



Allyson Lister, PhD

FAIRsharing Content and Community Coordinator

on behalf of the FAIRsharing team

FAIRsharing is a service based at the University of Oxford, and
anchored to the [University Research Practice Programme](#)



contact@fairsharing.org



Outline

- Standards: definition, types, numbers and complexity
- The problem to address
- Introducing FAIRsharing and its community
 - its role vs complementary terminology services
 - value of the its graph for users
 - examples of work with/for EOSC communities
 - exemplars of how its content powers other services

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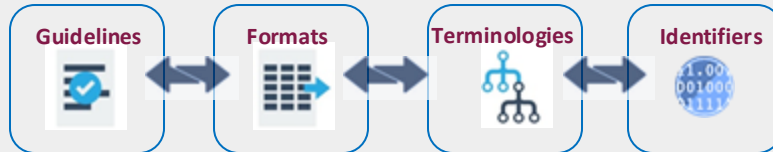
Standards: four main types

1 Reporting guidelines

Outline in narrative form the necessary and sufficient information that should be reported about data, such as in itemised, prescriptive checklists; or the features and behaviours that should be followed, such as in general guiding principles

2 Models and formats

Define the representation of information for use by machines; these range from conceptual models to transmission formats, facilitating data retrieval and exchange between systems



3 Terminology artefacts

Add an interpretive, semantic layer for use by machines and humans; these range from controlled vocabularies (lists of terms, often with definitions) to ontologies (complex hierarchical groupings), providing unambiguous identification of concepts and aiding data querying

4 Identifier schemata

Are formal systems to identify information in a unique, machine-readable way; these persistent identifiers (PIDs), minted by recognised registries, build reliable and long-lasting links between data, people, organisations and infrastructures

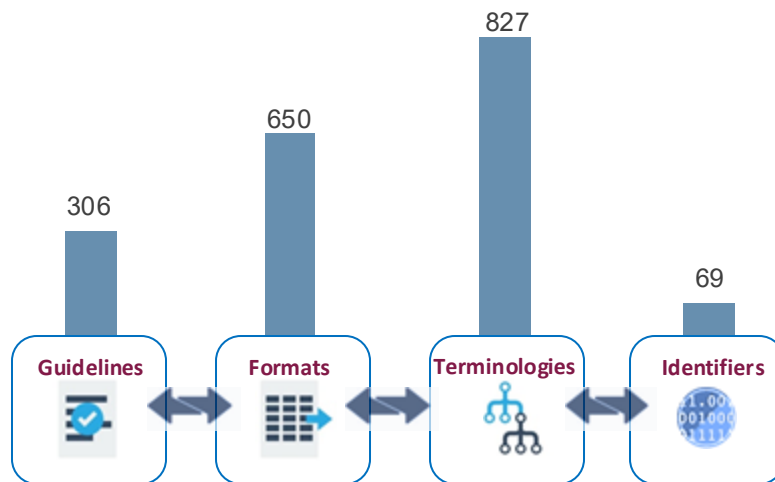
Standards ...

Are a **collectively agreed-upon** set of requirements, specifications, guidelines or characteristics that can be used for the **description, structure, harmonisation, citation, sharing, and/or preservation** of all kinds of data and metadata *

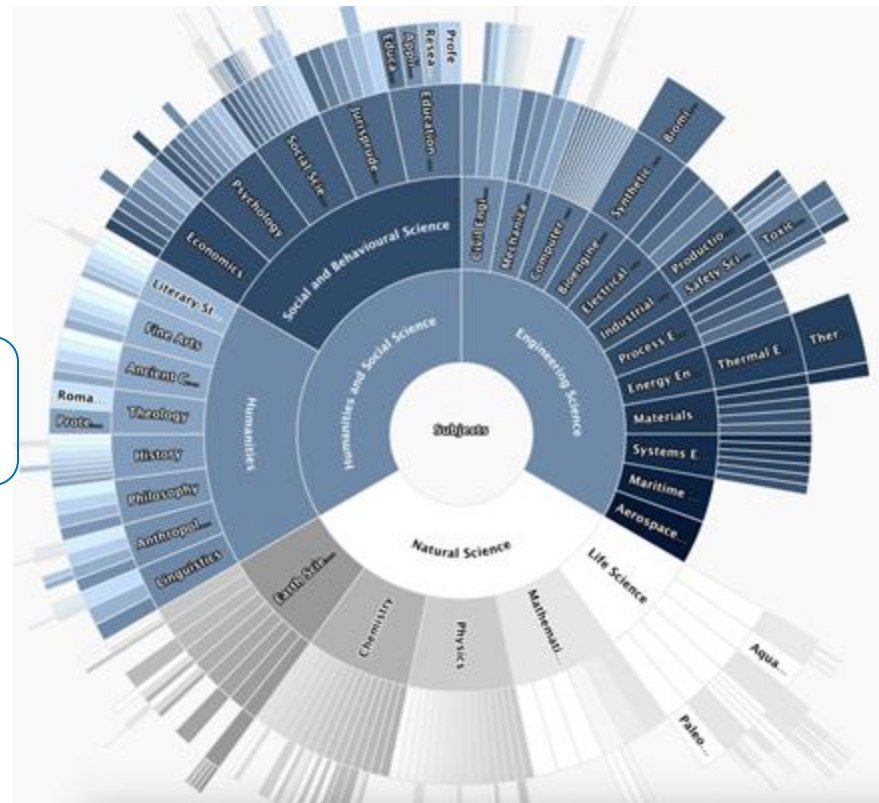
Help **machines** with computational accessibility, **interoperability**, and use of data with little/no human intervention; enable humans to understand and **reuse** data at scale

* Where **data** can simply be a piece of information, e.g., observations, a list of measurements, descriptions of certain objects, **metadata** specifies the relevant information about the data, and can be of many types, including descriptive, administrative, and legal

