How to implement (scientific) FAIR principles in my work?

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16-11-2020

Maastricht University

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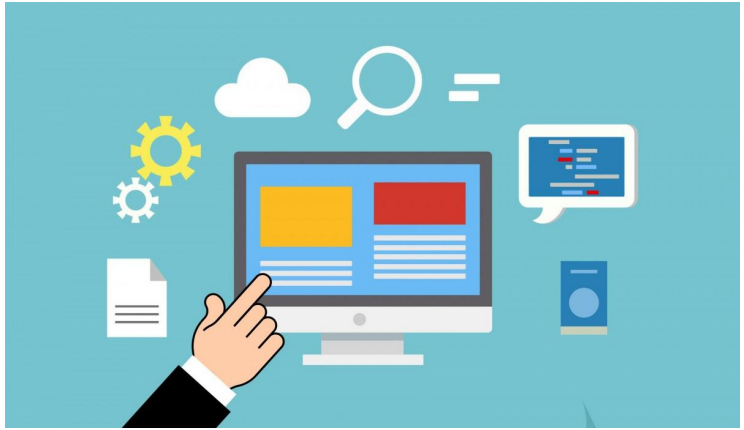
- Data sharing and reuse are beneficial for time efficiency and increased productivity in scientific research.



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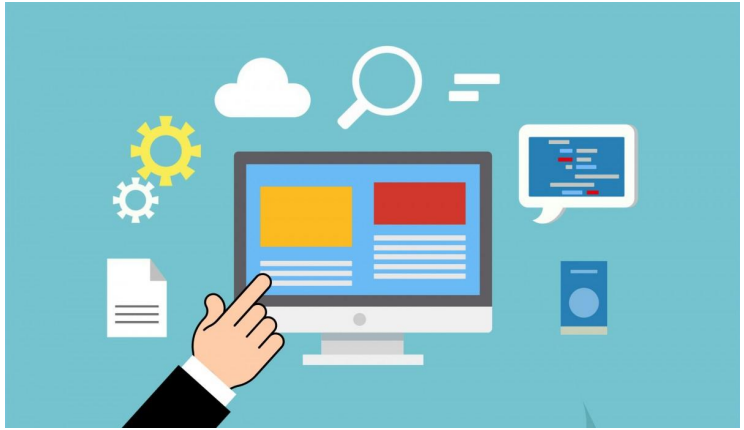

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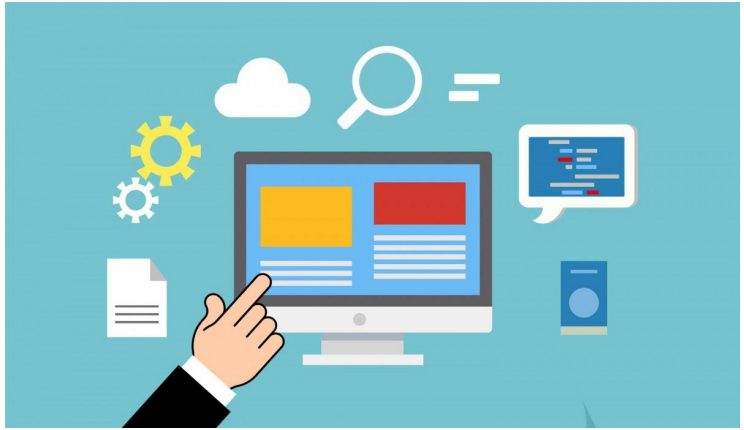

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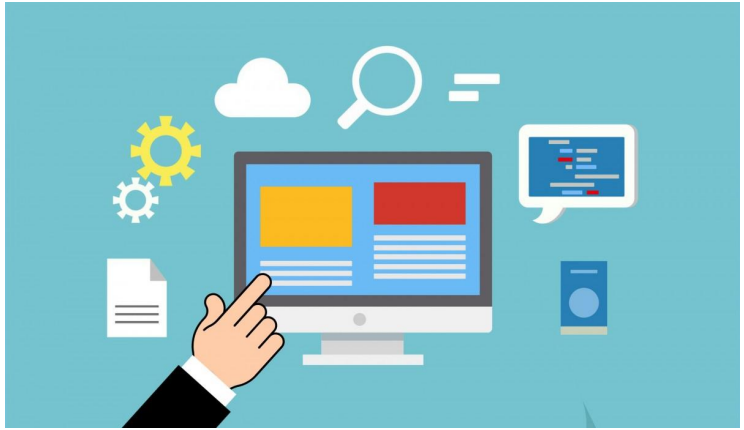

