



FAIR-IMPACT

Expanding FAIR solutions across EOSC

EOSC

SYMPOSIUM

20-22 September 2023

Taking EOSC
into the future

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Madrid, Spain

#EOSCsymposium23

FAIRness assessment for semantic artefacts

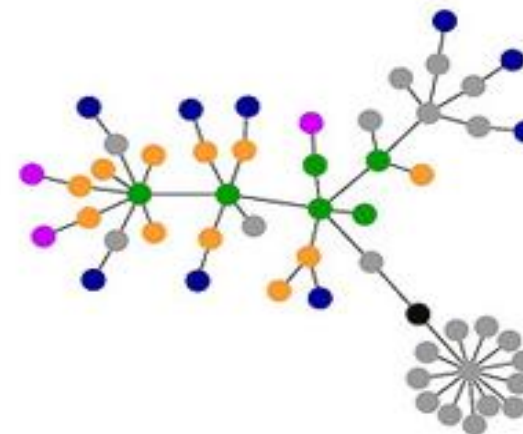
Clement Jonquet (INRAE, U. Montpellier)

Session on
*FAIR, Data Quality Management and Research
Metrics Assessment*

Semantic Artefacts help to make
data FAIR and have themselves
to be FAIR

I2. (Meta)data use vocabularies that follow FAIR principles

How to go from "principles" to specialized criteria to measure to which level ontologies respect the FAIR Principles?



From I1, I2 and I3, ontologies/vocabularies are a key element to achieve the FAIR Principles

SCIENTIFIC DATA

OPEN Comment: The FAIR Guidelines
Principles for scientific data management and stewardship

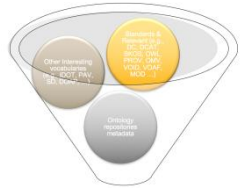
Mark D. Wilkinson *et al.*[#]

There is an urgent need to improve the infrastructure supporting the reuse of scholarly data. A diverse set of stakeholders—representing academia, industry, funding agencies, and scholarly publishers—have come together to design and jointly endorse a concise and measurable set of principles that we refer to as the FAIR Data Principles. The intent is that these may act as a guideline for those wishing to enhance the reusability of their data holdings. Distinct from peer initiatives that focus on the human scholar, the FAIR Principles put specific emphasis on enhancing the ability of machines to automatically find and use the data, in addition to supporting its reuse by individuals. This Comment is the first formal publication of the FAIR Principles, and includes the rationale behind them, and some exemplar implementations in the community.

Received: 10 December 2015

Accepted: 12 February 2016

Published: 15 March 2016



- As any data, semantic artefacts need to be FAIR

<https://doi.org/10.7490/f1000research.1115343.1>

- Assessing the Practice of Ontology Metadata: A Survey

<https://hal-lirmm.ccsd.cnrs.fr/lirmm-02315001>

- MOD1.4: A metadata vocabulary for ontology description and publication

https://dx.doi.org/10.1007/978-3-319-70863-8_17

- Harnessing the power of unified metadata in an ontology repository: the case of AgroPortal

<https://doi.org/10.1007/s13740-018-0091-5>


- FAIRsFAIR minimum metadata profile for semantic artefacts

<https://hal.science/hal-04106533>

FAIR-IMPACT tasks related to this subject

- T4.2 Semantic artefact lifecycle and their catalogues
...establish guidelines and community practices with respect to the lifecycle of semantic artefacts from creation to sharing and reuse via catalogues.
 - T4.2.1 FAIR semantic artefact by design
 - T4.2.2 Interoperable semantic artefact catalogues
 - T4.2.3 Standardized semantic artefact metadata and catalogues APIs
- T5.3 Semantic artefact assessment methodology
(see recent deliverable <https://zenodo.org/record/8305173>)
- M. Poveda, D. Garijo, Y. Le Franc, A. Gonzalez-Beltran, C. Jonquet ... and more...

eosc | FAIR-IMPACT
Expanding FAIR solutions across EOSC



Greater and more harmonised use of **semantic artefacts** throughout the EOSC ecosystem, leading to semantic interoperability **within and between disciplines.**



We now have an ontology/semantic artefact development methodology integrating FAIRness assessment

zenodo

Search

Upload Communities

Zenodo.org will be unavailable for 2 hours on September 29th from 06:00-08:00 UTC. See announcement.

August 31, 2023

Project milestone Open Access

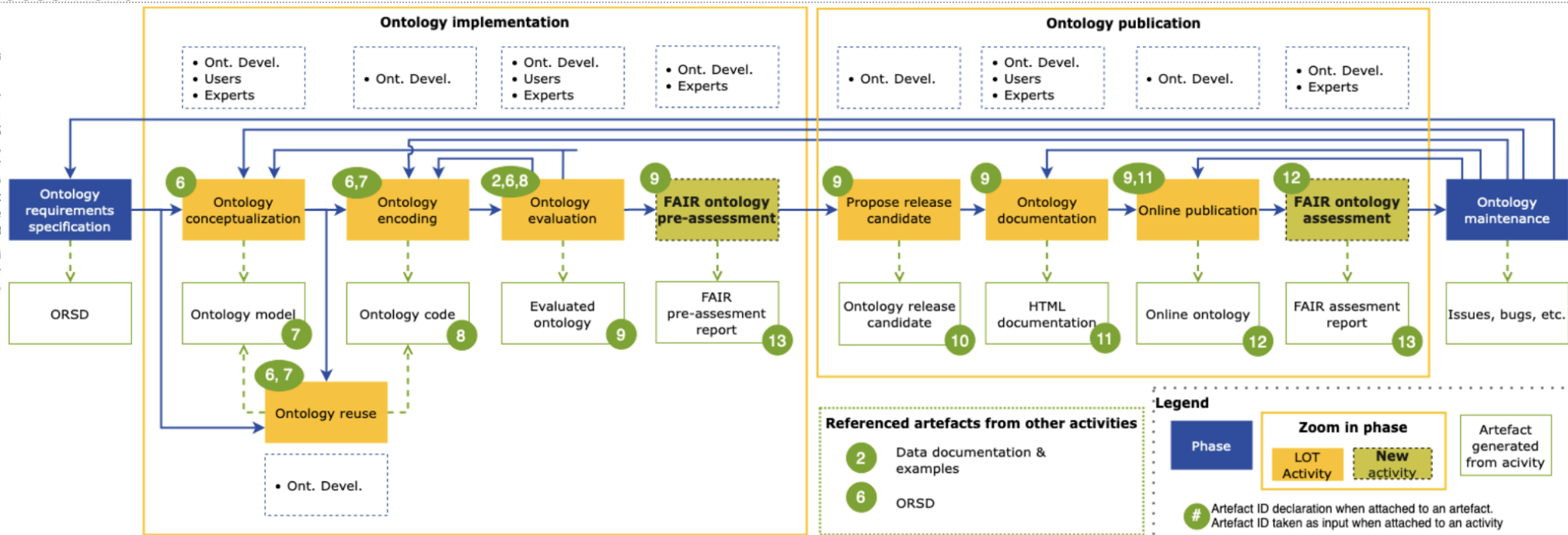
M5.3 Semantic artefact assessment methodology