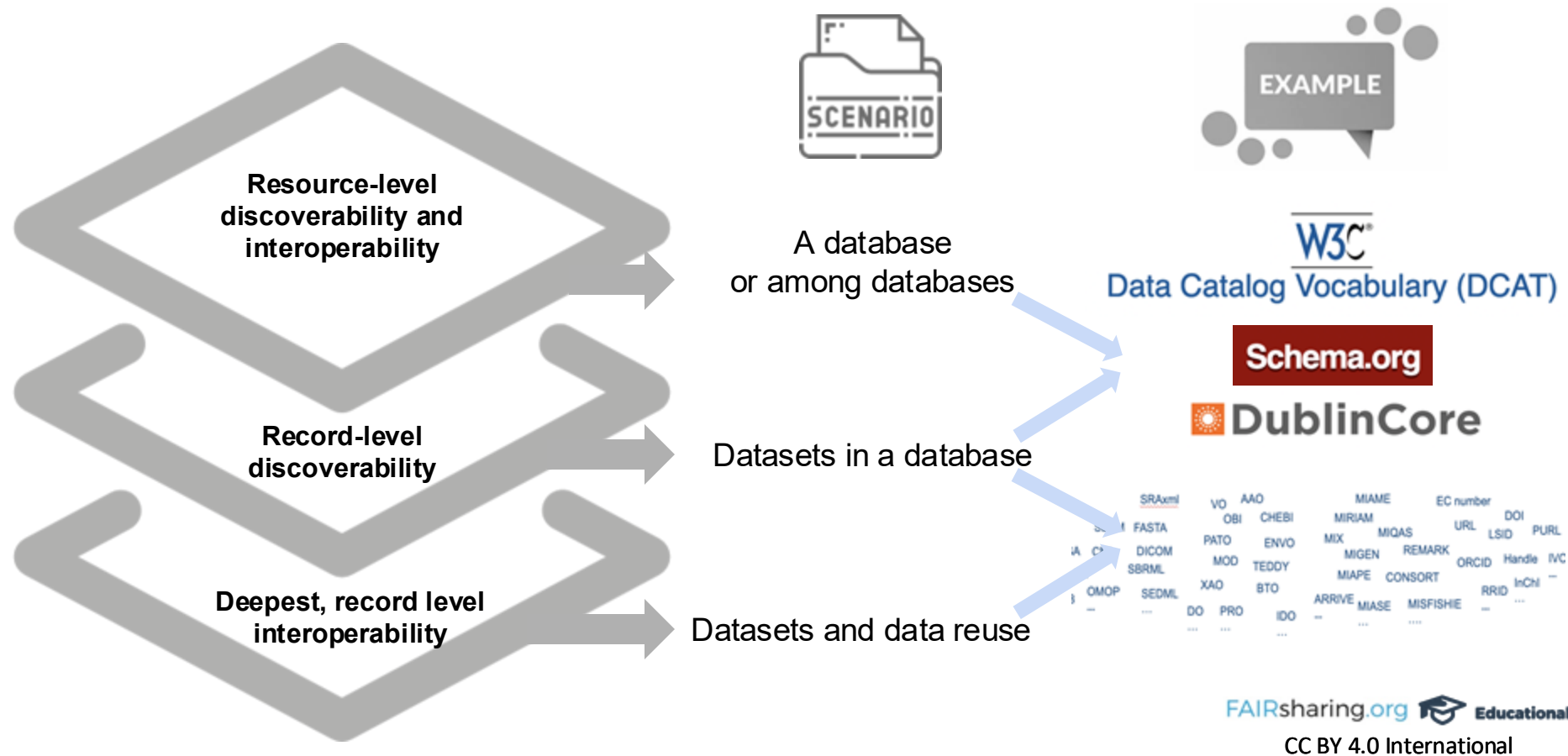
Standards in numbers: generic and discipline specific



