

● NFDI4Ing Conference 2022

(What is) Metadata4Ing(?)

An ontology for describing the generation and
provenance of research data within a scientific activity

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- What's an ontology?
- Can I download m4i?
- What can I do with it?

What's an ontology?

Ontologies are...



All icons credited on slides 26f.

- formal,
 - explicit,
 - standardized,
 - machine-understandable,
 - consensus-based
- representations of knowledge.***

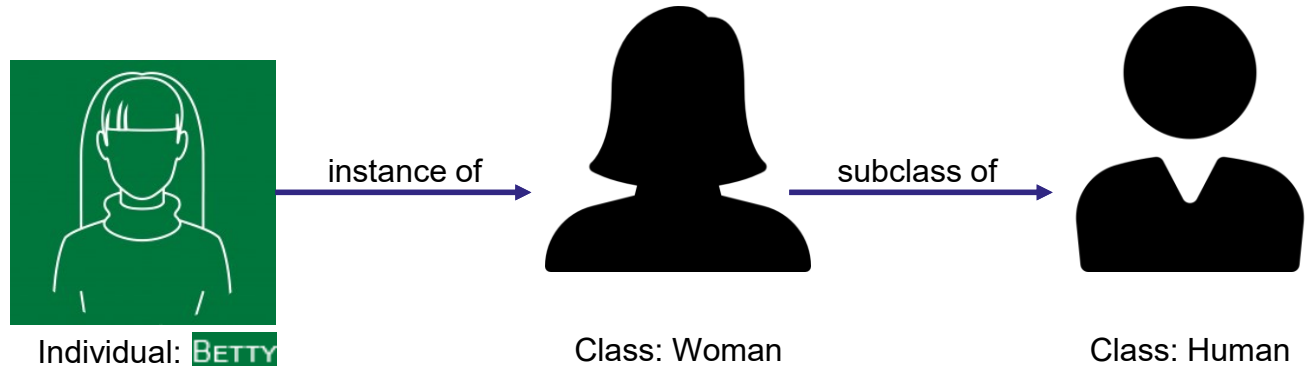
They are

- collections of concepts and relations,
- sets of explicit logical axioms,
- specifications for the representation of knowledge

in an „area of concern“.

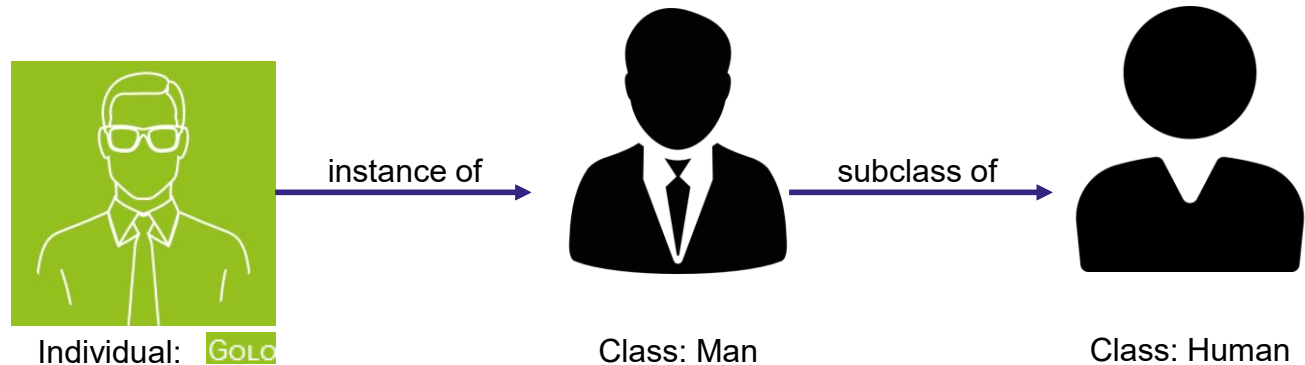
What are the main elements of an ontology?

