



The FAIR Principles



Findable.Accessible.Interoperable.Reusable

Findable* – What?

- F1: (Meta) data are assigned globally unique and persistent identifiers
- F2: data are described with rich metadata
- F3. Metadata clearly and explicitly include the identifier of the data they describe
- F4. (Meta)data are registered or indexed in a searchable resource

Findable – How?

Data can be **Findable** by

- Adding a persistent identifier - PID (e.g. DOI) that is global and unique
- Adding rich metadata, which are relevant for both humans and machines to access, understand, and process data
- Differentiating between metadata and dataset itself
- Uploading data into a data repository



*<https://www.go-fair.org/fair-principles/>

Findable.**Accessible**.Interoperable.Reusable

Accessible* – What?

- A1. (Meta)data are retrievable by their identifier using a standardized communications protocol
- A1.1 The protocol is open, free, and universally implementable
- A1.2 The protocol allows for an authentication and authorization procedure, where necessary
- A2. Metadata are accessible, even when the data are no longer available

Accessible – How?

Data can be **Accessible** by

- Retrieving data by 'clicking on a link', without specialized tools or communication methods (http, ftp):
Anyone with a computer and an internet connection can access at least the metadata.
- If you can't publish data openly, you should provide access to the metadata
- FAIR data ≠ Open data : Even if the data itself cannot be shared openly, you should create and publish a description of your data so that researchers with a relevant purpose can request permission to access



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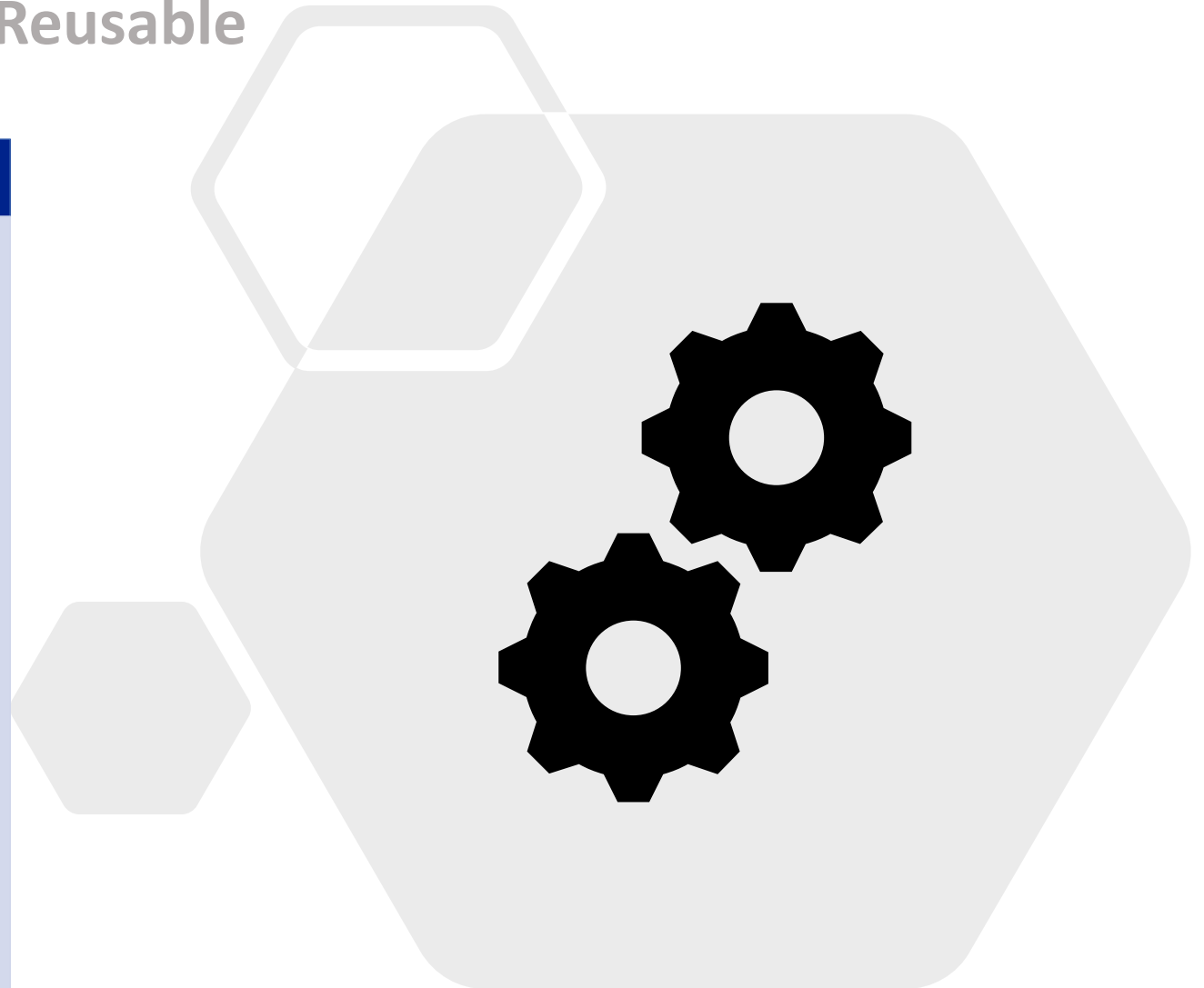
Interoperable* – What?

- I1. (Meta)data use a formal, accessible, shared, and broadly applicable language for knowledge representation.
- I2. (Meta)data use vocabularies that follow FAIR principles
- I3. (Meta)data include qualified references to other (meta)data

Interoperable – How?

