

Project Title	Expanding FAIR solutions across EOSC
Project Acronym	FAIR-IMPACT
Grant Agreement No.	101057344
Start Date of Project	2022-06-01
Duration of Project	36 months
Project Website	www.fair-impact.eu

D3.1 - Shared long-term vision for PID service providers on PID usage in EOSC

Work Package	WP3, PIDs
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Due Date	2025-03-31
Date	2025-02-28
Version	V1.1 - DRAFT not yet approved by the European Commission
DOI	10.5281/zenodo.15112835

Dissemination Level

<input checked="" type="checkbox"/>	PU: Public
<input type="checkbox"/>	PP: Restricted to other programme participants (including the Commission)
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<input type="checkbox"/>	CO: Confidential, only for members of the consortium (including the Commission)



Versioning and contribution history

Version	Date	Author	Notes
0.1	2025.12.09	Gabriela Mejias (DataCite)	V0.1
0.2	2025.01.24	Gabriela Mejias (DataCite), Liisa Marjamaa-Mankinen, Josefine Nordling Lassi Lager (CSC), Natascha van Lieshout (SURF), Elizabeth Newbold (UKRI-STFC)	V0.2
0.3	2025.02.10	Gabriela Mejias (DataCite)	V0.3
0.4	2025.02.21	Joy Davidson (DCC), Henning Hermjakob (EMBL-EBI), Josefine Nordling (CSC), Gabriela Mejias	V0.4
0.5	2025.02.26	Vasso Kalaitzi (KNAW-DANS), Natascha van Lieshout (SURF)	V0.5
0.6	2025.03.14	Sara Ramezani (SURF), Rene van Horik (DANS)	v.06
1.0	2025.03.28	Gabriela Mejias (DataCite)	V1.0

Disclaimer

FAIR-IMPACT has received funding from the European Commission's Horizon Europe funding programme for research and innovation programme under the Grant Agreement no. 101057344. The content of this document does not represent the opinion of the European Commission, and the European Commission is not responsible for any use that might be made of such content.



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TERMINOLOGY

Terminology/Acronym	Description
CAT	Compliance Assessment Toolkit
DOI	Digital Object Identifier
EOSC	European Open Science Cloud
FAIR	Findable, Accessible, Interoperable, Reusable
KB	Knowledge Base
MSCR	Metadata Schema and Crosswalk Registry
OA	Opportunity Area
PID	Persistent Identifier
PIDMR	Persistent Identifier Meta Resolve
RAiD	Research Activity Identifier
SRIA	Strategic Research and Innovation Agenda
TF	Task Force
WP	Work Package

Executive Summary

Persistent Identifiers (PIDs) are essential for achieving the FAIR (Findable, Accessible, Interoperable, and Reusable) principles within the European Open Science Cloud (EOSC). This report, produced within the FAIR-IMPACT project, presents a shared long-term vision for PID service providers and their role in EOSC. It outlines the current landscape of PID usage, key challenges, and recommendations to ensure effective integration and governance.

The report highlights the need for a structured coordination mechanism between EOSC and PID service providers, emphasizing the importance of adopting existing, globally recognised PID systems to avoid fragmentation. It also underscores the role of compliance tools such as the Compliance Assessment Toolkit (CAT) and the Knowledge Base (KB) in supporting PID service providers in meeting EOSC standards.

Key recommendations include formally adopting the EOSC PID Policy, integrating CAT and the KB into the onboarding process, and ensuring financial and technical support for sustainable, community-governed PID infrastructures. These steps will enhance interoperability, governance, and long-term sustainability of PIDs within EOSC.

1. Introduction

Persistent identifiers (PIDs) are crucial to enabling and achieving the goals of the FAIR principles, which describe how research data and other entities within the research lifecycle should be made Findable, Accessible, Interoperable, and Reusable (FAIR)¹. The FAIR-IMPACT project works with PID service providers² to better understand and address user needs, align with the EOSC PID policy³, and promote the widespread adoption of PIDs. These objectives are addressed within a dedicated Work Package (WP) focused on PIDs, contributing to the relevant activity areas of the EOSC Strategic Research and Innovation Agenda (SRIA).⁴

Achieving these goals requires enhanced coordination between PID service providers and EOSC (EOSC)⁵, ensuring PIDs are available for a wide variety of research outputs, including publications, datasets, software, instruments, services, people, and organisations. Following the development of a joint value proposition by PID providers,⁶ a proposed coordination mechanism across EOSC, and streamlining the requirements for onboarding PID service providers into EOSC,⁷ this report outlines the shared long-term vision for PID service providers regarding the use of persistent identifiers (PIDs) in the EOSC.

¹ Wilkinson, M., Dumontier, M., Aalbersberg, I. et al. The FAIR Guiding Principles for scientific data management and stewardship. *Sci Data* 3, 160018 (2016). <https://doi.org/10.1038/sdata.2016.18>

² In this report we define PID Service Providers following the EOSC PID Policy “An organisation which provides PID services in conformance to a PID Scheme, subject to its PID Authority. PID Service Providers have responsibility for the provision, integrity, reliability and scalability of PID Services, in particular the issuing and resolution of PIDs, but also lookup and search services, and interoperability with a generic resolution system”.

³ European Commission: Directorate-General for Research and Innovation, EOSC Executive Board, Hellström, M., Heughebaert, A., Kotarski, R. et al., A Persistent Identifier (PID) policy for the European Open Science Cloud (EOSC), Publications Office, 2020, <https://data.europa.eu/doi/10.2777/926037>

⁴ <https://eosc.eu/sria-mar/>

⁵ In the context of this report we use the term “EOSC” in its more broader aspect as an evolving ecosystem bringing together the European commission, the governments and the many Research and Innovation stakeholders involved in the European Research Area, co-created across European national and institutional level. This definition includes as well the EOSC Federation infrastructure being currently built across existing research infrastructures in Europe that enable researchers in Europe to to store, share, process, analyze, and reuse research digital objects. For more information see <https://resin.heanet.ie/wp-content/uploads/2024/02/EOSC-EU-Node-Ireland-2024.pdf>

⁶ Mejias, G., Cousijn, H., Marjamaa-Mankinen, L., van Lieshout, N., Tatum, C., & Lambert, S. (2023). M3.1 - Joint value proposition by relevant PID providers. Zenodo. <https://doi.org/10.5281/zenodo.7798215>
 Mejias, G., Cousijn, H., Marjamaa-Mankinen, L., Nordling, J., van Lieshout, N., & Gonzalez-Beltran, A. (2023). M3.2 - Proposal for an EOSC PID Service providers coordination mechanism. Zenodo. <https://doi.org/10.5281/zenodo.8405818>