👤 Garijo, Daniel; 👤 Poveda-Villalón, María; 👤 Flohr, Pascal; 👤 Gonzi, Maaike

Semantic artefacts (i.e., ontologies, vocabularies and SKOS taxonomies) are constructed, and help validate many existing Knowledge Graphs. proposed (Poveda-Villalón et al. 2020; Garijo and Poveda-Villalón 2023) to align semantic artefact best practices against the Findable, (FAIR principles) (Wilkinson et al. 2016). Based on these guidelines, r (Garijo et al. 2021; Amdouni et al. 2022a; 2022b) in order to guide us FAIR principles. However, different tests are based on different inter scores and checks for semantic artefacts. To the best of our knowle types of tests to perform in semantic artefacts, in order to map exist

In this document, we propose such a methodology. We do so by taki semantic artefacts into smaller parts (their code, content, ontology r different stages of their development process. We build on the Linke al. 2022), adding a "FAIR assessment" module, and, for each activity, semantic artefact FAIR assessment validators: FOOPSI (Garijo et al.

The rest of the document outlines our methodology, describes each and guidelines.



Semantic Artefact Catalogues (aka. ontology repositories, terminology services...) are necessary for FAIR

F indable

A ccessible

I nteroperable

R e-usable

API Documentation

General Usage

This API is comprised of a set of resources (Ontologies, Classes, etc) and related endpoints (Search, Annotator, Recommender) that are connected together via links, much like webpages. We recommend that you try browsing the API using a web browser (Chrome and Firefox work very well, while it does not before you start writing code. For more information, please see the documentation on [Media Types](#) and [Hypertext Media Links](#) or view our [sample code](#), available in Java, Python, Ruby and other languages (please email medic@ontobio.org if you need like examples in another language).

Common Parameters

Parameter	Possible Values	Description
apikey	(your api key)	An API Key is required to access any API call. It can be provided in three ways: 1. Using the <code>apikey</code> query string parameter 2. Providing an <code>Authorization</code> header <code>Authorization: apikey token=your_apikey</code> (replace your_apikey with your actual key) 3. When using a web browser to explore the API, if you provide your API Key once using method 1, it will be stored in a cookie for subsequent requests. You can

SPARQL httpd server v1.1.5-122-;

KB ontologies_api

```
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>

SELECT * WHERE {
  ?s ?p ?o
} LIMIT 10
```

MAPPING TO	ONTOLOGY	SOURCE	RELATION
implantation de prothese	Medical Subject Headings - version française	CLIR	
mise en place de prothese	Dictionnaire médical pour les activités réglementaires en matière de médicaments	CLIR	

MAPPING TO	ONTOLOGY	SOURCE	RELATIONS
prothese	http://ontobio.ontobio.org/ontologies/MSTDE	REST	skos:exactMatch gold:fr:translation

Additional Metadata

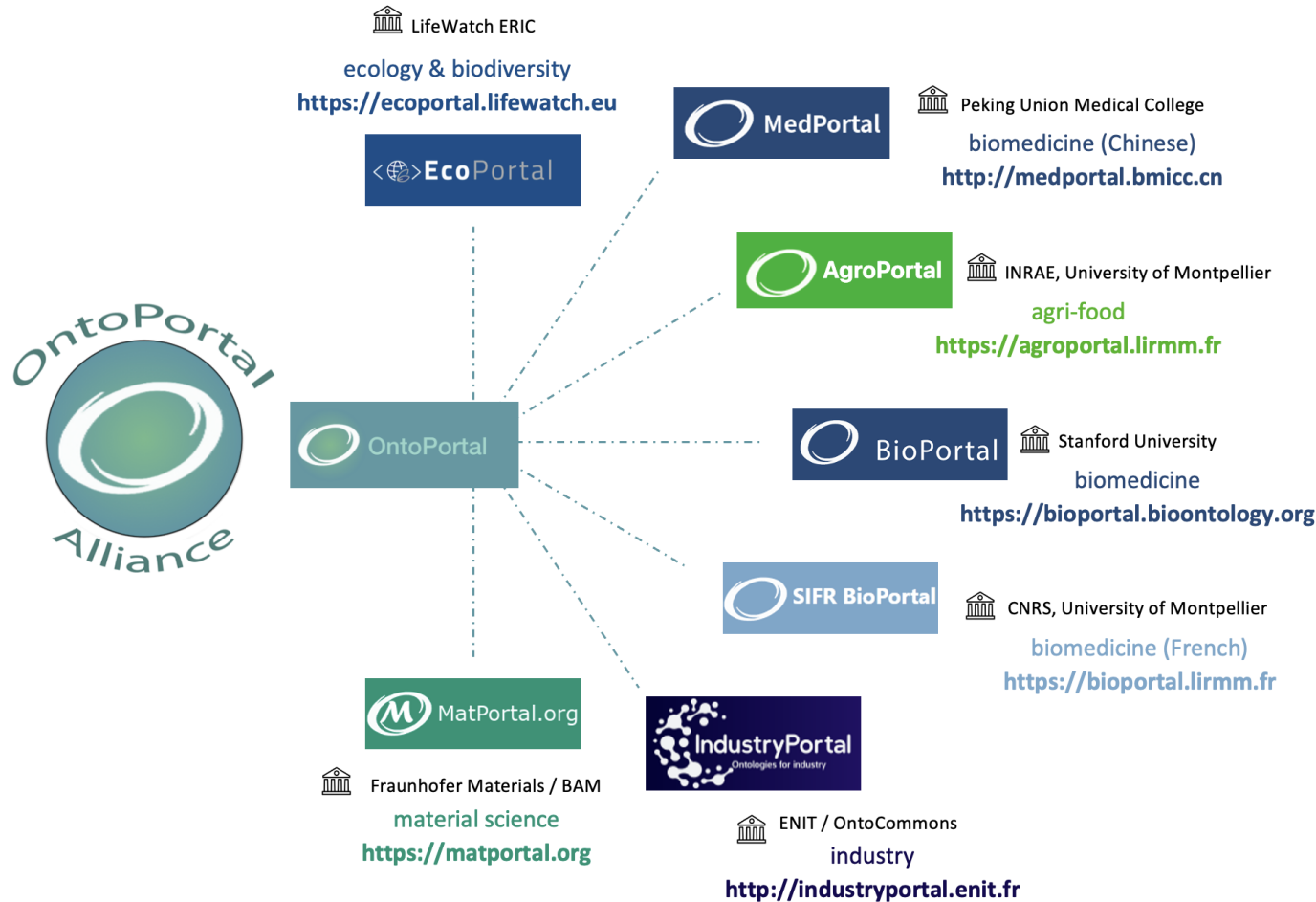
Metrics

Metric	Value
NUMBER OF CLASSES	2008
NUMBER OF INSTANCES	0
NUMBER OF PROPERTIES	0
NUMBER OF TERMS	12
NUMBER OF CLASSES OF CLASSES	42
NUMBER OF CLASSES OF PROPERTIES	0
CLASSES WITH A SINGLE CHILD	200
CLASSES WITH MORE THAN 10 CHILDREN	2