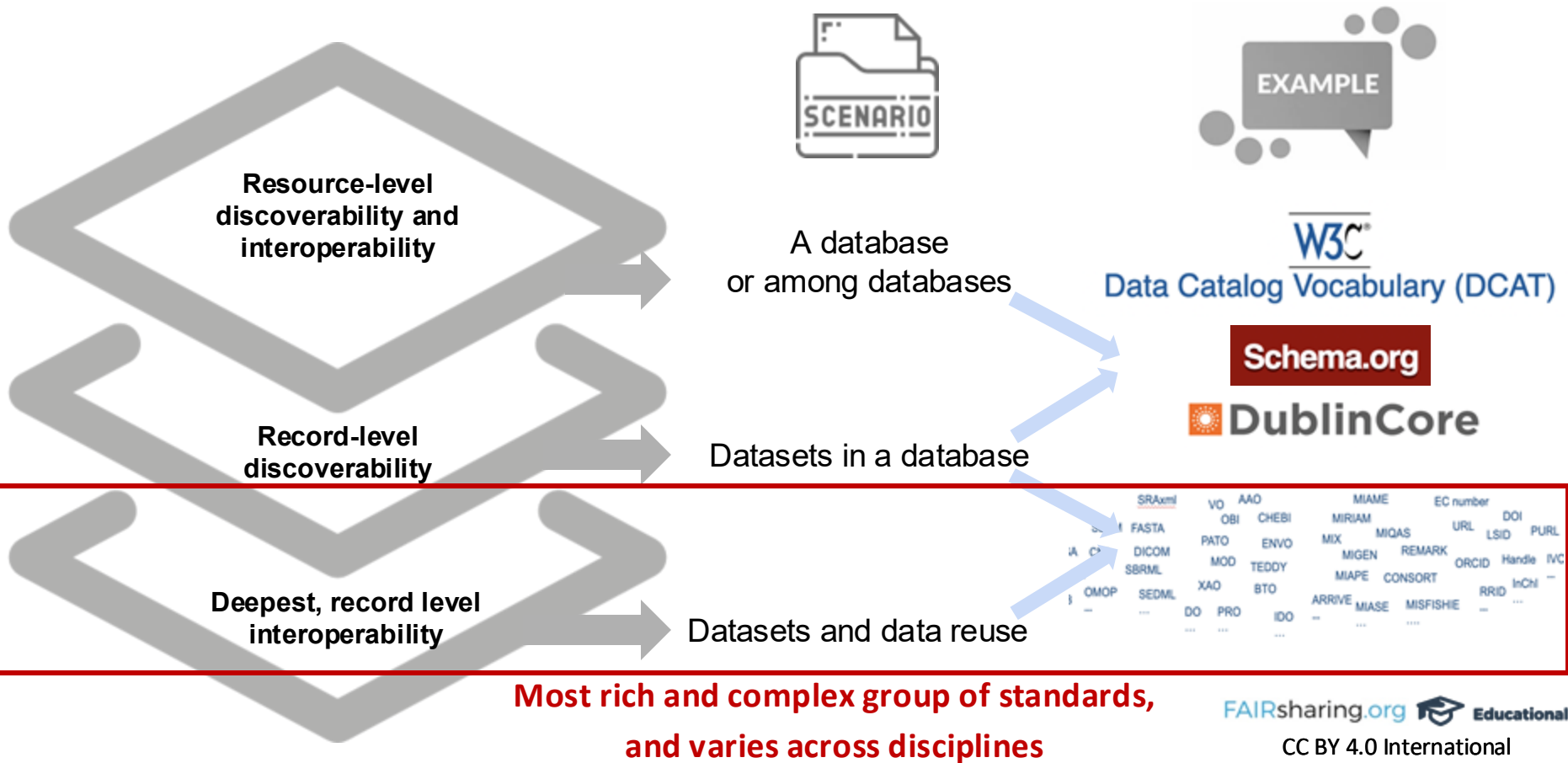
More than 1898 standards



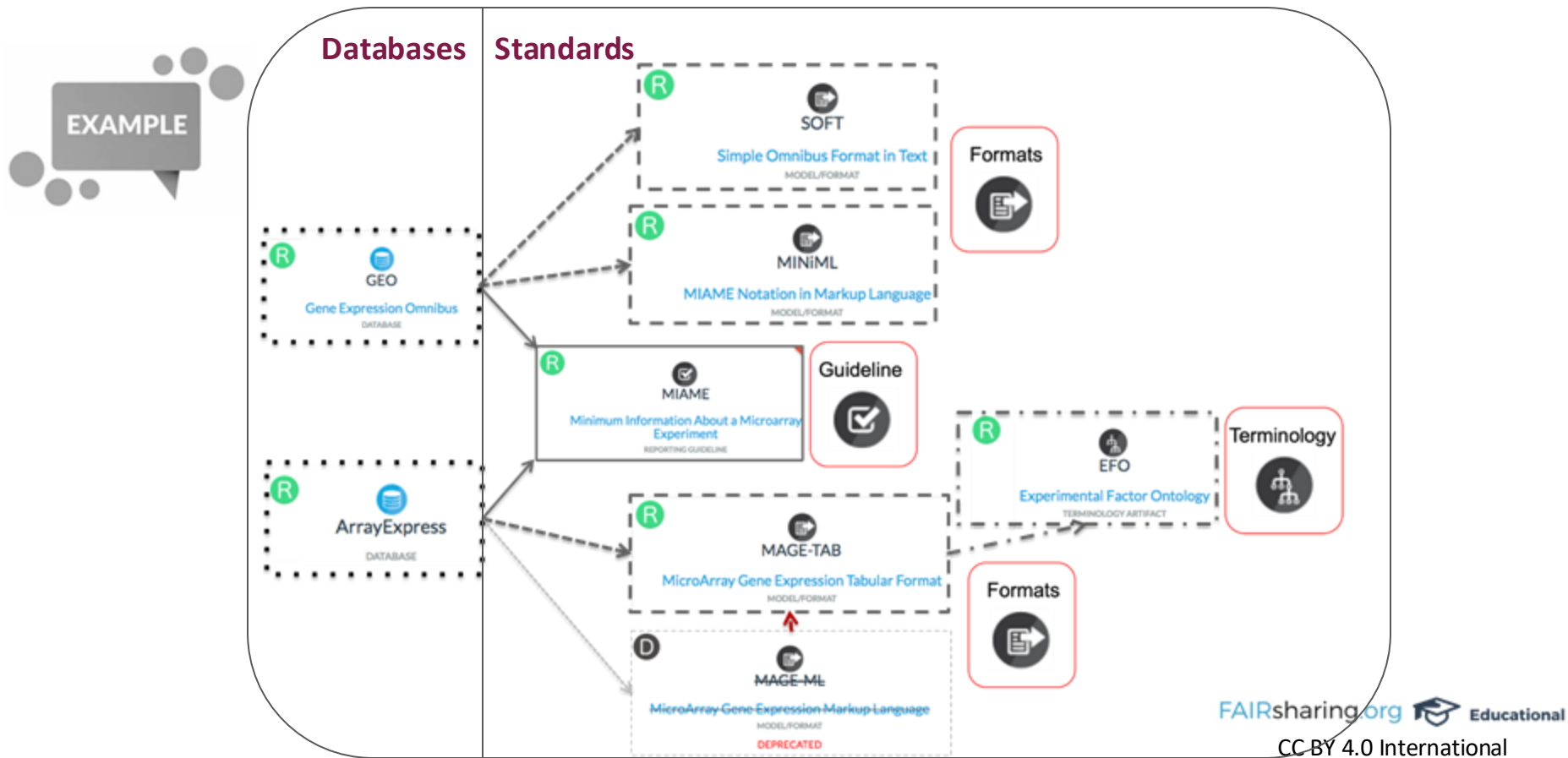
Standards: discoverability and interoperability roles



Standards: discoverability and interoperability roles



Standards for datasets: implemented as 'stacks' and evolving

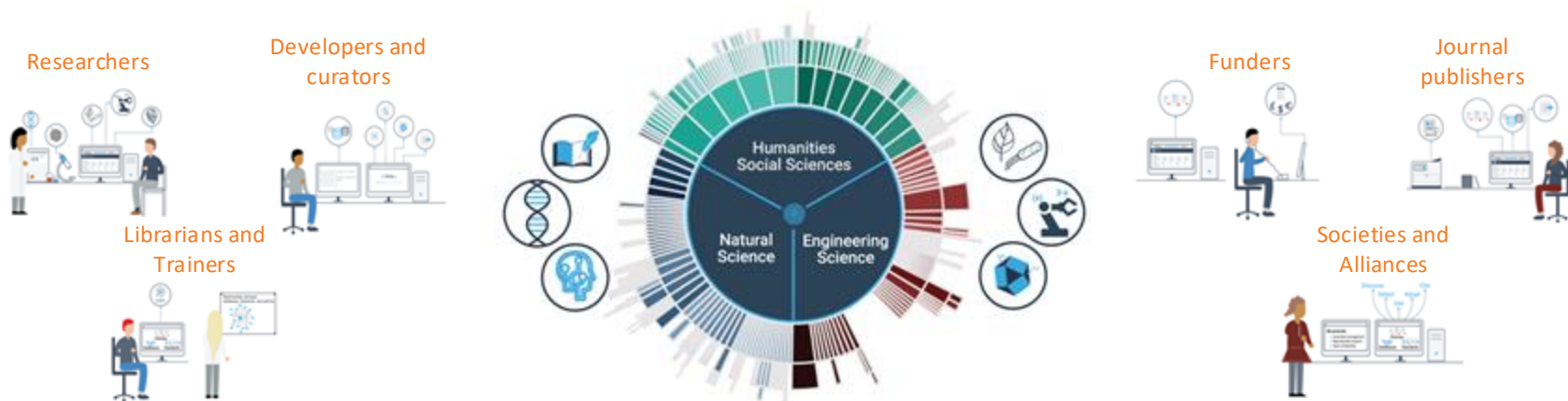


The problems to address

Standards are pillars of the FAIR Principles

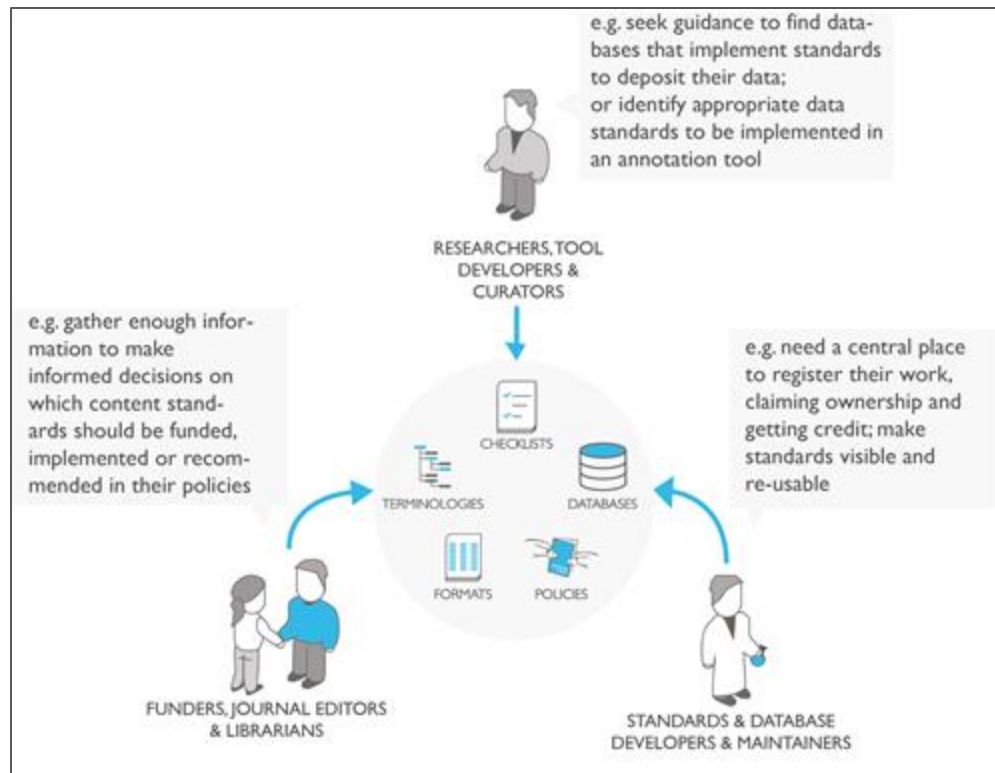
At various points in the research life cycle, stakeholders will use, implement and/or recommend them

However, there is a **wealth** of standards and **types**, at different stages of **maturity** and community **support**



The problems to address

Therefore, it is not easy to identify the appropriate **standards**, to know which **databases** implement them, and make informed decisions on which standards to use or recommend!



