FAIRsharing.org

Describing and linking standards, databases and policies across the natural sciences

Massimiliano Izzo

https://fairsharing.org

@fairsharing_org

UNIVERSITY OF OXFORD

Oxford e-Research Centre

elixir UNITED KINGDOM

FAIRsharing.org

A web-based, curated, and searchable portal that monitors the development and evolution of standards, across all disciplines, inter-related to databases/repositories and data policies

Making Standards, Databases and Policies FAIR

Pre-print at: https://doi.org/10.1101/245183

Authored by 68 stakeholders in academia, industry, funding agencies, standards organisations, infrastructure providers and scholarly publishers

GO FAIR

ISU CODATA

RDA RESEARCH DATA ALLIANCE

FORCE11 The Future of Research Communications and e-Scholarship

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Mapping a complex and evolving landscape…

FAIRsharing.org

Metadata standards and identifiers

Mapping a complex and evolving landscape…

FAIRsharing.org

Models/Formats = *Conceptual model, conceptual schema, exchange formats*

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Terminologies = *ontologies, Controlled vocabularies*, *thesauri*, etc.

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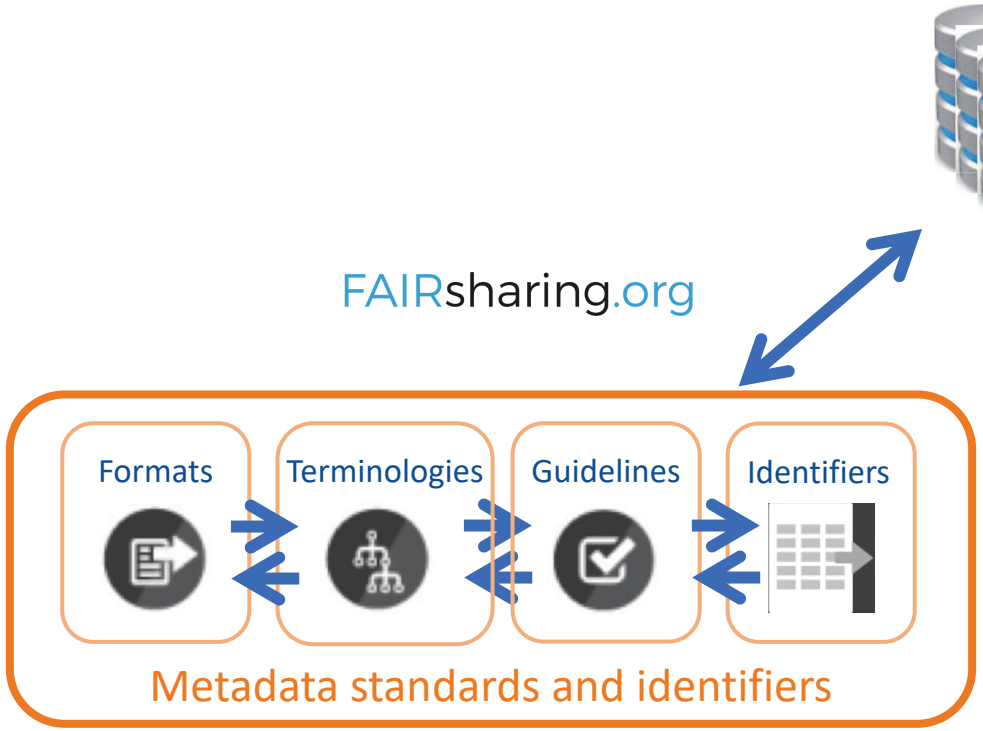

Databases – repositories and knowledgebases

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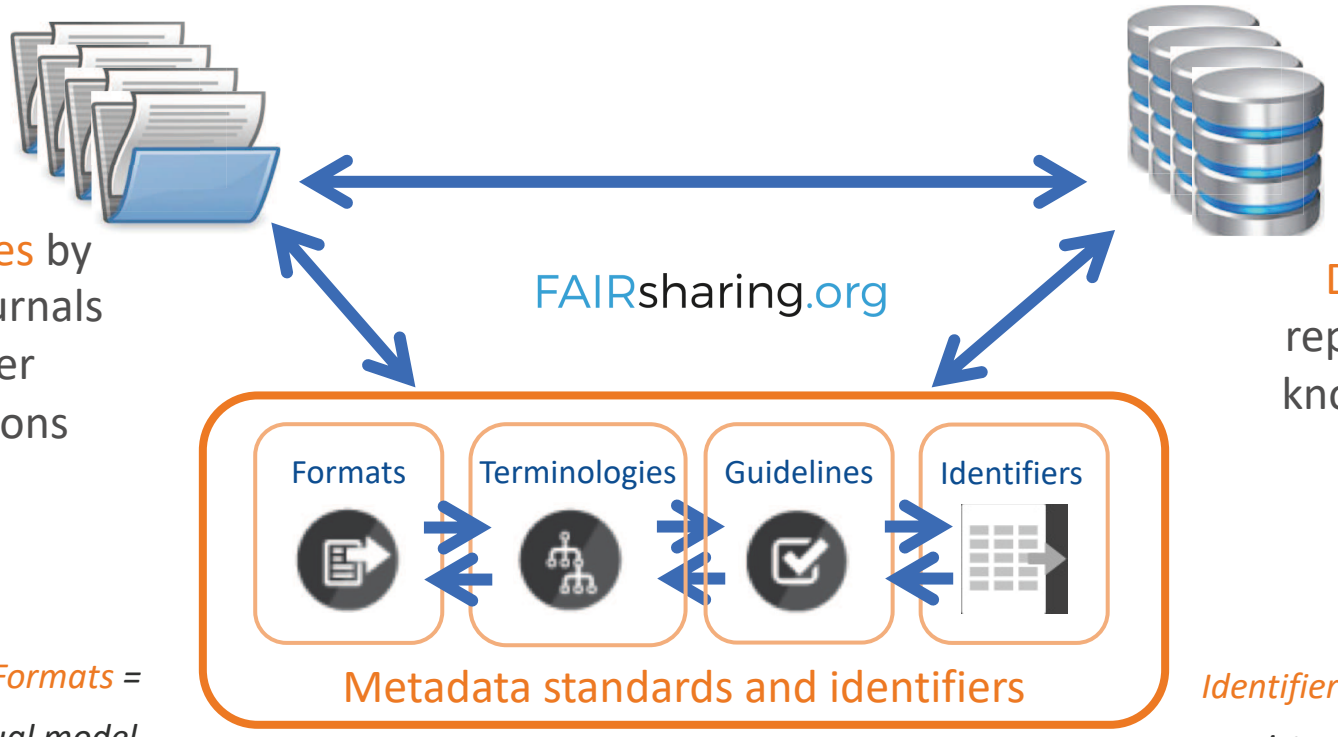

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Community verified status indicators

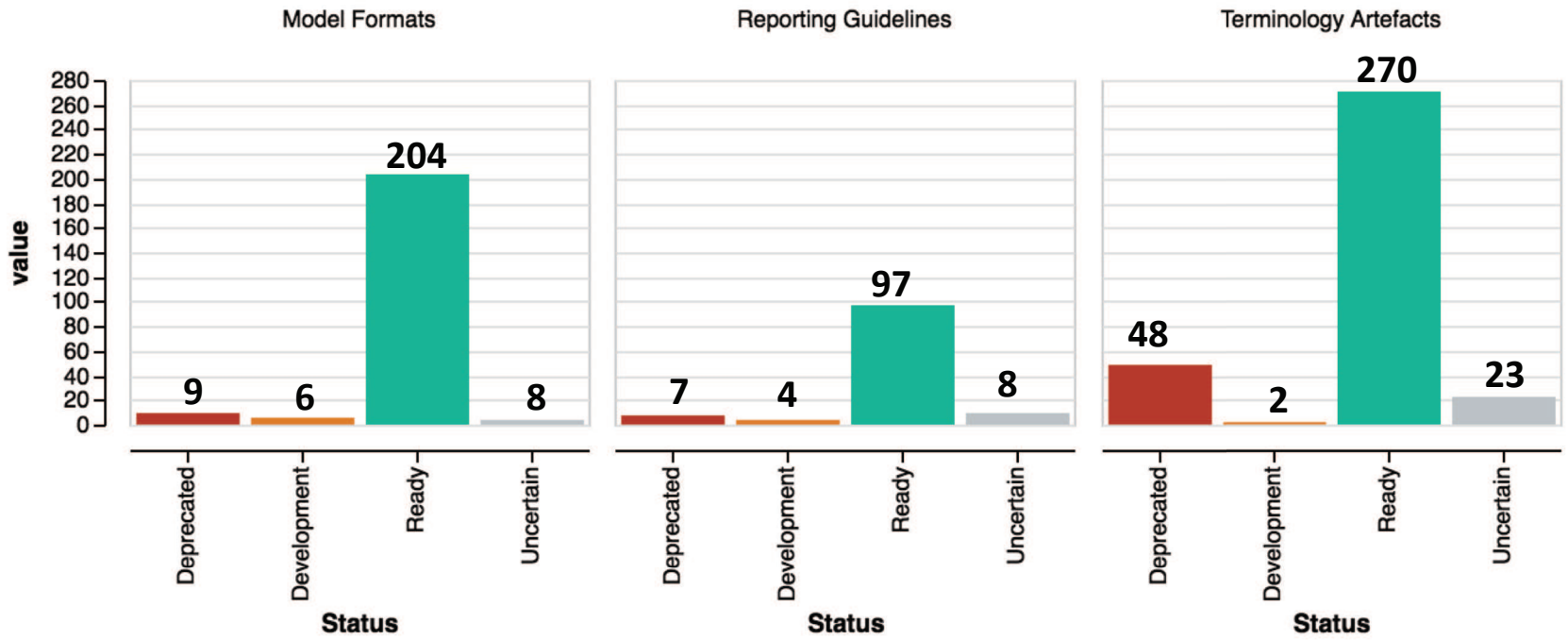
R **Ready for use, implementation, or recommendation**

Dev **In development**

U **Status uncertain**

D **Deprecated as subsumed or superseded**

All records are **manually curated** in-house and verified by the community behind each resource

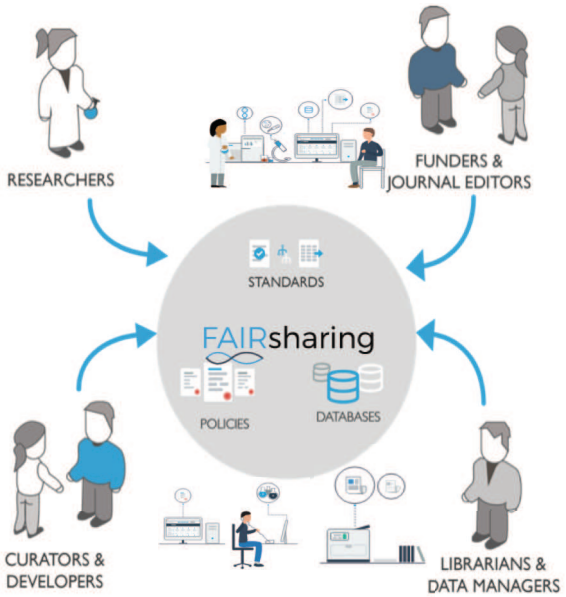


How can FAIRsharing help you?

Carla (**researcher**):
- Searches FAIRsharing to identify an established repository, recognized by the journal she plans to submit to
- Identifies which standards are used by the repositories she will submit to

Hagen (**biocurator**):
- Searches FAIRsharing for suitable standards to describe a set of biomedical experiments
- Filters the results by disciplines, focussing on standards implemented by one or more data repositories.
- Finds the details of a person or support group to contact.

Beatriz (**standards developer and repository manager**):
- Creates and maintains a collection to list and showcase the set of standards and repositories developed by the organizations she is the representative of
- Registers the standards/repositories and/or claims existing records added by the FAIRsharing team, vetting
- She uses the DOIs assigned to her records to cite the evidence of their adoption and use.