⁷ Mejias, G., Cousijn, H., Marjamaa-Mankinen, L., Nordling, J., Lager, L., van Lieshout, N., & Newbold, E. (2024). M3.3 - Aligning requirements for onboarding PID providers into EOSC, including emerging PIDs. Zenodo. <https://doi.org/10.5281/zenodo.11232175>

2. Current Landscape of PID Usage in EOSC

2.1 Overview of PIDs Governance within EOSC

The role of PIDs has been integral since the formation of EOSC. A number of key documents were drafted in the early stages of the EOSC development including the “The Strategic Research and Innovation Agenda (SRIA) 1.2”,⁸ “A Persistent Identifier (PID) policy for the European Open Science Cloud (EOSC)”,⁹ and “PID Architecture for the EOSC”.¹⁰

The SRIA defined the driving forces in building the EOSC and identified PIDs as one of the crucial components for achieving a well-functioning goal. It noted a number of areas for development including creating trusted PID Infrastructures for emerging resources, enhancing machine-actionable PIDs, and integrating PIDs into FAIR data management workflows. The EOSC PID policy document defined the roles and components of the PID infrastructure and set out expectations through definitions, guidelines, and usage requirements, while the architecture document outlined the key components of the architecture for persistent identifiers. Together these three documents formed the basis of the requirements and development of PIDs in EOSC.

The EOSC Association PID Policy and Implementation Task Force built on the work of the original documents on PIDs in the EOSC landscape.¹¹ The Task Force ran from the period 2021-2023 with final reports published in 2024. The PID Policy and Implementation Task Force produced a landscape report,¹² which included an inventory of PID types that could be of interest to EOSC. The FAIR-IMPACT milestone report “Proposal for an EOSC PID Service Providers coordination mechanism”¹³ also highlighted that many types of PIDs are already in common usage in EOSC, but the PID landscape is not static and emerging PIDs need to be identified and incorporated into the EOSC ecosystem. These emerging PIDs were outlined in the FAIR-IMPACT milestone report,¹⁴ including RAiD for projects, SWHID software source code artifacts, and ISLRN for language resources. EOSC-related EU-funded projects are also

⁸ [20231114_SRIA_1.2_final2.pdf](#)

⁹ European Commission, Directorate-General for Research and Innovation, Hellström, M., Heughebaert, A., Kotarski, R. et al., A Persistent Identifier (PID) policy for the European Open Science Cloud (EOSC), Publications Office, 2020, <https://data.europa.eu/doi/10.2777/926037>

¹⁰ European Commission, Directorate-General for Research and Innovation, Schwardmann, U., Fenner, M., Hellström, M. et al., PID architecture for the EOSC – Report from the EOSC Executive Board Working Group (WG) Architecture PID Task Force (TF), Publications Office, 2020, <https://data.europa.eu/doi/10.2777/525581>

¹¹ [PID Policy and Implementation - EOSC Association](#)

¹² Buys, M., Dreyer, B., Hellström, M., Kálmán, T., Mejias, G., Parkoła, T., Růžička, M., & Suominen, T. (2024). Community-specific (and stakeholder category-specific) perspectives on the EOSC PID architecture and the EOSC PID policy. Zenodo. <https://doi.org/10.5281/zenodo.11396803>

¹³ Mejias, G., Cousijn, H., Marjamaa-Mankinen, L., Nordling, J., van Lieshout, N., & Gonzalez-Beltran, A. (2023). M3.2 - Proposal for an EOSC PID Service providers coordination mechanism. Zenodo. <https://doi.org/10.5281/zenodo.8405818>

¹⁴ Mejias, G., Cousijn, H., Marjamaa-Mankinen, L., Nordling, J., Lager, L., van Lieshout, N., & Newbold, E. (2024). M3.3 - Aligning requirements for onboarding PID providers into EOSC, including emerging PIDs. Zenodo. <https://doi.org/10.5281/zenodo.11232175>

exploring and demonstrating emerging PIDs, as is the case with the FAIRCORE4EOSC project onboarding RAiD and ISLRN.

In 2024, EOSC launched its Opportunity Area (OA) Expert Groups as part of the 2024 EOSC Winter School. The EOSC OA Expert Groups facilitate collaboration on technical and related matters within the Horizon Europe EOSC Partnership. They emerge from voluntary cooperation among EOSC-related Horizon Europe projects, primarily within the HE Technology Group, and serve as a key platform for technical experts working to advance EOSC development. Among the seven expert groups, there is one dedicated to PIDs. Currently, the OA1: Persistent Identifiers¹⁵ group is continuing its work, with its first task focused on reviewing the proposed changes to the EOSC PID Policy as recommended by the PID Task Force¹⁶. To date the review is still in progress.

2.2 PIDs value for EOSC

The shared value proposition by PID providers was developed as part of the FAIR-IMPACT project.¹⁷ In alignment with the EOSC PID policy, this shared value proposition emphasises the roles of key actors, including PID Authorities, Service Providers, Managers, Owners, and End Users. By mapping these roles to existing infrastructures, the report underscores the critical importance of persistent identifiers in ensuring the seamless operation of EOSC.

The value proposition highlights the diverse benefits of PIDs across the research ecosystem. For researchers, PIDs simplify digital identity management, reduce administrative burdens, and ensure accurate attribution of contributions. This is particularly important in recognising a broader spectrum of outputs beyond traditional publications, including datasets, software, and instruments. Research performing organisations benefit from improved tracking and reporting of institutional research outputs, which enhances their ability to meet open science mandates and showcase their contributions effectively.

For service providers, PIDs enable streamlined workflows and promote interoperability, allowing for seamless connections between systems and enhanced analytics. The innovation potential unlocked by PIDs fosters the development of new tools and services that can better support the research lifecycle. Research-funding organisations also derive significant value from PIDs, which facilitate better tracking of grantees, grants, and outcomes. By improving transparency and reducing administrative burdens, PIDs enhance research integrity and accountability.

A key strength of the value proposition lies in its acknowledgment of community governance. Many PID services are operated and sustained by the community, ensuring their long-term sustainability and alignment with Open Science principles. This governance model reinforces the resilience and persistence of PID infrastructures, which are essential for preserving research outputs over time.

