

# GARDIAN FAIR METRICS

One of the grand challenges of data-intensive science is to facilitate knowledge discovery by assisting humans and machines in their discovery of, access to, integration and analysis of, task-appropriate scientific data and their associated algorithms and workflows.

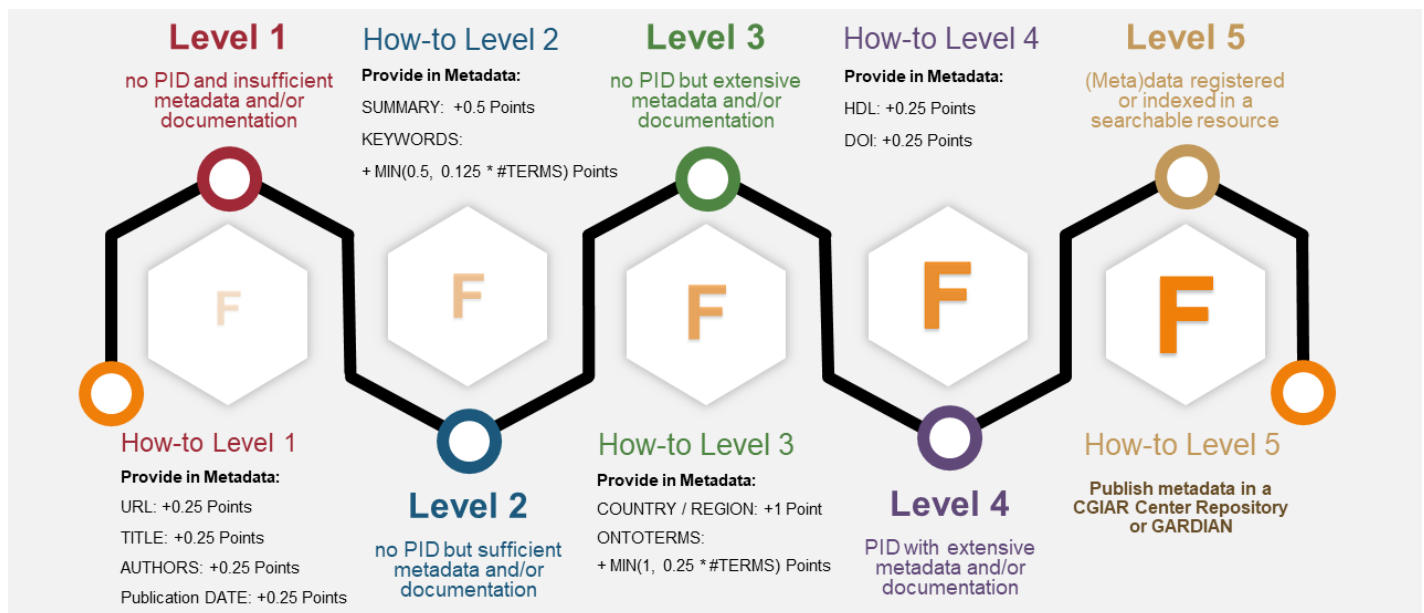
The FAIR Data Principles<sup>1</sup> is a set of guiding principles to make data Findable, Accessible, Interoperable, and Reusable. However, those principles are not orthogonal and have not been designed for automated machine-based evaluation. To this end, we have adopted the Netherlands Institute for Permanent Access to Digital Research Resources (DANS) metrics for FAIR compliance<sup>2,3</sup>.

## Findable

In our case, FINDABLE is defined by identifier, metadata and/or documentation, as follows:

- Level 0: No PID, no metadata and/or documentation (FAIR Points = 0)
- Level 1: No PID and insufficient metadata and/or documentation (FAIR Points = 1)
- Level 2: No PID but sufficient Metadata and/or documentation (FAIR Points = 2)
- Level 3: No PID but extensive metadata and/or documentation (FAIR Points = 4)
- Level 4: PID with extensive metadata and/or documentation (FAIR Points = 4.5)
- Level 5: (Meta)data are registered or indexed in a searchable resource (FAIR Points = 5)