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- FAIR (findable, accessible, interoperable, reusable) aims to provide guidance to increase data discovery and reuse.
- FAIRness of a dataset can be assessed using maturity indicators.

https://www.ands.org.au/working-with-data/fairdata/training

How to be FAIR in your work ?

1. Data repositories/registries

The research data repository provides additional information on its service.

The research data repository was reviewed by the re3data.org Team.

The research data repository is either certified or supports a repository standard.

The research data repository provides a policy.

The research data repository provides open/restricted/closed access to its data.

The research data repository uses a persistent identifier system to make its provided data persistent, unique and citable.

The terms of use and licenses of the data are provided by the research data repository.

https://commons.wikimedia.org/wiki/File:Journal.pone.0078080.g001.png

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Data registry
Provides information on repositories for the permanent storage and access of data sets to researchers, funding bodies, publishers and scholarly institutions (e.g. re3data)

https://www.openaire.eu/opendatapilot-repository-guide

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Repository Badge for eNanoMapper (re3data)

re3data.org

REGISTRY OF RESEARCH DATA REPOSITORIES

http://doi.org/10.17616/R31NJMKC

data.enanomapper

https://www.re3data.org/resources/badge/100013052

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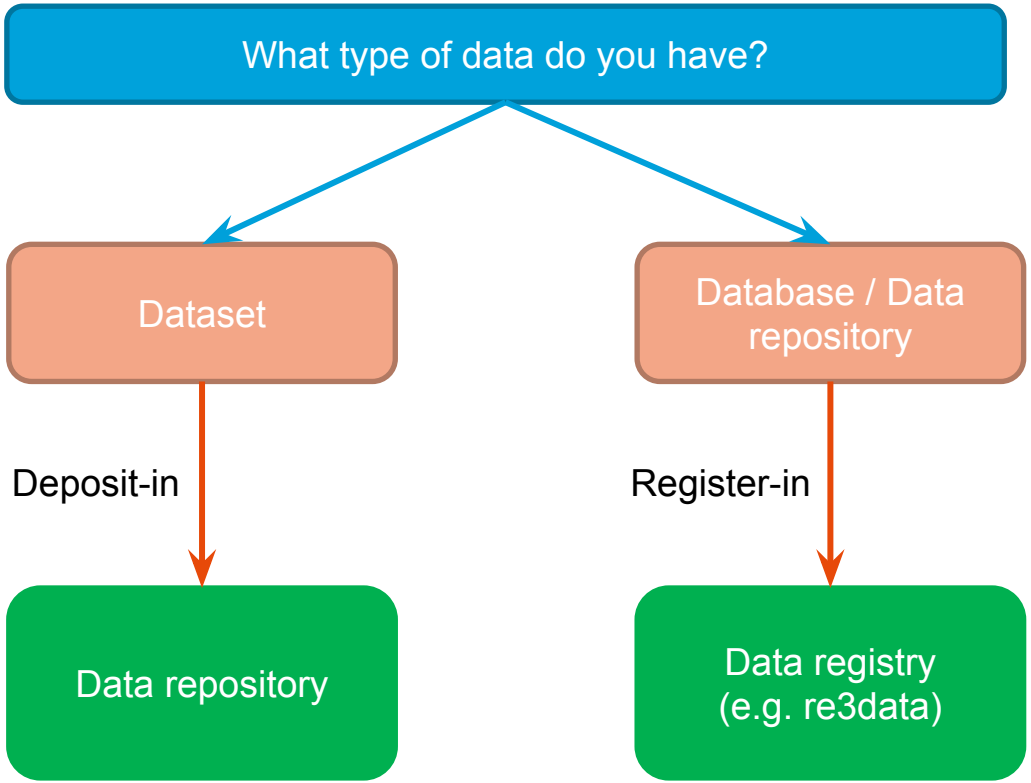