¹⁵ <https://eosc.eu/opportunity-area-exp/oa1-persistent-identifiers/>

¹⁶ <https://eosc.eu/advisory-groups/pid-policy-implementation>

¹⁷ Mejias, G., Cousijn, H., Marjamaa-Mankinen, L., van Lieshout, N., Tatum, C., & Lambert, S. (2023). M3.1 - Joint value proposition by relevant PID providers. Zenodo. <https://doi.org/10.5281/zenodo.7798215>

The report also addresses the challenges, or “pain points,” that PIDs can resolve. These include issues like name and identity ambiguity for researchers and organisations, difficulty in tracking and linking outputs across systems, incomplete metadata, and the administrative burdens associated with manual data entry and reporting. By providing unique, persistent identification and rich metadata, PIDs tackle these issues head-on, enabling interoperability, discovery, and reusability at scale.

2.3 EOSC PID developments

The FAIRCORE4EOSC and FAIR-IMPACT projects have developed many tools to support and harmonise PID adoption within the EOSC community. These tools are:

3. Compliance Assessment Toolkit (CAT)¹⁸: A publicly available tool developed by FAIRCORE4EOSC to help encode, record, and query compliance with the EOSC PID policy. In addition to the main service development, the CAT provides a vocabulary service, API, and a user interface. The tool allows various actors within the EOSC PID landscape to evaluate and demonstrate their compliance with the EOSC PID policy, increasing harmonisation through increased compliance.
4. Knowledge Base (KB)¹⁹: A publicly available database and user interface produced in conjunction with the CAT by FAIRCORE4EOSC. It provides a searchable and filterable database of up-to-date, reliable and fine-grained information about the PID landscape, PID services and their usage. The easy access provided by this tool will increase trust, lower barriers to adoption, and help harmonise PID usage across EOSC.
5. PID Meta Resolver (PIDMR)²⁰: The PIDMR is a generalised PID resolver that knows where to route different types of identifiers – e.g. DOI or URN:NBN. This will improve machine-based data processing and make compilation and analysis of data collections across different PID systems easier. The service consists of a backend, API, and UI.
6. EOSC PID Graph²¹: The component supports service workflows for regularly generating PID Graph²² data dumps related to community profiles for reuse by the EOSC community and related services.
7. User Guidelines: The end users of PIDs are in need of clear, community-defined practices when it comes to PID minting practices across the various data production workflows and when working with different types of data. Community engagement is crucial in defining the setup of these practices for a given scientific community. Large datasets add complexity to citation and the level of granularity for assigning PIDs is to

¹⁸ <https://faircore4eosc.eu/eosc-core-components/compliance-assessment-toolkit-cat>

¹⁹ <https://cat.argo.grnet.gr/pid-selection>

²⁰ <https://faircore4eosc.eu/eosc-core-components/eosc-pid-meta-resolver-pidmr>

²¹ <https://faircore4eosc.eu/eosc-core-components/eosc-pid-graph-pid-graph>

²² <https://support.datacite.org/docs/datacite-commons>

be defined, and in some cases, to be considered on a case-by-case basis. The D3.2 - User guidelines on EOSC PID implementation²³ provides recommendations on PID usage for different object types, data production workflows, scientific reproducibility, data granularity, complex data citation, sensitive data, PID ownership and maintenance, kernel metadata, and PIDs for instruments. This is a result of the work of seven integrated use case partners involved in the FAIR-IMPACT project, representing scientific domains, such as photon and neutron sciences, life sciences, and earth and environmental sciences. One domain-agnostic use case partner also provided their input to this work, which facilitates the collection and preservation of software in the form of source codes.

²³ The report is being finalized and will be published under <https://doi.org/10.5281/zenodo.15081434>.

3. Vision for PID Integration and Usage in EOSC

3.1 The EOSC Federation, governance and its integration of PIDs

The European Open Science Cloud (EOSC) aims to create a federated environment where researchers, organisations, and service providers can collaborate seamlessly by sharing data, tools, and services.

The first draft of the EOSC Federation Handbook was developed collaboratively through a series of weekly meetups and monthly review meetings led by the EOSC-Association.²⁴ To gather community input, a consultation on the first three of six chapters took place throughout November 2024. Based on the feedback received, a revised full draft was submitted to the EOSC Tripartite Governance in December 2024. This version, now encompassing all six chapters, was also shared with participants of the EOSC Winter School on 20 January 2025. The second draft includes rules of participation and take into account the results from the EOSC Winter School 2025²⁵, in which a discussion on PIDs was included around *Strategic Pillar 3 Ensuring research security and sovereignty* and *4 Linking with other common European Data Spaces and beyond* by the Opportunity Area Expert Group (OAEG) 1 PIDs²⁶ and Task Force (TF) 4 Long Term Data Retention, which together with OAEG 1 offers input and recommendations on targeted areas of EOSC's development.²⁷ To date the current version of the Handbook is delivered for acceptance of EOSC Tripartite.

The EOSC Nodes are regional, national, or thematic hubs that support multi-disciplinary and multi-national research promoting the use of FAIR (Findable, Accessible, Interoperable, Reusable) data and supplementary services in Europe and beyond. For PID providers, participating in EOSC Nodes means to “offer infrastructure and/or platform services following the cloud-based delivery model, that can form the European backbone of computational and data storage capabilities”.²⁸

The EOSC Federation will be established as a European Common Data Space for Research and Innovation. The EOSC Federation Handbook²⁹ defines EOSC Node as “an organisation complying with the EOSC Federation policies and legal framework, working at local, national, regional, thematic or European level. An EOSC Node offers Resources which provide added value to the EOSC Federation and delivers Federating Capabilities in collaboration with other EOSC Nodes. Each EOSC Node has its autonomy, its own governance model and offer in terms of resources. It operates its own platform, complying to the technical framework, and the EOSC Node architecture”. The EOSC EU Node is the first reference implementation of an operational node. The future role of the EOSC EU Node depends on the build-up phase and

²⁴ <https://eosc.eu/eosc-federation-handbook/>

²⁵ <https://eosc.eu/events/eosc-winter-school-2025/>

²⁶ <https://eosc.eu/opportunity-area-exp/oa1-persistent-identifiers/>

²⁷ <https://eosc.eu/advisory-groups/long-term-data-retention-task-force/>

²⁸ <https://open-science-cloud.ec.europa.eu/about/eosc-eu-node>

²⁹ To date the latest version of the EOSC Federation Handbook is being reviewed by EOSC Tripartite, and for that reason there is no reference or DOI to be added.

capabilities of the EOSC Federation. As presented during the 2025 EOSC Winter School ³⁰, see Table 1 below, the Node Operator³¹ has the capability to onboard third-party EOSC Providers (if not a "single purpose Node") and has responsibility for their own services and onboarded Providers. EOSC Providers³² have responsibility only for their own services. The current outline of requirements for onboarding as a provider, as presented during the EOSC Winter School (Table 1), focuses on technical criteria rather than specific functionalities related to Persistent Identifiers (PIDs) such as EOSC PID Policy compliance.

