

EOSC-A PID Policy and Implementation Task Force draft report:

# Mapping current PID-related activities in the EOSC context (A landscape analysis of PID activities)

19 February 2024

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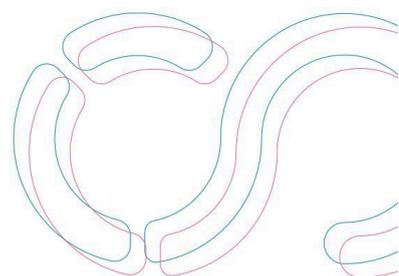
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## Abstract

This report collects an inventory of PID types that could be the primary focus for EOSC and a list of PID-related projects and providers with the goal of helping PID-interested adopters get started using PID in the context of EOSC. The 'PID Policy and Implementation' Task Force of the EOSC Association has set up a dedicated focus group (Focus Group "A") with the goal of making an inventory of current PID-related activities in the EOSC context and specifically to listing existing PID types and PID-related projects.

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This report is a living document that should be updated regularly based on the technological advances, the EOSC maturation and the increasing understanding of the PID usage cases.

The report builds on previous PID landscape analysis and, thus, provides not only an up-to-date snapshot of the current PID landscape but also a mechanism to assess what PID domains are evolving more quickly.

#### *Status of this document*

The ‘PID Policy and Implementation’ Task Force of the EOSC Association used this document as input for its work.

The living document was revised in Q2/2023 and Q1/2024 by a focus group of the Task Force.

This version is a snapshot of the ‘living document’ as of Q1/2024. This version was reviewed by the “Quality Review Committee (QRC)” of the EOSC Association, and it is being published as an official outcome of the “EOSC-A PID Policy and Implementation Task Force”.

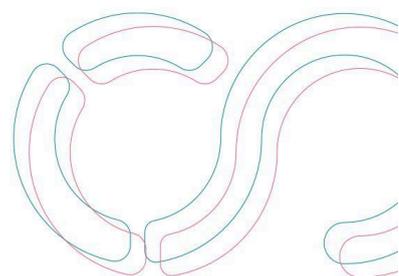
#### *How to read this document*

**Section 1** contains a quick description of the goals and working methodology of the Focus Group. **Section 2** lists PID types to consider with pointers to specific documentation that describes how to start using that particular PID type. **Section 3** contains the collection of PID-related projects, infrastructures, organisations and service providers that are active in the EOSC context or where more exchange with EOSC would be valuable.

#### *Current and previous versions:*

Latest version: This version is the latest version of the document.

Previous version: Previous drafts (revisions) are not available publicly.



## Section 1. Introduction

The 'PID Policy and Implementation' Task Force of the EOSC Association has set up a dedicated focus group (Focus Group "A") with the goal of making an inventory of current PID-related activities in the EOSC context and specifically to listing existing PID types and PID-related projects that could be of interest to EOSC or are already part of it.

This report collects the output of the focus group work and is shared with the whole TF-PID with the goal of assessing the usefulness of the approach and increasing the set of data collected and their correctness.

### Working methodology

The Task Force members contributed to this report by:

1. **Reviewing the overall structure of the report.** Are there missing pieces? Is there anything you think is needed for the intended future use of the report (as detailed in the next section and in the conclusions)?
2. **Reviewing the list of PID types.** Is there any type of PID missing? Is there any type that you judge not interesting for a research environment like EOSC? The greyed-out types are the ones that are defunct or unsuitable for this inventory. Do you think another column about PID Graph classification (see below) could help? Are all the entries PID types, or are some of them PID providers that add services to the PID?
3. **Reviewing the collection of PID-related projects.** Is there any project, study, or service missing from the list? Is there any entry that seems inappropriate or not interesting for EOSC? If possible, put your name in the *Who will update info* column for the projects you know.
4. **Adding previous works to the related section.** Do you know any work that shows the continuity of this effort with the overall EOSC project?

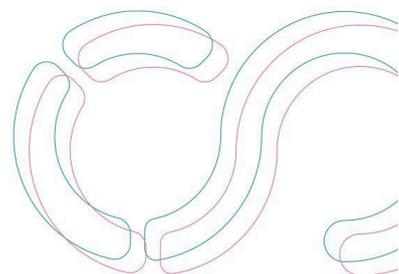
### Report overview

In the report, we collected:

1. A subset of PID types that could be the primary focus for EOSC;
2. A list of PID-related projects, infrastructures, organisations, and service providers.

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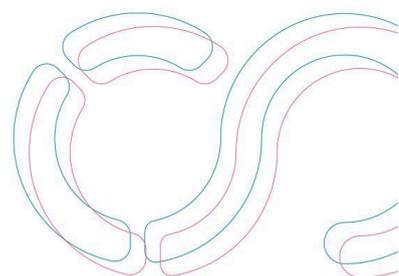
We devise these lists to help PID-interested adopters get started using PID in the context of EOSC.

This report is a living document that should be updated regularly based on technological advances, the EOSC maturation, and the increasing understanding of the PID usage cases.

The report builds on the PID landscape analysis [previously conducted](#) by initiatives like the EU-funded H2020 [FREYA project](#). The concept of PID Graph that the FREYA project [introduced](#) keeps maturing, and this report aims to update previous PID landscape analysis – including on levels of maturity for specific PIDs – like the one provided by the *Patterns* paper published in Jan 2021 under the title [“Connected Research: The Potential of the PID Graph”](#). The report will thus provide not only an up-to-date snapshot of the current PID landscape but also a mechanism to assess what PID domains are evolving more quickly.

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## Section 2. Inventory of PID types

The goal of this part is to collect the PID types that could be of interest to EOSC and relevant in a research context. The current list can be found below.