Projects Using This Ontology

PROJECT	DESCRIPTION	STATUS	DESCRIPTION
Urbain - L'urbanisme	L'urbanisme est une science qui étudie l'aménagement du territoire par la planification.	Public	Urbain - L'urbanisme
Urbain - L'urbanisme	L'urbanisme est une science qui étudie l'aménagement du territoire par la planification.	Public	Urbain - L'urbanisme

OntoPortal Alliance: Synchronizing and mutualizing research and development efforts



- Learning from things done in other domains
- Open source shared technology is being developed (<https://hal.science/hal-04088537>)
- OntoPortal is now instantiated in **multiple domains and communities**
- Possible out-of-the-shelf **EOSC service** for any community/project to deploy a Semantic Artefact Catalogue at the click of the mouse?

Background: 50 shades of FAIR!

- Generic (any type of data): SHARC, FDMM, FAIR Metrics, FAIR-Aware, FAIRshake, FAIR dat, FAIR checker
- Specific to semantic artefacts
 - H2020 FAIRsFAIR deliverable,
 - Poveda et al., (2 papers, then FOOPS!)
 - 10 simple rules paper
 - DBPedia Archivo
- Specific to semantic artefacts but pre-existing FAIR
 - MIRO guidelines (Minimum Information for Reporting an Ontology)
 - MOD (Metadata for Ontology Description and Publication Ontology)
 - 5-stars for vocabularies

(a) FAIRdat



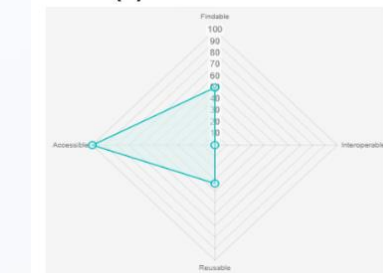
(c) FAIRshake



(d) FAIR-Aware



(e) FAIR checker

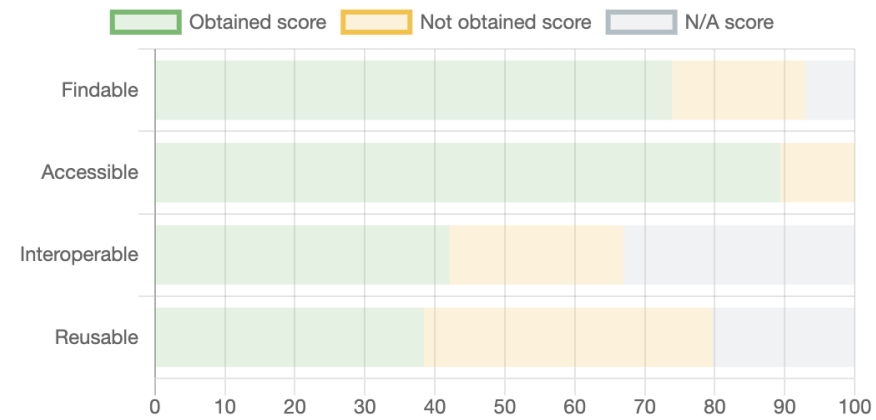
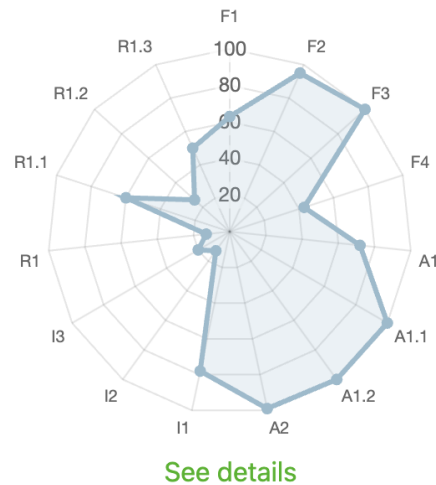




Recent work on FAIRness or alike...

- **[SHARC]** R. David et al., “Fairness literacy: The achilles’ heel of applying fair principles,” *Data Science Journal*, vol. 19, no. 1, pp. 1–11, Aug. 2020, doi: [10.5334/DSJ-2020-032](https://doi.org/10.5334/DSJ-2020-032).
- **[FDMM]** C. Bahim et al., “The FAIR data maturity model: An approach to harmonise FAIR assessments,” *Data Science Journal*, vol. 19, no. 1, pp. 1–7, Oct. 2020, doi: [10.5334/DSJ-2020-041](https://doi.org/10.5334/DSJ-2020-041).
- **[5-star]** A. Hasnain and D. Rebholz-Schuhmann, “Assessing FAIR data principles against the 5-star open data principles,” in *ESWC 2018 Satellite Events*, Jun. 2018, vol. 11155 LNCS, pp. 469–477. doi: [10.1007/978-3-319-98192-5_60](https://doi.org/10.1007/978-3-319-98192-5_60).
- **[MIRO]** N. Matentzoglou, J. Malone, C. Mungall, and R. Stevens, “MIRO: guidelines for minimum information for the reporting of an ontology,” *J Biomed Semantics*, vol. 9, no. 1, p. 6, Jan. 2018, doi: [10.1186/s13326-017-0172-7](https://doi.org/10.1186/s13326-017-0172-7).
- **[Povedal et al.]** D. Garijo and M. Poveda-Villalón, “Best Practices for Implementing FAIR Vocabularies and Ontologies on the Web,” in *Applications and Practices in Ontology Design, Extraction, and Reasoning*, IOS Press, 2020. doi: [10.3233/SSW200034](https://doi.org/10.3233/SSW200034). + M. Poveda-Villalón, P. Espinoza-Arias, D. Garijo, and O. Corcho, “Coming to Terms with FAIR Ontologies,” in *22nd International Conference on Knowledge Engineering and Knowledge Management, EKAW’20*, Sep. 2020, vol. 12387 LNAI, pp. 255–270. doi: [10.1007/978-3-030-61244-3_18](https://doi.org/10.1007/978-3-030-61244-3_18).
- **[FAIRsFAIR]** Y. le Franc, G. Coen, J. P. Essen, L. Bonino, H. Lehväslaiho, and C. Staiger, “D2.2 FAIR Semantics: First recommendations,” Mar. 2020. doi: [10.5281/zenodo.3707985](https://doi.org/10.5281/zenodo.3707985).
- **[10-simple-rule] (not used at the time)** S. J. D. Coxid, A. N. Gonzalez-Beltran, B. Magagna, and M.-C. Marinescu, “Ten simple rules for making a vocabulary FAIR,” *PLOS Comp. Biology*, June 2021, doi: [10.1371/journal.pcbi.1009041](https://doi.org/10.1371/journal.pcbi.1009041).