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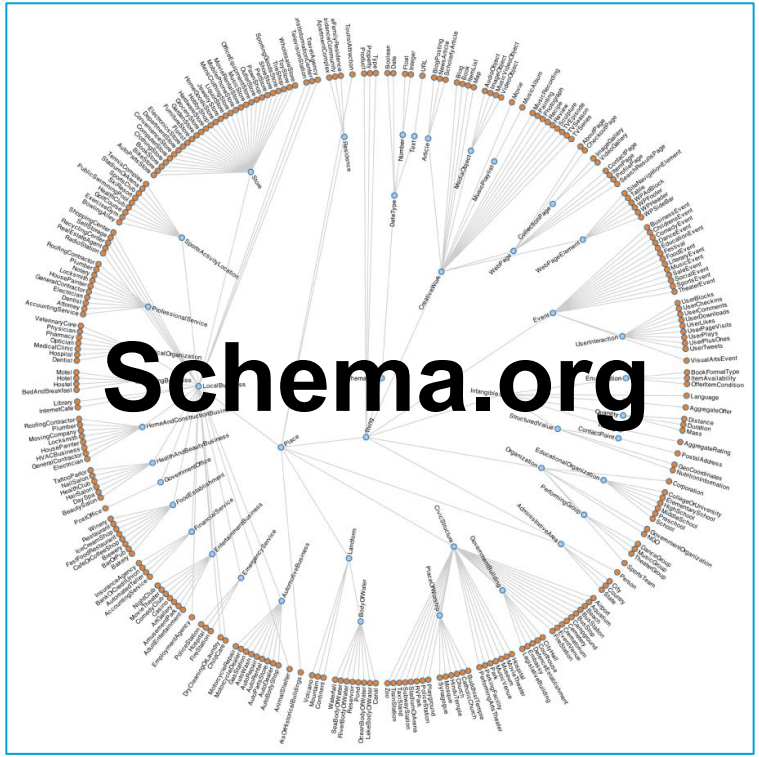
Bioschemas

- High quality metadata improves data discovery.



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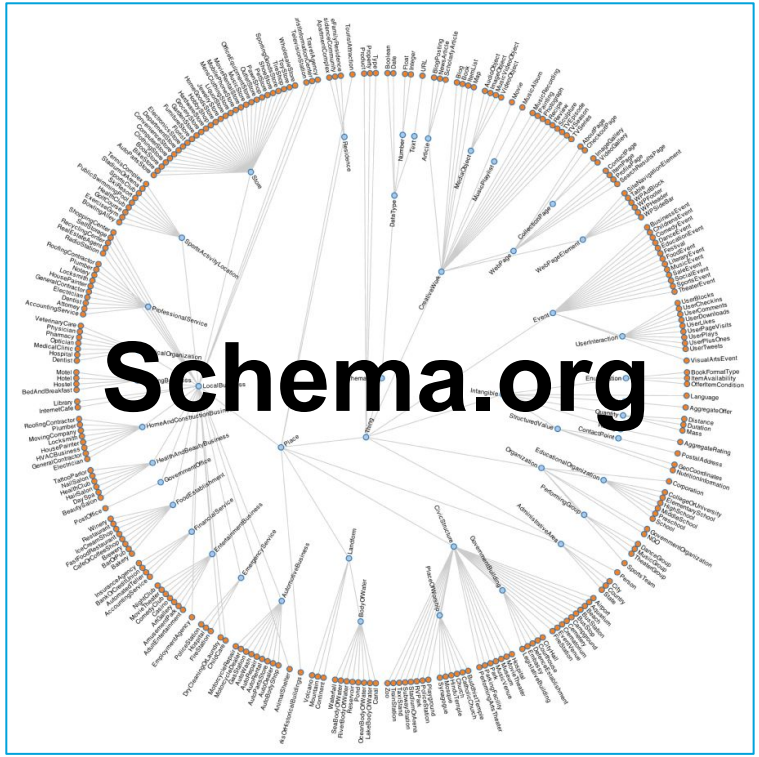