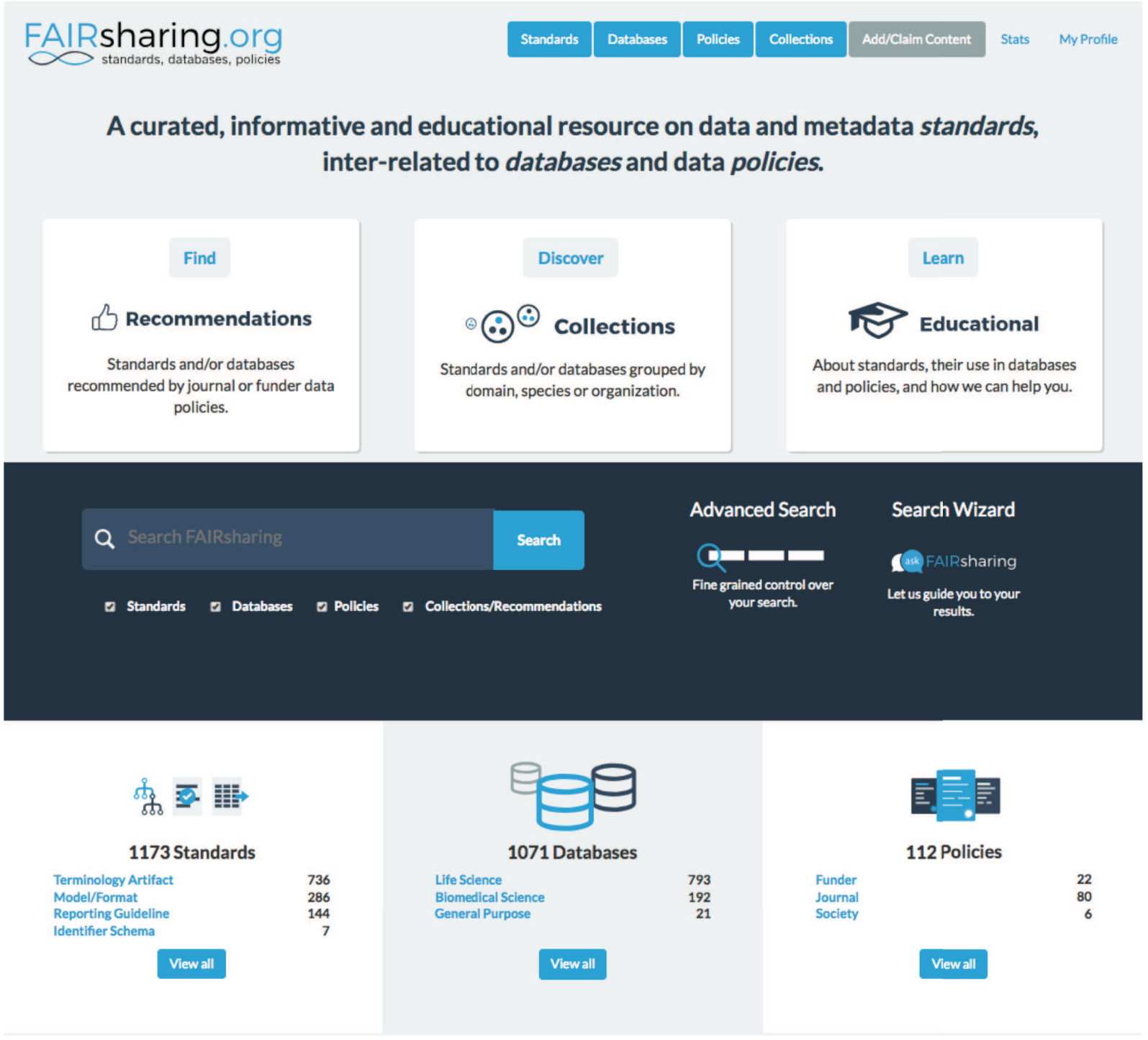


- FAIRsharing **guides consumers,** accelerating *discovery*, *selection* and *use* of relevant repositories, standards and data policies with confidence.
- FAIRsharing increases **producer satisfaction,** in terms of *visibility*, *reuse*, *adoption* and *citations* of their resources.

Laura (**policy maker**):
- Registers her journal's data policy in FAIRsharing,
- Creaties and maintains an interrelated list of the repositories and standards she recommends to the authors.
- She keeps her data policy up-to-date using visualization and comparison functionalities.

Marek (**data manager**):
- Consults FAIRsharing when creating a data management plan to identify the most appropriate reporting guidelines, formats and terminologies for his data types, and formally cites these community standards using their DOIs and the 'how to cite this record' statements provided for each resource.

Jen (**librarian**):
- Uses FAIRsharing to enrich educational and training material to support scholars to utilize data standards
- Identifies appropriate journal and funder policies, and develops guidance to increase capability and skills, and empowers researchers to organize and make their data FAIR.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standards, databases, policies
Standards
Databases
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A curated, informative and educational resource on data and metadata standards, inter-related to databases and data policies.
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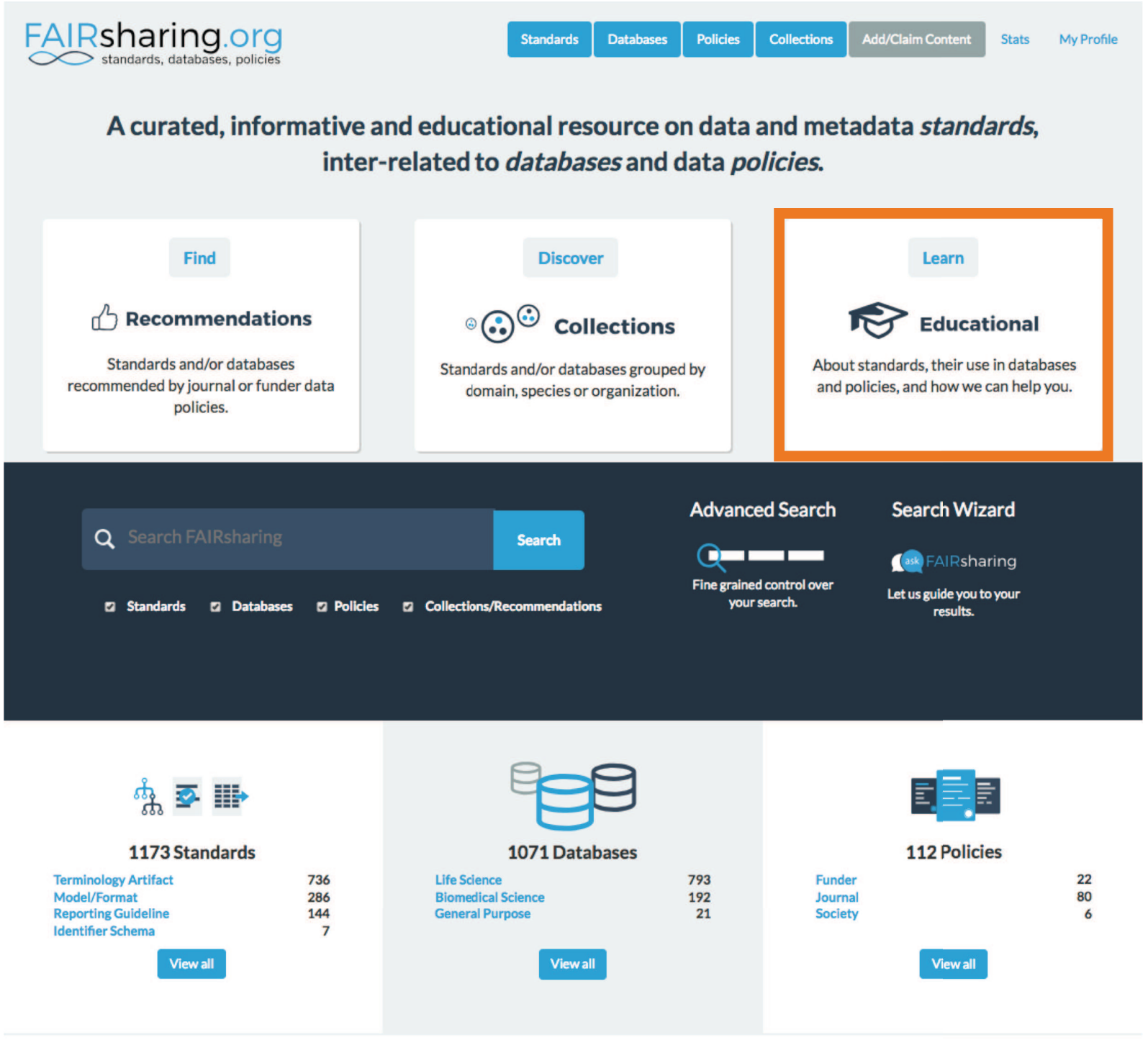
Let us guide you to your results.
1173 Standards
Terminology Artifact 736
Model/Format 286
Reporting Guideline 144
Identifier Schema 7
View all
1071 Databases
Life Science 793
Biomedical Science 192
General Purpose 21
View all
112 Policies
Funder 22
Journal 80
Society 6
View all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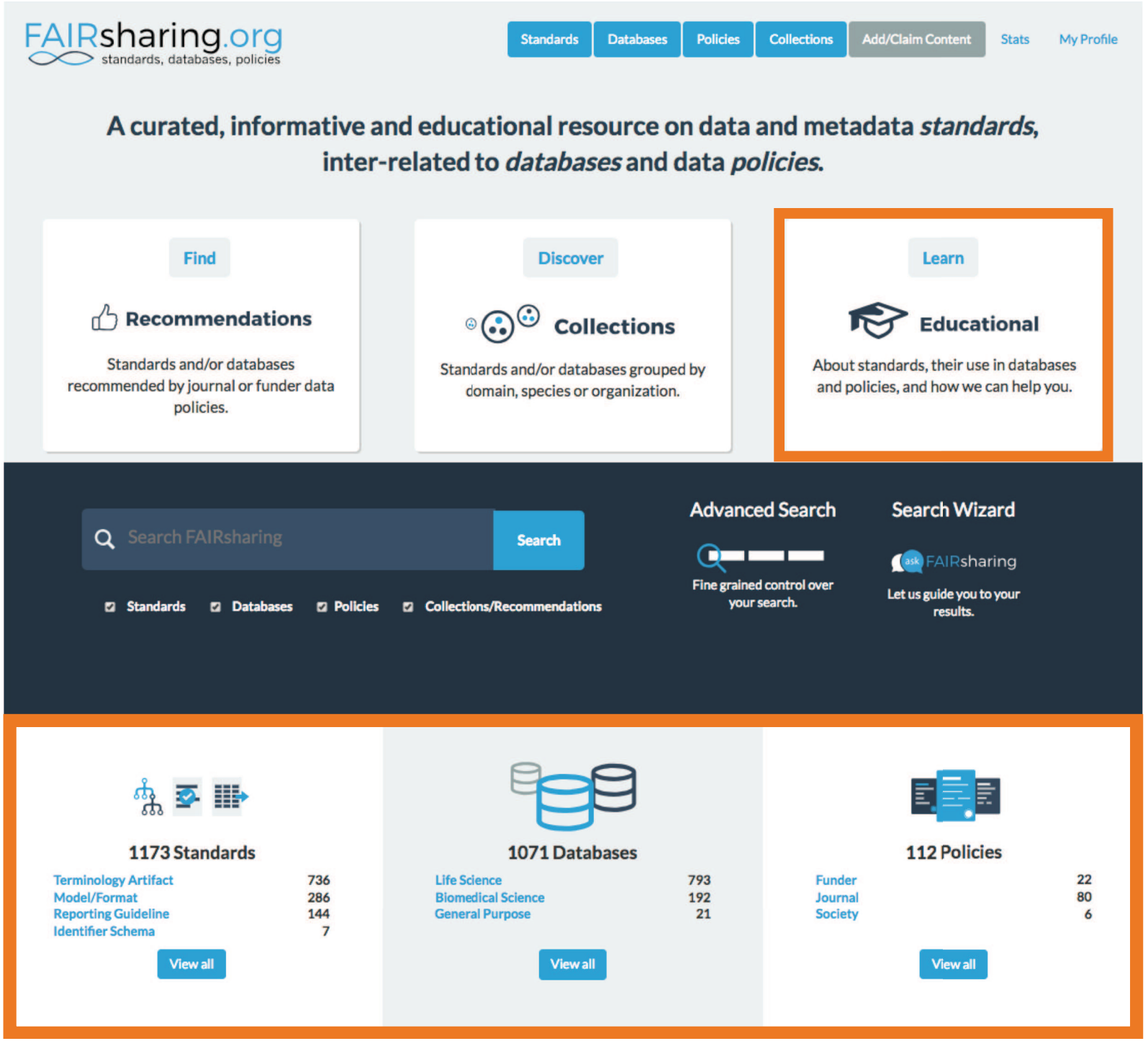
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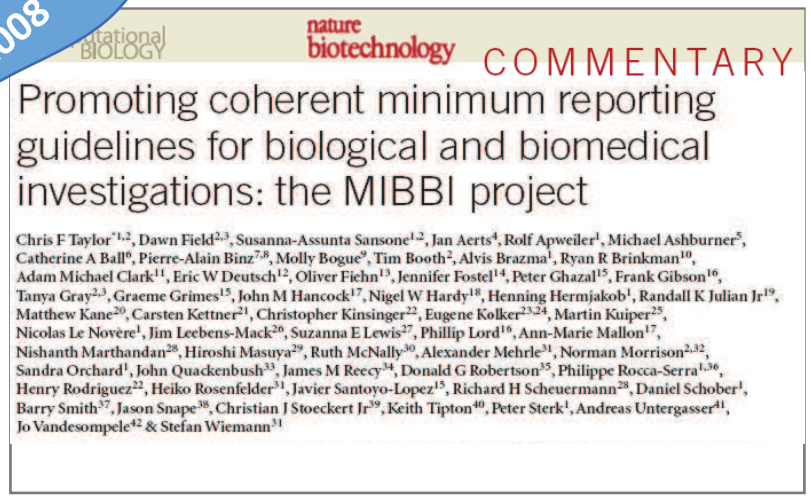
MIBBI → BioSharing → FAIRsharing