O'FAIRe: Ontology FAIRness Evaluator

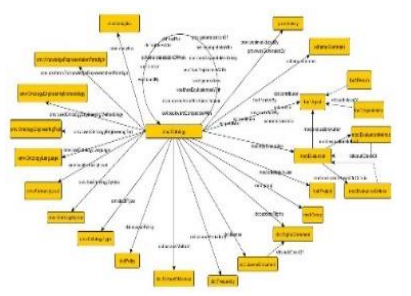


E. Amdouni, S. Bouazzouni, C. Jonquet. **O'FAIRe makes you an offer: Metadata-based Automatic FAIRness Assessment for Ontologies and Semantic Resources.** *International Journal of Metadata, Semantics and Ontologies*, 2022, 16 (1), pp.16-46. [10.1504/IJMSO.2022.131133](https://doi.org/10.1504/IJMSO.2022.131133).

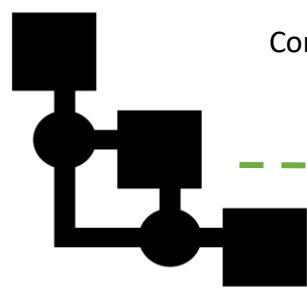


Our objective: a **methodology** and a **tool** to automatically assess the level of FAIRness of any semantic artefacts in a catalogue

<http://agroportal.lirmm.fr/>



Common metadata model (MOD 1.4)



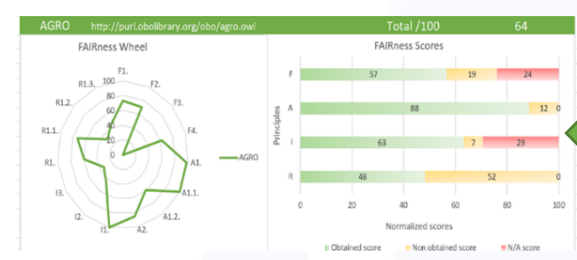
Ontologies

ID < ... >
Auteurs < ... >
Date < ... >
License < ... >
Type < ... >
....