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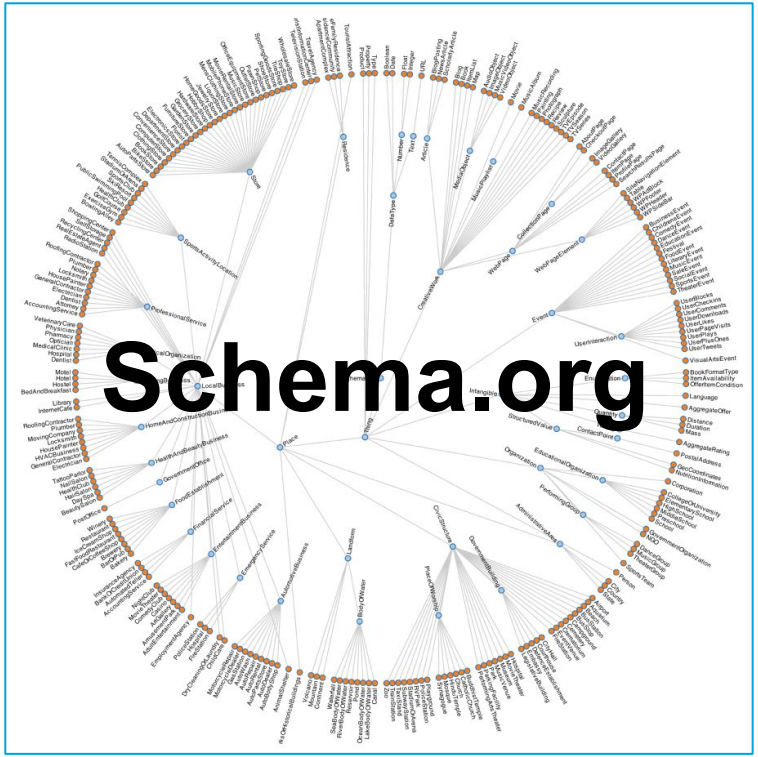
- Using a metadata schema to mark up a dataset can make your data findable to the world.
- Adding markup from **Schema.org** and its extension for the life sciences **Bioschemas.org** to your personal/institute web site -> indexed by **Google Dataset Search**



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Example:

https://doi.org/10.5468/ogs.2016.59.1.1

DOI Directory | Prefix | Suffix

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Benefits?

- Keeping track of data
- Data does not get lost or misidentified.
- Easier to cite and track the impact of datasets, much like cited journal articles.

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ORCID iD

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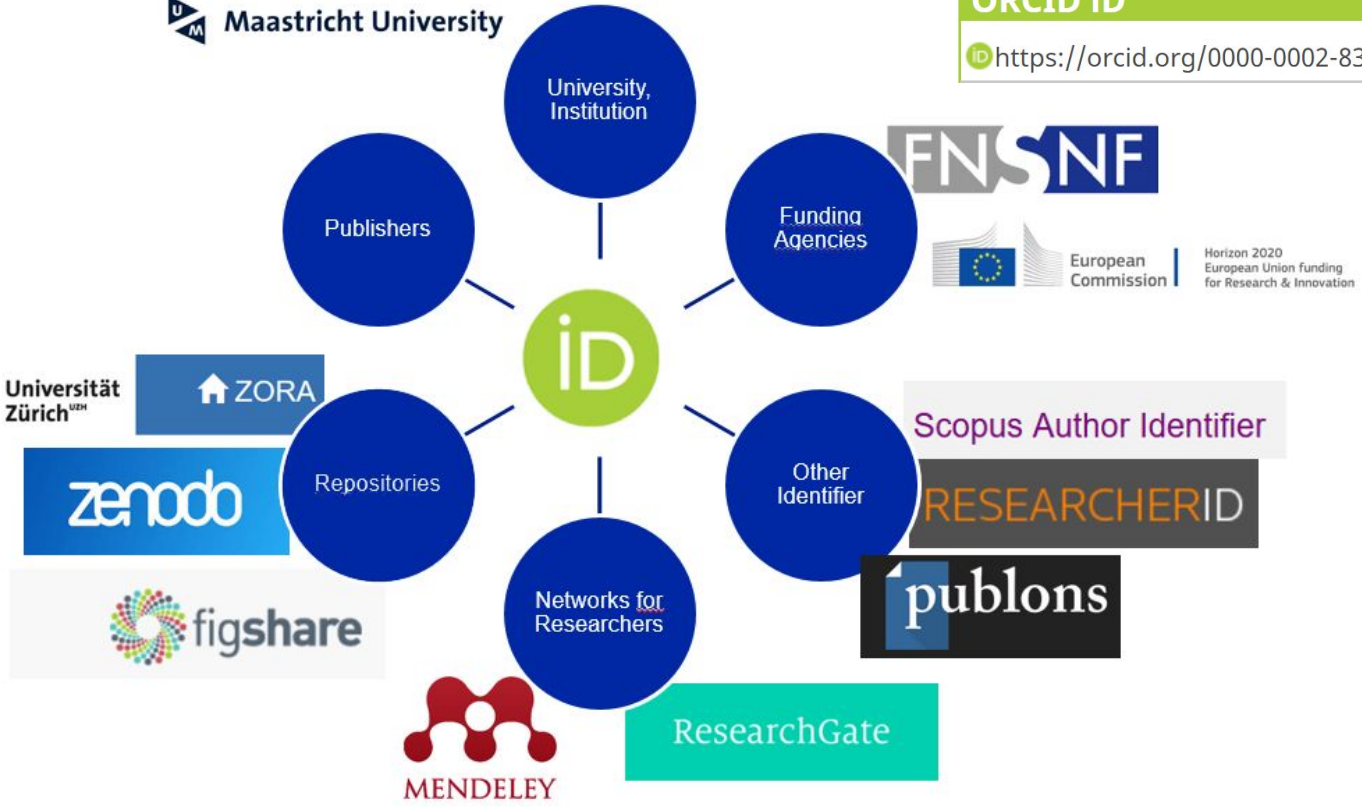