EOSC Provider vs. Node Operator

	EOSC Node Operator	EOSC Provider
Participation method	Enrolled into the EOSC Federation	Onboarded to an EOSC Node
Compliance to EOSC Federation level policies	Yes	Yes
Has its own policies	Acceptable Use Policy, User Access Policy, Privacy Statements	User Access Policy, Privacy Statement
Entry point	To the entire EOSC Federation	To the particular service/data of the Provider
Onboarding capability	May be able to onboard third-party EOSC Providers (if not a "single purpose Node")	No onboarding capability (may use underlying providers to offer the service)
Representation	Representing the EOSC Federation	Representing its own services
Responsibility	Responsibility for their own services and onboarded Providers	Responsibility only for their own services
Awareness	Awareness of all the other EOSC Nodes and their services in the Federation	Awareness of its own services and perhaps the other services of its EOSC Node
Main value proposition	Unique features of the Node: geolocation, discipline, service/data portfolio, user community	Unique feature of the services/data sets, use cases, impact, etc.
Cost of operations	Operations of its own native services and the middleware capabilities for onboarded Providers. (May also contribute to the core federating capabilities of the EOSC Federation)	Operations of their own services plus connecting to its EOSC Node middleware (core)
Technical capabilities	Core federating capabilities interoperating with other EOSC Nodes.	Interoperating with the minimum required core capabilities of its EOSC Node
Access to INFRAEOSC funding	Yes	Yes

Table 1. Source: Updates to the EOSC EU Node, Peter Szegedi, European Commission³³

3.2 Measuring EOSC PID Policy Compliance

One of the components developed within the FAIRCORE4EOSC project³⁴ is the Compliance Assessment Toolkit (CAT). The CAT has been developed to measure compliance for a range of policies, but the initial implementation is for the EOSC PID policy (as published in 2020). The CAT assessment of the EOSC PID Policy has provided suggestions to update the policy. These

³⁰ <https://eosc.eu/wp-content/uploads/2025/01/1.-2025-EOSC-Winter-School-Opening-Session.pdf>

³¹ The EOSC Federation Handbook defines this role as "EOSC Node Host: the legal entity representing an EOSC Node, and entering into the EOSC Collaboration Agreement".

³² The EOSC Federation Handbook defines this role as "EOSC Resource Provider: an organisation making a Resource available to the EOSC Federation, the resource is then called an EOSC Federation Resource and becomes part of the EOSC Node Exchange and of the overall EOSC Exchange".

³³ <https://eosc.eu/wp-content/uploads/2025/01/1.-2025-EOSC-Winter-School-Opening-Session.pdf>

³⁴ <https://faircore4eosc.eu/>

suggestions have been discussed with the members of the former EOSC PID Policy & Implementation Task Force, which has incorporated some of the feedback provided into a proposed update of the document that is currently being reviewed by the OA PIDs 101 Expert Group³⁵.

The EOSC PID Policy is a document that specifies policies for a spectrum of actors within the EOSC PID ecosystem. The CAT has broken these down into separate questionnaires aimed at specific actors (i.e. end user, service provider, authority, etc). Actors can then answer the relevant questionnaire to measure and demonstrate their compliance while citing supporting documentation and links.

By streamlining and standardizing the process of demonstrating compliance, the CAT makes the adoption of compliant PID services becomes much easier. The tool also offers support in the long term for maintaining compliance within this rapidly changing landscape. Should there be updates of the EOSC PID Policy published or actor's services or internal policies change, one can simply "update" their responses and still maintain a stable link (or PID) to their current level of compliance thanks to the CAT's sister application, the Knowledge Base (KB).

The KB was created to consolidate and offer oversight to the EOSC PID landscape. It supports all members of the PID community by providing a searchable and filterable database of up-to-date and fine-grained information about the PID landscape. Initially, the database was populated by scraping publicly available information, but the platform offers the option for actors to "take ownership" of the information to maintain the highest levels of accuracy. PID service providers and users are able to directly refer to the KB for up-to-date information on services offered and compliance. Populating the KB will increase trust in this system to a broader public by creating a source of reliable, up-to-date information on PID services and their usage.

Currently, it is unclear whether FAIRCORE4EOSC components such as the CAT and KB will be integrated into the EOSC Nodes. The EUDAT suite of services are most likely going to form their own EOSC Node within the EOSC Federation. Suggestions to integrate the CAT as part of the EUDAT infrastructure have been made, but this has not yet been escalated or confirmed. The more realistic scenario for the near future is to test the integration of the CAT service in the EOSC Core Innovation Sandbox³⁶, which is a testbed equipped with advanced automation tools designed for the testing and validation of EOSC services. The Sandbox serves two primary purposes: prototyping enhanced and new EOSC Core services and allowing providers to validate their integration with the EOSC before deploying services into production. The EOSC Beyond project is responsible for offering the EOSC Core Innovation Sandbox, which offers the possibility to pilot integrations with the state-of-the-art EOSC Core components and services.

3.3 Lessons learned from the PID Implementation Program

³⁵ For more information please refer to Hugo, W., Steinhoff, W., Turner, D., Buys, M., & Zamani, T. (2023). D2.1 Compliance Assessment Specification. Zenodo. <https://doi.org/10.5281/zenodo.10067253>

³⁶ <https://www.eosc-beyond.eu/service/eosc-core-innovation-sandbox>

FAIR-IMPACT's support action "Creating EOSC compliant Persistent Identifier (PID) policies"³⁷ helped participating organisations to complete self-assessments with regard to their PID policy readiness through the use of FAIRCORE4EOSC's CAT service³⁸. The CAT strives to encode, record, and query compliance with the EOSC PID policy. The support action did not focus on a specific PID type, but rather provided general best practice guidelines on the creation and assessment of PID policies.

During this support action, participants gained knowledge on the overall PID ecosystem and responsibilities related to their role in it (e.g. as a PID provider or PID Manager). A common piece of feedback from participants in the support action was that the CAT provides a valuable way to track compliance status and measure progress toward meeting EOSC requirements. Many appreciated that CAT offers a structured framework for evaluating alignment with key standards and policies, making it easier to identify gaps and areas for improvement. A PID Service provider participated in the support action: **RAISE³⁹ provider of RAI IDs. As per their feedback** "going through the assessment and discussions with other participants helped to formulate their own PID policy, usage policy and other documentation specially beyond technical aspects, as governance and sustainability"⁴⁰.

3.4 Consultation of PID Service Providers

We conducted a survey to better understand the perspectives of PID service providers on offering services through EOSC, the EOSC PID policy, and communication with EOSC. A total of 12 providers responded, sharing valuable feedback on these key areas, which help shape the recommendations for the long-term vision of PIDs across EOSC.

