On the Road to FAIR

Results of the Second National GO FAIR Workshop for the German Research Community: "GO BUILD - GO CHANGE - GO TRAIN – Ways for the German Community to Contribute to GO FAIR"

On Wednesday, 19 October 2018, the second GO FAIR workshop took place in Germany. At the Leibniz office in Berlin, representatives of various institutions met to tackle topics related to the fair provision of research data.

Invitation to the broad scientific landscape

With an invitation to the broad scientific community, Hans-Josef Linkens, Head of Division D3 Digital Transformation in Science and Research at the Federal Ministry of Education and Research, started off the second GO FAIR workshop. He emphasized the participation of all research communities and stakeholders as a fundamental element in successfully shaping digital change. Only with their contribution reputation systems, data expertise and technological standards can become FAIR.

Picking up this invitation Klaus Tochtermann, director of the ZBW – Leibniz Information Centre for Economics and strategic director of GO FAIR, explained the relation of the GO FAIR initiative to national efforts in research data management, to the European Open Science Cloud (EOSC) and to the Internet of FAIR Data and Services. Community-driven and bottom-up, the GO FAIR initiative creates an environment in addition to the largely funded EOSC projects. The cross-linkage of research communities including their infrastructure and service provider enables research data management to be organized at the national level: information exchange, participation and alignment with European developments. Considering the requirements placed on the National Research Data Infrastructure (Nationale Forschungsdateninfrastruktur, NFDI), the commitment to the FAIR principles will gain importance in the near future. This does not mean that solutions need to be immediately one hundred percent FAIR, but the commitment should be traceable. The GO FAIR initiative offers the possibility to get engaged as an implementation networks (IN) grouped into one of three areas of interest, the so-called pillars: GO BUILD, GO CHANGE, GO TRAIN.

- Presentation of GO FAIR by Klaus Tochtermann (in German only): Download here.

Designing research data management - Becoming an Implementation Network

- Presentation of GO FAIR implementation networks by Ines Drefs (in German only): Download here.
- Click here for more information on the GO FAIR implementation networks.

GO BUILD - GO CHANGE - GO TRAIN – Three Pillars that go hand in hand

The GO FAIR implementation approach is based on three pillars in which projects and institutions can play an active role:

1. the development of technical solutions (GO BUILD)
2. activities in favour of cultural change (GO CHANGE)
3. Training of IT and data expertise related to RDM (GO TRAIN)

In the second part of the workshop it was clearly demonstrated that these three pillars are closely connected and mutually beneficial. The participants answered collaboratively a number of key questions focusing on one specific pillar and revealed a number of topics that will be taken up and considered more intensively within the GO FAIR initiative. The future areas of activity will encompass the following efforts:

GO BUILD

<u>How can repository providers ensure that the data submissions are FAIR? How could the technical support look like?</u>

General consideration: The meaning of *Findable* and *Accessible* for (meta)data is technically clear, while *Interoperable* and *Re-usable* are unclear.

1. Define what FAIRness means on a technical basis?
    - Consider the level of FAIRness from a scientific perspective (to prevent fulltime documentation).
    - Implement community standards.
    - Design a seamless technical connectivity and develop workflows that allow automatic workflows.
    - Connect curation services to services and repositories.
2. Communicate clear requirements for technical solutions
    - Invest resources in community management.
    - Provide guidance for researchers (e.g. support, training) (>> GO TRAIN)
    - Offer a compliance check during the publishing process.
    - Establish metrics and level of FAIRness.
    - Ensure readability by humans
3. Change
    - Create technology that rewards FAIRness and documentation efforts immediately, e.g. citation, credits. (>> GO CHANGE)
    - Establish a workflow reaching from managed data to long-term availability.
    - Make use of feedback to improve and develop standards continuously.

<u>Which technical framework or support services are required to generate FAIR data? (from a researcher's perspective)</u>

General consideration: Offer recommendations for action by drawing a road to FAIR and explaining general objectives and related processes.

- Develop and apply consistent policies and RDM processes at every institution.
- Establish interfaces between institutions.
- Provide digital workflows and systematic IT support to close the competency gap between research and IT (e.g. data stewards).
- Enable the annotation of data already from the early beginning of the data creation process.
- Communicate data and software standards across communities and disciplines.
- Verify DMP and SMP throughout the research process.
- Establish incentives instead of formal requirements only (e.g. FAIR metrics, credits, review for data publication).

What are currently the biggest challenges for the development of FAIR Software/Services/Infrastructures?

General consideration: Management of requirements and expectations is one of the biggest challenges for the development of FAIR solutions.

- A clear definition of FAIR software/services/infrastructures for research data management is needed. This will allow the creation of appropriate evaluation criteria.
- Data diversity and community management are a challenge.
- Data validity as well as clean and continuous documentation throughout the research process is an issue.
- There is a lack of best practices, tools and applications.
- There is a lack of accepted impact and citation systems.
- Professionally skilled staff is urgently required. (> GO TRAIN)
- Legal issues, such as licensing information and options are a hurdle.
- Financial resources and funding for the development of FAIR solutions are needed.

GO TRAIN

Who needs to be trained?