https://www.uzh.ch/blog/hbz/2019/05/29/manage-your-research-output-with-orcid/?lang=en

4. Data formats, structuring and organization

Well-structured and well-organized data:

-> can be **reused** much more easily

-> can be **interoperable**

https://www.tandfonline.com/doi/full/10.1080/00031305.2017.1375989

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+120	120
+80	80
-40	40
-60	60

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- **Data model + data dictionary**
- **Data dictionary documents the model:**

DATA

last_name	nin	dept_id
Martinez	HH 45 09 73 D	1
Goldstein	SA 75 35 42 B	2
Cornelsen	NE 22 63 82	2
Petculescu	XY 29 87 61 A	1
Stadick	MA 12 89 36 A	15
Scardelis	AT 20 73 18	2
Hunter	HW 12 94 21 C	6
Evans	LX 13 26 39 B	6
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DATA DICTIONARY (METADATA)

Column	Data Type	Description
emlployee_id	int	Primary key of a table
first_name	nvarchar(50)	Employee first name
last_name	nvarchar(50)	Employee last name
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position	nvarchar(50)	Current postion title, e.g. Secretary
dept_id	int	Employee deparmtnet. Ref: Departmetns
gender	char(1)	M = Male, F = Female, Null = unknown
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Dataedo

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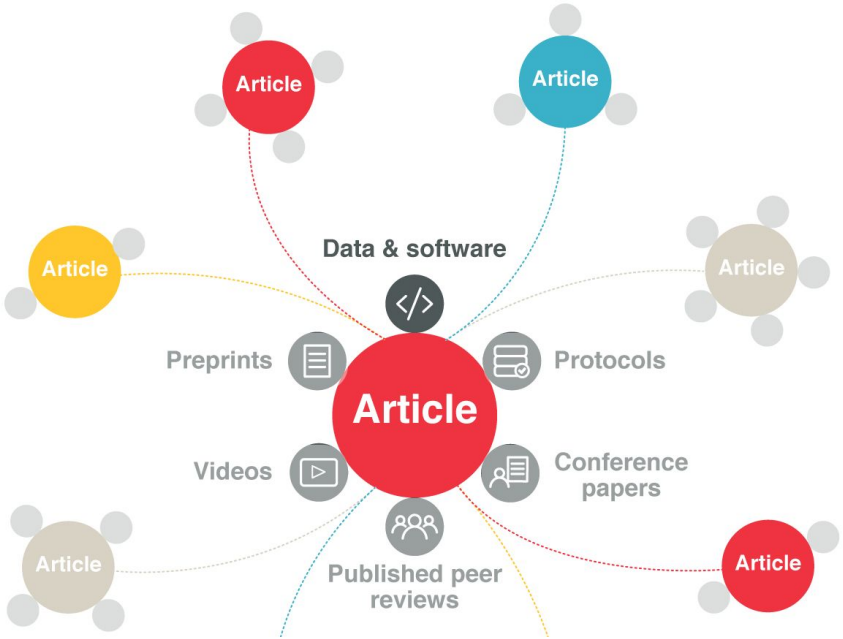