Offering services through EOSC

We asked PID providers what they need from EOSC to actively participate as PID providers. 91% of respondents indicated that they need documentation and guidelines, 75% financial support or funding opportunities, 41% regular communication and updates, and 25% technical infrastructure. Other comments included the need for certification, agreed standards and policies on PIDs, the need for a better understanding on expectations and obligations, benefits of participations and time investment, and type of integrations possible.

Graphic 1: Question 1 results.

³⁷<https://fair-impact.eu/support-offer-2-creating-eosc-compliant-persistent-identifier-pid-policies>

³⁸<https://faircore4eosc.eu/eosc-core-components/compliance-assessment-toolkit-cat>

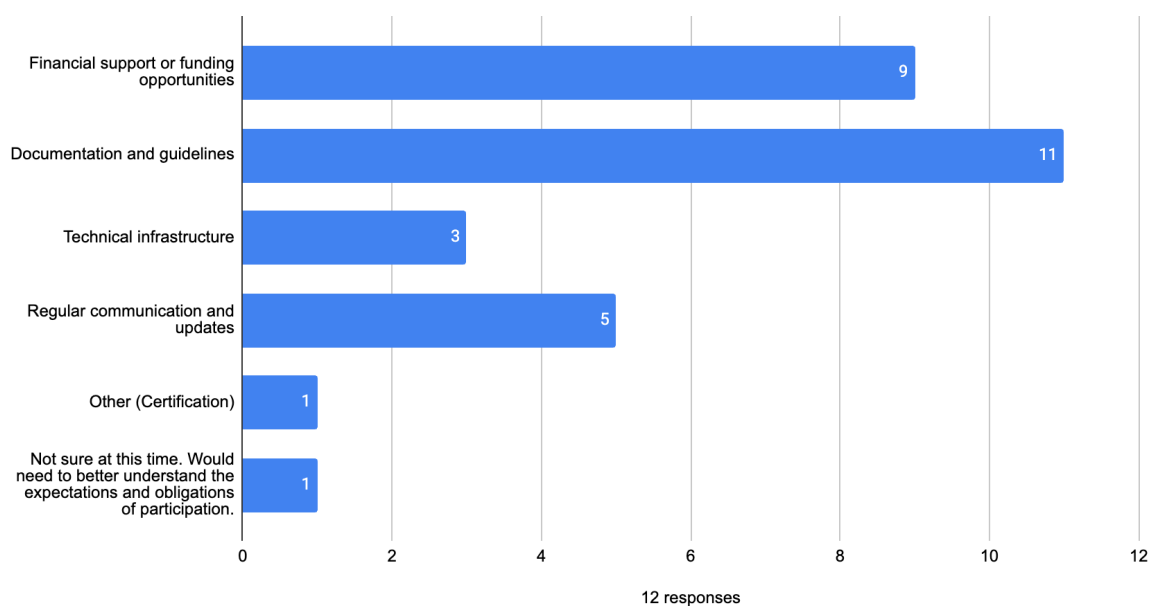
³⁹<https://raise-science.eu/>

⁴⁰ Konstantinidis, E., Epelde, G., & Makridou, I. (2025, March 21). Towards making the Research Analysis Identifier (RAI ID) EOSC PID policy compliant. Zenodo. <https://doi.org/10.5281/zenodo.15065669>

What do you need from the European Open Science Cloud (EOSC) to actively participate as a PID provider? Select all that apply.

12 responses

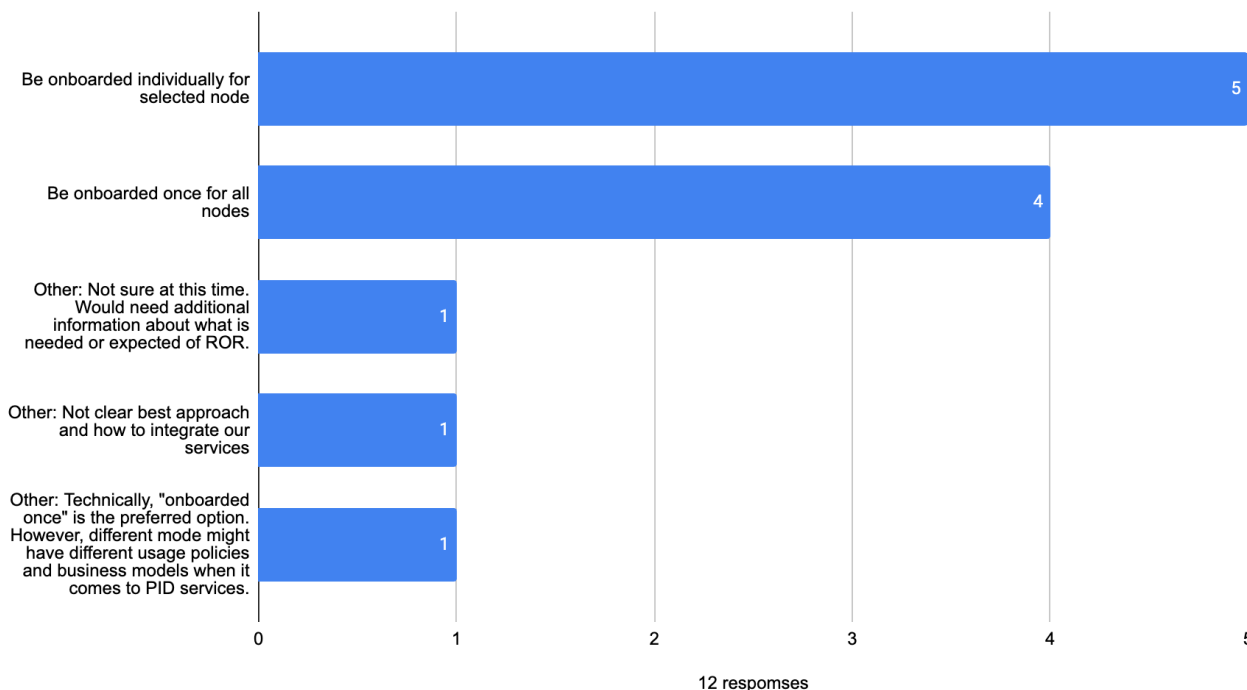
What do you need from the European Open Science Cloud (EOSC) to actively participate as a PID provider? Select all that apply.



When asked how they would prefer to participate in the EOSC Nodes, 5 of 12 respondents prefer to be onboarded individually, 4 prefer to be onboarded once for all nodes, and 3 respondents expressed uncertainty.

Graphic 2: Question 2 results.