aka: **Classes, Properties, and Individuals – And Basic Modeling With Them**

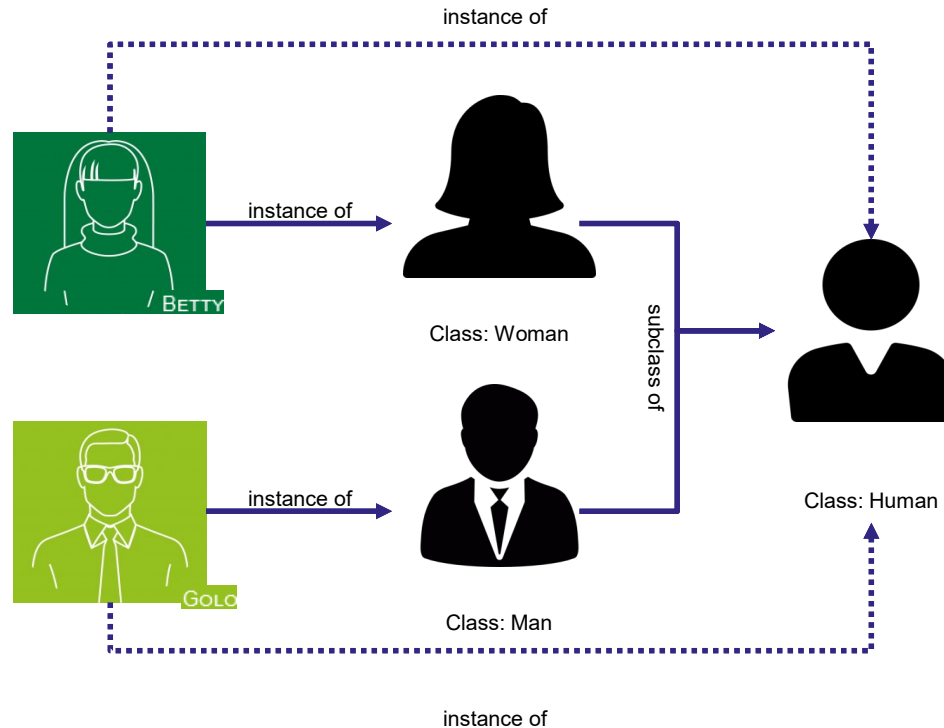


What are the main elements of an ontology?

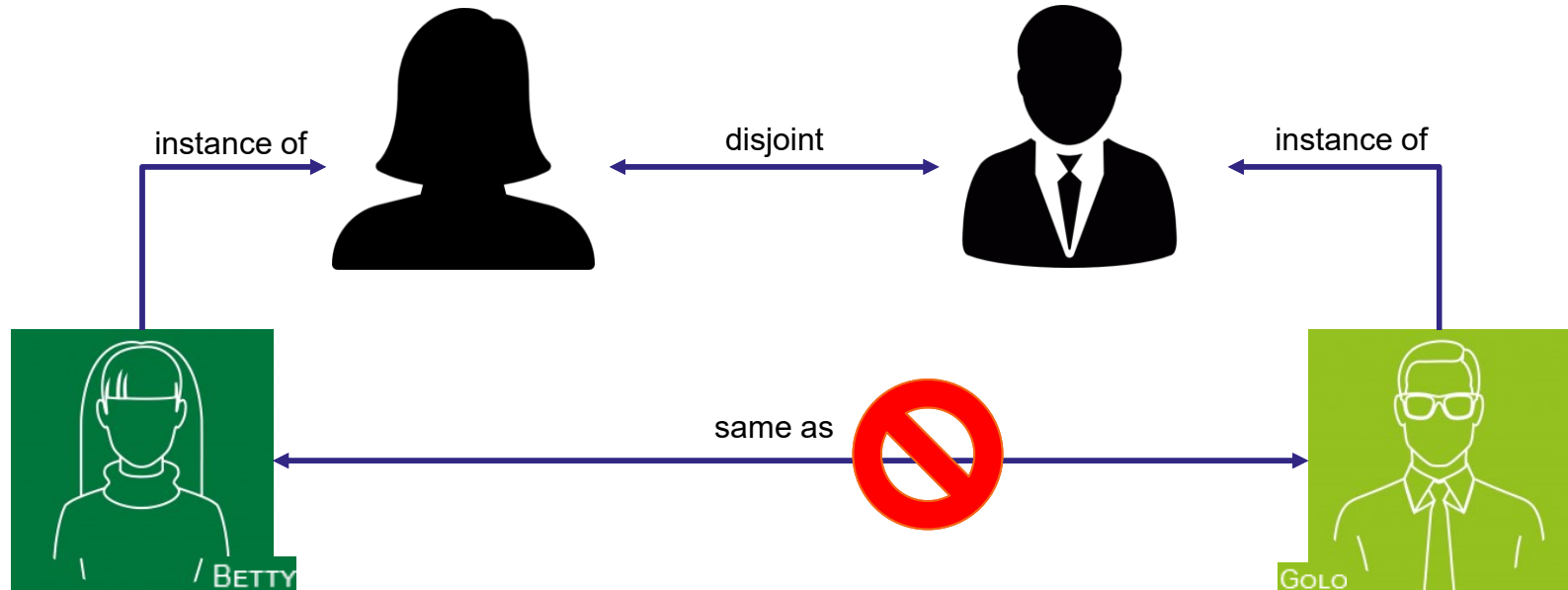
aka: **Classes, Properties, and Individuals – And Basic Modeling With Them**