- Young talents, such as students and research assistants, need to be trained as they will shape the science system in the future and can expeditiously bring change and innovation. (>> GO CHANGE)
- Trainers and lecturers in research data management need to be trained.
- Professionals need to be trained. This includes researchers, lecturers, persons from the management level as well as from the industry, evaluators and reviewers, future curators and colleagues from the library sector.
- Further target groups are computer scientists who develop infrastructure and services.
- Legal experts belong to the wider target group, too.
- Policy makers and scientific organizations must be involved in the training to develop an understanding of FAIR and initiate processes. (>> GO CHANGE)

What is the essential content of a training?

1. Within the organizational framework information needs to be given about:
    - Good science practice (>> GO CHANGE)
    - Policies, strategies and sustainability efforts (>> GO CHANGE)
    - Funding opportunities (>> GO CHANGE)
    - (Inter)national landscape
    - FAIR infrastructures and service providers
    - Best practices
    - Consulting services
2. Content aspects of training covers:
    - Definition of terms
    - Data Management Plans
    - Software Management Plans
    - Data curation
    - Relevant (meta)data standards

3. Technological aspects of a training addresses (>> GO BUILD):
    - Repository systems, federated infrastructures and services (validation)
    - Storage of data and versions
    - Interfaces and interface development
    - Machine readability, interoperability and semantic search
4. Legal aspects include information about:
    - Licenses of data for reusability aspects
    - Legal certainty for data re-use
5. Ethical aspects addresses:
    - Protection of data from a scientific perspective (e.g. Who owns the data?)
6. Own use case examples
    - Working with and preparing own data

What is the best way to convey FAIR skills to specific target groups?

General consideration: Create advisory services as well as general and discipline-specific training for different target groups.

1. Install a central point of contact to give continuous impetus: (>> GO CHANGE)
    - Offer constant support and advice (e.g. consultation hours)
    - Promote activities in research data management and enable networking
    - Collect and spread best practices
2. Train the management level and research data management experts by: (>> GO TRAIN)
    - Providing advice and consulting
    - Including FAIRness in online tutorials on good scientific practice
3. Scientists and students are another target group of importance:
    - Integrate FAIR skills into the curriculum
    - Offer online tutorials and webinars on good scientific practice
    - Organize workshops, meet-ups and "bring your own data"- hackathons
    - Offer discipline-specific training sessions

GO CHANGE

What kind of support is needed in order to foster cultural change?

General consideration: Different communities - different paces!

1. Disciplinary associations are important agents to support cultural change. *(>> GO BUILD)*
2. Incentives to support cultural change are:
    - Making FAIR handling of data[i] a criterion for funding
    - Making FAIR handling of data[ii] relevant for career advancement
    - Making FAIR handling of data[iii] relevant for reputation gain
3. Establishment of an "culture of error":
    - Errors that occur during the data lifecycle should be acknowledged as normal and not result in "shaming". Errors could, for example, be reported via anonymous systems (such as "LabCIRS"). It was assumed that an culture of error can decrease researchers' scruples when it comes to sharing data.

What prevents you/your colleagues from providing your data in a FAIR manner?

General consideration: Positive examples of fair data sharing need to be spread to gain more attention.

1. Researchers do make their data available, but most often to their peers only. Making data available beyond peer groups is allegedly inhibited by:
    - Fear of misuse
    - Insecurity in terms of legal issues/liability/GDPR
    - The wish to keep one's data for "later"
    - A lack of incentives
    - A lack of funding
    - A lack of infrastructure
    - A lack of institutional support
    - A lack of curatorial expertise

Which advantages do you hope for when ensuring FAIR compliance?

General consideration: Advantages are ranging from immediate advantages for the researchers to advantages for the society as a whole.

1. Immediate advantages:
    - Encourage quality insurance of data
    - Support efficient research by fostering interdisciplinarity and enhance cooperation opportunities. Machine readability and linkage of data may lead to a usage other than its immediate purpose.
    - Citing increases the researcher's impact and add to the reputation
    - Preserves contextual knowledge on the data (interoperability)
    - Enable the re-use of own data
    - Receive funding for FAIRification efforts
    - Open licenses and transparent rules decrease bureaucracy
2. Advantages for the societal and science system:
    - Endorses transparency
    - Fosters citizens' trust towards science

GO FAIR Outlook

On the jointly sketched "Road to FAIR" it became clear that the pillars cannot be seen in isolation. It is like a multi-lane highway: implementation networks of all three pillars move forward, build up further competencies and thus contribute conjointly to the FAIR sharing of research data. Consequently, the GO FAIR initiative will offer thematic workshops and bring community representatives together. Based on the interactions with the implementation networks, the International Support and Coordination Office (ISCO) will provide recommendations for action and best practices with the aim of applying reliable solutions across disciplines. Within this environment, the FAIR metrics will be evaluated in cooperation with the implementation networks. And last but not least, training is considered as a crucial topic. Here, too, relevant players, such as the Rat für Informationsinfrastrukturen (RfII, the German Council for Scientific Information Infrastructures, http://www.rfii.de), or the working group of the Allianz der Wissenschaftsorganisationen (Priority Initiative "Digital Information", https://www.allianzinitiative.de/) must be brought together.

Upcoming events

The next GO FAIR event will take place on October 26, 2018 in Leiden, the Netherlands. Ministerial and research representatives of different EU countries will meet to move GO FAIR forward at 'country level'.

All implementation networks (INs) will have the opportunity to meet at the first international workshop which is planned for the beginning of 2019. Details will follow soon.

[i] and other digital research objects – e.g. software, tools, etc.
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