2008



nature biotechnology COMMENTARY

Promoting coherent minimum reporting guidelines for biological and biomedical investigations: the MIBBI project

Chris F Taylor[*1,2], Dawn Field[2,3], Susanna-Assunta Sansone[1,2], Jan Aerts[4], Rolf Apweiler[1], Michael Ashburner[5], Catherine A Ball[6], Pierre-Alain Binz[7,8], Molly Bogue[9], Tim Booth[2], Alvis Brazma[1], Ryan R Brinkman[10], Adam Michael Clark[11], Eric W Deutsch[12], Oliver Fiehn[13], Jennifer Fostel[14], Peter Ghazal[15], Frank Gibson[16], Tanya Gray[2,3], Graeme Grimes[15], John M Hancock[17], Nigel W Hardy[18], Henning Hermjakob[1], Randall K Julian Jr[19], Matthew Kane[20], Carsten Kettner[21], Christopher Kinsinger[22], Eugene Kolker[23,24], Martin Kuiper[25], Nicolas Le Novère[1], Jim Leebens-Mack[26], Suzanna E Lewis[27], Phillip Lord[16], Ann-Marie Mallon[17], Nishanth Marthandan[28], Hiroshi Masuya[29], Ruth McNally[30], Alexander Mehrle[31], Norman Morrison[2,32], Sandra Orchard[1], John Quackenbush[33], James M Reecy[34], Donald G Robertson[35], Philippe Rocca-Serra[1,36], Henry Rodriguez[22], Heiko Rosenfelder[31], Javier Santoyo-Lopez[15], Richard H Scheuermann[28], Daniel Schober[1], Barry Smith[37], Jason Snape[38], Christian J Stoeckert Jr[39], Keith Tipton[40], Peter Sterk[1], Andreas Untergasser[41], Jo Vandesompele[42] & Stefan Wiemann[31]

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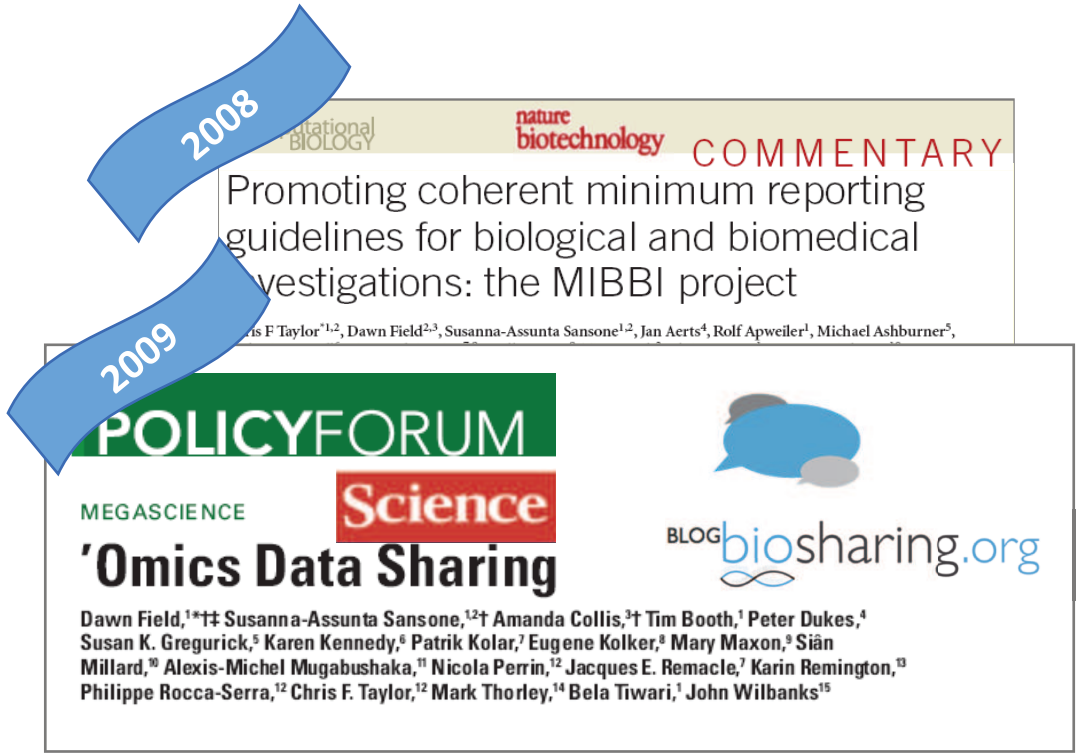

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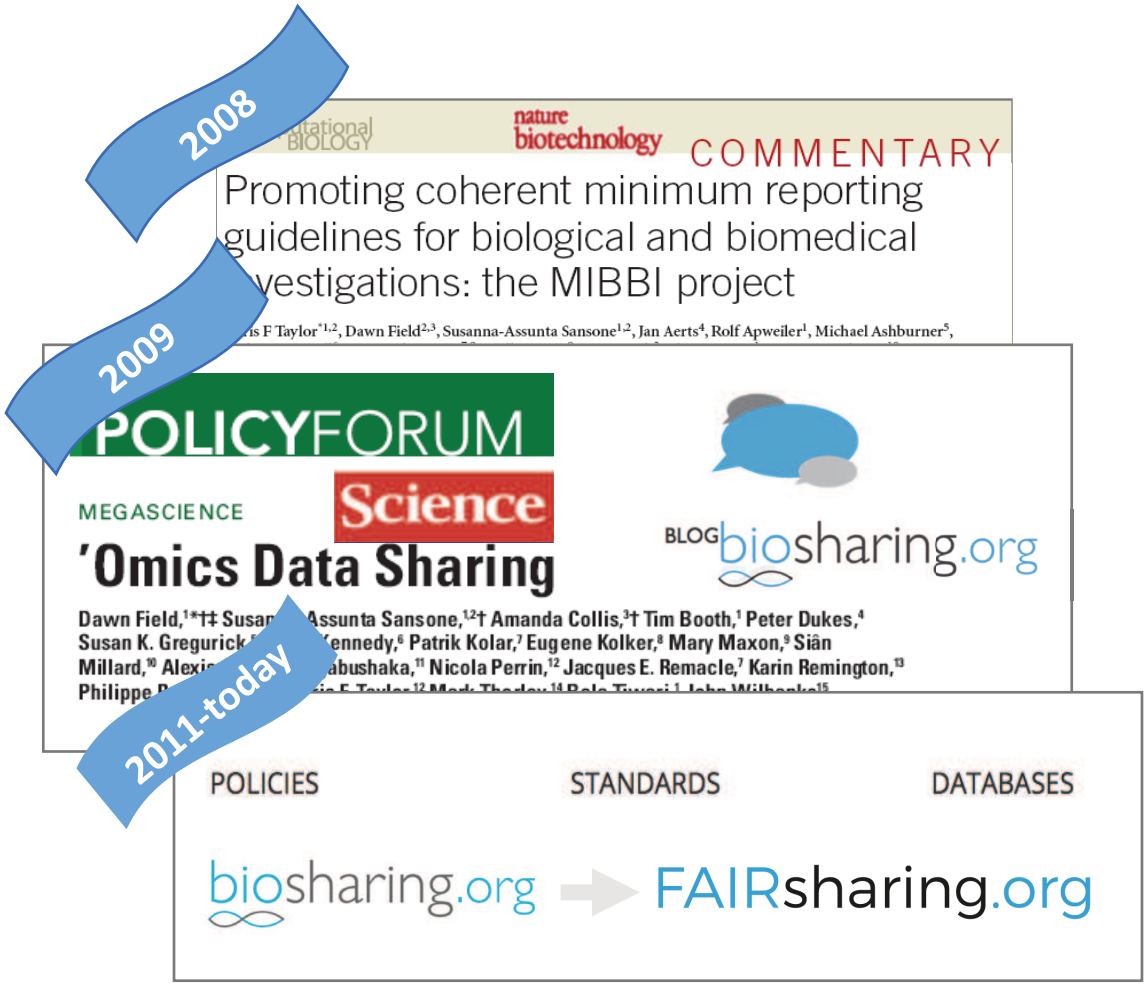

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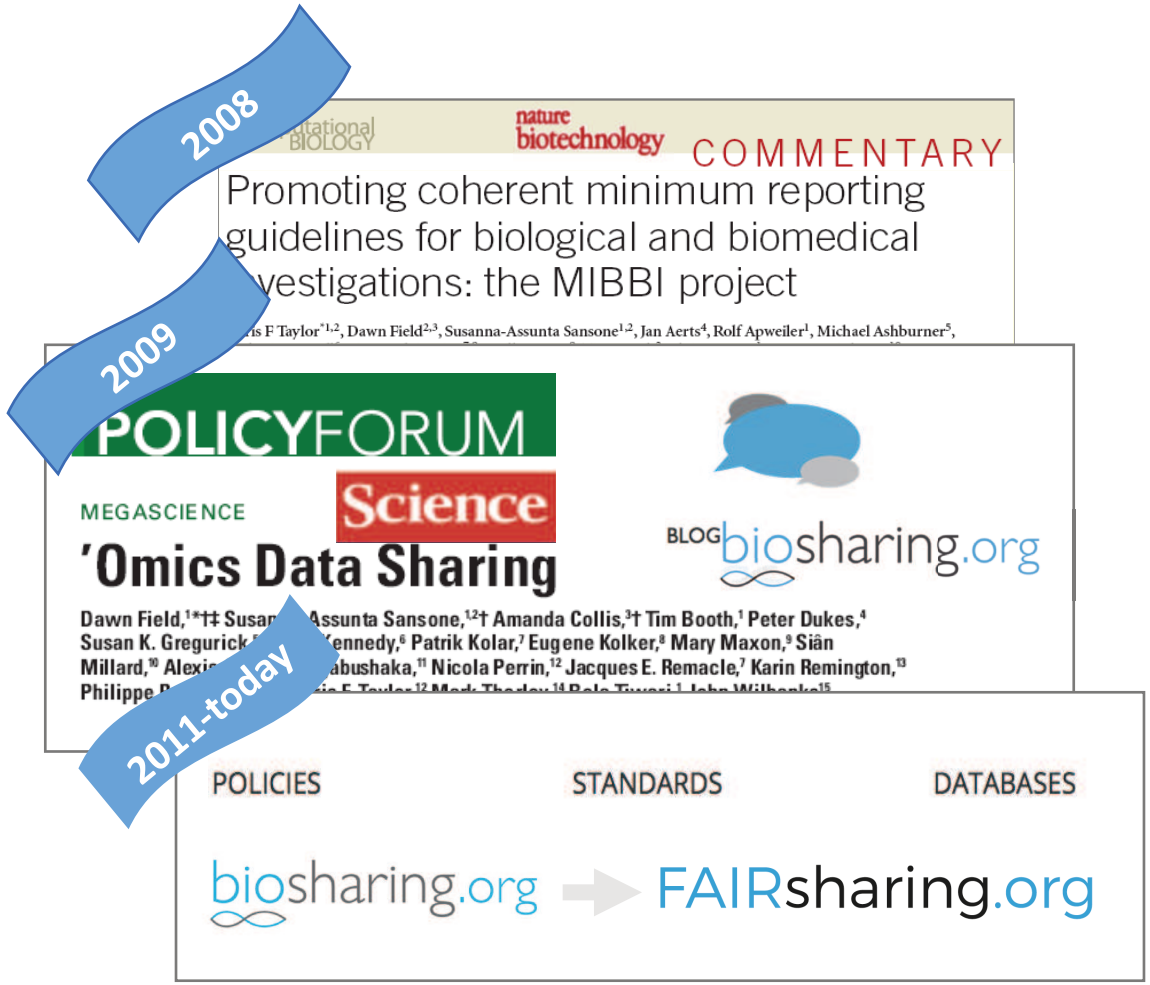

- Bias towards the life sciences (9 years)
- Grown organically with the community
- All data is CC-BY-SA 4.0
- Every record has a change log and receives a DOI
- Accessible by website or API

Information: This record is currently having edits to it reviewed by FAIRsharing Admins...

Minimum Information About a Proteomics Experiment

Abbreviation:MIAPE

RECOMMENDED

General Information

MIAPE attempts to define the minimum set of information about whole proteomics experiments that would be required by a public repository.