The table columns have the following meaning:

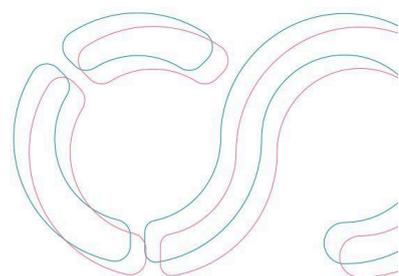
<b>Short Name</b>	The short name or acronym of the PID type
<b>Long Name</b>	Long English name of the PID type
<b>Official page</b>	Official page of the PID type
<b>Maturity</b>	Maturity level of the PID type (Ignore, emerging, mature as described below)
<b>Globally resolvable</b>	Mark if a global resolver for this PID exists
<b>For which object type</b>	Some PID types are specific for one or more object kinds
<b>Comment</b>	Anything that does not fit in the other columns

The list is not exhaustive and should be updated as the TF proceeds. To start the analysis, many PID types have been added to the list, even if they do not satisfy the criteria for inclusion listed here and detailed below:

1. True persistent identifier
2. Active at a high level of maturity
3. Globally resolvable
4. Satisfying the FAIR requirements, that is, providing support for metadata
5. Useful for Open Science

Note that the “For which object type” column is a first attempt to have PID Types classified by categories within the PID Graph, i.e., author PIDs, OrgIDs, grantIDs, PIDs for research outputs, etc.

Manifestations of the same identifier are included in the table if providers use different metadata schemas or address different communities.



Short name	Long name	Official page	Maturity	Globally resolvable	For which object type	Comments
<b>ADSBibcode</b>	Astrophysics Data System - Bibliographic Reference Code	<a href="https://ui.adsabs.harvard.edu/">https://ui.adsabs.harvard.edu/</a>	Mature	Needs token	Publication	
<b>ARK</b>	Archival Resource Key	<a href="https://arks.org/">https://arks.org/</a> ; see also N2T resolver	Mature	Yes	Other (in comments)	Everything (but you need to know which resolver is responsible for your ARK)
<b>arXiv</b>	arXiv identifier scheme	<a href="https://arxiv.org/">https://arxiv.org/</a>	Mature	Yes	Publication	
<b>ASIN</b>	Amazon Standard Identification Number	<a href="https://sellercentral.amazon.ca/gp/help/external/200317470?language=en-CA&amp;ref=mpbc_200576730_cont_200317470">https://sellercentral.amazon.ca/gp/help/external/200317470?language=en-CA&amp;ref=mpbc_200576730_cont_200317470</a>	Ignore	Yes	Other (in comments)	Things sold by Amazon
<b>ConfIDent</b>	Conference identifier	<a href="https://indico.cern.ch/event/780651/attachments/1776614/2888642/Conference_PIDs_and_Crossmark.pdf">https://indico.cern.ch/event/780651/attachments/1776614/2888642/Conference_PIDs_and_Crossmark.pdf</a>	TBD	Yes	Event	Project, TIB Hannover, RWTH Aachen, et al. The beta version launched in June 2022
<b>Crossref DOI</b>	Articles registry	<a href="https://www.crossref.org/">https://www.crossref.org/</a>	Mature	Yes	Publication	It is DOI plus metadata plus services. For published objects. Several schemes are possible.
<b>Crossref_funders</b>	Crossref Funder Registry	<a href="https://www.crossref.org/services/content-registration/grants/">https://www.crossref.org/services/content-registration/grants/</a>	Mature	Yes	Organisation	
<b>Crossref_grants</b>	Registering research grants	<a href="https://www.crossref.org/documentation/research-nexus/grants/">https://www.crossref.org/documentation/research-nexus/grants/</a>	Emerging		Other (in comments)	Grants
<b>DataCite DOI</b>	DOI of the International Data Citation Initiative	<a href="https://datacite.org/">https://datacite.org/</a>	Mature	Yes	Other (in comments)	DOI provider with predefined schemas. 28 different resources and outputs
<b>DEIMS.ID</b>	ID of the Dynamic Ecological Information Management System	<a href="https://deims.org/docs/deimssid.html">https://deims.org/docs/deimssid.html</a>	TBD	Yes	Other (in comments)	DEIMS.ID is an identifier for a registered site
<b>DOI</b>	Digital Object Identifier	<a href="https://www.doi.org/">https://www.doi.org/</a>	Mature	Yes	Publication	Services supporting PIDs and metadata for 40+ resource and output types

Short name	Long name	Official page	Maturity	Globally resolvable	For which object type	Comments
EIDR	A universal unique identifier for movie and television assets	<a href="https://www.eidr.org/">https://www.eidr.org/</a>	Emerging	Yes	Other (in comments)	Movie and television assets
eISBN	Electronic International Standard Book Number	<a href="https://www.isbn-international.org/">https://www.isbn-international.org/</a>			Publication	An ISO standard
eISSN	Electronic International Standard Serial Number	<a href="http://portal.issn.org/">http://portal.issn.org/</a>	Mature	Yes	Publication	An ISO standard to identify various types of serial publications (e.g. journals, websites, blogs)
ePIC Handle	PIDs by the 'Persistent Identifier Consortium for eResearch'	<a href="https://pidconsortium.net/">https://pidconsortium.net/</a>	Mature	Yes	Other (in comments)	Everything (generic purpose PIDs with free metadata). Additional services to support PID replication, PID types, etc.
GRID	Global Research Identifier Database	<a href="https://www.grid.ac/">https://www.grid.ac/</a>	Closed	-	Organisation	In 2021, GRID passed the torch to ROR for being the community-driven research organisation identifier.
Handle	Handle	<a href="http://www.handle.net/">http://www.handle.net/</a>	Mature	Yes	Dataset	Handle is the open-source technology supporting DOI and other PIDs
IGSN	International Geo Sample Number	<a href="https://www.igsn.org/">https://www.igsn.org/</a>	Mature	Yes	Other (in comments)	Physical Samples and Sampling Features An IGSN-DataCite Working Group is elaborating the metadata set: <a href="https://support.datacite.org/docs/igsn-id-metadata">https://support.datacite.org/docs/igsn-id-metadata</a>
ISAN	International Standard Audiovisual Number	<a href="https://www.isan.org/">https://www.isan.org/</a>	Mature	Yes	Other (in comments)	<b>ISAN</b> is ordered by <b>ISO Standard, 15706-1&amp;2</b> . An ISAN may be applied to <b>all types of audiovisual works</b> e.g. motion pictures and short films, trailers, video games, etc
ISBN	International Standard Book Number	<a href="https://www.isbn-international.org/">https://www.isbn-international.org/</a>	Mature		Publication	An ISO standard