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A **curated, informative** and **educational** resource on data and metadata **standards**, inter-related to **databases** and data **policies** - for all disciplines

Promote the **value** and **use** of these resources across all disciplines



Adopted internationally!



1. Guides **consumers** to discover, select and use these resources with confidence
2. Helps **producers** to make their resources more visible, more widely adopted and cited
3. Powers **third party tools** by providing trustworthy content to promote standards and databases

FAIRsharing in numbers

1582

Contributors

Our community of record maintainers and curators

4875

Records

Descriptions of standards, databases and policies

851K

Views

Page visits since 2015

Types and subtypes



2370 Databases

Repositories	1262
Knowledgebases	930
Knowledgebase/Repositories	178
Institutional Repositories	108



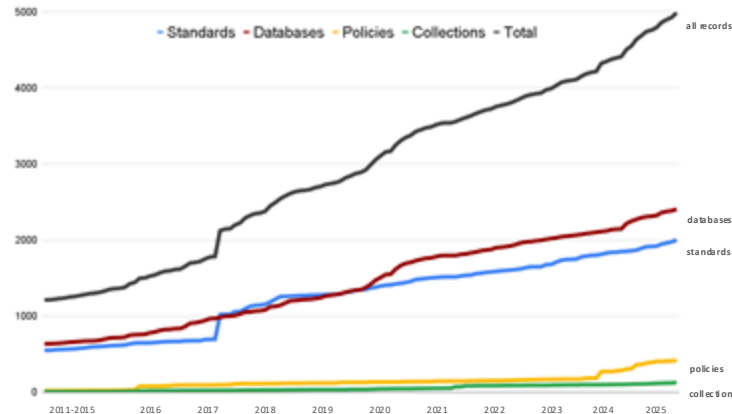
1898 Standards

Terminology Artifact	827
Model/Format	650
Reporting Guideline	306
Identifier Schema	69

356 Policies

Journal	196
Institution	58
Funder	41
Journal publisher	36
Society	17
Project	8

Growth since launch



Disciplines

Engineering Science

2825

Natural Science

10834

Subject Agnostic

519

Humanities and Social Science

1165

Community Champions: 30 active and 17 alumni (since 2022)

FAIRsharing supports and is supported by its **Community Champions** who gain **recognition**, **professional development** and **influence** by contributing to

- **curation** activities, and
- **educational** provision

2167
edits

325
updated records

64
new records

In 2024, and as compared to 2023

FAIRsharing for you: researchers
For the management of choice of your data

FAIRsharing content: standards overview
Core to research data management good practices

FAIRsharing promotes the value of standards, the backbone of the FAIR Principles

As trusted source of data and metadata* standards for all digital objects, incl. datasets, software, and materials across all disciplines, FAIRsharing:

- guides users to discover, select and use standards with confidence
- helps researchers to make their research more visible, more easily adopted and cited
- provides the research tools for providing FAIRsharing content to and receiving data and/or

Standards ...

Are a collectively agreed-upon set of requirements, specifications, guidelines or characteristics that can be used for the **description, structure, harmonization, citation, sharing, and/or preservation** of all kinds of data and metadata

Help machines with: computational accessibility, **interoperability**, and use of data with little human intervention, enable humans to understand and reuse data at scale

FAIRsharing
© 2024 FAIRsharing



Champions apply directly or are drawn from existing communities and collaborations from all disciplines



Associated with the FAIRsharing RDA WG

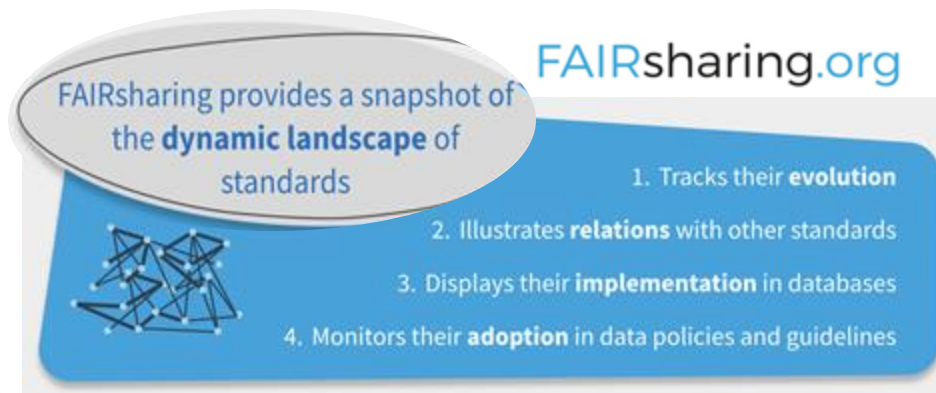
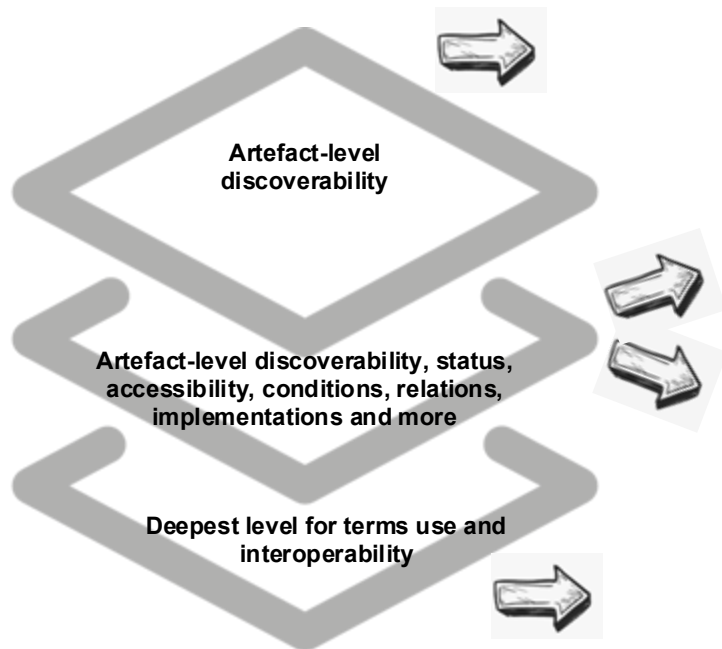


FAIRsharing Registry:
Connecting data policies,
standards and databases
RDA WG


FAIRsharing.org  **Educational**

CC BY 4.0 International

Focus on terminologies: complementary registries and services










<https://ontoportal.org/about/>



Environment Ontology (ENVO)

doi: 10.25504/FAIRsharing.azqskx


Type Terminology artefact

Registry Standard

Description The Environment Ontology (EnvO) provides a controlled, structured vocabulary that is designed to support the annotation of any organism or biological sample with environment descriptors. EnvO contains terms ranging from astronomical objects, through planetary scale biomes, to nanomaterials. Further, these terms are interlinked with logical axioms describing their composition, colocalisation, and relationships to environmental and biological processes. Using ENVO terms for an environmental description allows a comprehensive description of environment that is key to machine-assisted integration, archiving and federated searching of environmental data.

