Exposure of Resources through the EOSC Catalogue

All services and repositories delivered by the ENVRI Node will be **registered and described in EOSC-compatible catalogues**, ensuring discoverability and reuse at federation level.
This includes:

- Provision of rich, standardised metadata describing services, repositories, access conditions, and usage policies.
- Alignment with EOSC catalogue schemas and onboarding procedures.
- Synchronisation between ENVRI catalogues (including the ENVRI Catalogue of Services) and EOSC catalogue services.

Service descriptions are aligned with EOSC catalogue schemas and onboarding validation criteria, including:

- Service maturity level declaration
- Defined access conditions and licensing terms
- Contact points and support channels
- Technical interfaces and API documentation

The ENVRI Catalogue of Services acts as a thematic aggregation layer, synchronising structured metadata with the EOSC catalogue while preserving authoritative RI-level management and ensuring consistency without duplication. The adoption of FAIR Implementation Profile is planned and they will be included in the onboarding requirements.

4 Implementation of Node Core Capabilities

The ENVRI Node implements the required **Node Core Capabilities** as defined by the EOSC Federation, including:

- **Service Catalogue Capability**: operation of the ENVRI Catalogue of Services and its alignment with the EOSC catalogue.
- **Access and Identity Capability**: integration with EOSC AAI for authentication and authorisation.
- **Interoperability Capability**: use of common standards, APIs, persistent identifiers, and FAIR-aligned metadata.
- **Operational Support Capability**: monitoring, user support, and incident management aligned with EOSC operational practices.

These capabilities rely on stable, production-grade components (TRL ≥ 7) validated in previous European projects and deployed across multiple RIs. Interoperability is ensured through persistent identifiers (e.g., DOI), harmonised metadata, open APIs, and semantic enrichment via the ENVRI Knowledge Base, while operational support includes monitoring, incident management, helpdesk coordination, and collaboration with EOSC core services for cross-Node issues.

5 Technical Readiness and Sustainability

The ENVRI Node's technical components are already deployed and validated in operational environments through previous European projects. The build-up phase focuses on consolidation, harmonisation, and formal EOSC integration rather than new development. All services operate at TRL 7 or higher and rely on stable, well-documented software and proven interoperability standards aligned with EOSC coordination activities. Sustainability is anchored in the long-term mandates of the participating Research Infrastructures (RIs), which operate and steward authoritative, FAIR environmental data under stable institutional frameworks. The ENVRI-hub provides a lightweight federating layer built on these established services, requiring limited additional operational overhead. Its value extends beyond EOSC by enabling cross-disciplinary environmental research, and its continuity is supported through shared governance and integration within RI core missions.

6 Monitoring, Security, and Compliance Assurance

The ENVRI Node aligns with EOSC operational, security, and compliance requirements:

- **Monitoring and availability.-** Services are monitored at RI level, with Node-level coordination to ensure federation reliability and alignment with EOSC monitoring where needed.
- **Incident Management.-** Procedures include documented escalation paths between RI operators, Node coordination, and EOSC core services.
- **Security and Data Protection.-** Security is distributed but coordinated, following EOSC policies with secure communication, controlled access, and traceable authentication. While most datasets are non-personal, user account data are processed in GDPR compliance with clearly assigned responsibilities.
- **Compliance Review.-** Periodic reviews ensure alignment with EOSC technical, catalogue, and interoperability requirements.
- **Service Management (FitSM / SMS).-** From 2026, the Node will implement a FitSM-aligned IT Service Management System covering service lifecycle, incidents, changes, configuration, and continual improvement, ensuring coordination with EOSC operational and security frameworks.

7 Mapping of EOSC Technical Requirements to ENVRI Solutions

The table below summarises how the ENVRI Node addresses the minimum technical requirements for EOSC Nodes, as specified in the EOSC Federation Handbook.