Short name	Long name	Official page	Maturity	Globally resolvable	For which object type	Comments
ISCC	International Standard Content Code	<a href="https://iscc.codes/">https://iscc.codes/</a>	Emerging		Any file	Currently under standardisation with ISO
ISLI	Identifies the links between different entities	<a href="https://www.isbn-international.org/content/isli-introduction">https://www.isbn-international.org/content/isli-introduction</a>	TBD	Yes	Other (in comments)	Link bw. entities. Overridden by PID Graph?
ISMN	International Standard Music Number	<a href="https://www.ismn-international.org/">https://www.ismn-international.org/</a>	Mature	No	Publication	
ISNI	International Standard Name Identifier	<a href="https://isni.org/page/search-database/">https://isni.org/page/search-database/</a>	Mature		Person	Contributors to creative works and their distribution and organisations
ISSN	International Standard Serial Number	<a href="http://portal.issn.org/">http://portal.issn.org/</a>	Mature	Yes	Publication	Identifies various types of serial publications (e.g. journals, websites, blogs)
ISTC	International Standard Text Code		Defunct	No	Publication	Ceased in 2017
LSID	Life Sciences Identifier	<a href="http://www.lsid.info/">http://www.lsid.info/</a>	TBD	Yes	Other (in comments)	Metadata for life science items, last update 2013: <a href="https://sourceforge.net/projects/lkids/">https://sourceforge.net/projects/lkids/</a>
NBN	National Bibliography Number	<a href="https://tools.ietf.org/html/rfc8458">https://tools.ietf.org/html/rfc8458</a> ; linked to URN	Mature			Group of publication identifier systems used by national libraries when documents do not have a publisher-assigned identifier
ORCID	Open Researcher and Contributor ID	<a href="https://orcid.org/">https://orcid.org/</a>	Emerging	Yes	Person	
PIC	(EC) partner identity code	<a href="https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/support/faq/1055">https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/support/faq/1055</a>	TBD			
PIDINST	Identifier for instruments	<a href="https://rda-pidinst.readthedocs.io/en/latest/">https://rda-pidinst.readthedocs.io/en/latest/</a>	Emerging	Yes	Instrument	
PMID	PubMed ID	<a href="https://pubmed.ncbi.nlm.nih.gov/">https://pubmed.ncbi.nlm.nih.gov/</a>	Mature		Publication	
PURL	Persistent Uniform Resource Locator	<a href="https://purl.prod.archive.org/help">https://purl.prod.archive.org/help</a>	Mature	Yes	Other (in comments)	Resources on the Web

Short name	Long name	Official page	Maturity	Globally resolvable	For which object type	Comments
QID	Wikidata identifier	<a href="https://www.wikidata.org/wiki/Wikidata:Identifiers">https://www.wikidata.org/wiki/Wikidata:Identifiers</a>	Mature		Other (in comments)	Knowledge item
RAI ID	Research Analysis Identifier SystEm (RAISE)	<a href="https://raise-science.eu/">https://raise-science.eu/</a>	Emerging			RAISE
RAiD	Research Activity Identifier (RAiD)	<a href="https://www.raid.org.au/">https://www.raid.org.au/</a>	Emerging	Needs token	Other (in comments)	Research projects
Ringgold	Unique numerical identifier applied to organisations in the scholarly supply chain	<a href="https://www.ringgold.com/">https://www.ringgold.com/</a>	Mature		Organisation	
ROR	Research Organization Registry	<a href="https://ror.org/">https://ror.org/</a>	Emerging	Yes	Organisation	
RRID	Research Resource Identifier	<a href="https://scicrunch.org/resources">https://scicrunch.org/resources</a>				
ScopusAuthorID	Scopus Author ID	<a href="https://service.elsevier.com/app/answers/detail/a_id/11212/supporthub/scopus/">https://service.elsevier.com/app/answers/detail/a_id/11212/supporthub/scopus/</a>	Mature	No	Person	
SWHID	SoftWare Heritage persistent Identifiers	<a href="https://docs.softwareheritage.org/development/swh-model/persistent-identifiers.html">https://docs.softwareheritage.org/development/swh-model/persistent-identifiers.html</a>	Emerging	Local	Source Code	
UPC	Universal Product Code	<a href="https://www.gs1.org/standards/barcodes/ean-upc">https://www.gs1.org/standards/barcodes/ean-upc</a>	Ignore		Other (in comments)	Synonym of EAN13? Product identifier
URI	Uniform Resource Identifier	<a href="https://www.iana.org/assignments/uri-schemes/uri-schemes.xhtml">https://www.iana.org/assignments/uri-schemes/uri-schemes.xhtml</a>	Mature			<a href="https://www.w3.org/TR/uri-clarification/">https://www.w3.org/TR/uri-clarification/</a>
URL	Uniform Resource Locator	<a href="https://url.spec.whatwg.org/">https://url.spec.whatwg.org/</a>	Mature			<a href="#">Uniform Resource Locators were defined in RFC 1738</a>