## Findable: A how-to guide



<sup>1</sup> <https://www.force11.org/group/fairgroup/fairprinciples>

<sup>2</sup> <https://planeurope.files.wordpress.com/2015/03/doorn-fair-interoperability-poznan-plan-e-april-2017.pdf>

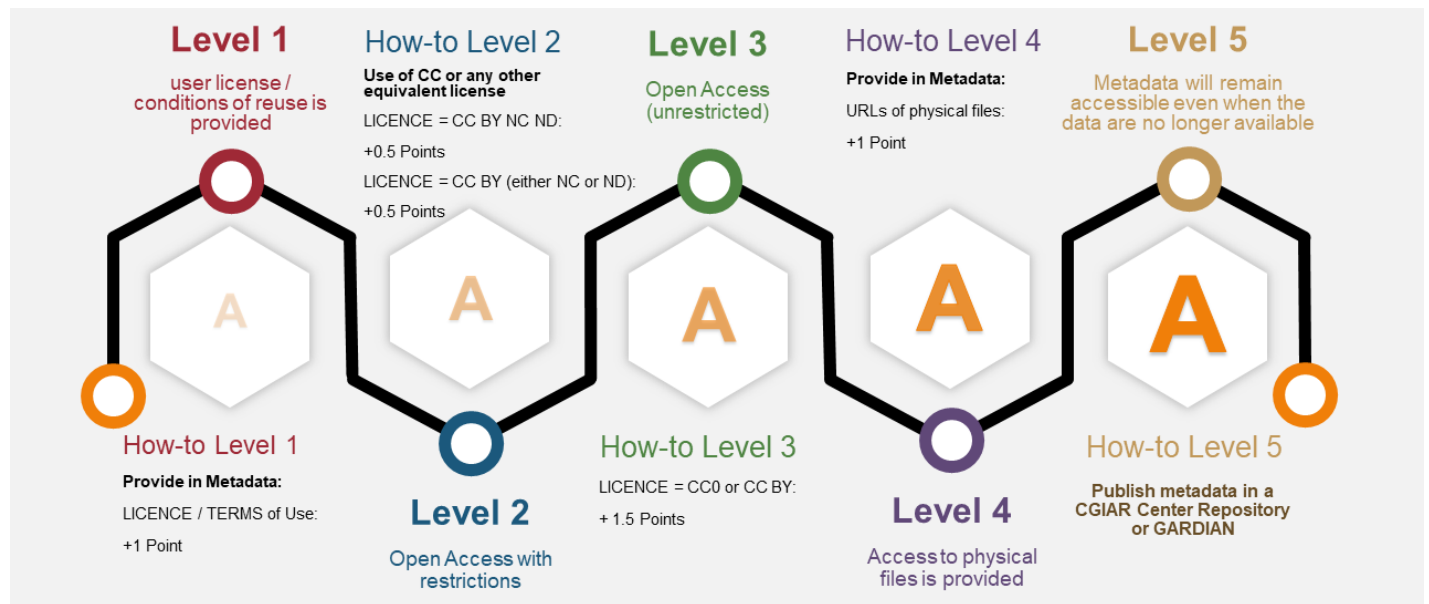
<sup>3</sup> <http://aims.fao.org/activity/blog/put-fair-principles-practice-and-enjoy-your-data>

## Accessible

In our case, ACCESSIBLE is defined by presence of user license and access to metadata and physical files, as follows:

- Level 0: No user license / unclear conditions of reuse (FAIR Points = 0)
- Level 1: Limited access (FAIR Points = 1)
- Level 2: Open Access (with restrictions) (FAIR Points = 2)
- Level 3: Open Access (unrestricted) (FAIR Points = 3.5)
- Level 4: Access to physical files is provided (FAIR Points = 4.5)
- Level 5: Metadata are accessible (even when the data are not or no longer available) (FAIR Points = 5)