Homepage <http://environmentontology.org/>

Year of Creation 2007

Maintainers [pibuttigieg](#) 

Countries developing this [Germany](#), [Kenya](#), [United States](#)


Object types in scope for this resource [Dataset](#) [Physical Object/Material](#)

Subjects [Environmental Science](#) [Life Science](#) [Nutritional Science](#) [Ecology](#) [Epidemiology](#)

Domains [Environmental Material](#) [Marine Metagenome](#) [Microbiome](#)







Taxonomic Range [Algae](#) [Archaea](#) [Bacteria](#) [Eukaryota](#) [Fungi](#) [Metazoa](#) [Protozoa](#) [Viruses](#)


Example of a terminology record and the descriptors provided



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Environmental Science Life Science Nutritional Science Ecology Epidemiology

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Algae Archaea Bacteria Eukaryota Fungi Metazoa Protozoa Viruses










Unique identifier to refer to this standard record



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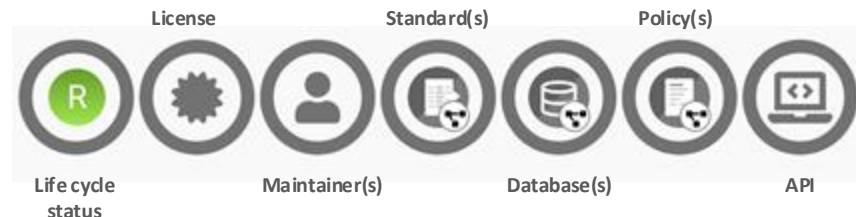
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Unique identifier to refer to this standard record




Attribution for maintainer via their ORCID



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DATA PROCESSES AND CONDITIONS


Processes

Name	Search Ontology	Read	Write
Access Method	User interface	✓	
Name	Download Ontology	Read	Write
Access Method	User interface	✓	
Name	Browse (via OLS)	Read	Write
Access Method	User interface	✓	
Name	Aggliportal: Browse / Download	Read	Write
Access Method	User interface	✓	
Name	Persistent URL, allowing access to the most recent version of ENVO in OWL format	Read	Write
Access Method	Other machine-accessible method	✓	
Name	Persistent URL, allowing access to the most recent version of ENVO in OBO format	Read	Write
Access Method	Other machine-accessible method	✓	
Name	Persistent URL, allowing access to the most recent version of ENVO in SKOS format	Read	Write
Access Method	Other machine-accessible method	✓	



Licences








This is a subset of licences recommended by the resource or most commonly used by its users.

[Creative Commons Attribution 3.0 Unported \(CC BY 3.0\)](#)



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RELATED STANDARDS (20)



Chemical Entities of Biological Interest


Environment Ontology **related to** Chemical Entities of Biological Interest



Phenotypic Quality Ontology


Environment Ontology **related to** Phenotypic Quality Ontology

RELATED DATABASES (11)




Joint Genome Institute, Genomes OnLine Database

Joint Genome Institute, Genomes OnLine Database **implements** Environment Ontology



Gramene: A curated, open-source, integrated data resource for comparative functional genomics in plants

Gramene: A curated, open-source, integrated data resource for comparative functional genomics in plants **implements** Environment Ontology



Manually Curated Database of Rice Proteins

Manually Curated Database of Rice Proteins **implements** Environment Ontology

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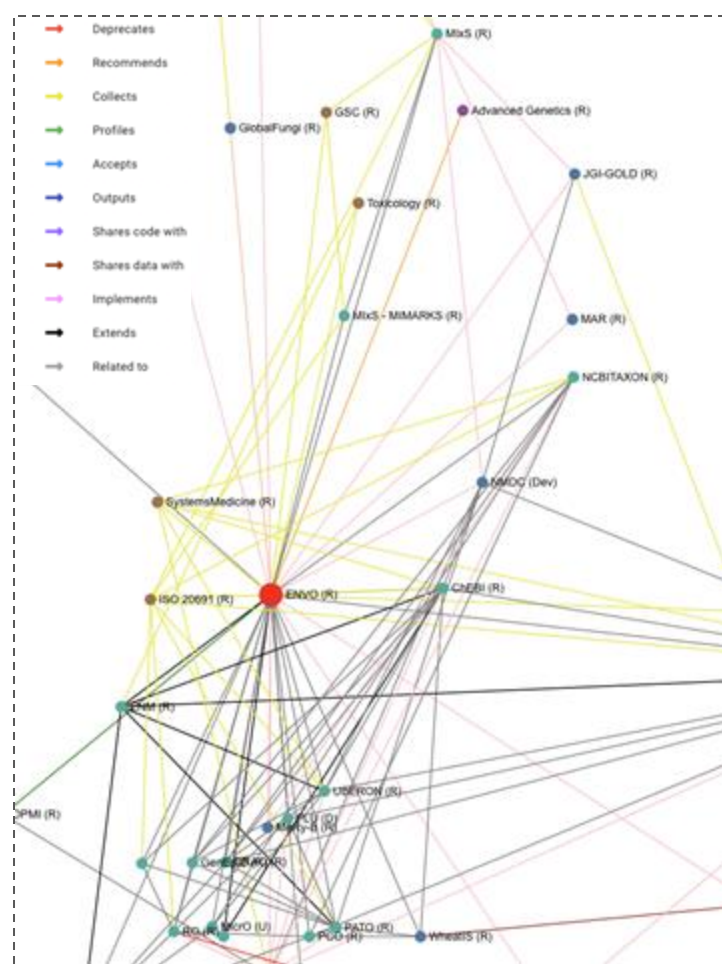
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Algae Archaea Bacteria Eukaryota Fungi Metazoa Protozoa Viruses





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Year of Creation 2007

Maintainers [pibuttigieg](#) 





Countries developing this [Germany](#), [Kenya](#), [United States](#)

ADDITIONAL INFORMATION			
Cross References			
URL	https://bioportal.bioontology.org/ontologies/ENVO	URL	http://www.obofoundry.org/ontology/envo.html
Name	ENVO	Name	envo
Portal	BioPortal	Portal	OBO Foundry







Environment Ontology

Last updated: February 5, 2025

[Summary](#)
[Classes](#)
[Properties](#)
[Notes](#)
[Mappings](#)
[Widgets](#)

Details

Acronym	ENVO
Visibility	Public
Description	Official PURL: http://purl.obolibrary.org/obo/envo.owl The most up-to-date information about ENVO is available here: http://www.obofoundry.org/ontology/envo.html EnvO is an OBO Foundry and Library ontology for the concise, controlled description of environmental entities such as ecosystems, environmental processes, and environmental qualities. It closely interoperates with a broad collection of other OBO ontologies and is used in a diverse range of projects.
Status	Production
Format	OWL
Categories	Experimental Conditions Other Physicochemical
Groups	OBO Foundry Biodiversity Information Standards
Bibliographic reference	http://environmentontology.org/ 
Contact	Pier Luigi Buttigieg (http://orcid.org/0000-0002-4366-3088)
Creation date	February 5, 2025
Documentation	http://environmentontology.org/ 
Root of obsolete branch	http://www.geneontology.org/formats/oboInOwl#ObsoleteClass 
Submission date	February 5, 2025
Version information	2024-07-01
uri	http://purl.obolibrary.org/obo/envo.owl 

Submissions

Version	Released	Uploaded	Downloads
2024-07-01	(Download)	(Download)	(Download)

Tracking evolution: deprecation and tombstoning records

1. Deprecate a record when a resource has been *retired* and is no longer available

2. Deprecate a record when a resource has been *superseded*, e.g., merged into another

3. Tombstone a record when it should not have been added, e.g., when a resource is added twice or by mistake

822

deprecated records

GENERAL INFORMATION

This record was deprecated on 2021-05-27 for the following reason(s): The UniGene database and web pages have been retired. Please see <https://ncbiinsights.ncbi.nlm.nih.gov/2019/02/06/the-unigene-web-pages-are-now-retired/> for more information.