Short name	Long name	Official page	Maturity	Globally resolvable	For which object type	Comments
URN	Uniform Resource Name	<a href="https://www.iana.org/assignments/urn-namespaces/urn-namespaces.xhtml">https://www.iana.org/assignments/urn-namespaces/urn-namespaces.xhtml</a>	Mature	Yes	Other (in comments)	The URN identifier is specified in the Internet standards of the IETF (Internet Engineering Task Force). It is used, e.g., for European Corona Vaccination certificates, and can be used to make ISBNs and LSIDs globally resolvable, which are applied most often to datasets, publications, and semantic objects. ISBN numbers are used as part of a URN identifier, which is specified in RFC 3187, ISSN numbers in RFC 3044, and NBN numbers in RFC 3188. URN syntax is specified in RFC 2141. See e.g.: <a href="https://www.kiwi.fi/display/URN/In+English">https://www.kiwi.fi/display/URN/In+English</a> or <a href="https://en.wikipedia.org/wiki/Uniform_Resource_Name">https://en.wikipedia.org/wiki/Uniform_Resource_Name</a>
VAT-number	VAT number	<a href="http://ec.europa.eu/taxation_customs/vies/vatRequest.html">http://ec.europa.eu/taxation_customs/vies/vatRequest.html</a>	Mature		Organisation	Identifies companies not identified as research organisations
zbMATH	A PID for individuals and outputs	<a href="https://www.wikidata.org/wiki/Property:P1556">https://www.wikidata.org/wiki/Property:P1556</a> <a href="https://www.wikidata.org/wiki/Property:P894">https://www.wikidata.org/wiki/Property:P894</a>	Emerging		Person	

## The inclusion criteria

### True persistent identifier

The first criterion is that the identifier should be a persistent identifier and not simply an identifier.

A persistent identifier (PID) is a globally unique, long-lasting, **and** resolvable identifier. All three attributes must be met. A PID must guarantee unambiguity and long-term access to digital information by redirecting to a “landing page” or to the resource itself. It must be machine-actionable to support the Web of FAIR data and services. To give an example, URLs are unique identifiers which may break because of link rot or content drift. A persistent identifier, e.g. ARK, DOI, URN, points more reliably and more persistently to a digital entity.

### Active at a high level of maturity

In this report, three categories are used to give some useful guidance for the maturity levels:

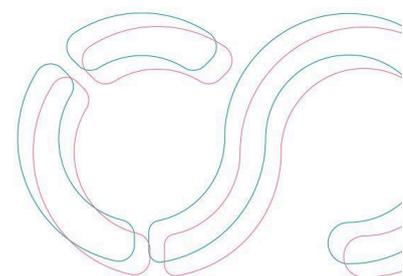
<b>Ignore</b>	–	The type exists, but either has been closed or is defunct, or it is a simple identifier, not a PID.
<b>Emerging</b>	TRL 1 - TRL 7	Initial proposal exists or has already been implemented and used for niche use cases. Careful evaluation is needed for consideration in EOSC.
<b>Mature</b>	TRL 8 - TRL 9	The type is used in production and has a solid infrastructure.

As it is shown in the table, the evaluation is related to the TRLs<sup>1</sup>. At the beginning of the evaluation, we started using the TRLs. TRLs are a system used primarily in aerospace and technology development to assess the maturity level of a particular technology. The TRLs range from TRL 1 (conceptualisation) to TRL 9 (full operational deployment). The set of TRLs was too detailed to be applied to evaluate PID types.

We decided to simplify the evaluation by categorising the criteria into three broad levels: Ignore, Emerging, and Mature. This simplification helps to streamline the evaluation process and make it more applicable to a wider range of technologies and projects. By categorising technologies into these broad levels, the focus lies on whether a technology is too early in development to consider (Ignore), still in the emerging stages but potentially promising (Emerging), or fully developed and ready for implementation (Mature). This approach can

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<sup>1</sup> Technology Readiness Levels (TRLs) are a type of measurement system used to assess the maturity level of a particular technology. TRL has been devised [by NASA](#). There are nine technology readiness levels: TRL 1 is the lowest, and TRL 9 is the highest.



provide a clearer framework to evaluate the readiness and suitability of technologies for inclusion.

### Globally resolvable

PID resolution is a process of turning the PID string into information about the digital object or the digital object itself and getting associated metadata. The resolution is crucial, and therefore it is usually part of all generic PID platforms.

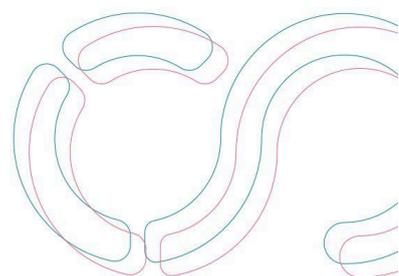
The resolution approaches can be defined in different ways – cases with and without a global resolver exist. For any interconnected research activities, the globally resolvable PIDs are important. This is only the case when a resolver service is globally reachable, the resolution process follows agreed standards, and the resolution service is known to the users. Without these, hidden PIDs might exist that cannot be resolved.

### Satisfying the FAIR requirements

Besides being a persistent identifier, the PID type should provide support for flexible metadata that can evolve.

### Useful for Open Science

The PID type should refer to the kind of objects of interest to open science.



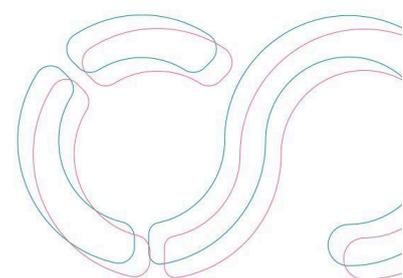
## Section 3. Collection of PID-related projects, infrastructures, organisations and service providers

The task force members collected information on PID-related projects, infrastructures, organisations, and service providers that are either already integrated into the European Open Science Cloud (EOSC) or could potentially be of interest to it.

The list focuses on the activities that task force members are involved in, cooperate with or are representatives of the relevant organisations. This ensures that the information gathered is not only detailed but also reflects firsthand knowledge and expertise in the field of Persistent Identifiers (PIDs) and their integration within the European Open Science Cloud (EOSC) ecosystem.

The columns have the following meanings:

<b>Name</b>	Name of the PID-related project, infrastructures, organisations, providers
<b>What it offers</b>	Brief description of the project. If a more extensive description is needed, add a link in the Comments/References field
<b>Type</b>	Type of the project (e.g. Infrastructure, Service, Study)
<b>Running or not</b>	Whether the project is running or has ended
<b>Ends</b>	When the project ends
<b>PID Provider system?</b>	Which PID provider gives the PID used by the project
<b>PID type</b>	The type of the PID (from the other table)
<b>Official contact point</b>	The contact person to which official info could be requested
<b>Who will update the info</b>	Who in the TF is responsible for collecting information
<b>URL</b>	Link to the project pages
<b>Comments/References</b>	Always welcome comments.