How would you prefer to engage with EOSC Nodes?



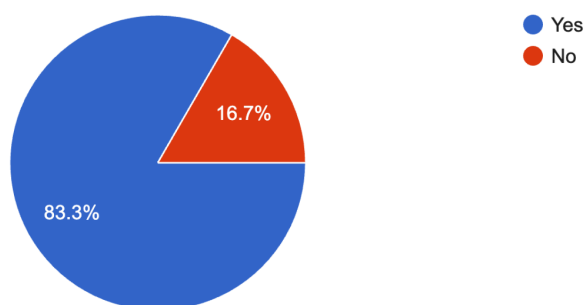
EOSC PID Policy

Most respondents, 10 out of 12 are aware of the EOSC PID Policy while only 2 are unaware.

Graphic 3: Question 3 results.

Are you aware of the EOSC Persistent Identifier (PID) Policy?

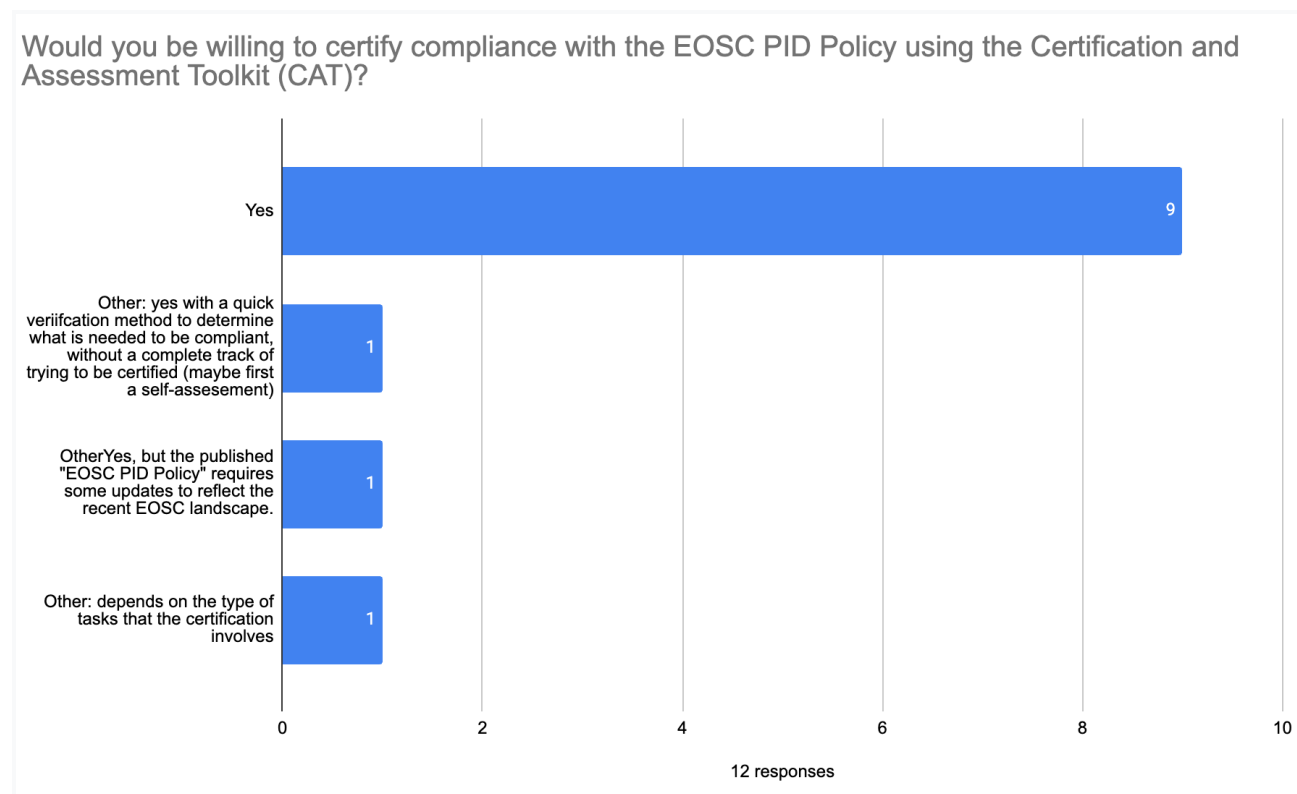
12 responses



When asked about their willingness to certify compliance with the EOSC PID Policy using the CAT, 9 out of 12 respondents answered with "yes", 2 answered "yes" with reservations such

as “depends on the types of tasks the certifications involves” and “ the published "EOSC PID Policy" requires some updates to reflect the recent EOSC landscape” and 1 answered “no”.

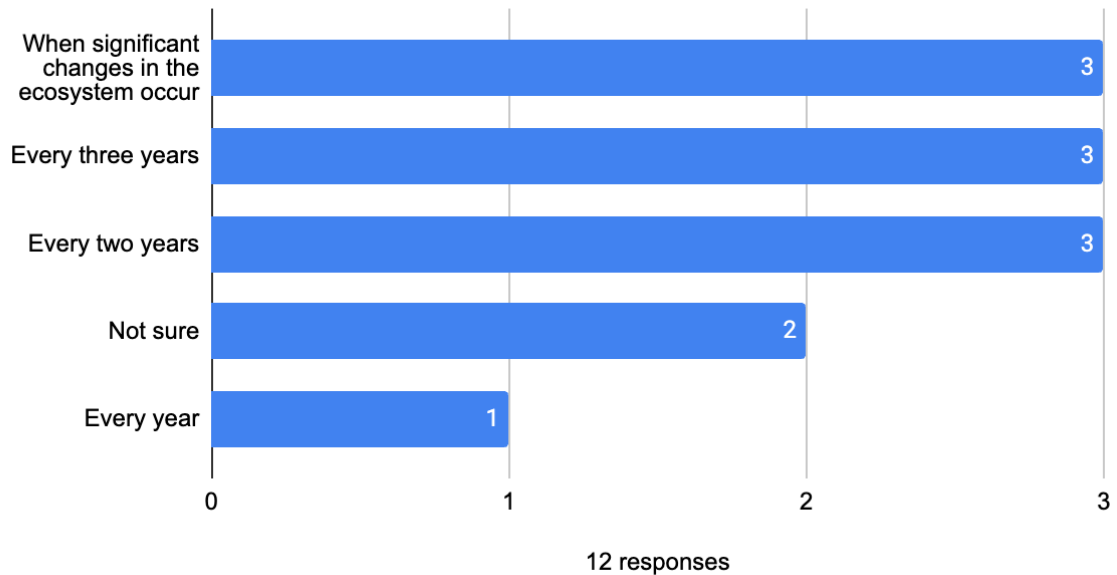
Graphic 4: Question 4 results.