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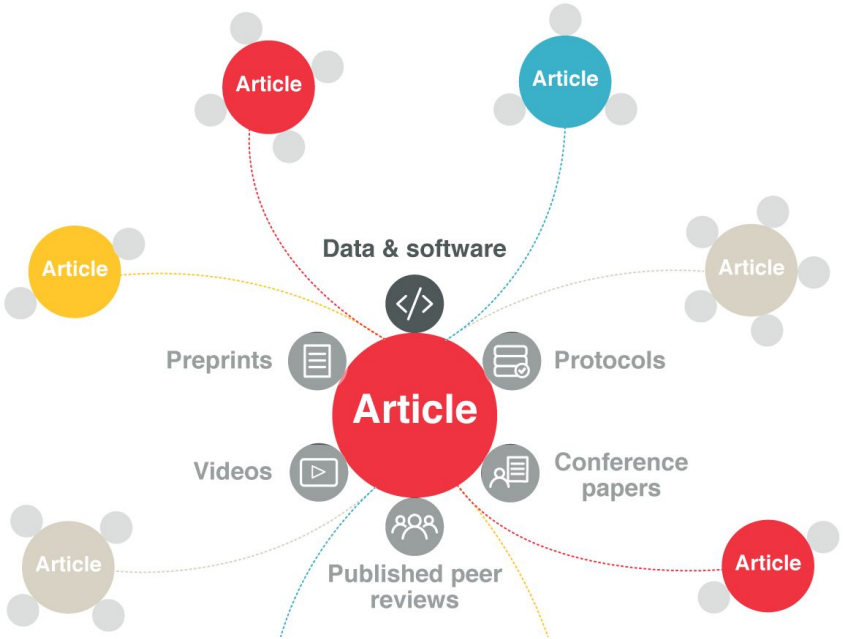

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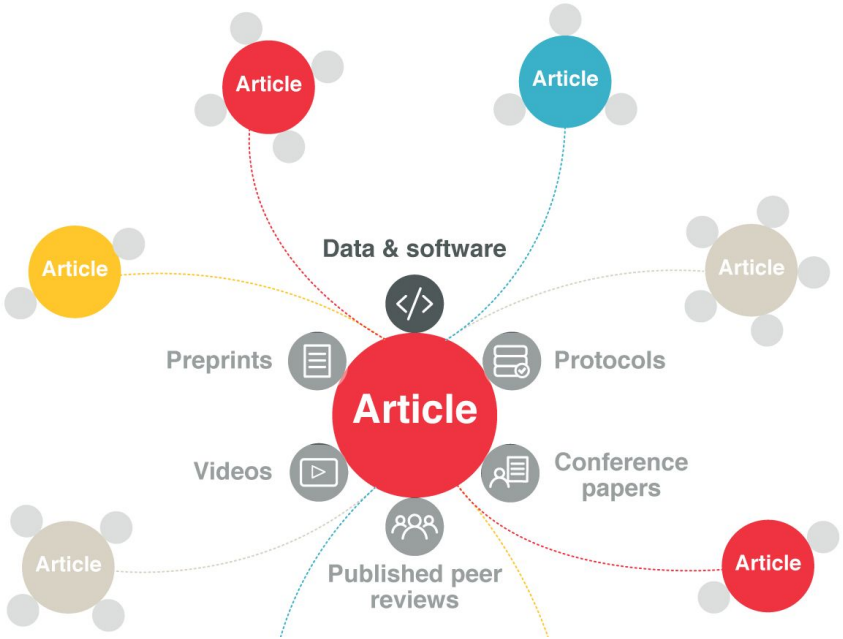
- Long-term data stewardship is an important factor for keeping data open and accessible for the long term.