Homepage http://www.psidev.info/miape

Developed in Australia , Austria , Belgium , European Union , France , Germany , Japan , Netherlands , Republic of Ireland , Switzerland , United Kingdom , United States

Created in 2007

Taxonomic range

Archaea | Bacteria | Eukaryota

Scope and data types

Assay | Life Science | Pathogen | Protein | Proteomics

In the following recommendations:

EMBOpress SCIENTIFIC DATA

How to cite this record FAIRsharing.org: MIAPE; Minimum Information About a Proteomics Experiment; DOI: 10.25504/FAIRsharing.8vv5fc; Last edited: July 12, 2018, 11:05 p.m.; Last accessed: Jul 15 2018 9:44 p.m.

This record is maintained by javizca ORCID and HUPO PSI (HUPOPSI)

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Associated recommendations

EMBO Press

Scientific Data

In Collections

FAIRDOM Community Standards

Minimum Information for Biological and Biomedical Investigations

HUPO Proteomics Standards Initiative

Support

General

mailing list	Psidev-pi-dev@lists.sourceforge.net
mailing list	psidev-ms-dev@lists.sourceforge.net
online documentation	http://mibbi.sourceforge.net/projects/MI ...

Additional Information

Contact	Juan Antonio Vizcaino

Tools

No tools defined

Related Standards

Reporting Guidelines

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MIAPE: Mass Spectrometry
Minimum Information about a Molecular Interaction Experiment
MIAPE: Mass Spectrometry Informatics
MIAPE: Mass Spectrometry Quantification
MIAPE: Capillary Electrophoresis
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Minimum Information About a Peptide Array Experiment

Terminology Artifacts

Sample processing and separations controlled vocabulary

Models and Formats

mz Markup Language
imaging mz Markup Language
Molecular Interaction eXtensible Markup Language
Minimum Information About an RNAi Experiment Tabular

Implementing Databases (4)

PRoteomics IDEntifications database
The PRIDE PRoteomics IDEntifications database is a centralized, standards compliant, public data repository that provides protein and peptide identifications together with supporting evidence.

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A public repository, standards compliant, for proteomics image data published in the literature. This repository currently contains data from 16 published articles, putting together 22 reference maps for 15 species, totalizing nearly 4'400 identified spots.

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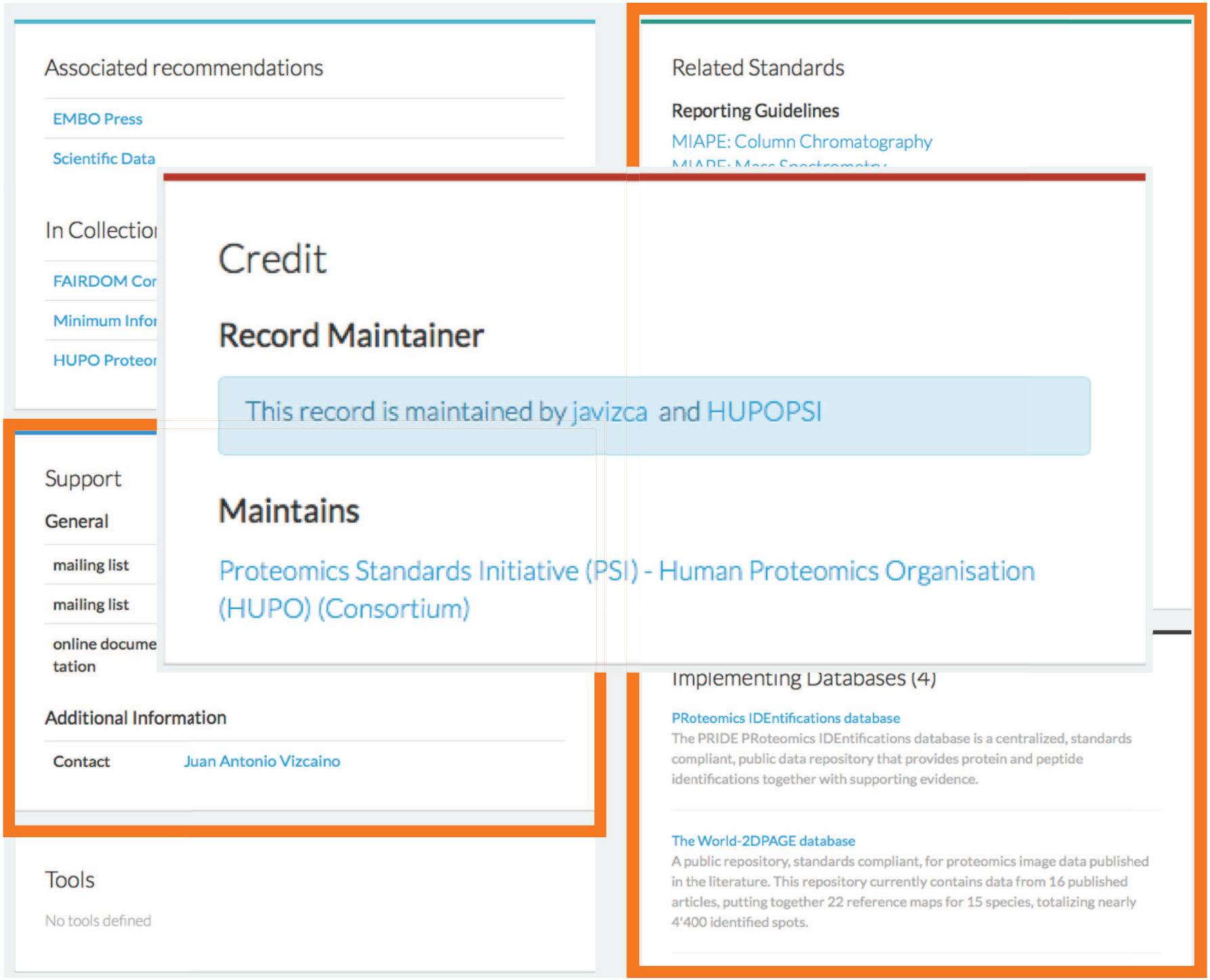
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Credit
Record Maintainer
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Maintains
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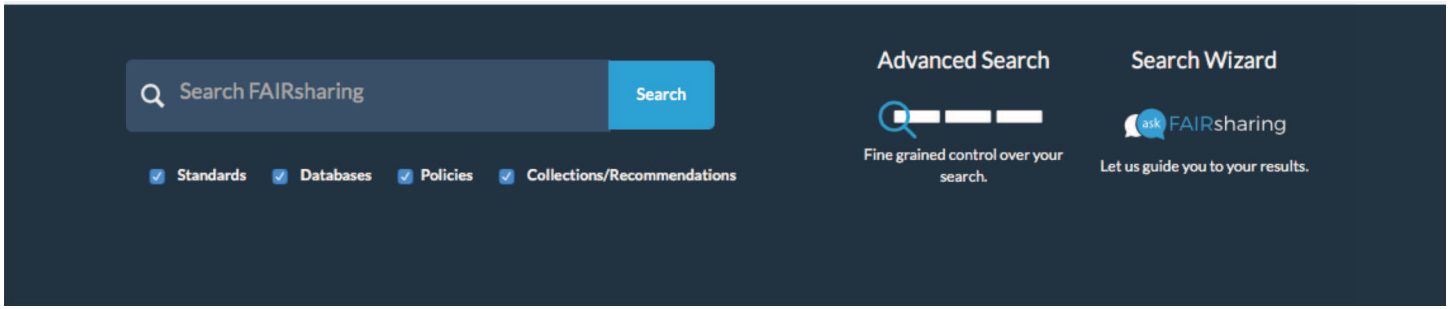
Finding and Accessing the data



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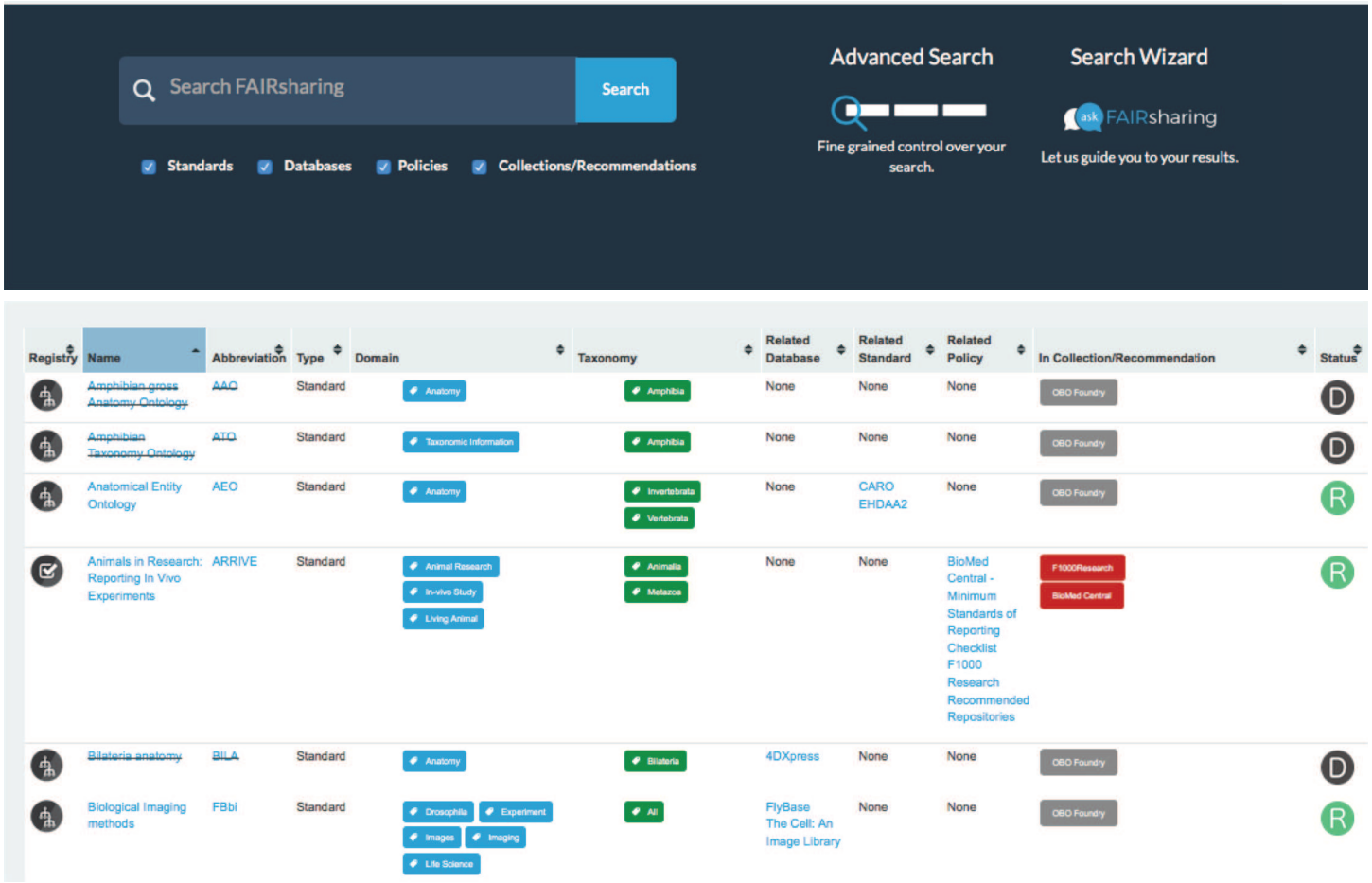