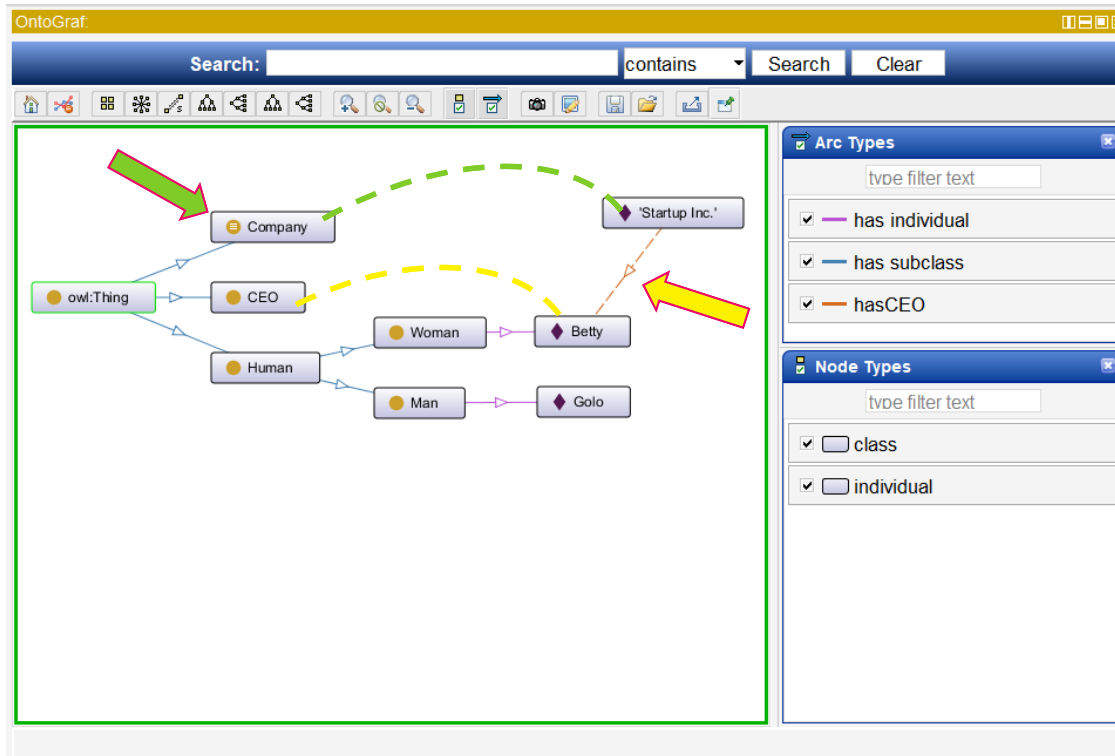
What are the main elements of an ontology?



What are the main elements of an ontology?