Name	What it offers	Type	Running or not	Ends	PID type and provider system	Official contact point	Who will update info	URL	Comments/References
<b>Clarín</b>	The research infrastructure for language as social and cultural data CLARIN is a digital infrastructure offering data, tools and services to support research based on language resources.	INFRASTRUCTURE		-	Handle, DOI possible if specific requirements are met		Jozef Mišutka	<a href="https://www.clarin.eu/">https://www.clarin.eu/</a>	It is more of a use case.
<b>DONA</b>	Digital Object Interface Protocol - The Digital Object Interface Protocol (DOIP) version 2.0 specifies a standard way for clients to interact with digital objects (DOs). It is assumed that such DOs are managed by DOI Services, which we often refer to as DOIP services in this document, and that the protocol implementation is part of those services. In this context, a DOIP service itself is considered a digital object. By its very nature, a protocol is intended to enable interaction between one or more other entities running the protocol and, thus, in general, to support a specific form of process-to-process interaction in a network environment.	INFRASTRUCTURE						<a href="https://www.dona.net/specs-software-documents">https://www.dona.net/specs-software-documents</a>	
<b>ENVRI-FAIR</b>	The "data cluster" INFRA-EOSC project brings together ESFRIs from Environmental and Earth sciences to make their data services FAIR, especially focusing on ensuring machine actionable reuse of collected observational data from the RI portals through the	INFRASTRUCTURE	FINISHED	06/2023	Handle, DataCite DOI and coolURI		Maggie Hellström		

Name	What it offers	Type	Running or not	Ends	PID type and provider system	Official contact point	Who will update info	URL	Comments/References
	development of a common "ENVRI-hub" service catalogue based on interoperable metadata. ENVRI-FAIR has a project task force on identification that has worked on best practices and is also looking into PID system functionalities and typing strategies required for FAIR Digital Object framework implementation.								
<b>EOSC CZ</b>	Plans to implement a National Repository Platform as the foundation for building institutional and topical repositories in the Czech Republic. We expect this platform to handle assigning PIDs for stored datasets for the whole Czech community in 2023–2027. It will use the services of existing PID providers.	INFRASTRUCTURE	Not Yet Started	2027	Probably DOI, Handle	<a href="https://e-infra.cz/eosc/">https://e-infra.cz/eosc/</a>	Michal Růžička	<a href="https://e-infra.cz/eosc/">https://e-infra.cz/eosc/</a>	The project proposal is currently under development.
<b>ePIC</b>	ePIC was founded in 2009 by a consortium of European partners in order to provide PID services for the European Research Community, based on the handle system (TM, <a href="https://www.handle.net/">https://www.handle.net/</a> ), for the allocation and resolution of persistent identifiers. The consortium signed a Memorandum of Understanding aiming to provide long-term reliability for the PID services. Meanwhile, ePIC is an international consortium and is open to partners from the research community worldwide.	INFRASTRUCTURE			HANDLE / B2HANDLE		Mario Valle	<a href="https://www.pidconsortium.net/">https://www.pidconsortium.net/</a>	

Name	What it offers	Type	Running or not	Ends	PID type and provider system	Official contact point	Who will update info	URL	Comments/References
<b>EUDAT</b>	The EUDAT Collaborative Data Infrastructure (or EUDAT CDI) is one of the largest infrastructures of integrated data services and resources supporting research in Europe. It is sustained by a network of more than 20 European research organisations, and data and computing centres. It offers a number of services covering the data lifecycle by using PIDs (ex. Handles, DOIs) such as <a href="#">B2FIND</a> , Find research data, <a href="#">B2SHARE</a> , Store and publish research data, <a href="#">B2SAFE</a> , Keep research data safe via data management policies <a href="#">B2INST</a> , Register your instruments, <a href="#">B2HANDLE</a> , Register your research data with a persistent identifier.	INFRASTRUCTURE			HANDLE / B2HANDLE	Yann Le Franc		<a href="https://www.eudat.eu/">https://www.eudat.eu/</a>	
<b>EuroScience-Gateway</b>	Leveraging the European compute infrastructures for data-intensive research guided by FAIR principles;	INFRASTRUCTURE							
<b>EZID</b>	EZID (easy-eye-dee) makes it easy for University of California (UC) scholars and researchers to create and manage long-term, globally unique identifiers for data and sources, ensuring their future discoverability.	INFRASTRUCTURE			ARK and DOI	Albert-Ludwigs-Universität Freiburg		<a href="https://ezid.cdlib.org/">https://ezid.cdlib.org/</a>	
<b>FRIS</b>	Metadata model for research infrastructure Source: I de Bals, H Poelmans, P Dengis (2021) " <a href="#">Research infrastructures: metadata model &amp; data capturing in FRIS</a> ".	INFRASTRUCTURE				Ils De Bal			See <a href="#">extended abstract for follow-up May 31<sup>st</sup>, 2023 presentation at euroCRIS meeting</a>

Name	What it offers	Type	Running or not	Ends	PID type and provider system	Official contact point	Who will update info	URL	Comments/References
<b>INCIPIIT</b>	INCIPIIT will develop a complementary infrastructure for the low-cost attribution of persistent identifiers (PIDs) to any concept or resource based on the Archival Resource Key (ARK) scheme. <a href="https://campus.hesge.ch/id_bilingue/projekte/incipit/default.html">https://campus.hesge.ch/id_bilingue/projekte/incipit/default.html</a>	INFRASTRUCTURE						<a href="https://campus.hesge.ch/id_bilingue/projekte/incipit/default.html">https://campus.hesge.ch/id_bilingue/projekte/incipit/default.html</a>	
<b>Research Activities (RAiD)</b>	Handle PID + metadata envelope. <a href="https://www.raid.org.au/">https://www.raid.org.au/</a>	INFRASTRUCTURE			ARDC (Australian Research Data Commons)			<a href="https://ardc.edu.au/services/identifier/raid/">https://ardc.edu.au/services/identifier/raid/</a>	
<b>Research Graph</b>	Research Graph schema is an accessible meta-model for connecting research objects.	INFRASTRUCTURE						<a href="https://researchgraph.org/">https://researchgraph.org/</a>	
<b>DARIAH-PL/ Dariah.lab</b>	PID services for digital humanities and art sciences especially focused on a combination of wikidata, handle and other services.	INFRASTRUCTURE				<a href="mailto:info@lab.dariah.pl">info@lab.dariah.pl</a>	Tomasz Parkoła	<a href="https://lab.dariah.pl/">https://lab.dariah.pl/</a>	Done in the context of Polish DARIAH e-infrastructure.
<b>PIDs for samples</b>	PIDs for samples. The <a href="#">ISGN initiative</a> for minting International Geo Sample Numbers has been active for quite some time now and is a good example of a bottom-up PID initiative where researchers organise themselves to operate the PIDs they need to use (in this case, for material samples). A good summary of	ORGANISATION						<a href="https://blog.datacite.org/bringing-together-communities">https://blog.datacite.org/bringing-together-communities</a>	