Metadata



Metadata curation



OntoBiotope

Details

Additional Metadata

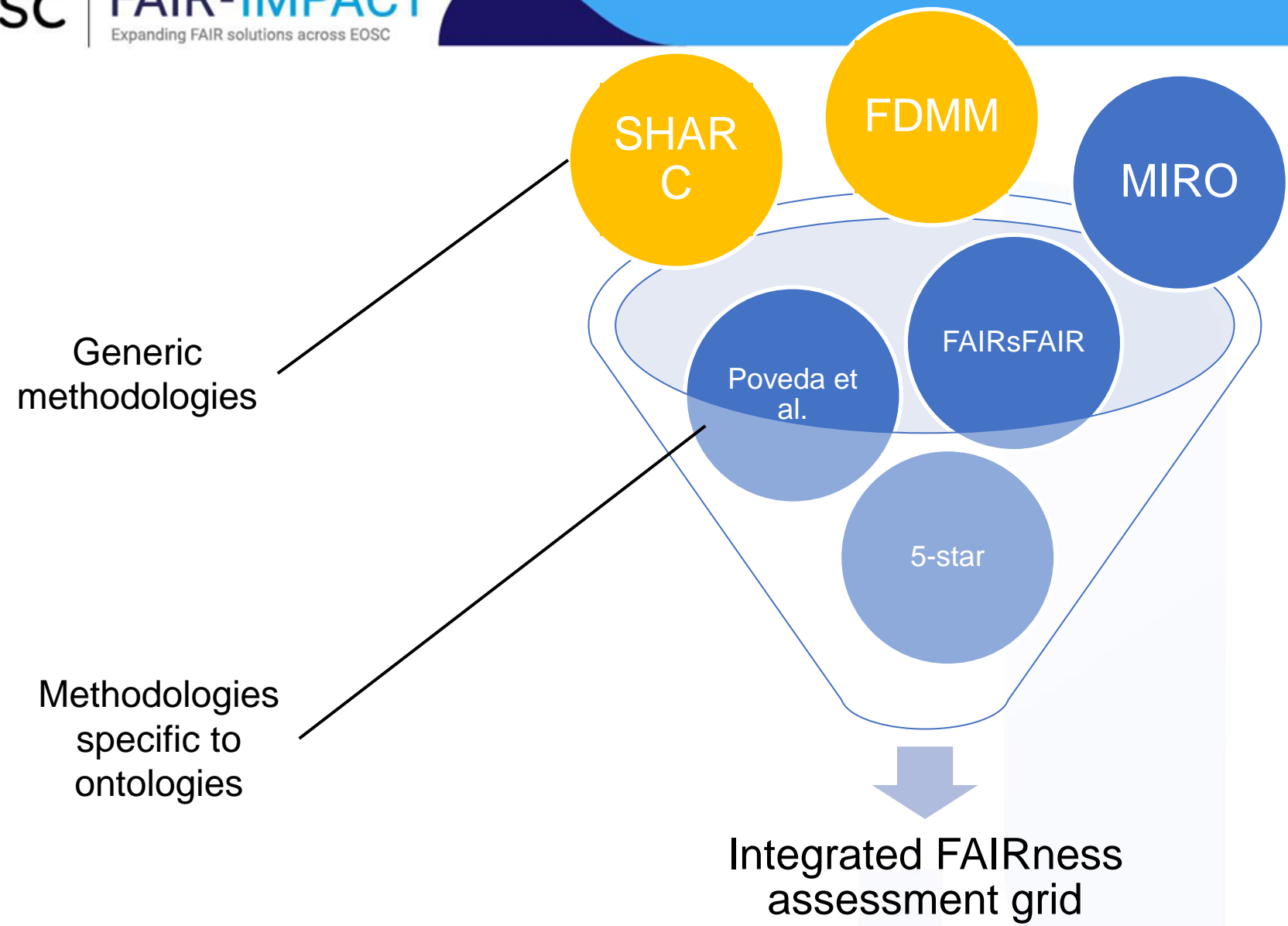
Metrics

Reviews

Submissions

Projects Using This Ontology

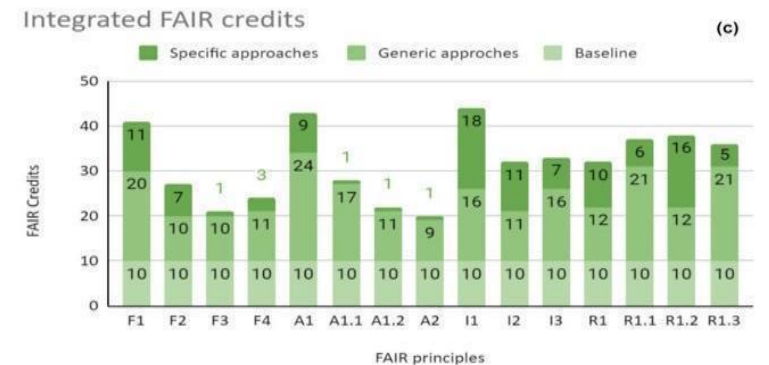
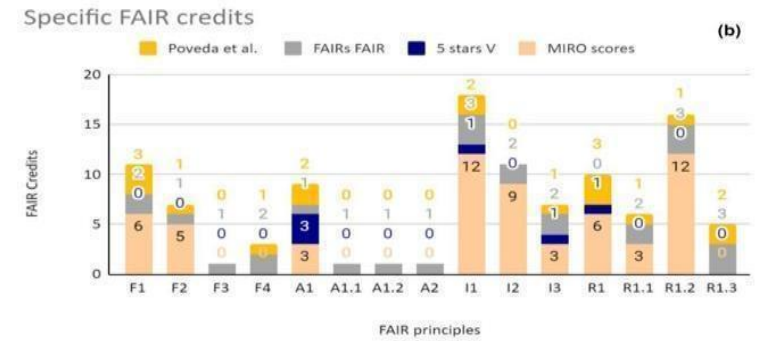
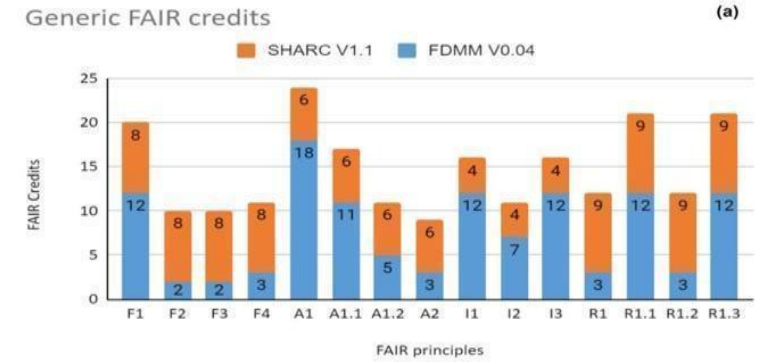
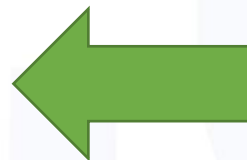




Requirement #1: a FAIRness assessment grid

- Evaluate the importance of each principles in multiple approaches (generic & specific)
- Integrate them all in an “quantitative” grid

478 credits
dispatched on
15 principles

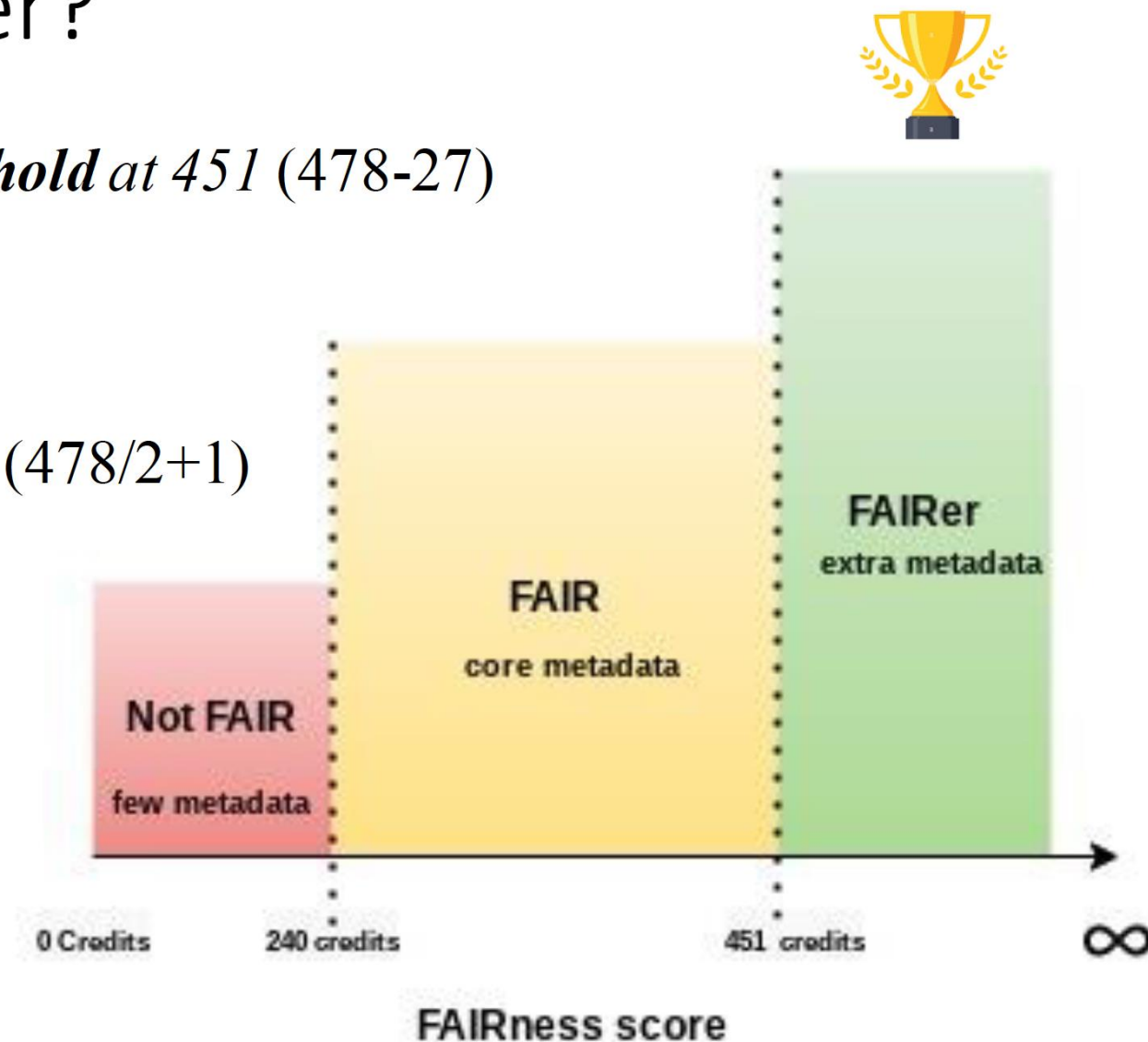


Integration

FAIR or FAIRer?

Second threshold at 451 (478-27)
Score=94%

First threshold at 240 (478/2+1)
Score=50%



E. Amdouni, C. Jonquet. FAIR or FAIRer? **An integrated quantitative FAIRness assessment grid for semantic resources and ontologies.** *MTSR 2021 - 15th International Conference on Metadata and Semantics Research*, Nov 2021, Madrid, Spain. pp.67-80, [10.1007/978-3-030-98876-0_6](https://doi.org/10.1007/978-3-030-98876-0_6).