There is no clear consensus on how often the EOSC PID Policy should be updated. 3 respondents indicated “every 2 years”, 3 replied “every 3 years”, 3 replied “when significant changes in the ecosystem occurred”, and the other 3 expressed uncertainty.

Graphic 5: Question 5 results.

How often should the EOSC PID Policy be reviewed or updated to remain effective?

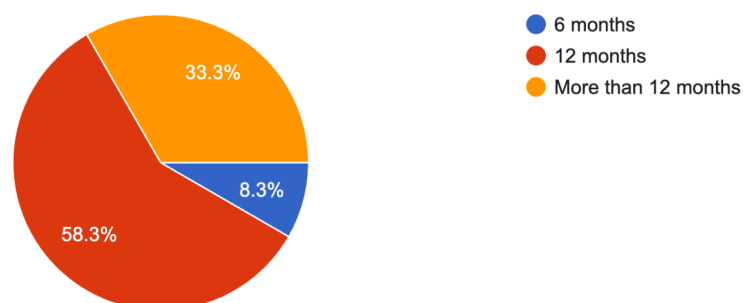


The majority of respondents, 7 of 12, indicated that they would need 1 year to implement changes resulting from updates to the EOSC PID Policy, 4 respondents would need more than 1 year, and 1 indicated they would need 6 months.

Graphic 6: Question 6 results.

How much lead time would you require to implement changes resulting from updates to the EOSC PID Policy?

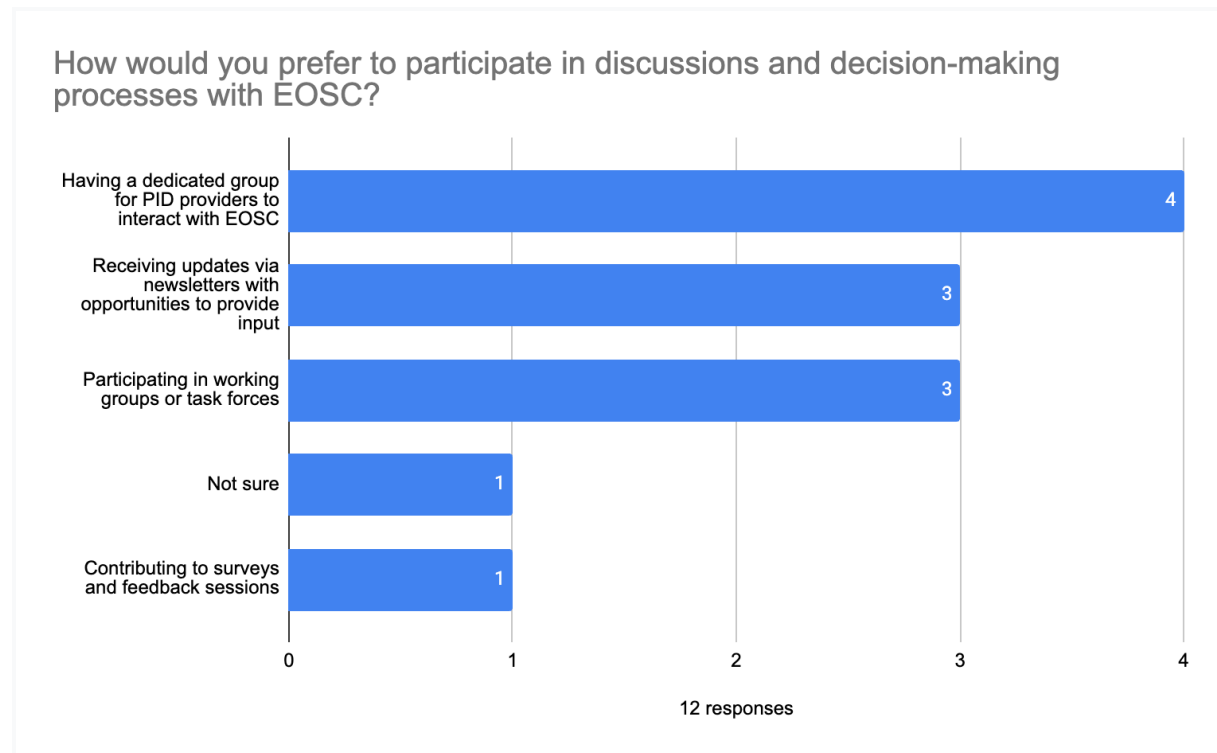
12 responses



Communicating with EOSC

When asked about their preference to engage with EOSC, 4 respondents indicated they would prefer having a dedicated group for PID providers within EOSC, 3 indicated they would participate in working groups or task forces, 3 answered they would rather receive updates through newsletters, and two expressed uncertainties.

Graphic 7: Question 7 results.



When asked about any additional feedback, the responses vary.

Graphic 8: Question 8 results.

If anything, what is currently missing or insufficient for your effective participation in EOSC?

5 responses

I was a member of the EOSC task force on PID that was disbanded last year. Since then, I have had no more interactions with EOSC apart from information sent to Observers.

a PID validator service similar to the OAI-PMH validator principle

"EOSC" as such is a continuously evolving environment. Many of the related concepts are now being worked out. Understanding (and discussing & agreeing on) the standards and the rules of participation is as crucial as communicating those details well in time. The adoption of those agreements requires resources on the PID providers' side. As most PID providers are not-for-profit organisations, dedicated financial contributions and dedicated funding may boost up PID providers' adoption processes, as well as it would help to give priorities for EOSC-related matters.

Clear API specs on resolution and expected response format. We already support globally unique, persistently resolvable identifiers and persistent target objects, but the specific requirements for EOSC interop is a bit unclear.

My own time availability 😞

Overall the survey results show the importance of guidelines, documentation, financial support, and structured communication when integrating PID providers into EOSC. While most providers are aware of the EOSC PID Policy and willing to certify compliance, most would need at least a year to implement any updates should the policy be updated. Many PID provider organizations are non profit organizations that depend on public funding and have limited resources. While most respondents would be willing to use the CAT to certify compliance, there are still some uncertainties on what this would imply, and the same goes for being onboarded into EOSC nodes. Preferences for engagement mechanisms also vary, but there is support from PID providers to interact with EOSC through dedicated working groups. These insights provide a good foundation for the long-term vision for PIDs in EOSC and ensure that providers can effectively contribute to and benefit from the ecosystem.