Name	What it offers	Type	Running or not	Ends	PID type and provider system	Official contact point	Who will update info	URL	Comments/References
	the initiative is provided in this Data Science Journal paper dated Oct 28th, 2021, " <a href="#">Towards Globally Unique Identification of Physical Samples: Governance and Technical Implementation of the IGSN Global Sample Number</a> ". IGSN is also working with DataCite to reinforce their community-building activity; see DataCite blog, May 31st, 2021, " <a href="#">Bringing together communities: IGSN and DataCite</a> ".							<a href="#">s-igsn-and-datacite/</a>	
<b>FDO-Forum</b>	FAIR Digital Objects (FDO) bind all critical information about an entity in one place and create a new kind of actionable, meaningful and technology-independent object that pervades every aspect of life today: A technical essence of a “thing” in cyberspace.	ORGANISATION			Handle	Ulrich Schwardmann	Mario Valle	<a href="https://fairdo.org/">https://fairdo.org/</a>	
<b>FAIR-EASE</b>	FAIR Earth Sciences & Environment Services; the overall objective of FAIR-EASE is to customise and operate distributed and integrated services for observation and modelling of the Earth system, environment and biodiversity by improving their different components implemented in close cooperation with user-communities, the European Open Science Cloud (EOSC) and research infrastructures in their design and sustainable availability.	PROJECT	RUNNING	31/08/2025				<a href="https://fairease.eu/">https://fairease.eu/</a>	
<b>FREYA</b>	FREYA was a 3-year project funded by the European Commission under the Horizon 2020 programme. The	PROJECT	FINISHED	31/12/				<a href="https://www.project-fr">https://www.project-fr</a>	

Name	What it offers	Type	Running or not	Ends	PID type and provider system	Official contact point	Who will update info	URL	Comments/References
	<p>project started in December 2017 and ended in December 2020. It aimed to extend the infrastructure for persistent identifiers (PIDs) as a core component of open research, in the EU and globally. FREYA worked to improve discovery, navigation, retrieval, and access to research resources. New provenance services were developed to enable researchers to better evaluate data and make the scientific record more complete, reliable, and traceable. By engaging with the global community through the Research Data Alliance (RDA) and other research infrastructures, they worked together to realise the vision of fully accessible data. FREYA followed on from the successful THOR project.</p> <p>The three pillars of FREYA:</p> <ul style="list-style-type: none"> <li>- The PID Graph connects and integrates PID systems, creating relationships across a network of PIDs and serving as a basis for new services</li> <li>- The PID Forum promotes engagement with the global community via pidforum.org, and through organising conferences, workshops and other PID-themed events</li> <li>- The PID Commons addresses the sustainability of the PID infrastructure resulting from FREYA beyond the lifetime of the project</li> </ul>			2020				<a href="http://eva.eu/en/about/mission">eva.eu/en/about/mission</a>	

Name	What it offers	Type	Running or not	Ends	PID type and provider system	Official contact point	Who will update info	URL	Comments/References
<b>RAISE</b>	Research Analysis Identifier SystEm; aims to provide the mechanisms for a distributed crowdsourced data processing system, moving from open data to data open for processing. To do so, RAISE will attempt to adapt open data to the culture of the research community, ensuring FAIR principles.	PROJECT	RUNNING					<a href="https://raise-science.eu/">https://raise-science.eu/</a>	
<b>RIS Synergy (Austria)</b>	Subproject 1: Interfaces and Standards In order to digitise administrative processes, the IT systems of funding organisations and research institutions need to be connected, which would make it possible to improve data quality and conserve resources on all sides. New developments in the digital systems of the FWF (elane, PROF1, final project reports) offer an excellent opportunity for this.	PROJECT	RUNNING	31/03/2024		<a href="mailto:sabine.neff@tuwien.ac.at">sabine.neff@tuwien.ac.at</a>	Beate Guba	<a href="https://forschungsdate.n.at/en/ris-ueber-ris-synergy/">https://forschungsdate.n.at/en/ris-ueber-ris-synergy/</a>	
<b>RDA National PID Strategies WG</b>	An international collaborative initiative under the Research Data Alliance (RDA) banner to "coordinate and align different national PID strategies and bring together PID experts".	PROJECT	FINISHED	10/06/2023	RDA	Christopher Brown		<a href="https://www.rd-alliance.org/groups/national-pid-strategies-wg/">https://www.rd-alliance.org/groups/national-pid-strategies-wg/</a>	Updates are regularly provided and discussed at RDA Plenary meetings. National PID case studies are available for countries like Australia,