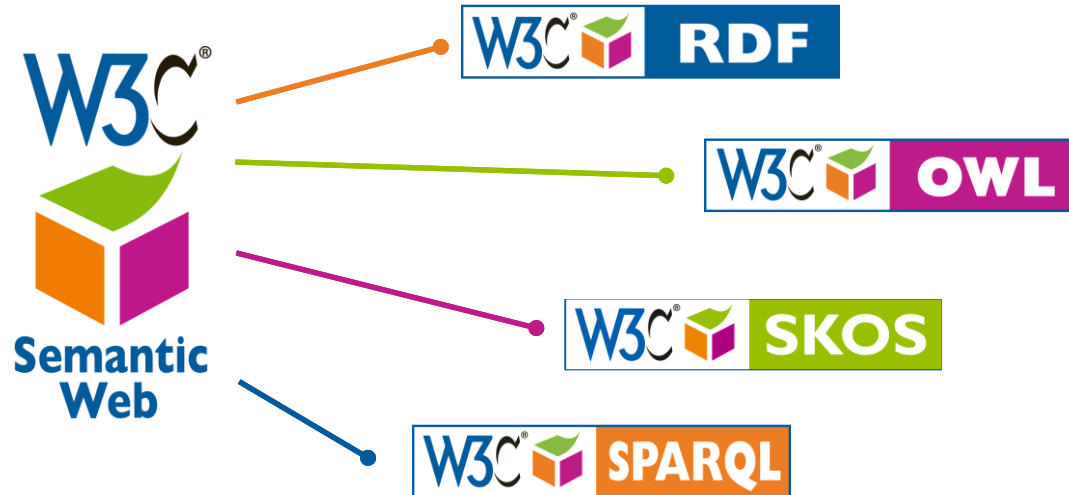


What are the main elements of an ontology?



Which standards govern ontology engineering?

Ontologies as a backbone for the Web of Data



Where is m4i? Can I download it?

<https://w3id.org/nfdi4ing/metadata4ing/>



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Where is m4i? Can I download it?

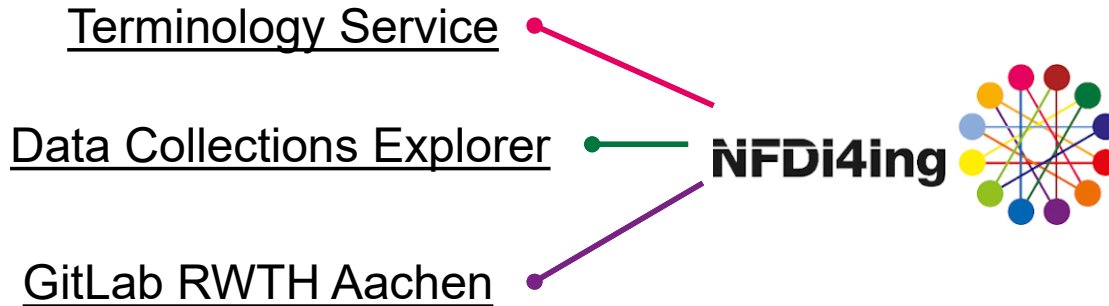
`curl -H "Accept: application/json" https://w3id.org/nfdi4ing/metadata4ing/`



```
$ curl -H "Accept: application/json" https://w3id.org/nfdi4ing/metadata4ing/
% Total    % Received % Xferd  Average Speed   Time    Time     Time  Current
           Dload  Upload  Total      Spent    Left     Speed
100  361  100  361    0    0    928      0  --:--:-- --:--:-- --:--:--   932<!DOCTYPE
HTML PUBLIC "-//IETF//DTD HTML 2.0//EN">
<html><head>
<title>303 See other</title>
</head><body>
<h1>See other</h1>
<p>The answer to your request is located <a href="https://nfdi4ing.pages.rwth-
aachen.de/metadata4ing/metadata4ing/ontology.jsonld">here</a>.</p>
<hr>
<address>Apache/2.4.29 (Ubuntu) Server at w3id.org Port 443</address>
</body></html>
```

Where is m4i? Can I download it?

Other locations and registrations



Registered at:

- Wikidata ([Q111516803](#))
- FAIRsharing.org ([3804](#))
- Linked Open Vocabularies ([m4i](#))
- Bartoc ([20402](#))

Archived at:

- Zenodo
([doi:10.5281/zenodo.5957104](https://doi.org/10.5281/zenodo.5957104))

Where is m4i? Can I download it?