UniGene gene-oriented nucleotide sequence clusters (UniGene)

DOI: 10.25504/FAIRsharing.gt1c1p

Type: Repository

Registry: Database

Description: Each UniGene entry is a set of transcript sequences that appear to come from the same transcription locus (gene or expressed pseudogene), together with information on protein similarities, gene expression, cDNA clone reagents, and genomic location.

GENERAL INFORMATION

This record was deprecated on 2014-04-01 for the following reason(s): This standard has been revised and is superseded by ISO 19115-1:2014. However, many other resources still reference this particular version.

This record is replaced by:

ISO 19115:2003 Geographic information -- Metadata (ISO 19115:2003)

Awaiting DOI

! This record does not exist anymore. Genome Association File version 2. The record with DOI 10.25504/FAIRsharing.s8eeek was invalid.

Description: This resource is no longer available because it replicates another entry in FAIRsharing. Please refer to <https://doi.org/10.25504/FAIRsharing.IIMCe0>

Best Practices for Tombstone Pages



DOIs are persistent identifiers (PIDs), which means that they are intended to be a permanent means of identifying and accessing a particular resource. Because of this, a DataCite DOI cannot be deleted. However, there may be infrequent cases where it is not desirable for the item described by a DOI to be available publicly, such as in the case of research retraction. In these cases, it is best practice to still provide a "tombstone page", which is a special type of landing page describing the item that has been removed. Tombstone pages are generally the responsibility of the organization responsible for maintaining the DOI (in other words, a DataCite member).

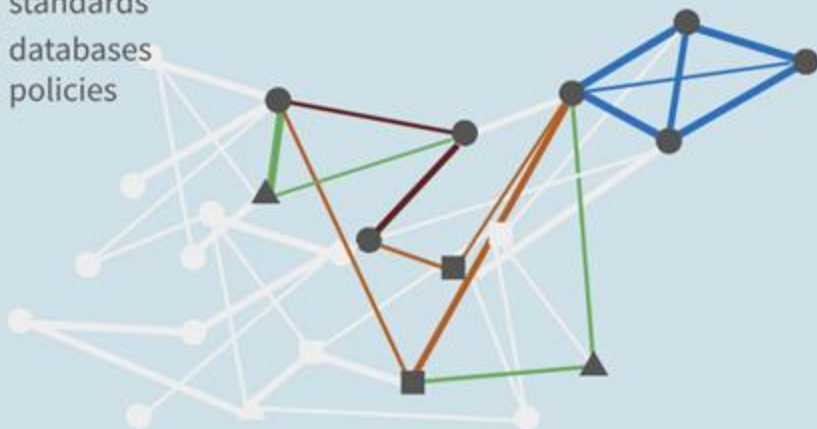
<https://support.datacite.org/docs/tombstone-pages>

The value of relationships and examples of activities and use

FAIRsharing visualises **relationships** among resources, e.g.,

- many **standards** are used in **combination** as ‘packages’, such as when a **terminology** is **related to** a given **format**
- which **standards** are **implemented by** databases and are **recommended by** policies

- standards
- databases
- ▲ policies



EXAMPLES

①



Astrophysics And Astronomy

②



GBIF

Global Biodiversity
Information Facility

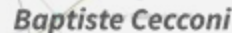
Biodiversity

③



Life Science

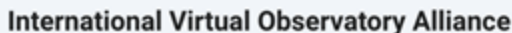
Working with standards initiatives: an example



Observatoire de Paris

0000-0001-7915-5571

*FAIRsharing Champion for Planetary
Sciences and Heliophysics*



Astrophysics And Astronomy



The refQ format is a hierarchical scheme for the descriptive storage and access of sky survey data. The system is based on hierarchical string of sky regions at four and four-half.



IVIA Support Interface (IVI) describes the minimum interface that a web service requires to participate in the IVIA. Note that this is not required of standard VI series.



eflspace is the first interface to distributed storage. This specification presents the second R2D2 version of the interface. It specifies how V2 experts and applications call a.



SingleSign-On Profile Authentication Mechanism is a protocol describing approved challenge authentication mechanisms for the SSO engagement profile. The



The Vocabulary in the Virtual Observatory (VO) document specifies a standard format for vocabularies based on the W3C's Resource Description Framework (RDF) and XML.



The Astronomical Data Query Language (ADQL) is the language used by the IVSA to represent astronomy queries posed to VL surveys. The field has developed over-



This document describes the Multi-Order Crossover method (MOC) to specify primary city regions. The goal is to be able to provide a very fast customized tour.



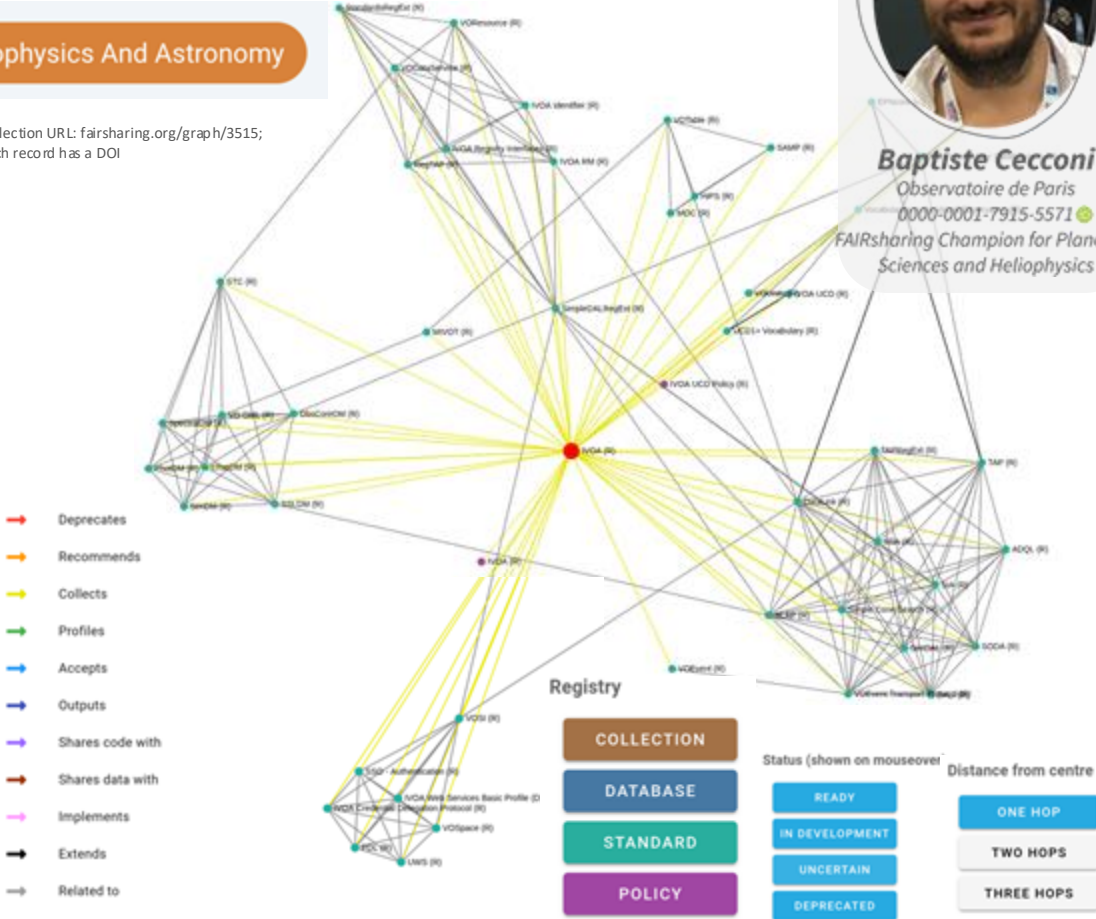
ISMP is a messaging protocol that enables autonomy software nodes to communicate and coordinate. Field members have recognised that building a multi-tier tool is