4. Recommendations

Coordination mechanism between EOSC and PID Service Providers

To achieve effective coordination between the EOSC and PID service providers (established and new), a well-defined, flexible, and sustainable coordination mechanism is needed. A coordination mechanism between the EOSC and PID Providers should embody certain characteristics to operate effectively. These include transparency, open communication, and flexibility to adapt to the evolving research landscape. Additionally, the mechanism should ensure knowledge sharing and accountability. By encompassing these characteristics, the mechanism can facilitate collaboration, advance open research, and promote FAIRness within the European research community. In a previous milestone report,⁴¹ we proposed that the coordination be led by the EOSC Association, leveraging existing mechanisms such as the EOSC PID Policy and Implementation Task Force, bringing all stakeholders mentioned above into the task force. As previously noted, in 2024 the EOSC PID Task Force was discontinued and replaced with the EOSC Expert Group OA1: PIDs. This group could serve as a dedicated group to coordinate collaboration between PID service providers and EOSC, ensuring its effective implementation and operation.

Encourage adoption of community governed sustainable PID infrastructures

Community-governed PID infrastructures ensure transparency, inclusion, and alignment with the needs of the research ecosystem. Unlike proprietary solutions, they allow the research community to define policies, standards, and strategic directions. Long-term availability and persistence of PIDs require infrastructures with stable funding models and governance structures that prioritize the scholarly community's interests rather than commercial objectives. A federated research infrastructure like EOSC benefits from PIDs that are developed and maintained collectively by the research community. As noted on Graphic 1 (page 15) most of the PID providers consulted indicated the need for funding or financial opportunities to actively participate in EOSC.

This recommendation aligns with the EOSC PID Policy criteria that states that *"PID Service Providers should apply appropriate community governance to ensure that their PID Services and Systems adhere to these policies and are agile and responsive to the needs of research, Open Science, and EOSC. As such, the active EU research community needs to be represented in the governance structure to be able to influence the activities and business models."*⁴²

⁴¹ Mejias, G., Cousijn, H., Marjamaa-Mankinen, L., Nordling, J., van Lieshout, N., & Gonzalez-Beltran, A. (2023). M3.2 - Proposal for an EOSC PID Service providers coordination mechanism. Zenodo. <https://doi.org/10.5281/zenodo.8405818>

⁴² European Commission: Directorate-General for Research and Innovation, EOSC Executive Board, Hellström, M., Heughebaert, A., Kotarski, R. et al., A Persistent Identifier (PID) policy for the European Open Science Cloud (EOSC), Publications Office, 2020, <https://data.europa.eu/doi/10.2777/926037>

Furthermore, this recommendation was also discussed during the EOSC Winter School 2024⁴³, reinforcing the importance of community-led governance in ensuring the long-term sustainability and responsiveness of PID infrastructures within EOSC.

Fund and enforce adoption of existing PID systems that are aligned with the EOSC PID policy

Globally adopted PID systems have stable governance, funding models, and broad community support. Supporting and enforcing their adoption within EOSC strengthens integration with international research infrastructures, facilitating seamless data linking and reuse.

The proliferation of redundant PIDs can lead to fragmentation, interoperability challenges, and inefficiencies in the research ecosystem. EOSC should prioritise the use of well-established, widely adopted PIDs rather than creating new identifiers when suitable solutions already exist.

Many existing, sustainable, and globally recognized PID systems already meet the EOSC PID Policy criteria, including requirements for persistence, open governance, and interoperability. These established infrastructures are widely used by the research community and have proven governance models that ensure long-term sustainability.

As discussed during the EOSC Winter School 2024, before funding the development of new PID systems, the KB should be consulted to determine whether a PID already exists for the intended use case. This ensures that resources are efficiently allocated and that efforts build on existing infrastructure rather than creating unnecessary alternatives. This does not preclude the development of new PIDs, providers, or use cases but ensures consideration and awareness of the PID landscape and reduces unnecessary duplication.

Include the CAT and KB as part of the onboarding process for PID service providers into EOSC Nodes

The Compliance Assessment Tool (CAT) provides a structured framework to evaluate whether PID service providers adhere to the EOSC PID Policy. By incorporating CAT into the onboarding process, EOSC Nodes can ensure that only PID services meeting policy criteria—such as persistence, open governance, and interoperability—are integrated into the ecosystem.

The KB serves as a comprehensive resource for identifying existing PID services and their use cases. Including it in the onboarding process helps prevent duplication by ensuring that new providers are not introducing PIDs for domains where established, widely adopted solutions already exist. This aligns with EOSC's goal of avoiding fragmentation and reinforcing interoperability across research infrastructures.

⁴³ <https://eosc.eu/eosc-focus-project/winter-school-2024/>

Mandating these tools in the onboarding process ensures that EOSC funding and efforts are directed toward improving and scaling sustainable PID services rather than duplicating efforts. This maximises the value of investments and reduces inefficiencies in the ecosystem.

The EOSC PID Policy is fundamental for the long-term integration of PIDs across EOSC and should be officially adopted by EOSC

The EOSC PID Policy establishes the foundational principles necessary to ensure that Persistent Identifiers (PIDs) within EOSC are persistent, interoperable, and governed by open and community-driven frameworks. To successfully implement this policy, the EOSC Association must endorse and clearly define the policy governance. This means that an organization or stakeholder officially supports and commits to adopting the principles and recommendations outlined in the policy, specifying the mechanisms for compliance certification, monitoring, and enforcement, ensuring that PID providers recognize the policy as an authoritative standard within EOSC. Official adoption of this policy by EOSC is crucial for maintaining a consistent, federated approach to PIDs across the ecosystem.

5. Conclusions and next steps

The report highlights the crucial role of Persistent Identifiers (PIDs) in achieving the objectives of the European Open Science Cloud (EOSC) and ensuring the Findability, Accessibility, Interoperability, and Reusability (FAIR) of research outputs. It outlines progress in PID integration, governance, compliance assessment, and community engagement, emphasising the need for sustainable, community-driven PID infrastructures.

The report highlights the need for a structured coordination mechanism between EOSC and PID service providers to enhance interoperability and governance. It emphasises the importance of leveraging existing, globally recognised PIDs rather than creating new ones, thereby minimising fragmentation. Additionally, tools such as the CAT and the KB are recognised for their value in assessing PID service compliance and reducing redundancy.

To advance these efforts, the next steps involve establishing a formal coordination mechanism for PID service providers within EOSC and integrating CAT and the KB into the EOSC PID onboarding process. Ensuring the formal adoption and enforcement of the EOSC PID Policy is also a priority. Furthermore, promoting financial and technical support for sustainable, community-governed PID infrastructures will be essential. Finally, enhancing communication channels between EOSC and PID service providers through working groups and structured engagement will facilitate greater collaboration and alignment across the ecosystem.