Requirement #2: a projection of the FAIR Principles for semantic resources

- FAIR Principles are very generic and need to be “projected” for different kind of research objects (cf. FAIR-IMPACT Horizon EU project)
- 61 questions
 - 45 are dependent on the semantic artefact
 - 16 are independent
- 3 examples
 - F4 Q2. Is the ontology registered in multiple open ontology 'repositories'? **10 pts**
 - A2 Q2. Are the ontology metadata of each version available? **5 pts**
 - R1.1 Q1. Is the ontology license clearly specified, with an URI that is resolvable and supports content negotiation? **15 pts**

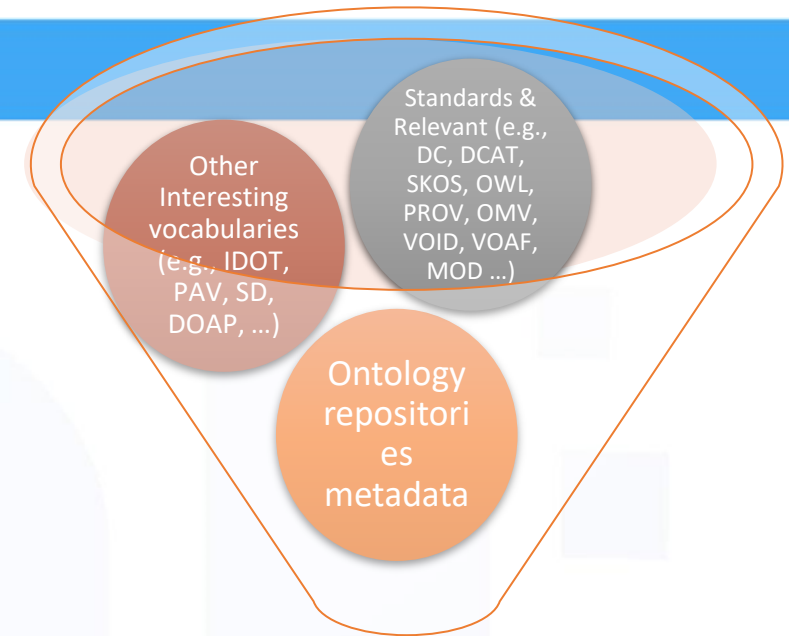


<https://github.com/agroportal/fairness>

$$FAIRScore(sr) = \sum_{j=1}^n FAIRSubPrincipleScore_{ij}(sr) = \sum_{k=1}^m QScore_{ijk}(sr)$$

Requirement #3: a unified way to describe semantic resources (metadata)

- MOD1.4 = a set of identified properties (127) one can use to describe a semantic resource
- In O'FAIRe
 - 57 MOD properties are “core” metadata properties allowing 276/478 credits
 - 70 MOD properties are “extra” metadata properties for a FAIRer level



Stable

MOD: Metadata for Ontology Description and publication

Release August 2, 2018

This version: <http://www.isibang.ac.in/ns/mod/1.4>

Latest version: <http://www.isibang.ac.in/ns/mod/1.4>

Previous version: <http://www.isibang.ac.in/ns/mod/1.2>, <https://www.isibang.ac.in/ns/mod/1.1>, <https://www.isibang.ac.in/ns/mod/1.0>

Revision: 1.4

Authors: Biswanath Dutta, ([Indian Statistical Institute](#))
Clement Jonquet, ([University of Montpellier](#))

Contributors: Anne Toulet, ([University of Montpellier](#))
Udaya Varadarajan, ([Indian Statistical Institute](#))

Publisher: <http://www.isibang.ac.in/>

Download serialization: [Format JSON LD](#) [Format RDF/XML](#) [Format N-Triples](#) [Format TTL](#)

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346 relevant properties that could be used to describe ontologies

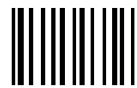
127 used to build a new metadata model inside AgroPortal and available in MOD1.4



B. Dutta, A. Toulet, V. Emonet, C. Jonquet. **New Generation Metadata vocabulary for Ontology Description and Publication**. *MTSR 2017 - 11th International Conference on Metadata and Semantics Research*, Nov 2017, Tallinn, Estonia. pp.173-185, [10.1007/978-3-319-70863-8_17](https://doi.org/10.1007/978-3-319-70863-8_17).

O'FAIRe is 80% resource metadata-based

« Findable »



- PID
owl:ontologyIRI, dct:identifier, owl:versionIRI



- Rich metadata
omv:acronym, dct:title, dct:alternative, skos:hiddenLabel, dct:description, foaf:page, omv:resourceLocator, omv:keywords ...



- Metadata with PID

N/A

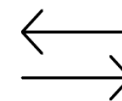


- Searchable resource
schema:includedInDataCatalog

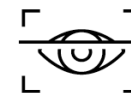
« Accessible »



- Standardised protocol
owl:ontologyIRI, dct: identifier, sd:endpoint



- Free and open protocol
N/A



- Authentication
Schema:includedInDataCatalog



- Long term metadata access
omv:status, owl:deprecated

O'FAIRe is 80% resource metadata-based

« Interoperable »



• Vocabularies

omv:hasOntologyLanguage, omv:hasFormalityLevel, omv:hasOntologySyntax, dct:hasFormat, dct:isFormatOf

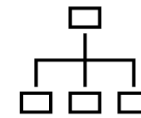
• FAIR vocabularies

owl:imports, voaf:hasEquivalenceWith, owl:priorVersion, voaf:similar, voaf:metadataVoc, dct:relation, dct:isPartOf, voaf:specializes, schema:translationOfWork, voaf:generalizes

F-A-I-R



« Reusable »



• Métadonnées avec attributs

mod:prefLabelProperty, mod:synonymProperty, mod:definitionProperty, mod:authorProperty, bpm:obsoleteProperty, mod:hierarchyProperty, mod:obsoleteParent, mod:maxDepth, mod:maxChildCount, mod:averageChildCount, mod:classesWithOneChild, mod:classesWithNoDefinition



• License

dct:license, dct:rightsHolder, dct:accessRights, cc:morePermissions, cc:useGuidelines



• Provenance

dct:source, prov:wasGeneratedBy, prov:wasInvalidatedBy, dct:accrualMethod, dct:accrualPeriodicity, dct:accrualPolicy, omv:versionInfo, vann:changes, dct:hasVersion, omv:usedOntologyEngineeringTool, omv:usedOntologyEngineeringMethodology, omv:conformsToKnowledgeRepresentationParadigm, omv:designedForOntologyTask, mod:competencyQuestion, dct:fundedBy



• Standards de la communauté

mod:ontologyInUse, omv:endorsedBy, mod:group, dct:accessRights



Requirement #4: a harmonized and curated environment for ontology descriptions

- AgroPortal offers a unified metadata model for every hosted semantic resources
- Metadata is curated

The screenshot shows the OntoBiotope web interface for the 'OntoBiotope' ontology. It includes sections for 'Details', 'Additional Metadata', 'Metrics', 'Reviews', 'Submissions', 'Views', and 'Projects Using This Ontology'.