Terminology Service API e.g. m4i metadata (<https://tinyurl.com/meta4m4i>)

```
JSON Rohdaten Kopfzeilen
Speichern Kopieren Alle einklappen Alle ausklappen JSON durchsuchen
ontologyId: "m4i"
loaded: "2022-09-23T16:51:29.913+0000"
updated: "2022-09-26T21:11:47.969+0000"
status: "LOADED"
message: ""
version: null
fileHash: "406dcef8082fb25905163e1517d52ff2a4452e98"
loadAttempts: 0
numberOfTerms: 31
numberOfProperties: 120
numberOfIndividuals: 21
▼ config:
  id: "http://w3id.org/nfdi4ing/metadata4ing#"
  versionIri: "http://w3id.org/nfdi4ing/metadata4ing/1.0.0"
  ▼ title: "Metadata4ing: An ontology for describing the generation of research data within a scientific activity (v. 1.0.0)"
    namespace: "m4i"
    preferredPrefix: "m4i"
  ▼ description: "The ontology Metadata4ing is developed within the NFDI Consortium NFDI4ing with the aim of providing a thorough framework for the semantic description of research data, with a particular focus on engineering sciences and neighbouring disciplines. This ontology allows a thorough description of the whole data generation process (experiment, observation, simulation), embracing the object of investigation, all sample and data manipulation procedures, a summary of the data files and the information contained, and all personal and institutional roles. The subordinate classes and relations can be built according to the two principles of _inheritance_ and _modularity_. _inheritance_ means that a subclass inherits all properties of its superordinate class, possibly adding some new ones. _modularity_ means that all expansions are independent of each other; this makes possible for instance to generate expanded ontologies for any possible combinations of method × object of research."
  homepage: null
  version: "v1.0.0"
  mailingList: "metadata4ing@nfdi4ing.de"
  ▼ tracker: "https://git.nwth-aachen.de/nfdi4ing/metadata4ing/metadata4ing/-/issues"
```

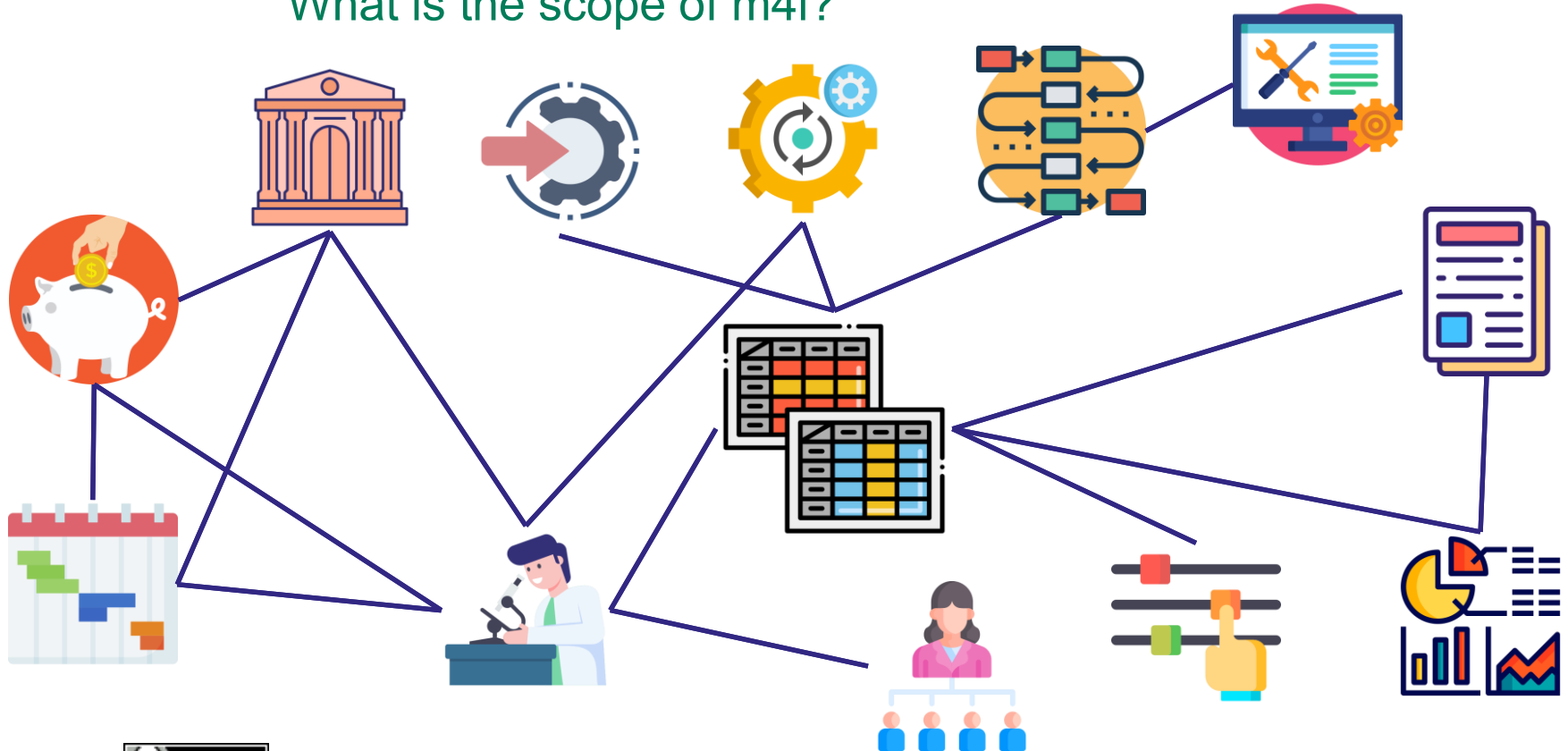
Why apply ontologies in research data management?