## Accessible: A how-to guide



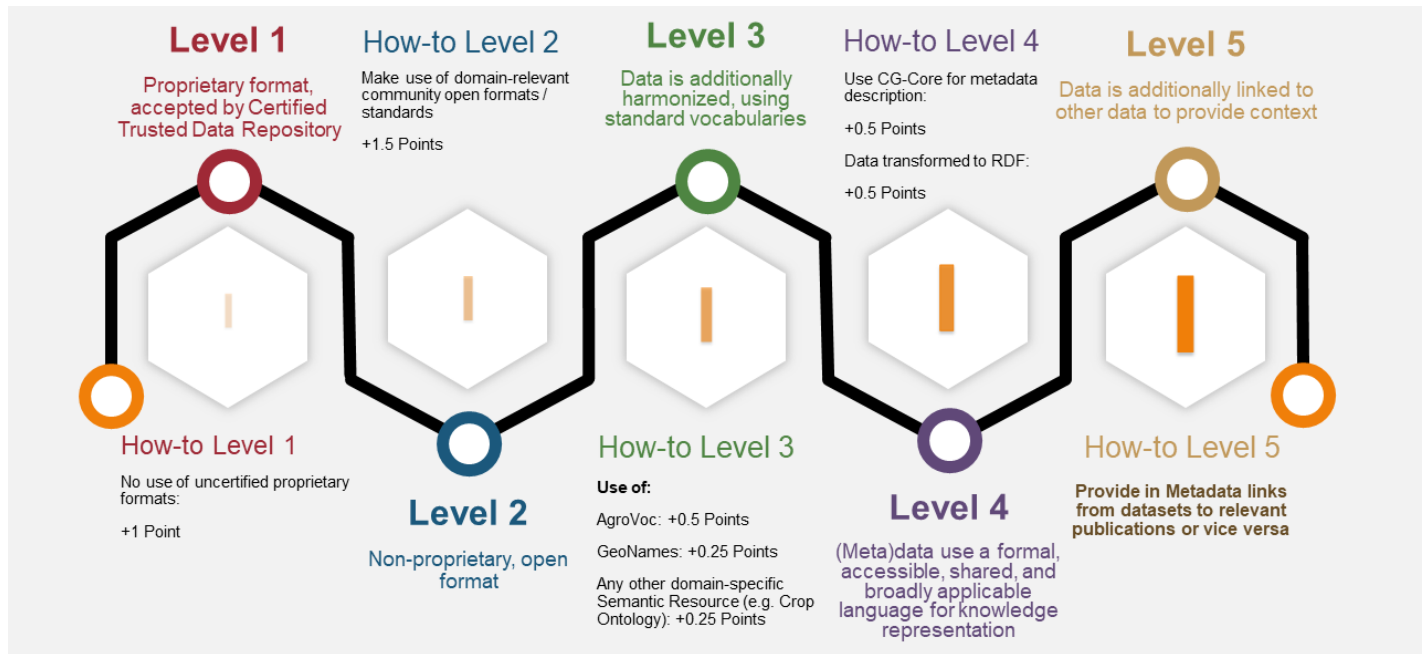
## Interoperable

In our case, INTEROPERABLE is defined by the data format (a modified version of Tim Berners-Lee's 5- star open data plan<sup>4</sup>), contextual information and knowledge representation language, as follows:

- Level 0: Proprietary, non-open format data (FAIR Points = 0)
- Level 1: Proprietary format, accepted by Certified Trusted Data Repository (FAIR Points = 1)
- Level 2: Non-proprietary, open format (FAIR Points = 2.5)
- Level 3: Data is additionally harmonized, using standard vocabularies (FAIR Points = 3.5)
- Level 4: (Meta)data use a formal, accessible, shared, and broadly applicable language for knowledge representation (FAIR Points = 4.5)
- Level 5: Data is additionally linked to other data to provide context (FAIR Points = 5)

<sup>4</sup> <https://5stardata.info/en/>

# Interoperable: A how-to guide



## Reusable

According to the FAIR Data Principles, to be Reusable:

[Reusable principles overlap with Accessible and Interoperable principles]

- R1. meta(data) have a plurality of accurate and relevant attributes
- R1.1. (meta)data are released with a clear and accessible data usage license
- R1.2. (meta)data are associated with their provenance
- R1.3. (meta)data meet domain-relevant community standards

We consider reusability as the result of the other three FAIR dimensions, that is,  $R=(F+A+I)/3$ .