Details:

- ACRONYM: ONTOBIOTOPE
- VISIBILITY: Public
- DESCRIPTION: OntoBiotope is an ontology of microorganism habitats. Its modeling principle and its focus reflect the better classification used by biologists to describe microorganism habitats (e.g. GenBank, DSM, ATCC). OntoBiotope is developed and maintained by the Meta-univers of Microbial Ecosystems (MUE) network in which 35 microorganisms have been. French National Institute for Agricultural Research from all fields of applied microbiology participate. The relevance of OntoBiotope terms is evaluated through the PubliBioPortal semantic search engine. It identifies and categorizes microbial habitats in all published elements by applying the 'SiloMap' method. OntoBiotope Mapping is the OntoBiotope ontology. It also indexes 3.16 million relations between taxa and their habitats.
- STATUS: In production
- FORMAT: OWL
- CONTACT: Claire Naudin, claire.naudin@inra.fr
- HOME PAGE: <http://ontobiotope.fr/>
- PUBLICATION PAGE: <https://doi.org/10.1080/1471-2129.16.510101>
- DOCUMENTATION PAGE: <http://ontobiotope.fr/>
- CATEGORIES: Natural Resources (Earth and Environment)
- GROUP: INRA Linked Open Vocabularies

Additional Metadata:

- NATURAL LANGUAGE:
- REVIEW: 1.2
- RELEASE DATE: 2015-06-25T06:00:00-05:00
- KEYWORDS: information extraction, corpus annotation, natural language processing, ontology building, biology, genetics
- KNOWN STAGE: Used by the BALEP Shared task (Bacteria Biotope task) in 2013, 2014 and 2015
- NOTES: OntoBiotope is developed and maintained by the Meta-univers of Microbial Ecosystems (MUE) network in which 35 microorganisms have been. French National Institute for Agricultural Research from all fields of applied microbiology participate.
- CREATOR: Claire Naudin
- REQUIRED FOR ONTOLOGY TERM: <http://purl.org/ontology/eng/ontobiotope/association-task>
- EXPOSED BY: INRA (<http://www.inra.fr/>)
- FOUNDED BY: INRA (<http://www.inra.fr/>)
- MAX PRIVACY LEVEL: <http://purl.org/ontology/eng/ontobiotope/ontology>
- MAX LICENSE:
- ONTOLOGY STATUS: <http://purl.org/ontology/eng/ontobiotope/ontology>
- NO. OF TERMS: <http://purl.org/ontology/eng/ontobiotope/ontology>
- PUBLISHED: INRA (<http://www.inra.fr/>)
- IDENTIFIER: doi.org/10.14454/1.430249320105144212
- COPYRIGHT HOLDER: INRA (<http://www.inra.fr/>)

Metrics:

- NUMBER OF CLASSES: 2320
- NUMBER OF INDIVIDUALS: 0
- NUMBER OF PROPERTIES: 0
- NAMESPACE: 13
- NAMESPACE NUMBER OF CHILDREN: 42
- AVERAGE NUMBER OF CHILDREN: 3
- CLASSES WITH A SINGLE CHILD: 240
- CLASSES WITH MORE THAN 19 CHILDREN: 3
- CLASSES WITH NO DEFINITION: 2320

Visits: Download as CSV

Additional Info:

- Feedback: [Feedback](#)
- Help: [Help](#)
- INRA SCIENCE & INRAE



C. Jonquet, A. Toulet, B. Dutta, V. Emonet. **Harnessing the power of unified metadata in an ontology repository: the case of AgroPortal.** *Journal on Data Semantics*, 2018, pp.1-31. [10.1007/s13740-018-0091-5](https://doi.org/10.1007/s13740-018-0091-5).

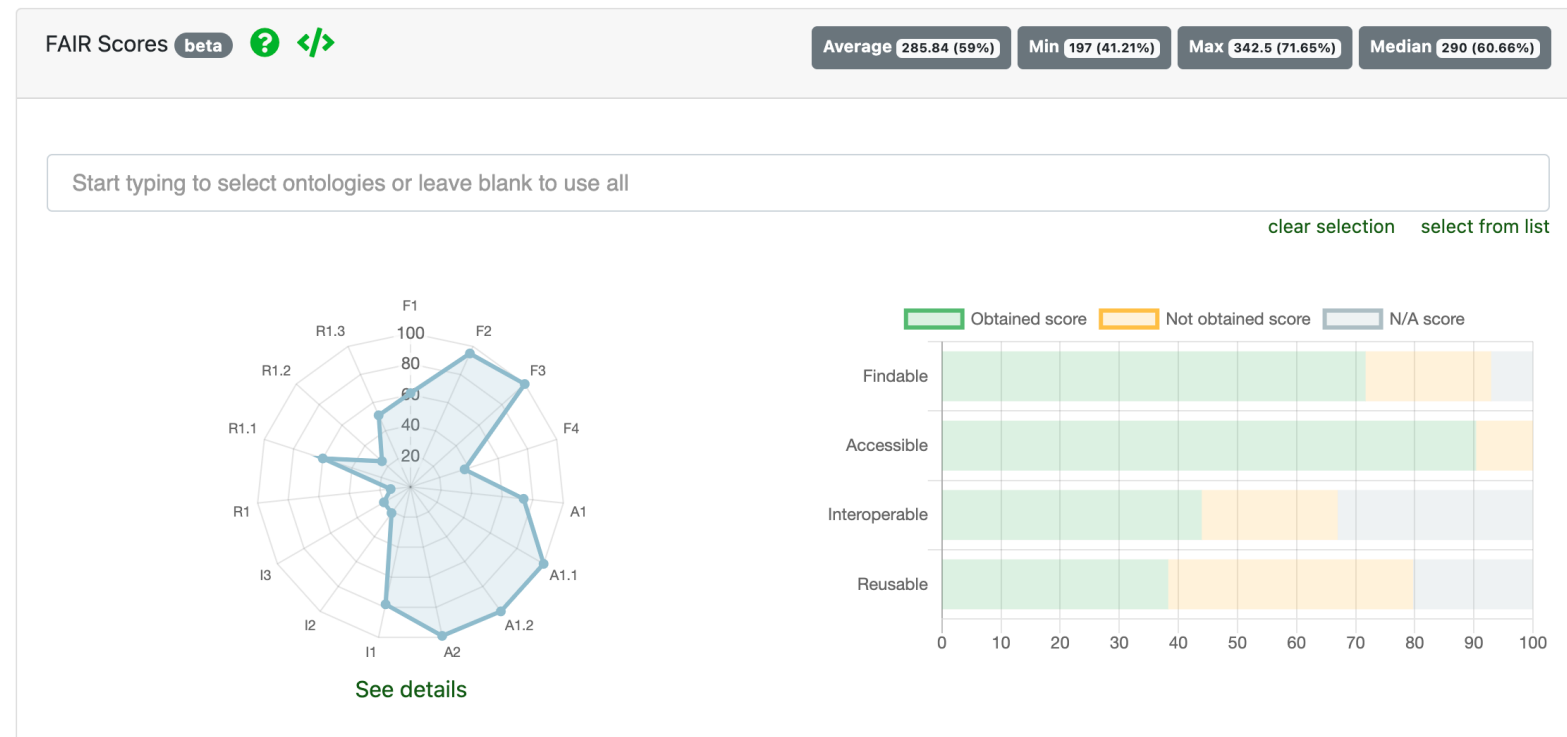
O'FAIRe: *Ontology FAIRness Evaluator*

- A methodology

Which uses as much as possible assigned metadata values to answer a series of questions, specialized for semantic resources