Data can be **Interoperable** by

- Having a standard way to describe itself to whoever (machine or human) tries to access it without a need for a translator or mappings (common Format: JSON, RDF...)
- Using vocabularies and ontologies (each metadata field has its definition, and a meaningful relation among them and their constraints)
- Using a well-defined framework to describe and structure (meta)data → to create as many meaningful links as possible between (meta)data resources



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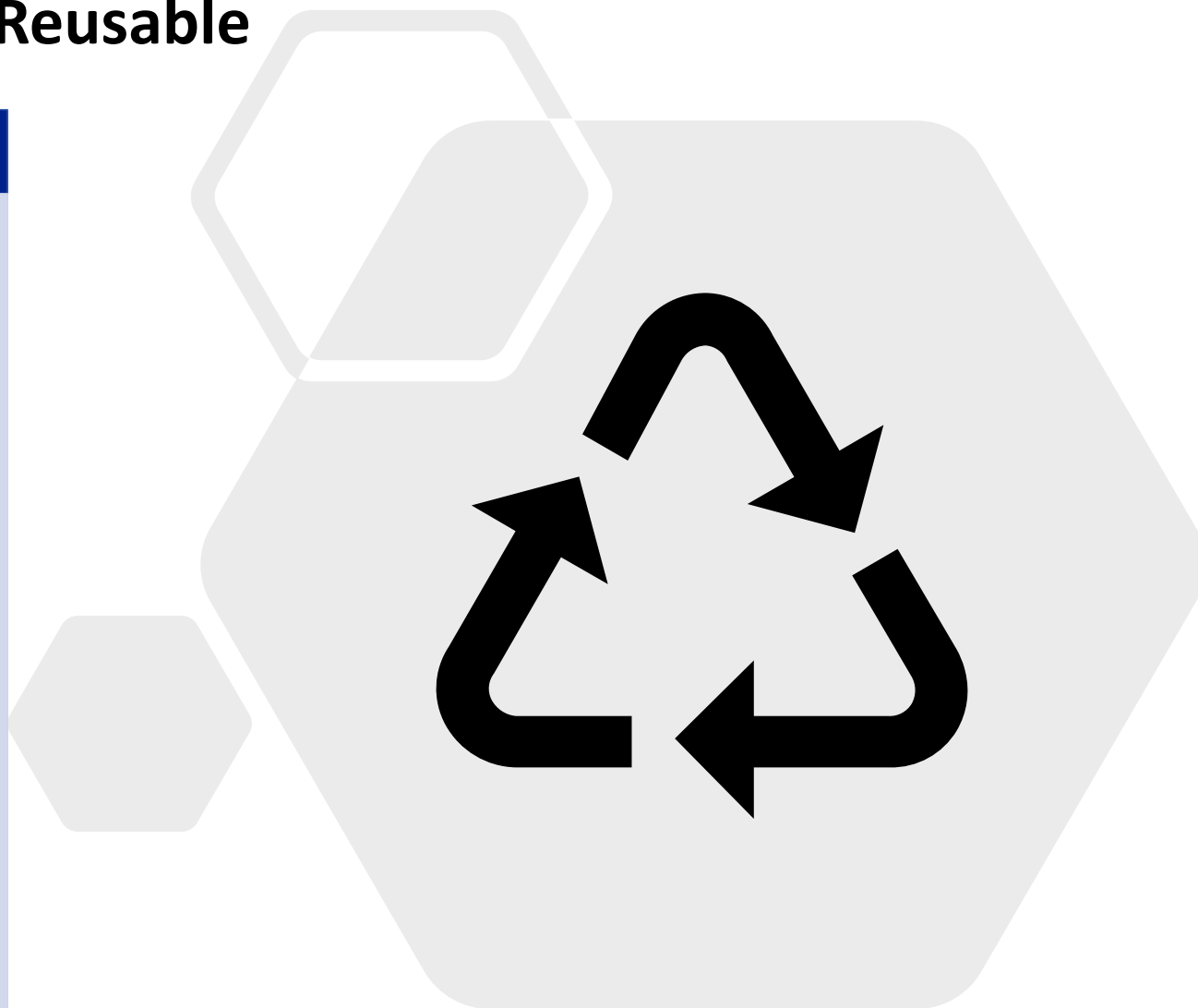
Reusable* – What?

- R1. (Meta)data are richly described with 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 detailed provenance
- R1.3. (Meta)data meet domain-relevant community standards

Reusable – How?

Data can be **Reusable** by

- Adding documentation that helps others understand the data
- Adding an appropriate data license that determines how data can be reused
- Adding rich metadata that describes the context under which the data was generated (Provenance means to describe the origin of data - Who? What? When? How?)
- Considering which usage rights you want to attach to your data - to what extent is the data useful for others?



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Repositories and FAIRness

Data repositories are key in putting the FAIR principles into practice.

Not only do they enable findability and access, but they also provide persistent identifiers, documentation and metadata, thus fostering reusability for humans and machines.

- A “form” needs to be filled – metadata by default.
- The form complies with a specific metadata standard.
- Metadata will then become machine-actionable and searchable in an online resource.
- A persistent identifier for the data is automatically generated.
- References to other data or metadata can be included.
- Authentication and authorization procedures are in place.
- Access can be regulated from closed to open.
- The provision of machine-readable licenses enhances the reusability of the data.
- The use of standards and controlled vocabularies is enforced.
- Interfaces for external services like OAI-PMH allow harvesting of metadata for stored records.