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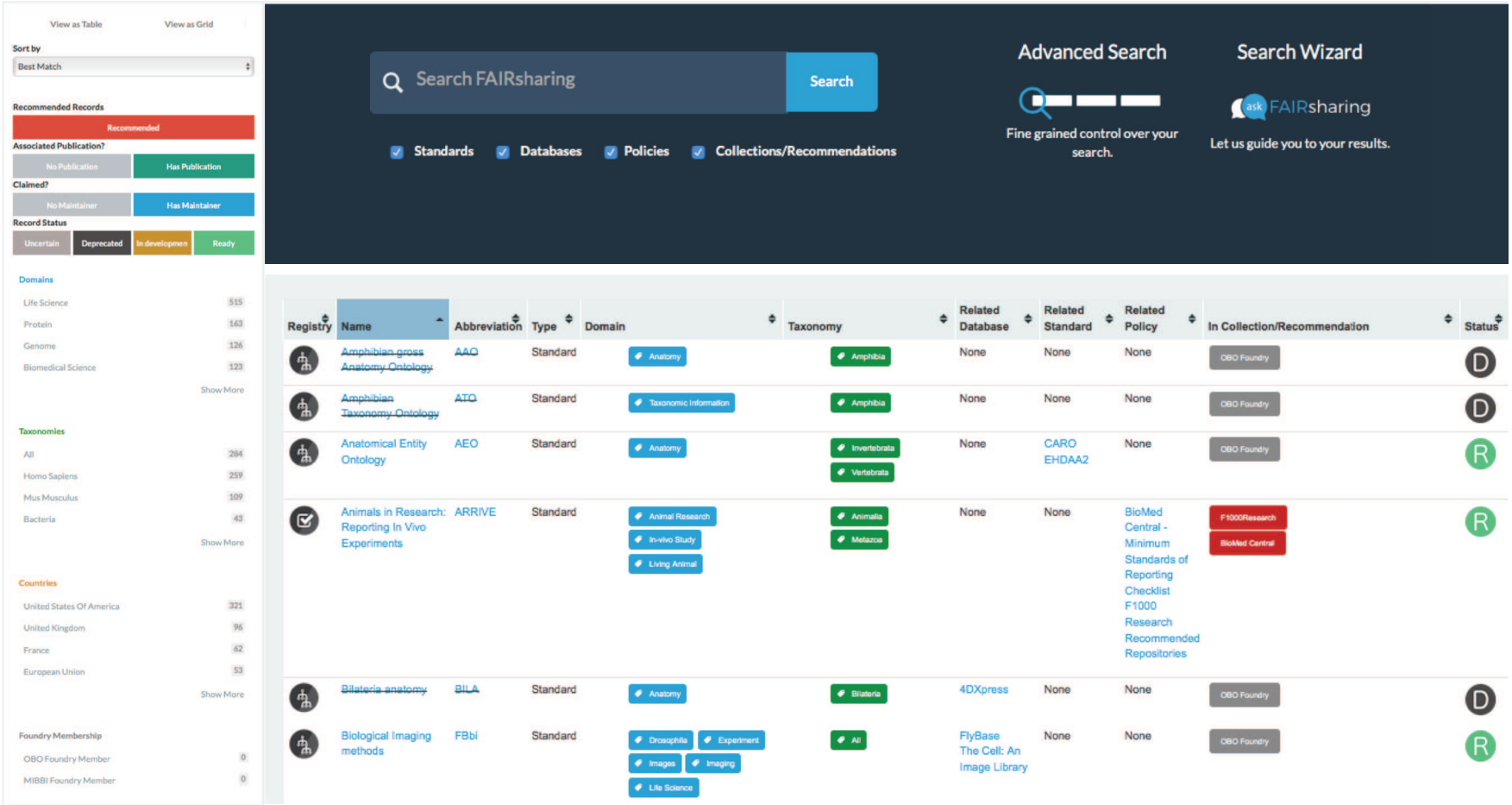
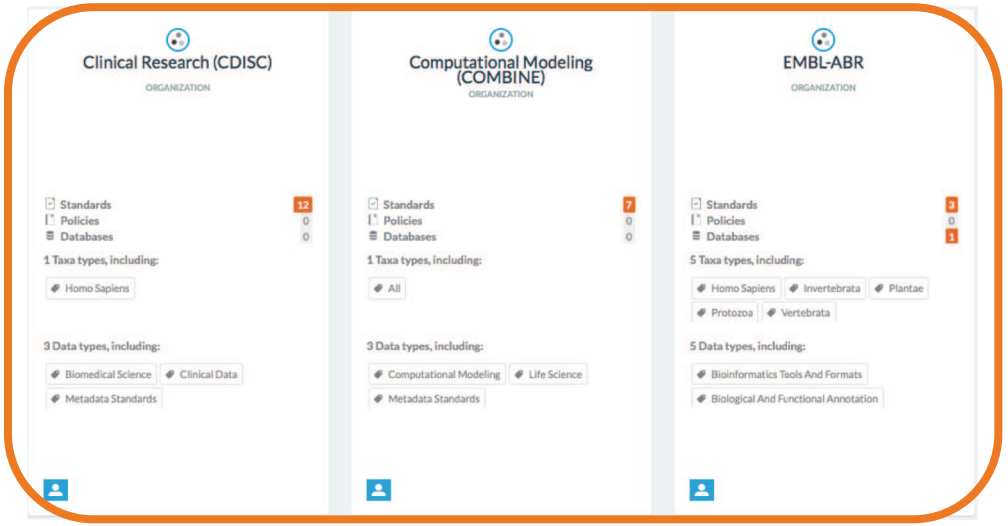


Grouping the data

Collections group together one or more types of resource by domain, project or organization.



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Recommendations are a core-set of resources that are selected and recommended by a funder or journal data policy.

PLOS PLOS

RECOMMENDATION

PLOS has identified a set of established repositories and data standards, which are recognized and trusted within their respective communities, for their journals PLOS Biology, PLOS Medicine, PLOS ONE, PLOS Genetics, PLOS Computational Biology, PLOS Pathogens, and PLOS Neglected Tropical Diseases. PLOS requires that authors comply with field-specific standards for preparation and recording of data and select repositories appropriate to their field, for example deposition of microarray data in ArrayExpress or GEO; deposition of gene sequences in GenBank, EMBL or DDBJ; and deposition of ecological data in Dryad. Authors are encouraged to select repositories that meet accepted criteria as trustworthy digital repositories.

This record is maintained by: eganley , PLOSData

This recommendation is taken from the following policy:

Public Library of Science Recommended Data Repositories.

Record updated: April 10, 2017, 11:41 a.m. by The FAIRsharing Team.

Homepage | Reference

Taxonomic range

All

Scope and data types

Biomedical Science | Data Sharing | Life Science | Metadata Standardization

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Show edit history

Compare with collection/recommendation (Beta) — Please select a Collection or Recommendation

View as Table | View as Grid

Sort by: Name

Recommended Records: Recommended

Associated Publication?: No Publication | Has Publication

Claimed?: No Maintainer | Has Maintainer

Record Status: Uncertain | Deprecated | In development | Ready

Standard Type

- Terminology Artifact 1

Registry

- Database 84
- Standard 1

Domains

- Life Science 62
- Biomedical Science 20
- Genome 15
- Gene Expression Data 12

Showing records 1 - 90 of 89.

« 1 2 »

Registry	Name	Abbreviation	Type	Domain	Taxonomy	Related Database	Related Standard	Related Policy	In Collection/Recommendation	Status
	ArrayExpress	ArrayExpress	Database	Chromatin Immunoprecipitation - DNA Microarray (ChIP-Chip); Chromatin Immunoprecipitation - DNA Sequencing (ChIP-Seq); DNA Microarray; Gene Expression Data; Genotyping; Plus 4 more...	All	BioSD; Expression Atlas; SMD; DGVA; ClinVar; Plus 3 more...	EFO; MAGE-TAB; MIAME/Env; MINSEQE; MIAME; Plus 2 more...	AAAS Science Policy; Springer Nature - Nature Biotechnology - Availability of Data and materials; Elsevier - Lancet Neurology - Information for Authors; Cold Spring Harbor Laboratory Press - Genes and Development - Instructions Regarding Data Submission; EMBO Recommended Databases and Data Standards; Plus 47 more...	Data Citation Implementation; DNA Microarray; ELIXIR node contributed resources	R
	Australian Antarctic Data Centre	AADC	Database	Atmospheric Science; Biology; Earth Science; Environmental Sciences; Geology; Plus 4 more...	All	GBIF	None	SciData Data Policy; PLOS Recommended Repositories	None	R
	Biological General Repository for Interaction Datasets	BioGRID	Database	Gene; Life Science; Molecular Interaction; Protein	Arabidopsis thaliana; Drosophila melanogaster; Saccharomyces cerevisiae; Schizosaccharomyces pombe	PhenoM; SGD; PomBase; APID Interactomes; DrugBank; Plus 7 more...	MIRO; MITAB; PSI-MI XML	SciData Data Policy; PLOS Recommended Repositories	Data Citation Implementation; Open Science Prize; NIH-supported data repositories	R
	Biological Magnetic Resonance Databank	BMRB	Database	Life Science; Molecular Entity; Nuclear Magnetic Resonance (NMR) Spectroscopy; Spectrum; Structure	All	PDBe; Protein Data Bank Japan; RCSB PDB; wwPDB	PDB; NMR-STAR; nmrCV; CCPN data model; NMR-ML	AAAS Science Policy; Springer Nature - Nature Genetics - Availability of Data and materials; Springer Nature - Nature Biotechnology - Availability of Data and materials; Cold Spring Harbor Laboratory Press - Genes and Development - Instructions Regarding Data Submission; Springer Nature - Nature Materials -	Data Citation Implementation	R

PLOS PLOS

RECOMMENDATION

PLOS has identified a set of established repositories and data standards, which are recognized and trusted within their respective communities, for their journals PLOS Biology, PLOS Medicine, PLOS ONE, PLOS Genetics, PLOS Computational Biology, PLOS Pathogens, and PLOS Neglected Tropical Diseases. PLOS requires that authors comply with field-specific standards for preparation and recording of data and select repositories appropriate to their field, for example deposition of microarray data in ArrayExpress or GEO; deposition of gene sequences in GenBank, EMBL or DDBJ; and deposition of ecological data in Dryad. Authors are encouraged to select repositories that meet accepted criteria as trustworthy digital repositories.

This record is maintained by: eganley , PLOSData

This recommendation is taken from the following policy:

Public Library of Science Recommended Data Repositories.

Record updated: April 10, 2017, 11:41 a.m. by The FAIRsharing Team.

Homepage | Reference

Taxonomic range

All

Scope and data types

Biomedical Science | Data Sharing | Life Science | Metadata Standardization

View as Graph

Show edit history

Compare with collection/recommendation (Beta) | Please select a Collection or Recommendation

View as Table | View as Grid

Sort by: Name

Recommended Records

Recommended

Associated Publication?

No Publication | Has Publication

Claimed?

No Maintainer | Has Maintainer

Record Status

Uncertain | Deprecated | In development | Ready

Standard Type

Terminology Artifact 1

Registry

Database 84

Standard 1

Domains

Life Science 62

Biomedical Science 20

Genome 15

Gene Expression Data 12

« 1 2 »

Registry	Name	Abbreviation	Type	Domain	Taxonomy	Related Database	Related Standard	Related Policy	In Collection/Recommendation	Status
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	Biological General Repository for Interaction Datasets	BioGRID	Database	Gene; Life Science; Molecular Interaction; Protein	Arabidopsis thaliana; Drosophila melanogaster; Saccharomyces cerevisiae; Schizosaccharomyces pombe	PhenoM; SGD; PomBase; APID Interactomes; DrugBank; Plus 7 more...	MIRO; MITAB; PSI-MI XML	SciData Data Policy; PLOS Recommended Repositories	Data Citation Implementation; Open Science Prize; NIH-supported data repositories	R
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All

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Biomedical Science | Data Sharing | Life Science | Metadata Standardization

View as Graph

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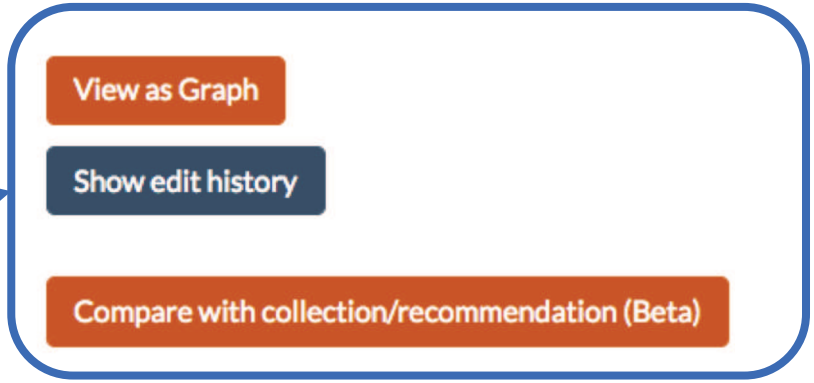
Compare with collection/recommendation (Beta)

Please select a Collection or Recommendation



View as Table | View as Grid

Sort by

Name

Recommended Records

Recommended

Associated Publication?

No Publication | Has Publication

Claimed?