EOSC Technical Requirement	**ENVRI Node Implementation**
Federated Authentication and Authorisation (AAI)	Full integration with EOSC Federated AAI, supporting EOSC-approved identity providers and RI-specific authorisation policies
Resource Discovery via EOSC Catalogue	Registration and synchronisation of ENVRI services and repositories through EOSC-compatible catalogues
Node Core Capabilities	Implementation of catalogue, access, interoperability, and operational support capabilities using mature ENVRI services
Interoperability and FAIR Compliance	Harmonised metadata, persistent identifiers, standard APIs, and FAIR-aligned practices
Operational Readiness (TRL ≥ 7)	All exposed services operate at TRL 7 or higher, validated through prior operational deployments
Monitoring and Support	Alignment with EOSC monitoring, incident handling, and user support procedures, FitSM

EXTERNAL DEPENDENCIES & KEY RISKS

Risk / Dependency	**Level**	**Key Mitigation**	**Timeline**
Dependency on EOSC EU Node core services (AAI, catalogue, monitoring)	Medium	Early integration testing; phased onboarding; fallback via RI services; continuous coordination	Integration M2–10; monitoring M10–24
Evolution of EOSC governance and technical specifications	Medium	Active participation in EOSC forums; periodic service alignment reviews	Reviews M6, M12, M18, M24
Engagement of participating ENVRI RIs	Medium	Formal governance agreements; defined roles; quarterly coordination	Formalisation M0–3; quarterly thereafter
Interoperability with other EOSC Nodes (Data-Terra, DTO, EGI, Galaxy, Italian Node)	Medium	Early API/metadata alignment; agreed scope; joint validation milestones	Alignment M0–6; validation M6–24
Heterogeneity of RI systems and standards	Medium	ENVRI interoperability framework; metadata harmonisation; EOSC alignment	Harmonisation M0–12; maintenance M12–24
Legacy components from prior projects	Low–Medium	Technical debt assessment; prioritised refactoring	Assessment M0–4; updates M4–18

Operational scalability under increased EOSC usage	Medium	Usage monitoring; capacity planning; incremental onboarding	Monitoring from M6; scaling M6–24
Distributed governance complexity	Medium	Clear escalation framework; documented decision processes	Defined M0–2; review M12 & M24
Resource availability at RI level	Medium	Integration within RI core mandates; sustainability planning	Planning M0–6; review M18
Scope creep beyond agreed federation scope	Low–Medium	Explicit scope definition; change control oversight	Defined M1; continuous oversight
Information security risks	Medium	Alignment with EOSC security policies; AAI integration; security coordination under FitSM/SMS	Initial M0–6; continuous monitoring
Data protection / GDPR compliance	Low	Clear responsibility allocation; periodic compliance review	Review M0–4; audits M12 & M24
Incorrect enforcement of RI access policies	Medium	Standardised policy descriptions; automated AAI enforcement; validation testing	Implementation M3–8; validation M8–12
Policy or regulatory changes (EU/EOSC)	Low–Medium	Policy monitoring; adaptive updates to services and agreements	Continuous; review M12 & M24
Alignment with European Data Spaces (Green Deal, Copernicus, etc.)	Medium	Interoperability mapping; role clarification; coordination with initiatives	Mapping M6–12; alignment M12–24

CONTRIBUTIONS [DELIVERABLES (INCLUDING DOCUMENTATION)]

1 Overview of Contributions

The ENVRI Node will contribute to the EOSC Federation through:

- Delivery of operational thematic federating services for in-situ environmental research.
- Integration of distributed environmental repositories into EOSC-wide discovery and access mechanisms.
- Provision of documentation, guidelines, and training materials supporting reuse and interoperability.
- Delivery of demonstrator use cases showcasing multi-Node scientific workflows and federating capabilities.

2 Deliverables

To ensure clarity, feasibility, and alignment with EOSC build-up phase expectations, the ENVRI Node limits formal **deliverables** to a small set of core, tangible outputs. Other activities are tracked as **milestones**, reflecting their role as integration or validation points rather than standalone artefacts.