Name	What it offers	Type	Running or not	Ends	PID type and provider system	Official contact point	Who will update info	URL	Comments/References
									Canada, Finland, Korea, Netherlands, United Kingdom.
<b>Skills4EOSC</b>	Skills4EOSC ‘Skills for the European Open Science commons: creating a training ecosystem for Open and FAIR science’ is funded by the European Commission Horizon Europe programme (GA 101058527). Skills4EOSC will set up a pan-European network of competence centres to speed up the training of European researchers and harmonise the training of new professional figures for scientific data management.	PROJECT	RUNNING	08/2025		<a href="mailto:info@skills4eosc.eu">info@skills4eosc.eu</a>			
<b>FAIRCORE4EOSC</b>	Project proposal FAIRCORE4EOSC submitted to Horizon Europe call “Enabling an operational, open and FAIR EOSC ecosystem (HORIZON-INFRA-2021-EOSC-01)” last Sep (2021). With the CSC, SURF, OpenAIRE, KNAW-DANS, GDWG, DataCite, GRNET, INRIA, EUDAT and CERN being part of the consortium behind this proposal, this could be a game-changer in terms of PID adoption if accepted – which looks likely since it seems no competing proposals were submitted to this call. Note: this proposal has already been awarded funding	PROJECT	RUNNING	31/05/2025	URN, DOI, RAID, ... All?	Tommi Suominen	Tommi Suominen	<a href="https://faircore4eosc.eu/">https://faircore4eosc.eu/</a>	Internal information

Name	What it offers	Type	Running or not	Ends	PID type and provider system	Official contact point	Who will update info	URL	Comments/References
<b>DICE</b>	<p>The main goal of the Calls for DICE Service Requests is to encourage European researchers to take advantage of a set of digital storage services being made available free of charge by the European Commission. The offering includes a broad spectrum of services ranging from the familiar “personal drive storage” for individuals and small teams up to extremely sophisticated value-added facilities for long-term preservation, identification, metadata curation, and implementation of FAIR principles for data-intensive research projects. DICE-1010172017 H2020 project “<a href="#">Data infrastructure capacity for the European Open Science Cloud</a>” led by CINECA. Start-date Jan 1st, 2021, End-date June 30th, 2023</p> <p>Project description: Big data storage and management is the cornerstone of digital services, and Europe cannot afford to leave its digital infrastructure lacking. One of the key tools for researchers and science professionals in the EU is the European Open Science Cloud (EOSC), which offers a multitude of services, including storage, data management, processing and analysis. The EU-funded DICE project will provide cutting-edge data management services and a significant amount of storage resources for the EOSC. The data services offered via DICE through EOSC are</p>	PROJECT	FINISHED	30/06/2023	HANDLE DOI / B2HANDLE	Debora Testi	Themis Zamani	<a href="https://dice-eosc.eu/">https://dice-eosc.eu/</a>	

Name	What it offers	Type	Running or not	Ends	PID type and provider system	Official contact point	Who will update info	URL	Comments/References
	designed to be multidisciplinary and to fulfil the needs of different research communities. The goal is to enhance the EOSC infrastructure and ensure the best possible support to guide European research and innovation into the future.								
<b>FAIR-IMPACT</b>	The overall objective of FAIR-IMPACT is to realise a FAIR EOSC, that is an EOSC of FAIR data and services, by supporting the implementation of FAIR-enabling practices across scientific communities and research outputs at a European, national, and international level.	PROJECT	RUNNING	31/05/2025		Ingrid Dillo	Tommi Suominen	<a href="https://www.fair-impact.eu/">https://www.fair-impact.eu/</a>	
<b>A Service for Open Research Information on Conferences</b>	Conference IDs. The DFG-funded ConfiDent project – <a href="#">“A Service for Open Research Information on Conferences”</a> – has been run (led by Stephanie Hagemann-Wilholt) at the German TIB in Hannover for the last couple of years. This is a project-funded development so they’re now waiting for the next round of funding before they continue, but in the meantime, they’ve teamed up with DataCite to make the initiative more sustainable; see this 2018 post <a href="#">“PIDs for conferences – your comments are welcome!”</a> on the DataCite blog.	STUDY	FINISHED		DOI / DataCite	Stephanie Hagemann TIB Hannover		<a href="https://labs.tib.eu/info/en/project/confident/">https://labs.tib.eu/info/en/project/confident/</a> <a href="https://blog.datacite.org/pids-for-conferences/">https://blog.datacite.org/pids-for-conferences/</a>	
<b>Study: “Risks and trust in pursuit of a well</b>	Knowledge Exchange work on “Risks and trust in pursuit of a well functioning Persistent Identifier infrastructure for research”. A study was commissioned	STUDY	FINISHED	28/02/2023				<a href="https://www.knowledge-exchang">https://www.knowled</a> <a href="https://www.knowledge-exchang">ge-exchang</a>	

Name	What it offers	Type	Running or not	Ends	PID type and provider system	Official contact point	Who will update info	URL	Comments/References
<b>functioning Persistent Identifier infrastructure for research”</b>	by the KE to explore the issues around risks and trust around the current and emerging PID landscape, see resulting report and case studies at <a href="https://knowledge-exchange.info/reports">https://knowledge-exchange.info/reports</a> . Start-date: Sep 2021, end-date: Dec 2022							<a href="https://knowledge-exchange.info/reports">e.info/event/pids-risk-and-trust</a>	
<b>PIDs for research instruments and facilities</b>	PIDs for research instruments and facilities. This is an area where plenty of initiatives are happening in parallel and without too much contact with each other. The most relevant of these may be the Research Data Alliance Working Group Persistent Identification of Instruments (PIDINST) led by Markus Stoker at TIB Hannover. A paper called “ <a href="#">Persistent Identification of Instruments</a> ” was published in 2020 in the Data Science journal. At the same time, some research funders are starting to implement initiatives to comprehensively capture a snapshot of the research equipment and facilities they’re funding – and this includes their persistent identification.	STUDY	FINISHED					<a href="http://hdl.handle.net/11366/1867">http://hdl.handle.net/11366/1867</a>	
<b>Grant IDs</b>	Research funders are particularly interested in progressing with the issuing of PIDs for their grants and for themselves as organisations (see <a href="#">CrossRef’s Funder Registry</a> for the latter). The Wellcome Trust in Britain was one of the pioneering funders in this regard; see this 2018 post, “Wellcome explains the benefits of developing an open and global grant identifier”, but	STUDY	ONGOING (with Wellcome Trust and the EC as frontrunners)					<a href="https://www.crossref.org/blog/the-more-the-merrier-or-how-more-registered-">https://www.crossref.org/blog/the-more-the-merrier-or-how-more-registered-</a>	