No Maintainer | Has Maintainer

Record Status

Uncertain | Deprecated | In development | Ready

Standard Type

Terminology Artifact 1

Registry

Database 84

Standard 1

Domains

Life Science 62

Biomedical Science 20

Genome 15

Gene Expression Data 12

« 1 2 »

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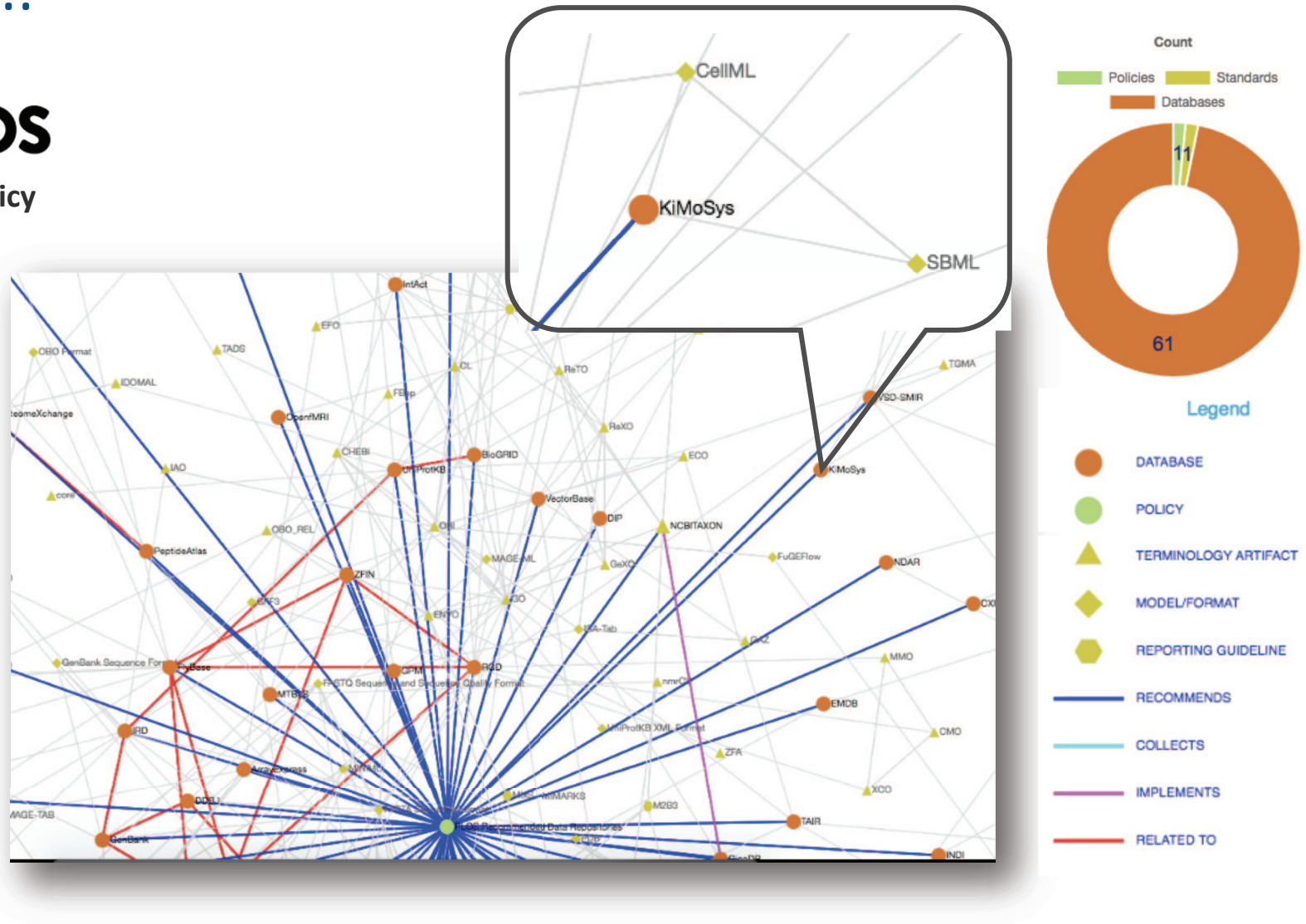
Visualizing the relationships between data…

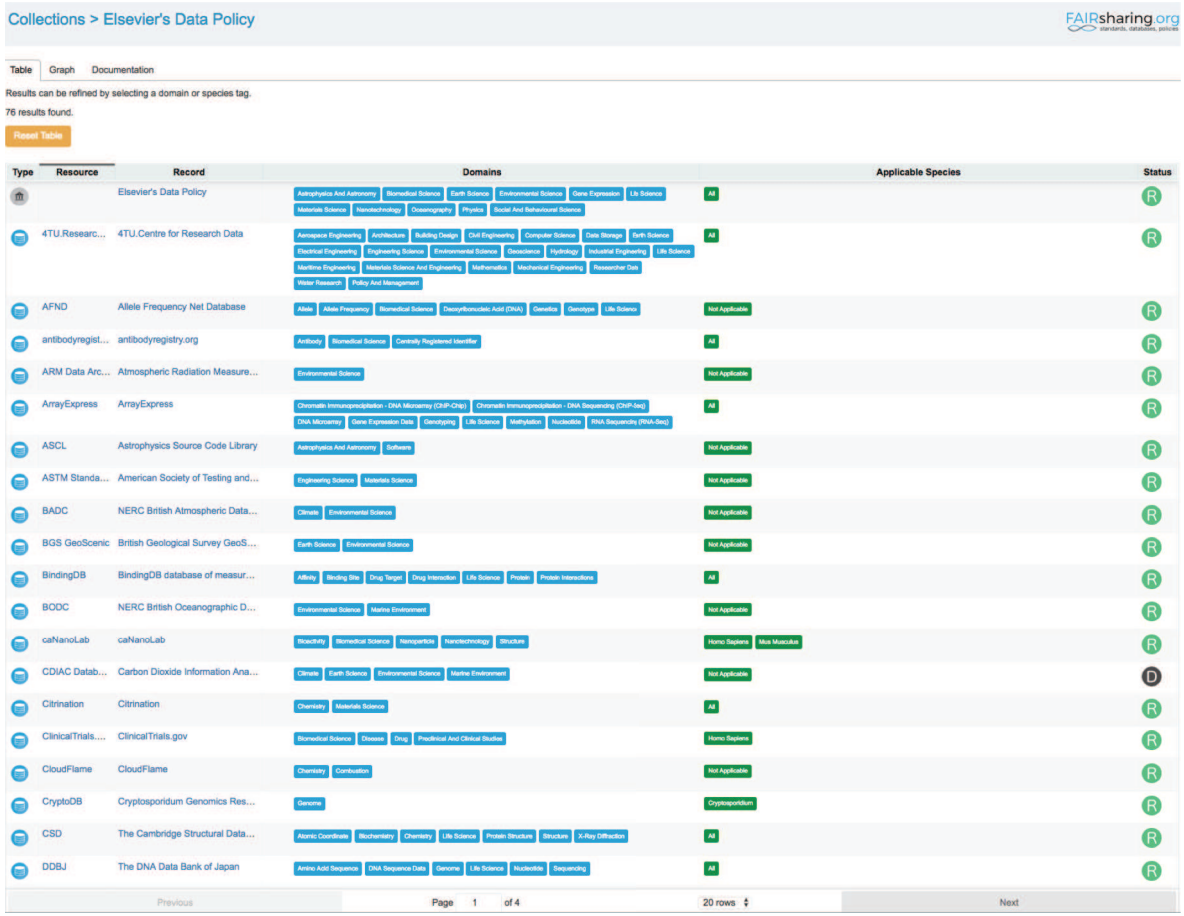
PLOS

Data Policy



Collection/recommendation widget

- Embed a collection or recommendation in a third-party website
- Data is retrieved through FAIRsharing REST API
- Widget is provided as a service
- The collection or recommendation can be visualized either as a table or as a graph
- User can filter records by type tags or path distance from the central node



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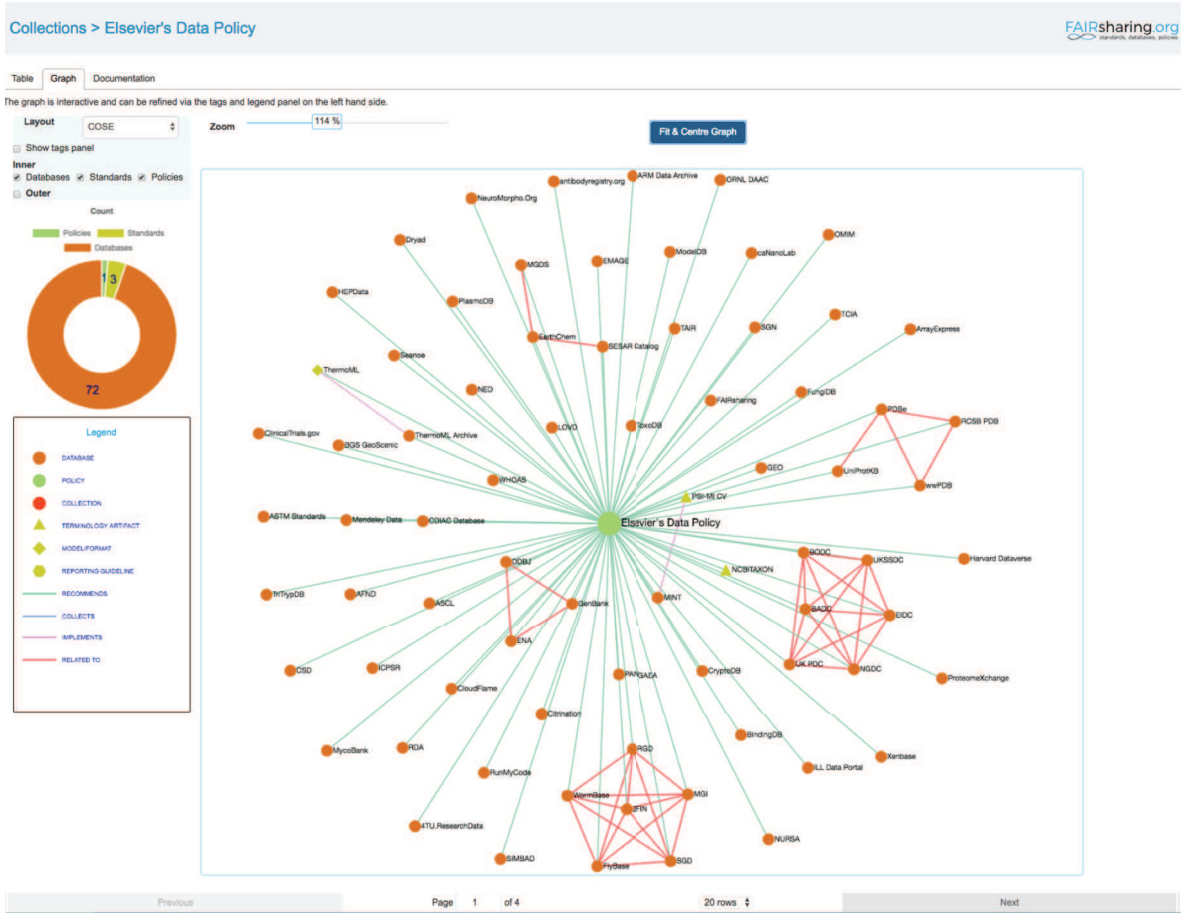
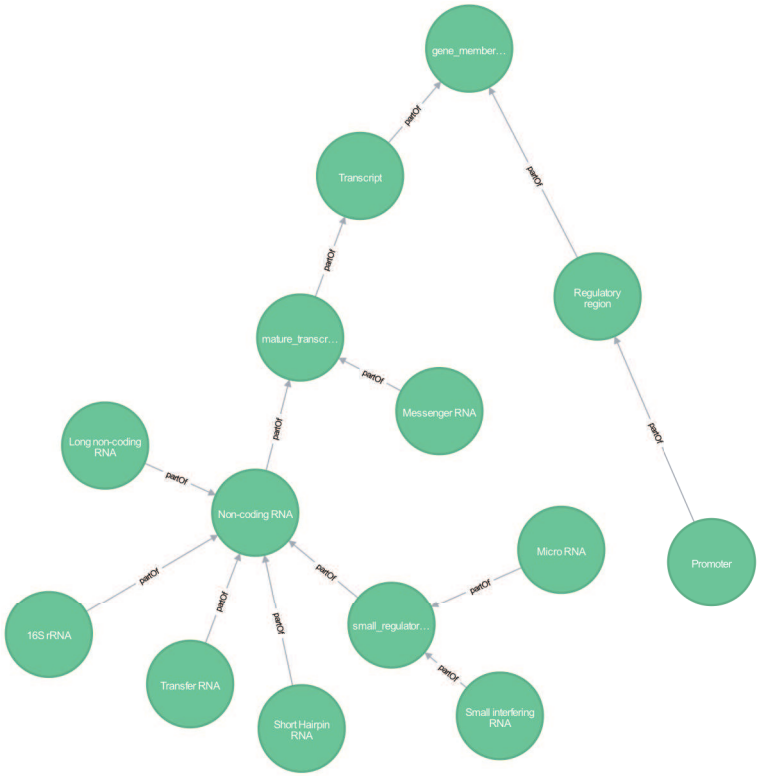