Deliverable ID	Deliverable Name	Description	Responsible	Deadline
D1	EOSC-ENVRI Node Project Charter	Formal project charter defining scope, governance, services, and commitments of the ENVRI Node	ACTRIS.	3
D2	ENVRI Node Architecture and Integration Description	Reference documentation describing the ENVRI Node architecture, integration with EOSC core services, and Node Core Capabilities	IAGOS	12

D3	ENVRI Services Exposure and Onboarding Documentation	Consolidated documentation enabling discovery, onboarding, and reuse of ENVRI services through the EOSC catalogue	EPOS	15
D4	Multi-Node Use Case Demonstration Report	Report documenting the realised multi-Node use cases and federation-level added value	LifeWatch	24

3 Documentation and Sustainability

All documentation will be made openly available and maintained in alignment with EOSC documentation practices. Deliverables will be updated as services evolve and will support long-term sustainability by enabling reuse, onboarding of new services, and integration with future EOSC developments.

The ENVRI Node's contributions are designed to deliver lasting value to the EOSC Federation by consolidating prior European investments into stable, operational, and reusable services.The listed deliverables reflect the operational focus of the ENVRI Node and are aligned with the examples of project charters from existing EOSC Nodes. All deliverables build upon mature results from previous European projects and will be maintained at **minimum Technology Readiness Level (TRL) 7**.

Documentation (living docs, updated as services evolve):

- Node Operations Manual (onboarding, lifecycle, change/incident, monitoring, escalation)
- Service Catalogue Metadata Guidance (how services/resources are described for EOSC catalogue)
- AAI & Access Policy Guide (how EOSC AAI/ENVRI ID is used; attribute/role model; policy enforcement)
- API & Interoperability Profiles (interfaces, standards, PID practice, metadata profiles, FAIR Implementation Profiles)
- User-facing Guides (how to discover/access via ENVRI-hub/EOSC; FAQs)
- Security & Data Protection Notes (security contacts, incident workflow, GDPR responsibilities)
- FitSM SMS package (service portfolio, incident/request/change, CSI—minimal but compliant)

Sustainability approach

- Hosted by RIs under their core mandates: services and data remain operated by the contributing RIs; the Node federates rather than centralises.
- Operational responsibilities are distributed but governed: RI-level service ownership + Node-level coordination for EOSC integration, compliance, and incident escalation.
- Service management via FitSM from 2026: ensures continuity (processes, roles, monitoring, change/incident).
- Incremental onboarding model: start with the core RIs, add more as they meet EOSC requirements; avoids overextension. Adoption of FAIR Implementation Profiles to guarantee quality levels.
- Reuse-first technical stack: build on ENVRI-hub/ENVRI Catalogue/Knowledge Base and EOSC core services; minimise bespoke development.
- Funding continuity plan: operational costs covered by RI contributions and institutional hosting; enhancements may be supported via aligned EOSC/RI projects (explicitly: not required for baseline operations).
- Open documentation and community support: reduces lock-in and enables handover.

COMMUNITY ENGAGEMENT

By relying on well-established pan-European infrastructures which were built and are evolved based on the real scientific communities' needs, the ENVRI Node is in an unique position to ensure the optimal and continued engagement of the wider environmental research community in the EOSC Federation. Our community engagement plan focuses on onboarding, interoperability, and effective use of EOSC services, rather than generic dissemination.

Enabling Community Participation in EOSC

The ENVRI Node represents a broad community of European environmental Research Infrastructures (RIs) and supports their participation in EOSC by:

- **Providing structured onboarding pathways** for RI-operated data repositories and services, enabling their exposure through EOSC catalogues and access via EOSC AAI.
- **Offering the capacity to onboard third-party resources**, where these are aligned with ENVRI scope (in-situ environmental observations) and comply with EOSC technical and policy requirements.
- **Acting as an integration layer** through the ENVRI-hub, which lowers the technical barrier for community services to participate in EOSC without disrupting existing RI operations.

Engagement Mechanisms

Community engagement is implemented through **lightweight, task-oriented mechanisms**:

- Regular coordination with ENVRI RIs to support service onboarding, lifecycle management, and operational alignment with EOSC.
- Use-case–driven collaboration with other EOSC Nodes, focusing on concrete integration objectives rather than generic networking.
- Short, targeted technical workshops addressing specific needs such as EOSC AAI integration, catalogue onboarding, metadata alignment, and interoperability standards.
- Direct technical support channels for service providers and advanced users involved in onboarding and testing.