The Data Access Layer Interface (DALI) standard defines the basic web service interface common to all Data Access Layer (DAL) services. This standard defines the following:

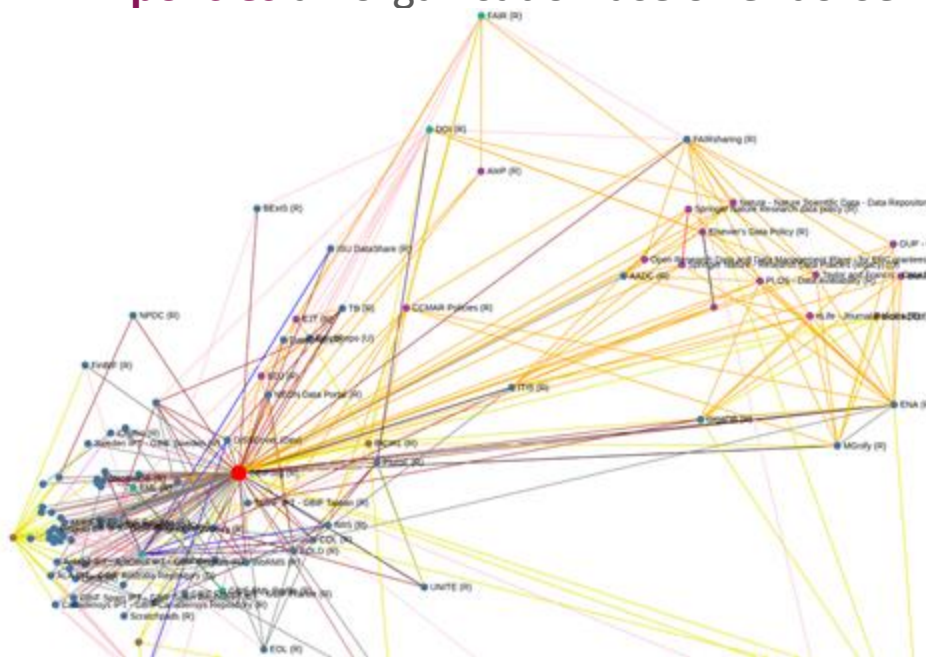


Collection URL: fairsharing.org/graph/3515;
each record has a DOI




Creating organisation profiles: branded pages and graphs

To show the **standards**, **repositories** and **policies** an organisation use or endorse



URL: fairsharing.org/organisations/1166
fairsharing.org/graph/2163

ORGANISATION



Global Biodiversity Information Facility

Homepage

<http://www.gbif.org/>

Types

Consortium

Users

[lcopes@gbif.org \(0000-0002-6590-599X\)](mailto:lcopes@gbif.org)

[jmiller@gbif.org \(0000-0002-5768-9010\)](mailto:jmiller@gbif.org)

skristensen@gbif.org


GregEndresen@gbif.org

Countries

Denmark

ROR

<https://ror.org/05fjyn938>



Biodiversity Community Integrated Knowledge Library (BICKL)

This Horizon 2020-funded project includes 14 European institutions from 10 countries that represent the continent's and global key players in biodiversity research and natural history. Together they will deploy a...

Relation: Collaborates On

Life Science


Knowledge

Phylogeny

Taxonomy

Biodiversity

Taxonomic



Biological Collections Ontology (BCO)

The Biological Collections Ontology (BCO) supports the interoperability of biodiversity data, including data on museum collections, environmental/metagenomic samples, and ecological surveys. The BCO covers distinctio...

Relation: Maintains

Taxonomy


Biodiversity

Metagenomics

Ecology

Taxonomic

Sample An...

