FAIR data **Source: DTL, Force11**

Source: https://www.dtls.nl/fair-data/

In the FAIR Data approach, data should be[1]:

1. **Findable – Easy to find by both humans and computer systems and based on mandatory description of the metadata that allow the discovery of interesting datasets;**
2. **Accessible – Stored for long term such that they can be easily accessed and/or downloaded with well-defined license and access conditions (Open Access *when possible*), whether at the level of metadata, or at the level of the actual data content;**
3. **Interoperable – Ready to be combined with other datasets by humans as well as computer systems;**
4. **Reusable – Ready to be used for future research and to be processed further using computational methods.**

[1] https://www.dtls.nl/fair-data/fair-data/, retrieved March 10, 2017

Force 11: FAIR Data Principles[2]

Preamble

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. Here, we describe **FAIR** - a set of guiding principles to make data **Findable, Accessible, Interoperable, and Re-usable**.

To be Findable:

F1. (meta)data are assigned a globally unique and eternally persistent identifier.
F2. data are described with rich metadata.
F3. (meta)data are registered or indexed in a searchable resource.
F4. metadata specify the data identifier.

To be Accessible:

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.

To be Interoperable:

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.

To be Re-usable:

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.

[2] https://www.force11.org/group/fairgroup/fairprinciples, retrieved March 10, 2017

Fair data management planning[3]

The FAIR principles provide excellent handles for data management planning:

To ensure **F**indability,

- select a data repository at an early stage and check out its data format and metadata requirements;
- make sure the data can get a persistent identifier so that it can be cited;
- maybe select a catalogue to make your data more findable, especially if the repository is more generic in nature.

To ensure **A**ccessibility,

- guarantee longevity of the data (e.g., by submitting it to a repository that has a certification like the Data Seal of Approval or an ISO certification);
- check and describe the legal conditions under which the data can be made available (this is generally easier to do before you have collected and interpreted the data);
- establish an embargo period if necessary;
- make sure your ICT infrastructure will keep the data available even in case of equipment failure or human error.

To ensure **I**nteroperability,

- select commonly used data formats;
- select commonly used vocabularies for data items.

To ensure **R**eusability,

- make sure you keep proper provenance information (i.e., details about how and where the data was generated, including machine settings, and details about all processing steps, such as the software tools with their versions and parameters);
- select the right minimal metadata standard and collect the necessary metadata (many minimal metadata standards are included in ELIXIR's biosharing.org repository);
- select a license for the data (preferably an open license) and the associated software tools;
- make sure the important conclusions of your study will not only be available in a paper in narrated form, but also in a digital file (e.g., a nanopublication).

More information on Fair Guiding Principles:

Wilkinson, M. D. *et al.* The FAIR Guiding Principles for scientific data management and stewardship. *Sci. Data* 3:160018 doi: 10.1038/sdata.2016.18 (2016).

[3] https://www.dtls.nl/research-data-management/data-management-planning-3/, retrieved March 10, 2017