Ontologies help to

- avoid the ambiguity of of natural language terms
- provide persistent identifiers to ontology terms
- define domain concepts and relations with formal logic
- make implicit assumptions explicit
- share domain knowledge with your peers
- standardize terminology and knowledge representation within a domain
- annotate unstructured data (e.g. research papers) with ontology entities
- improve recall and precision of queries
- discover knowledge by logical reasoning and inferencing
- check for consistencies
- provide connections between data
- make data integration easier
- automatically process knowledge, e.g. in visualization, comparison, navigation
- make logical queries over data possible
- make data machine-understandable

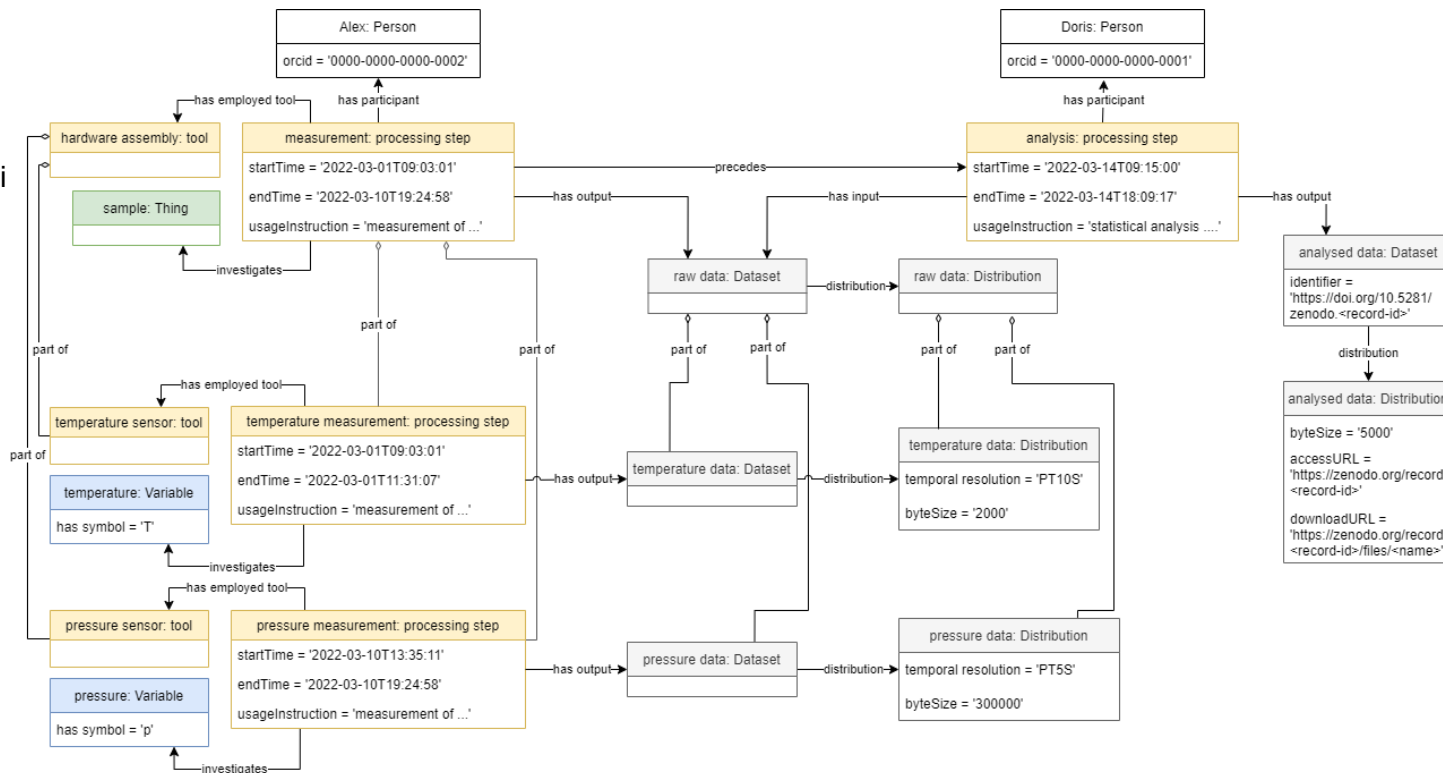
to be continued...