Name	What it offers	Type	Running or not	Ends	PID type and provider system	Official contact point	Who will update info	URL	Comments/References
	<p>many other ones are joining this initiative these days. The eventual development of RAIDs may overlap with this area of activity.</p> <p>See also <a href="#">Grant Identifier Metadata Schema</a>.</p>							<a href="#">grants-means-more-relationships-with-outputs/</a>	
<b>EOSC PILLAR</b>	<p>EOSC PILLAR: Use of relevant information on PID from the reports, surveys, studies.</p> <p>The EOSC-Pillar Annual Report is a publication of the EOSC-Pillar project, which has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 857650 and is produced to showcase the major results and achievements of the project, collaborations ongoing with other initiatives and updates for the wider community.</p> <p><a href="https://zenodo.org/record/5726913#_Yf0Y4PjKUK">https://zenodo.org/record/5726913#_Yf0Y4PjKUK</a></p> <p>EOSC-Pillar D3.1 Summary report of the EOSC-Pillar National Initiatives Survey: EOSC-Pillar invited 2,204 organisations (funding bodies, universities, research infrastructures, and e-infrastructures) in five countries (Austria, Belgium, France, Germany, Italy) to participate in the 'National Initiatives' Survey. 688 representatives (31%) responded to the survey and answered various questions on business models, sustainability, users, Service Level Agreements (SLAs),</p>	STUDY	FINISHED	31/12/2022			Paolo Lai	<a href="https://www.eosc-pillar.eu/">https://www.eosc-pillar.eu/</a> / <a href="https://zenodo.org/record/5726913#_Yf0Y4PjKUK">https://zenodo.org/record/5726913#_Yf0Y4PjKUK</a>	

Name	What it offers	Type	Running or not	Ends	PID type and provider system	Official contact point	Who will update info	URL	Comments/References
	access to data and services, FAIRness of data, data management in repositories, regulations on open science and open data as well as on perceptions of EOSC. This document contains the main results in terms of frequency analysis.								
<b>B2HANDLE</b>	B2HANDLE is the distributed service for storing, managing and accessing persistent identifiers (PIDs) and essential metadata (PID records) as well as managing PID namespaces. The implementation of the service relies on the DONA/Handle persistent identifier solution. B2HANDLE can be used by middleware applications, end-user tools and other services to reliably identify data objects over longer time spans and through changes in object location or ownership.	SERVICE			Handle	<a href="https://www.eudat.eu/contact-support-request">https://www.eudat.eu/contact-support-request</a> Select B2HANDLE under Service.		<a href="https://eudat.eu/services/userdocs/b2handle">https://eudat.eu/services/userdocs/b2handle</a>	
<b>B2INST</b>	B2INST is a registry for Instruments that offers a place for research communities and researchers to register and maintain instrument information in a FAIR way ("PID for instruments").	SERVICE				<a href="https://www.eudat.eu/contact-support-request">https://www.eudat.eu/contact-support-request</a> Select B2INST under Service.	Tibor Kálmán	<a href="https://b2inst.gwdg.de/">https://b2inst.gwdg.de/</a>	

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eClass IRDIs	ECLASS contains tens of thousands of product classes and unique properties. This lets you standardise procurement, storage, production, and distribution activities in and between companies - across sectors, countries and languages. Realise sales potentials and new synergies, reduce costs, and increase the efficiency of your merchandise and data management. Thousands of companies - including many global players - already depend on ECLASS.	SERVICE			IRDI	<a href="https://www.eclass.eu/en/contact.htm">https://www.eclass.eu/en/contact.htm</a> ↓		<a href="https://www.eclass.eu/en/">https://www.eclass.eu/en/</a>	
RO-Crate	Researchobject.org aims to map the landscape of initiatives and activity in the development of Research Objects, an emerging approach to the publication and exchange of scholarly information on the Web.	SERVICE						<a href="https://www.researchobject.org/">https://www.researchobject.org/</a>	
Scholix	The goal of the Scholix initiative is to establish a high-level interoperability framework and guidelines for exchanging information about links between scholarly literature and research data.	SERVICE							

## Previous work

Here are documents useful as input for this report.

- EOSC PID Policy document: <https://doi.org/10.2777/926037>
  - page 9: policy requests for PID types in the EOSC context
- EOSC PID Architecture document: <https://doi.org/10.2777/525581>
  - page 17 is about certification of a PID type
  - pages 19-25: different types of PID presented
- Survey of Current PID Services Landscape by FREYA  
<https://zenodo.org/record/1324296>
- The Dutch Pid-wijzer <https://www.pidwijzer.nl/en>
- Connected Research: The Potential of the PID Graph  
<https://doi.org/10.1016/j.patter.2020.100180> has a table of research entities, PID types and maturity
- De Castro, Pablo; Herb, Ulrich; Rothfritz, Laura; Schöpfel, Joachim: The role of research funders in the consolidation of the PID landscape. Report 2022. DOI: <https://doi.org/10.5281/zenodo.7258210>
- De Castro, Pablo; Herb, Ulrich; Rothfritz, Laura; Schöpfel, Joachim: Some reflections on the current PID landscape with an emphasis on risks and trust issues. In: *Procedia Computer Science*. Volume 211, 2022, pp. 28-35. DOI: <https://doi.org/10.1016/j.procs.2022.10.173>

## Conclusions and future work

This document provides two lists to help PID-interested adopters get started using PID in the context of EOSC.

The first table lists **PID types** to consider with pointers to specific documentation that describes how to start using that particular PID type. The PID types to be of interest for EOSC are included in the table with motivation in the *Comments* column.

From the second table, **PID projects, infrastructures, organisations, and providers** that are already active in the EOSC context can be extracted, as well as a list of projects where more exchange with EOSC would be valuable.

Remember that this version is a snapshot of a living document, which is used as input for the work of the task force itself in producing recommendations to EOSC.