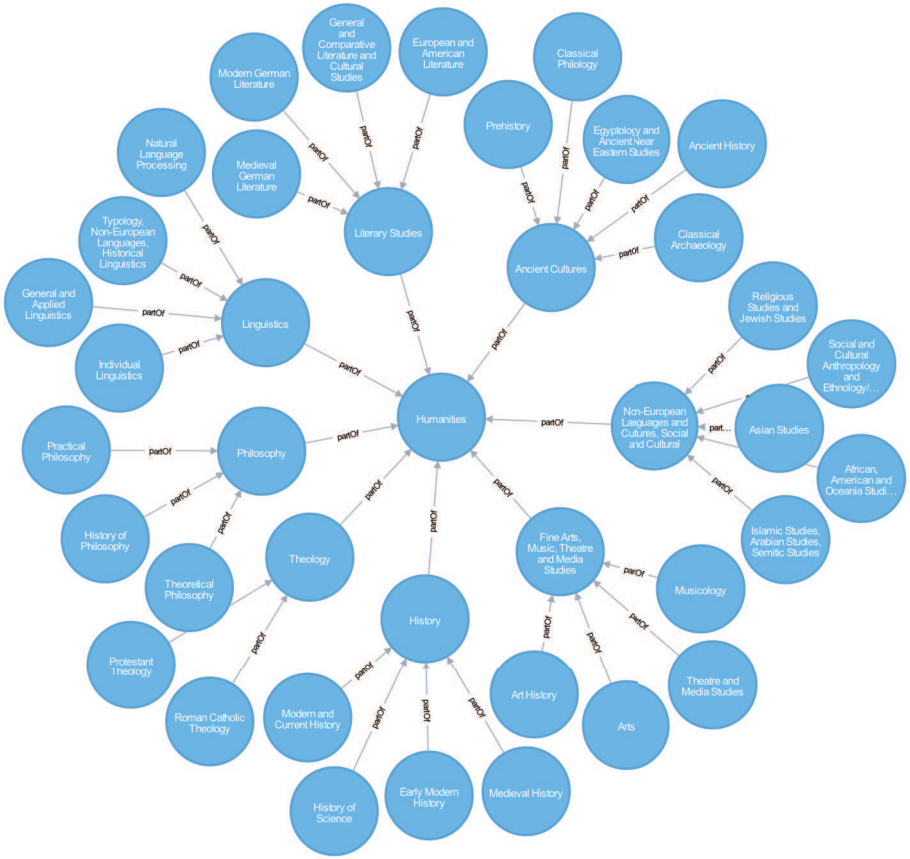
Ontology-based tagging support

Knowledge Domains Application Ontology (DRAO)



OBI, CHEBI, UBERON and over other 40 existing ontologies
https://github.com/FAIRsharing/domain-ontology

Disciplines/Subjects Application Ontology (SRAO)

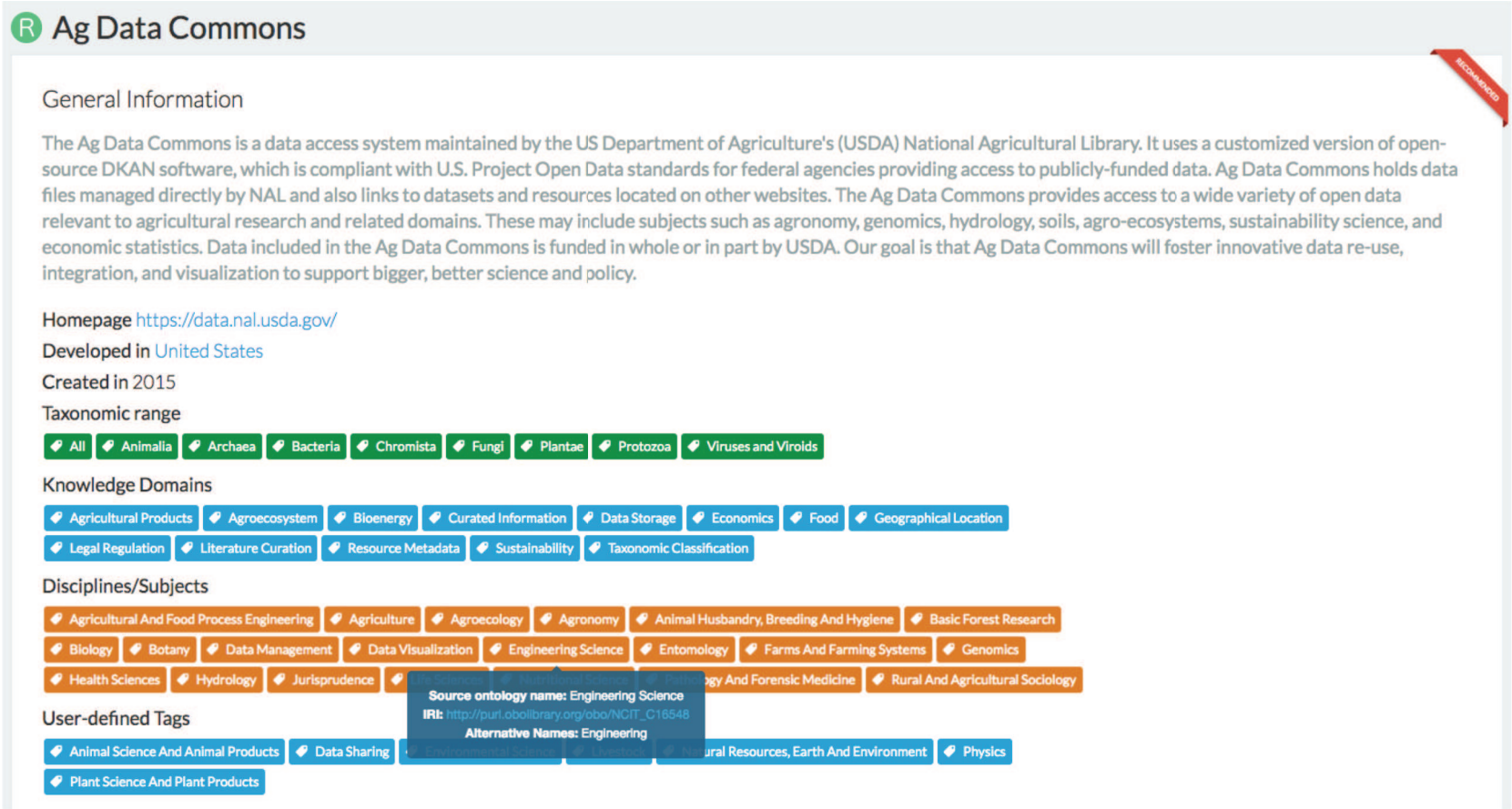


re3data, Agrovoc, PO, NCIT, EDAM, OMIT
https://github.com/FAIRsharing/subject-ontology

Ontology tagging: viewing a record

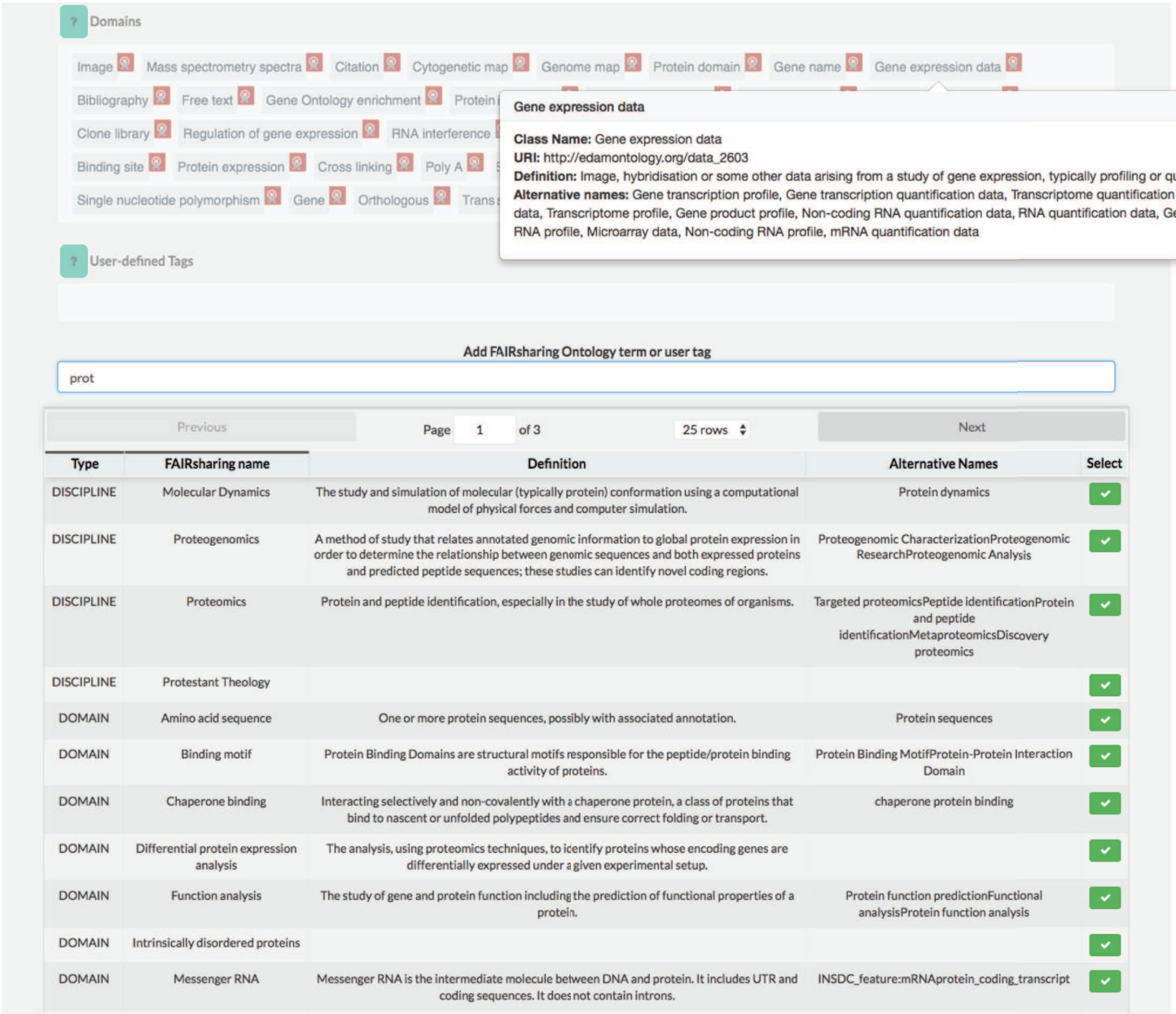
The current “scope and data types” tags will be split into:

- Knowledge Domains (DRAO)
- Disciplines/Subjects (SRAO)
- User-defined tags (free-text)



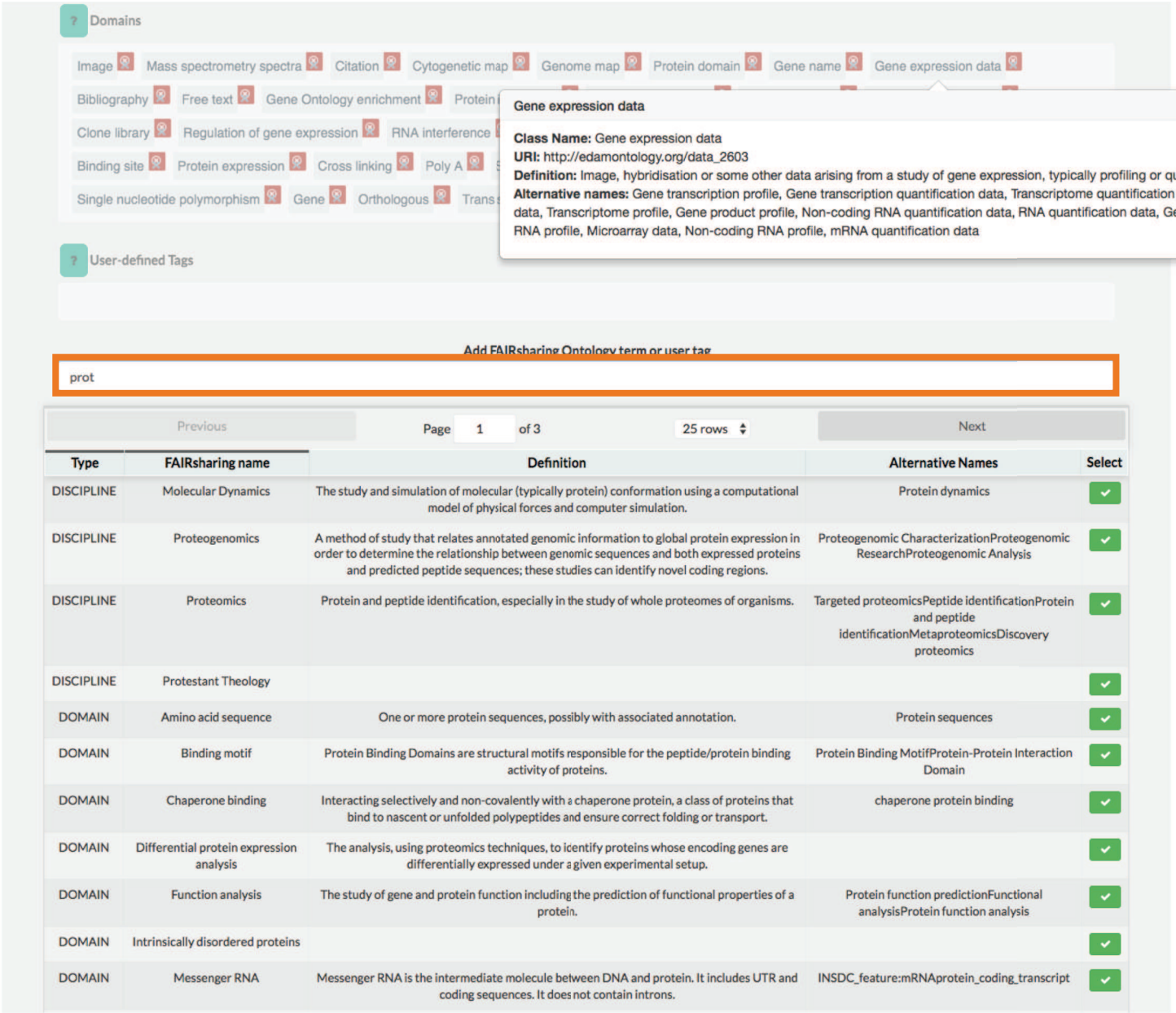
Accessible at: https://preview.fairsharing.org/