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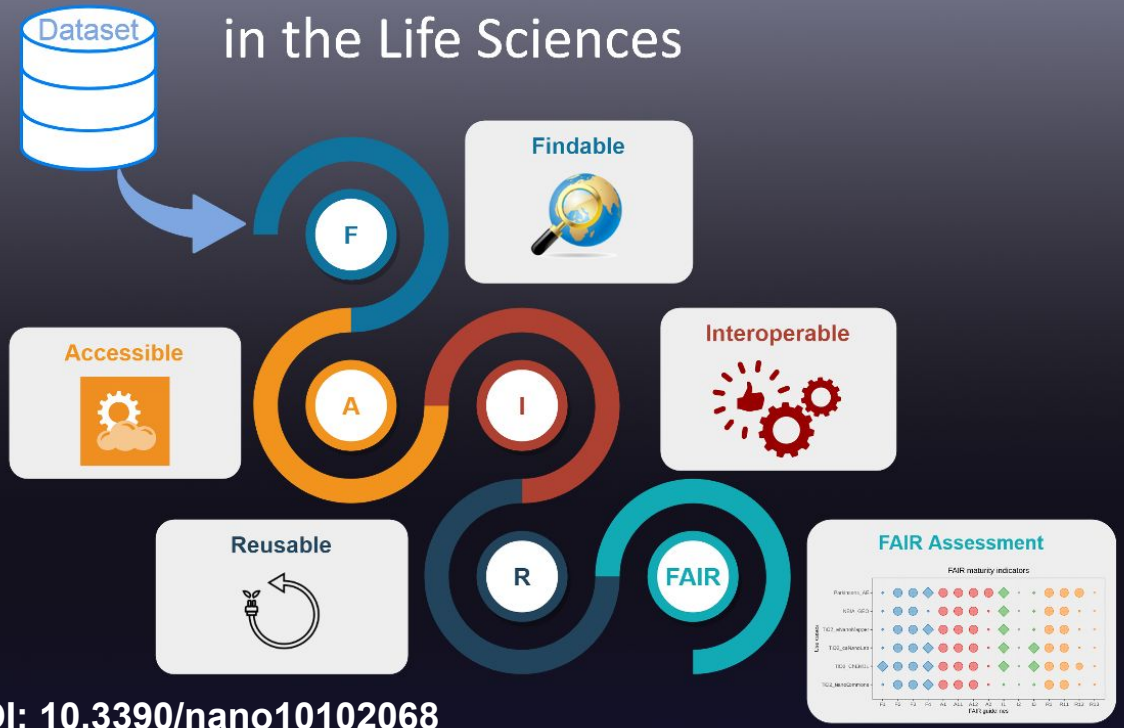
- Data reusability in the life sciences domain is hard to quantify.
- FAIR assessment is mostly done manually, which makes the process slow and less objective.
- We lack the means of comparing the FAIRness of life sciences data in a visual easy-to-read manner.