What is the scope of m4i?

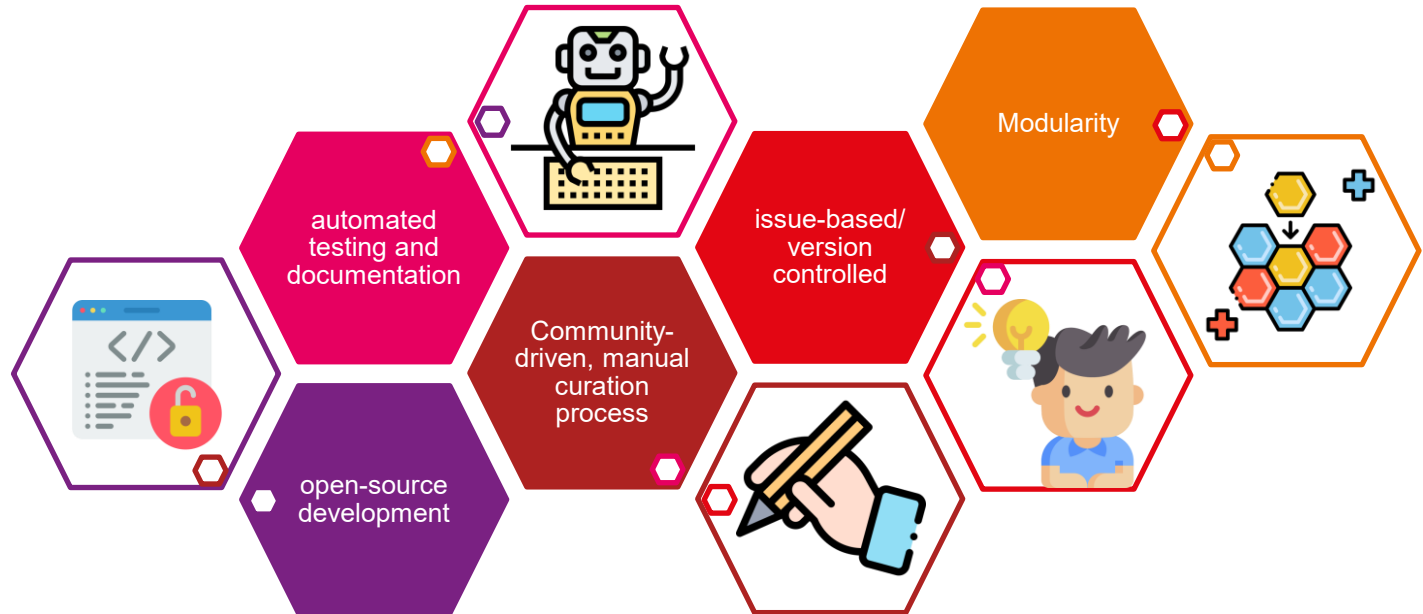


How can I use m4i?

<https://tinyurl.com/docs-m4i>



What is the development process of m4i?



How FAIR is m4i?

foops! Ontology Pitfall Scanner for FAIR (Beta)

[Validator](#) [About](#)

URI

Example: <https://w3id.org/example> (click [here](#) to enter this ontology)

RUN

Title:

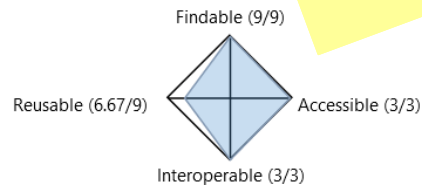
URI:

License:

Wanna know more about FAIR
semantic resources?

<https://doi.org/10.5281/zenodo.6276576>

90%



Are further developments planned? What could be optimized?

YES! YES! YES!