No new long-term forums or parallel governance structures are created unless operationally justified.

User Support, Training, and Feedback

User support and feedback are a cornerstone of our community engagement strategy, embedded in routine operations:

- First-level support is provided by ENVRI service operators, with clear escalation paths to EOSC core services when required.
- Feedback is collected through onboarding activities, support interactions, and use-case reviews, and prioritised based on impact on reliability, interoperability, and EOSC compliance.
- Training activities are **needs-driven and minimal**, relying on short tutorials, focused webinars, and reuse of existing ENVRI and EOSC training materials.

Use of Lessons Learned from Existing EOSC Nodes

The ENVRI Node explicitly builds on lessons learned from the current wave of EOSC Nodes, including:

- The importance of **early and continuous integration with EOSC core services** (AAI, catalogue, monitoring).
- Prioritising targeted engagement activities that directly support service onboarding and interoperability, ensuring that all outreach efforts lead to concrete operational impact within the EOSC Federation.
- Clear separation between Node responsibilities and EOSC core or other thematic Node responsibilities to prevent duplication.

TIMING AND MILESTONES

Milestones

The following milestones capture key achievements related to service readiness, integration, and adoption. These milestones do not produce standalone deliverable documents but mark critical points in the build-up and validation of the ENVRI Node within EOSC.

Milestone ID	Milestone Description	Related Activities	Target Timing
M1	Project Kick-off Meeting and Team Alignment	Establish project governance, roles, and responsibilities; finalise project management plan and communication strategy	Month 1
M2	ENVRI Catalogue of Services operational and synchronised with EOSC catalogue	Service configuration, metadata alignment, catalogue registration	Month 12
M3	ENVRI Knowledge Base operational and accessible through EOSC	Semantic indexing, API exposure, cross-node discovery tests	Month 12
M4	EOSC AAI integration completed for ENVRI services	Authentication and authorisation configuration, access policy validation	Month 6
M5	Operational support and monitoring processes in place	Incident handling, service monitoring, user support workflows	Month 18
M6	Training and outreach activities executed	Webinars, tutorials, user engagement activities	Month 23

Indicative Timeline and Phases of Implementation

Inspired by the phased approach adopted by other EOSC Nodes (e.g. Data-Terra), the ENVRI Node implementation follows a **clear, time-bound, and incremental timeline**. The timeline reflects the maturity of existing ENVRI assets and focuses on rapid operational readiness, followed by consolidation and multi-Node integration.

The timeline is indicative and aligned with the EOSC Federation build-up phase. It is organised into **four main phases**, each associated with concrete milestones and outcomes.

Phased Timeline Overview

Phase	Timeframe	Objectives	Key Outputs and Milestones
Phase 0 – Preparation and Alignment	Month 0–2	Establish governance, coordination, and planning	Project Kick-off Meeting,governance and roles agreed; project management and communication plans finalised
Phase 1 – Core Integration with EOSC	Month 2–12	Achieve technical onboarding and federation readiness	EOSC AAI integration; ENVRI Catalogue synchronised with EOSC catalogue ; initial services exposed
Phase 2 – Service Consolidation and Interoperability	Month 13–18	Consolidate services and enable cross-Node interoperability	ENVRI Knowledge Base operational ; monitoring and support in place ; interoperability with other Nodes
Phase 3 – Multi-Node Use Cases and Adoption	Month 6-24	Demonstrate federation value and promote uptake	Multi-Node use case demonstrations ; training and outreach activities completed

Timeline Narrative

- **Phase 0** focuses on organisational readiness and alignment, ensuring that governance, roles, and coordination mechanisms are in place before technical onboarding begins.
- **Phase 1** delivers the core technical integration required for EOSC participation, prioritising identity management, catalogue exposure, and basic service availability.
- **Phase 2** strengthens interoperability and operational robustness, enabling ENVRI services to be reliably reused across EOSC and by other Nodes.
- **Phase 3** demonstrates the added value of the ENVRI Node

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