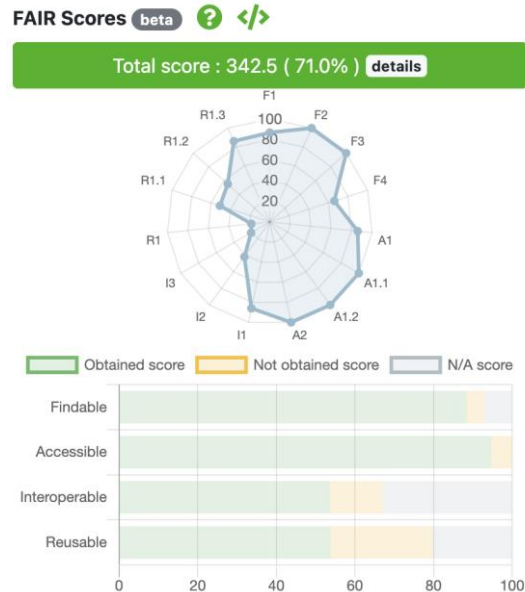
- A tool

A web service working with any OntoPortal installations respecting the MOD1.4 metadata profile to harmonize metadata



O'FAIRe in AgroPortal Demo: <https://agroportal.lirmm.fr/>

Get the FAIRness score of a given ontology



Get the explanations

FAIRness assessment questions

- F1
- F1Q1
- F1Q2
- F1Q3
- F1Q4
- F2
- F2Q1
- F2Q2
- F2Q3
- F3
- F3Q1

properties)

F1: Ontologies and ontology metadata are assigned a globally unique and persistent identifier.

36.0 (87%)

5.0 (13.0%)

F1Q1 : Does the ontology have a "local" identifier, i.e., a globally unique and potentially permanent identifier assigned by the developer (or developing organization)? 9 / 9

[See possible credits](#) [See metadata used properties](#)

owl:ontologyIRI <http://purl.ebiolibrary.org/ebi/agro.owl>

F1Q2 : Does the ontology provide an additional "external" identifier, i.e., a guarantee globally unique and persistent identifier assigned by an accredited body? If yes, is the external identifier a DOI? 6 / 11

[See possible credits](#) [See metadata used properties](#)

F1Q3 : Are the ontology metadata clearly identified either by the same identifier than the

Get the FAIRness score of a group of ontologies

FAIR Scores beta ? </>

Average 314 (65%) Min 300 (62.76%) Max 323 (67.57%) Median 319 (66.73%)

Animal Health Ontology for Livestock (AHOL) Environment Ontology for Livestock (EOL) Animal Trait Ontology for Livestock (ATOL)

This interface shows how an ontology or a group responded successfully to O'FAIRe FAIRness assessment questions. See details for each ontologies on the specific ontology summary pages.

hover on a principle to see details

Principle	Obtained score	Not obtained score	N/A score
F1	78.04 (32%)	21.95 (9%)	0 (0%)
F2	100%	0%	0%
F3	100%	0%	0%
F4	100%	0%	0%
A1	100%	0%	0%
A1.1	100%	0%	0%

F1 : Ontologies and ontology metadata are assigned a globally unique and persistent identifier.

Obtained score: 78.04 (32%)

Not obtained score: 21.95 (9%)

N/A score: 0 (0%)

3 (100%) responded successfully to: F1Q1: "Does the ontology have a "local" identifier, i.e., a globally unique and potentially permanent identifier assigned by the developer (or developing organization)?"

3 (100%) responded successfully to: F1Q2: "Does the ontology provide an additional "external" identifier, i.e., a guarantee globally unique and persistent identifier assigned by an accredited body? If yes, is the external identifier a DOI?"

Web service (O'FAIRe returns a JSON with the following structure)

```
{
  "ontologies": {
    "FCU": { // ontology acronym
      "Findable": { // FAIR principal
        "F1": { // Subprincipal
          "label": "Ontologies and ontology metadata are assigned a globally unique and persistent identifier",
          "results": {
            "F1Q1": {
              "question": "Does an ontology have a \"local\" identifier i.e., a globally unique and persistent identifier",
              "score": 9,
              "explanation": "Present and valid ontology URI.", //Score explanation
              "properties": { //List of properties used in the test with there values
                "owl:ontologyIRI": "http://ontology.inrae.fr/frenchcropusage"
              }
            },
            "maxCredits": 9,
            "points": [ //Array of possible scores and explanation for this question
              {
                "explanation": "Ontology URI is not present.",
                "score": 0
              },
              {
                "explanation": "Present but invalid ontology URI.",
                "score": 3
              },
              {
                "explanation": "Present and valid ontology URI.",
                "score": 9
              }
            ]
          }
        }
      }
    }
  }
}
```

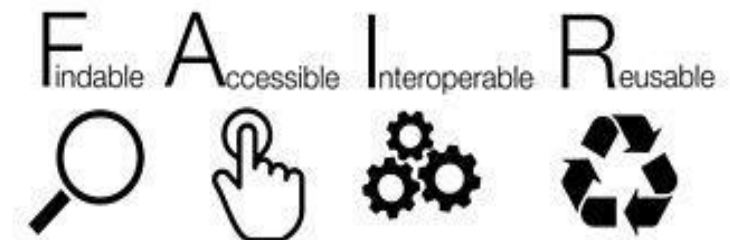
<http://services.agroportal.lirmm.fr/ofaire?ontologies=AGRO>

Or

<http://services.agroportal.lirmm.fr/ofaire?ontologies=ATOL,EOL,AHOL&combined>

Conclusion

- O'FAIRe is an approach **built from other methods and contributions** in the FAIR ecosystems but much more complete in terms of aspects covered
- A generic methodology with a reference evaluation grid (assuming the metadata descriptions are provided)
 - Questions can be changed or be added/removed without changing the method
 - Customizable to enhance/ignore certain aspects of FAIR
- A web service **working with OntoPortal ontology repositories** implementing 51/61 of O'FAIRe questions
- Easier identification and selection of ontologies to use.
- **FAIRer ontologies!**



FAIRness assessment for semantic artefacts

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