Ontology tagging: editing a record



The user types the term sought, and a list of options is fetched remotely, with details about the source ontology and synonyms

Ontology tagging: editing a record



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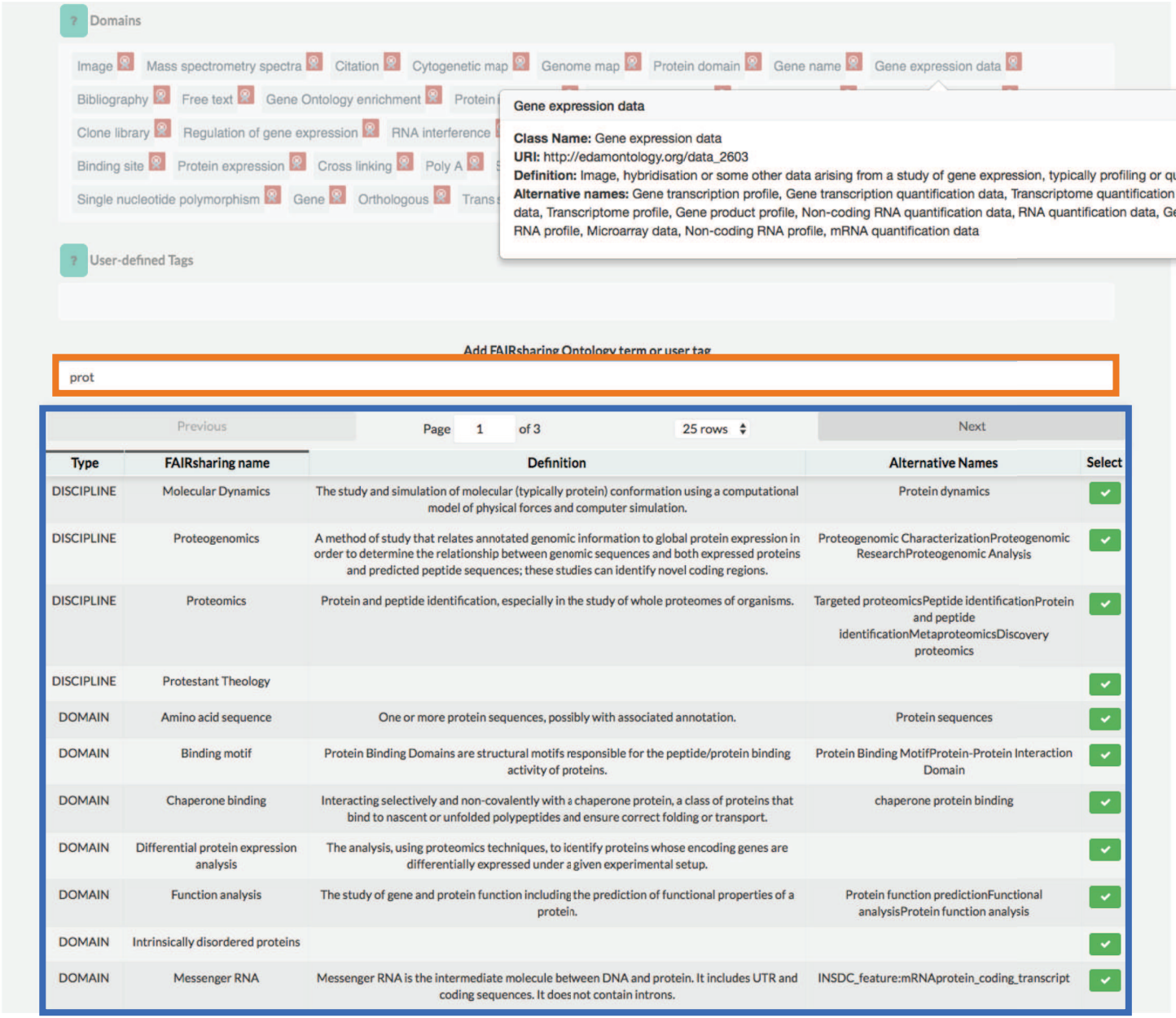
Ontology tagging: editing a record



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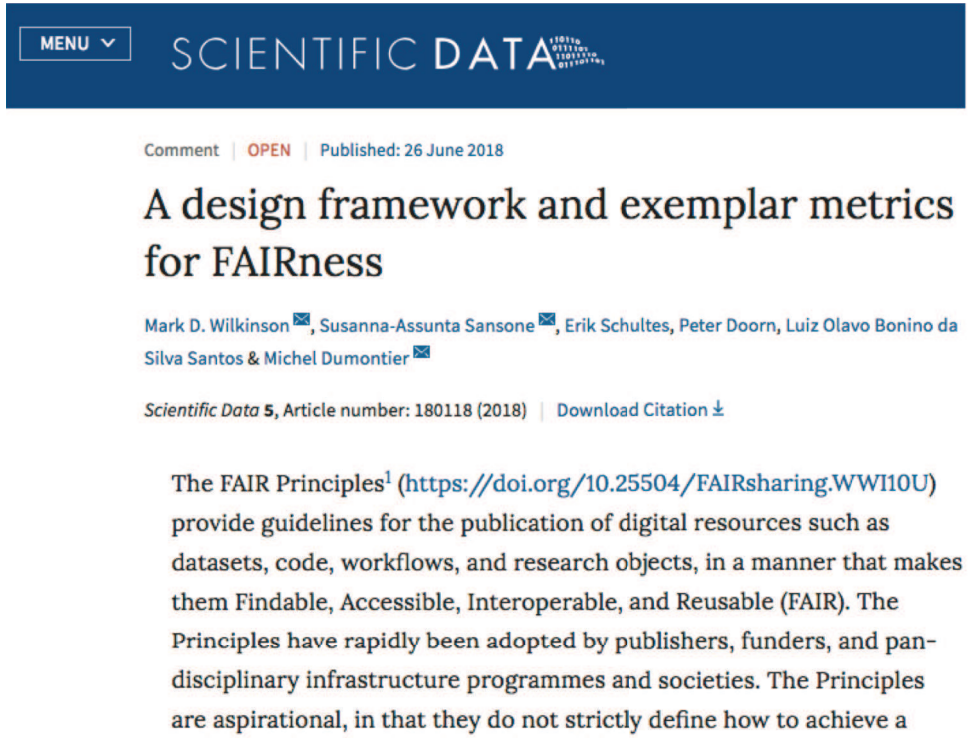
Making things FAIR

1.



MENU SCIENTIFIC DATA

Comment | OPEN | Published: 26 June 2018

A design framework and exemplar metrics for FAIRness

Mark D. Wilkinson, Susanna-Assunta Sansone, Erik Schultes, Peter Doorn, Luiz Olavo Bonino da Silva Santos & Michel Dumontier

Scientific Data **5**, Article number: 180118 (2018) | Download Citation

The FAIR Principles[1] (https://doi.org/10.25504/FAIRsharing.WWI10U) provide guidelines for the publication of digital resources such as datasets, code, workflows, and research objects, in a manner that makes them Findable, Accessible, Interoperable, and Reusable (FAIR). The Principles have rapidly been adopted by publishers, funders, and pan-disciplinary infrastructure programmes and societies. The Principles are aspirational, in that they do not strictly define how to achieve a

FAIRmetrics.org

https://github.com/FAIRMetrics

2.

ELIXIR Core Data Resource FAIRness Implementation study

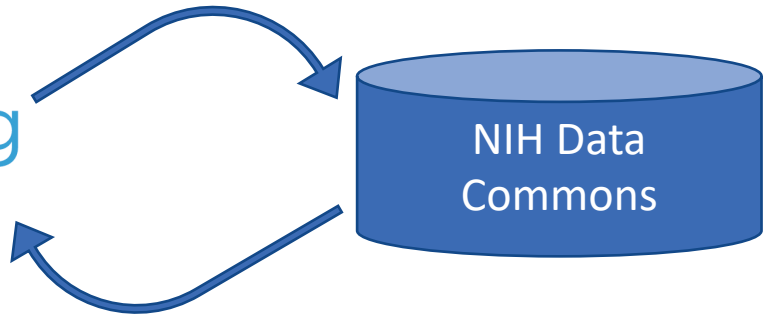
3.

Funded work on:

- Finding and citing FAIR objects
- FAIR assessment
- FAIR insigna
- Training materials on FAIR

FAIRsharing.org

FAIRsharing record metadata



FAIR assessment insignia

http://commonfund.nih.gov/commons

Susanna-Assunta Sansone, PhD
Associate Professor, Associate Director

Philippe Rocca-Serra, PhD
Senior Research Lecturer

Alejandra Gonzalez-Beltran, PhD
Research Lecturer

Milo Thurston, PhD
Research Software Engineer

Allyson Lister, PhD
Knowledge Engineer

Peter McQuilton, PhD
Project Coordinator

Delphine Dauga, PhD
Biocurator Contractor

Massimiliano Izzo, PhD
Research Software Engineer

Melanie Adekale, PhD
Biocurator Contractor

Ramon Granell
Research Software and Knowledge Engineer

Dominique Batista
Research Software and Knowledge Engineer

Team is funded by

FAIRsharing.org

contact@fairsharing.org

@FAIRsharing_org

Advisory Board and RDA/Force11 Working Group Members

Emma Ganley (PLOS) Co-chair
Varsha Khodiyar (NPG) Co-chair
Michael Ball (ESRC)
Theo Bloom (BMJ)
Jennifer Boyd (OUP)
Dave Carr (The Wellcome Trust and Wellcome Open Research)
Helena Cousijn (Elsevier)
Scott Edmunds (GigaScience, BGI)
Dominic Fripp (JISC)
Simon Hodson (CODATA), *Co-Chair of the RDA/Force11 WG*
Mike Huerta (Coordinator of Data & and Open Science Initiative, Associate Director for Programme Development at the NIH National Library of Medicine)
Rafael Jimenez (ELIXIR)
Amye Kenall (BMC)
Rebecca Lawrence (F1000), *Co-Chair of the RDA/Force11 WG*
Thomas Lemberger (EMBO Press)
Jennifer Lin (CrossRef)
Gabriella Rustici (ELIXIR UK Node Industry Training Sector Lead, University of Cambridge, UK)
Shelley Stall (American Geophysics Union)
Imma Subirats (Information Management Officer, FAO of the United Nations, Italy)
Marta Teperek (Data Stewardship Coordinator, TUDelft, The Netherlands)
Michael Witt (re3data; Purdue University Libraries)

fairsharing.org/communities

Working with the community

Societies and organisations, incl:

EURO-BIOIMAGING
ISB International Society for Biocuration
RDA RESEARCH DATA ALLIANCE
EMBL Australia Bioinformatics Resource
FAIRDOM
FORCE11 The Future of Research Communications and e-Scholarship

Institutional RDM services, incl:

STANFORD UNIVERSITY LIBRARIES
DMPTool
OPEN DATA UNIVERSITY OF CAMBRIDGE
RESEARCH DATA OXFORD

Cross-links, data exchange, incl:

NBDC
Identifiers.org
equator network
Jisc
BioPortal
elixir TeSS

Projects, programmes:

NIH
CEDAR CENTER FOR EXPANDED DATA ANNOTATION AND RETRIEVAL
imi Innovative Medicines Initiative
Bioschemas
bioCADDIE
excelerate
NIH LINCS PROGRAM
GO FAIR
EOSC pilot The European Open Science Cloud for Research Pilot Project

FAIRmetrics.org

Journal, publishers, incl:

SPRINGER NATURE
EMBOpress
ELSEVIER
PLOS
F1000 FACULTY of 1000
OXFORD UNIVERSITY PRESS
Wellcome Open Research

Standard developing groups, incl:

CDISC
Biodiversity Information Standards TDWG
combine
CMSO Cell Migration Standardization organisation