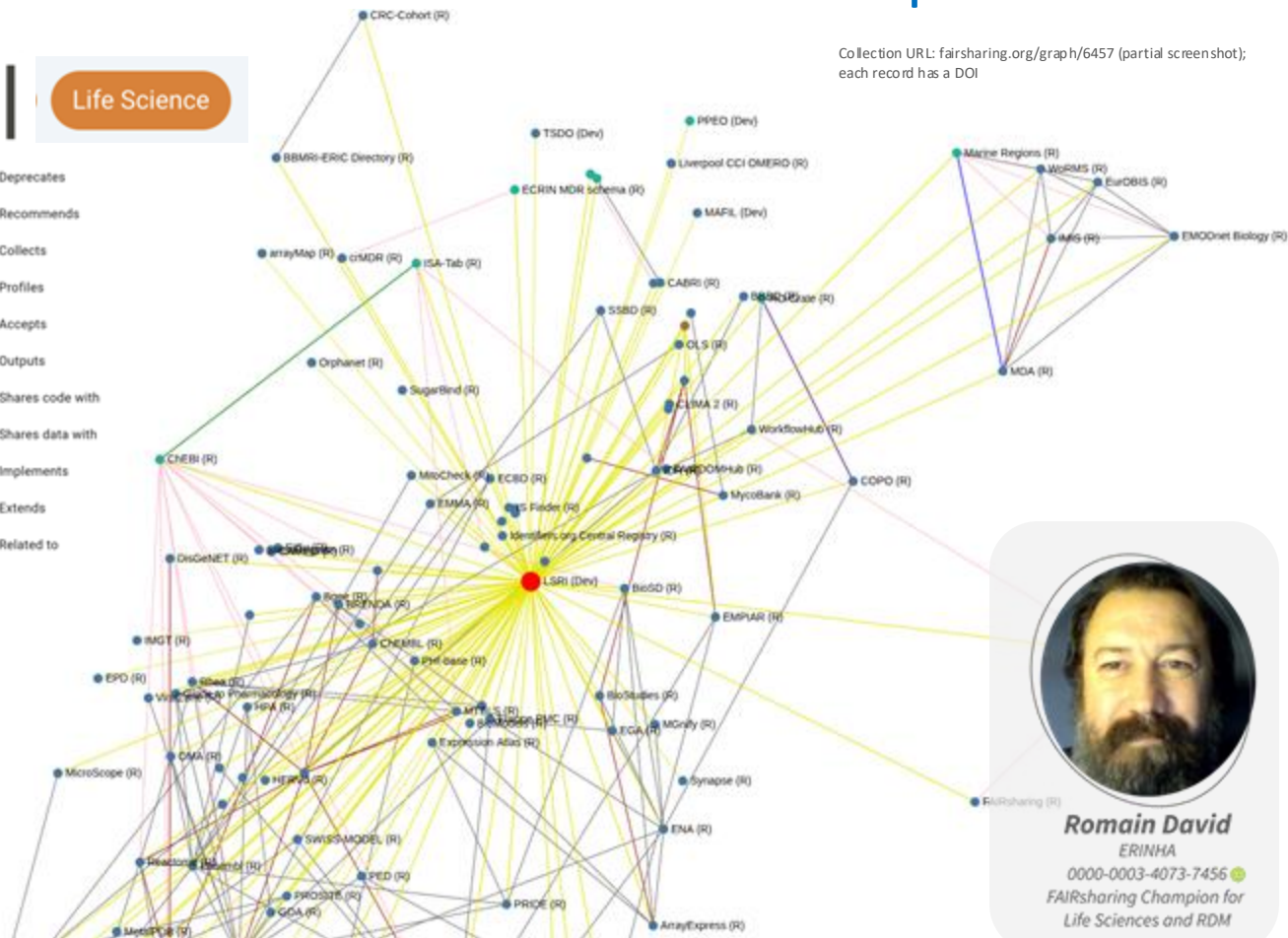


Canadensys IPT - GBIF Canadensys Repository




To **curate** the **descriptions**
and **visualise** the **relations** of
their **databases** and the
data/metadata **standards**
the clusters implement

-  Deprecates
-  Recommends
-  Collects
-  Profiles
-  Accepts
-  Outputs
-  Shares code with
-  Shares data with
-  Implements
-  Extends
-  Related to



Romain David
ERINHA
0000-0003-4073-7456 
FAIRsharing Champion for
Life Sciences and RDM

COLLECTION

Status (shown on mouseover)

Distance from centre

ONE HOP

TWO HOPS

THREE HOPS

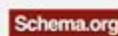
FAIRsharing: a FAIR-compliant resource that powers other services

FAIRsharing provides **humans** and **tools** with access to *trustworthy content* to support and enable data management tasks

Findability



Sitemap.xml, JSON



Markup with Schema.org for search indexes (*pre-rendered*)



Globally unique, persistent identifiers for each record



ORCID trusted party

Interoperability



JSON markup



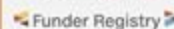
Standardized semantics



Cross-links to records in other registries



ROR for organizations



FundRef for funders (*ongoing*)

Accessibility



REST Web Services



Content negotiation



Data preservation policy

Reusability



CC BY 4.0 license



Full record history & attribution



Metadata docs and community alignment

examples

- 1 Providing DMPs and FAIR-enabling tools and services, part of EOSC projects
- 2 Guiding publishers to operationalise checks to improve FAIRness of the results underpinning articles

DMPs & FAIR-enabling tools:

FAIRsharing as authoritative source of standards information

Activity

Integration with a number of third-party tools relating to creation of **DMPs** and **FAIR assistance/assessment**; these tools use FAIRsharing API to access/select content

Output

Actionable descriptions of standards and databases to **power** and **inform** the creation of DMPs, measurements and improvements of FAIRness

Outcome

Decision-making and **selection** is **facilitated** for the users of these tools (e.g. when identifying databases to share their digital objects in their DMP, or assessing if they are using the appropriate standards to annotate their data)



Want to know more?

<https://ostrails.eu>

FAIRsharing Blog

blog.fairsharing.org/?p=657
blog.fairsharing.org/?p=824
(elixiruknode.org/blog/2024/joining-up-the-research-data-management-dots)

Guiding publishers to operationalise their data policies

Activity

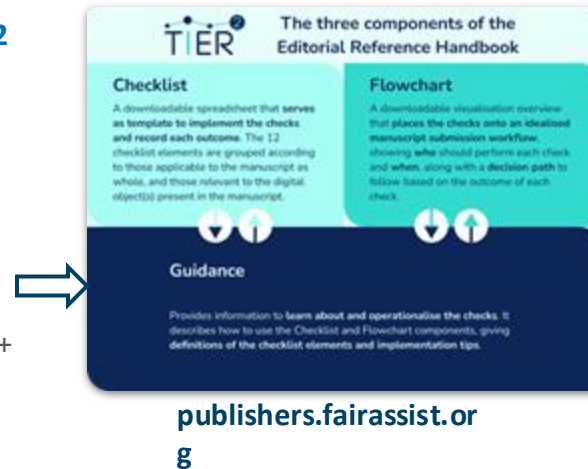
With 10+ major publishers, T&F and Oxford led co-creation of **12 educational and practical set of checks** to **guide** the **in-house editorial staff** to improve FAIRness in practice for all digital objects during the manuscript submission process

Output

The **Editorial Reference Handbook** contributes provides the **checks** together with **guidance** and a **flowchart** to provide a practical resource to implement; planned **interventions** with 20+ journals to operationalise the checks (preliminary results in Autumn 2025)

Outcome

Awareness of and **practice** on how to operationalize the checks with confidence; **improved journal data policies** that in turn will also inform authors on what is expected of them, reviewers to assist, and service providers to cater for journal needs



THE LANCET

WILEY

SPRINGER NATURE



(GIGA) SCIENCE



AMERICAN PSYCHOLOGICAL ASSOCIATION



want to know more?

<https://tier2-project.eu>

FAIRsharing.org Educational

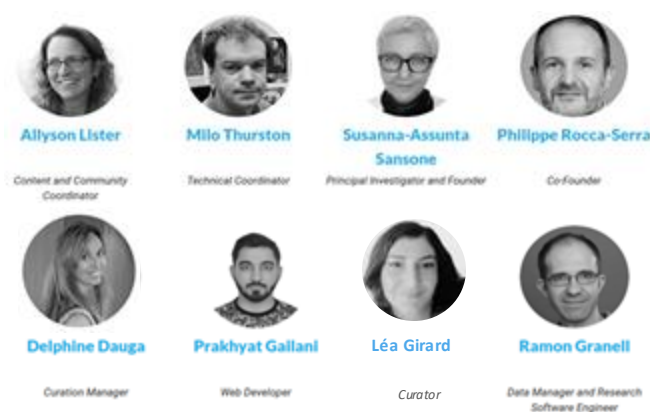
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Operational Team



FAIRsharing is a service based at the University of Oxford, and anchored to the [University Research Practice Programme](#)

fairsharing.org/communities#governance

RDA FAIRsharing WG Chairs

- Graham Smith, Springer Nature
- Holly Murray, Health Data Research UK
- Peter McQuilton, GSK
- Rebecca Grant, Taylor and Francis
- Simon Hodson, CODATA
- Allyson Lister, Uni of Oxford
- Susanna-A Sansone, Uni of Oxford

Community Champions



fairsharing.org/community_champions