Active

training materials
application
examples
„Add-Ons“
(HPC, traffic
observation)

Pending tasks

application
profiles/shapes
(connect to S3-1)

further tool
integration

new knowledge /
new terms
(competency
questions)

On the horizon

Ontology
Development Kit
Release Cycles
LinkdML

**MORE ENGINEERING
REQUIREMENTS!**

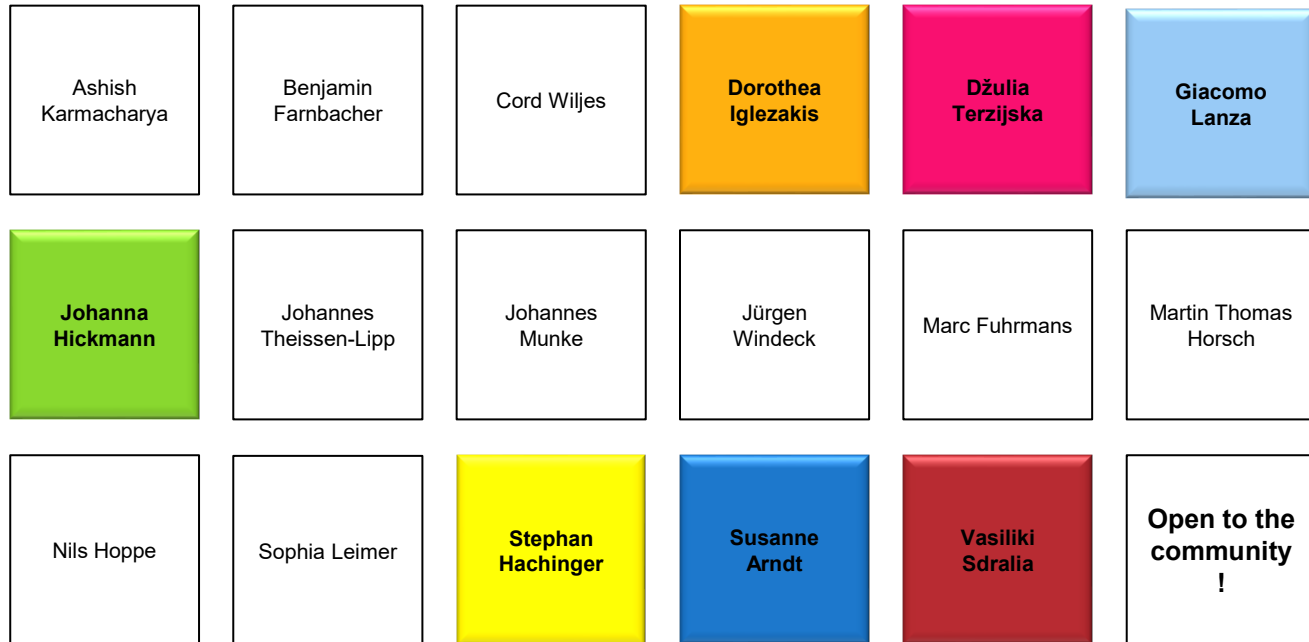
How can the engineering community become involved in m4i?

Send feedback to the crew or join us:

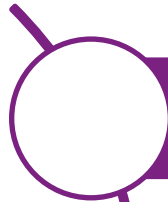


- Mailinglist: Mail to [metadata4ing\[at\]nfdi4ing.de](mailto:metadata4ing@nfdi4ing.de) to subscribe
- Web call every two weeks
next meeting: Wednesday, 09:15 a.m. CET at
<https://conf.dfn.de/webapp/conference/97972246>
- Join us on GitLab to make your issues known or contribute suggestions:
<https://git.rwth-aachen.de/nfdi4ing/metadata4ing/metadata4ing>
(GitHub or DFN-AAI account required)

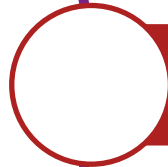
What's the Metadata4Ing work group?



Why do we invite you to participate in ontology engineering?



You know engineering data best!



We want to meet your requirements!



You can ensure the scientific adequacy of domain ontologies!

● Thank you!

More questions?

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8341-1478), Vasiliki Sdralia (0000-0002-7213-5110)

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- RDF 1.1 Primer. 2014. URL: <http://www.w3.org/TR/2014/NOTE-rdf11-primer-20140624/>
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- Metadata4Ing: An ontology for describing the generation of research data within a scientific activity. 2022. URL: <https://w3id.org/nfdi4ing/metadata4ing/>

References

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- Musen, M.A. The Protégé project: A look back and a look forward. AI Matters. Association of Computing Machinery Specific Interest Group in Artificial Intelligence, 1(4), June 2015. DOI: 10.1145/2557001.25757003.

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