nanomaterials

A Semi-Automated Workflow for FAIR Maturity Indicators in the Life Sciences



DOI: 10.3390/nano10102068

python™

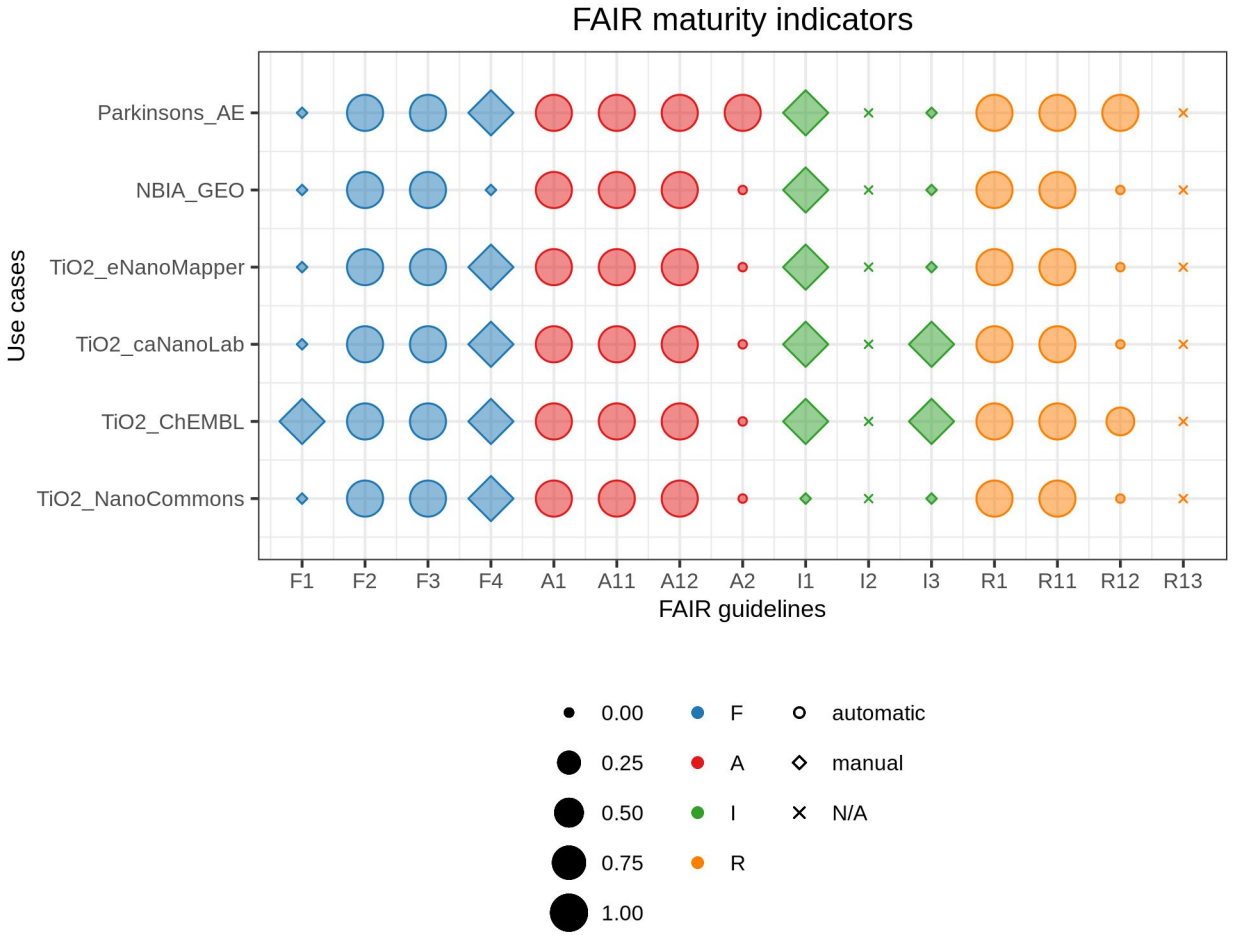
jupyter

binder

GitHub

https://nanocommons.github.io/wgf-fairdata-analysis/

Study Results



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- Observations from 15 nano-QSAR article review:
  - At least 3 features/descriptors were used in any QSAR study
  - Presence of units is important to build the QSAR model.
  - Frequent physio-chemical features used: surface area, porosity, shape, size distribution, zeta potential.

Conclusion

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- There is many options (tools, standards, etc) so pick up what benefits you the most.
- FAIRness can be measured.
- We developed a semi-automated workflow to assess FAIRness and applied it on six life sciences resources using maturity indicators. Such a workflow could help the developers of the databases to improve their FAIRness.

Acknowledgment

Serena Bonaretti
Transparent MSK Research, Maastricht, The Netherlands (https://tmskr.github.io/)

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Joris Quik, Martine Bakker
National Institute for Public Health and the Environment (RIVM), NL-3720 BA Bilthoven, The Netherlands

Dieter Maier
Biomax Informatics AG, Planegg, Germany

Iseult Lynch
School of Geography, Earth and Environmental Sciences, University of Birmingham, Birmingham, UK

RISK GONE

NanoSolveIT

Gov4Nano
meeting the needs of nanotechnology

NanoSafety Cluster

Thank you