eosc | FAIR-IMPACT
Expanding FAIR solutions across EOSC

First synchronisation workshop report

Highlights and recommendations

FAIR-IMPACT- Expanding FAIR solutions across EOSC

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Disclaimer

February 2023

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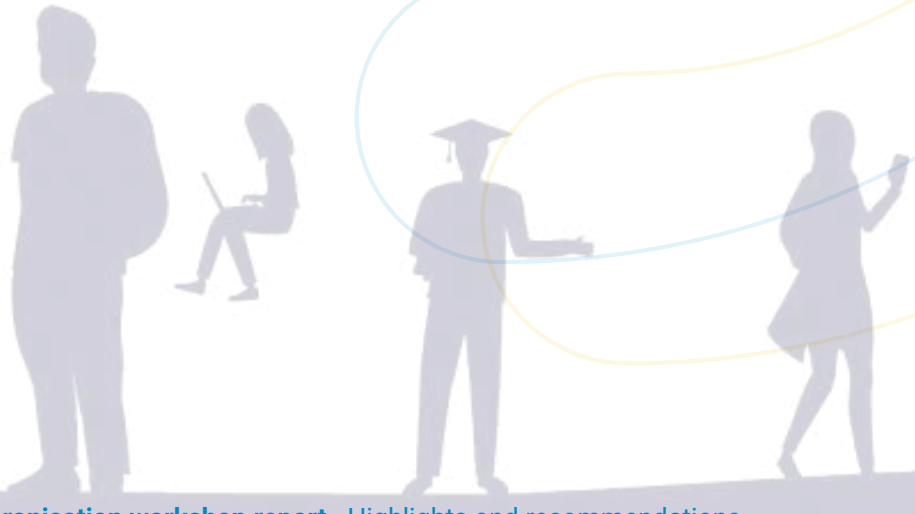


Terminology

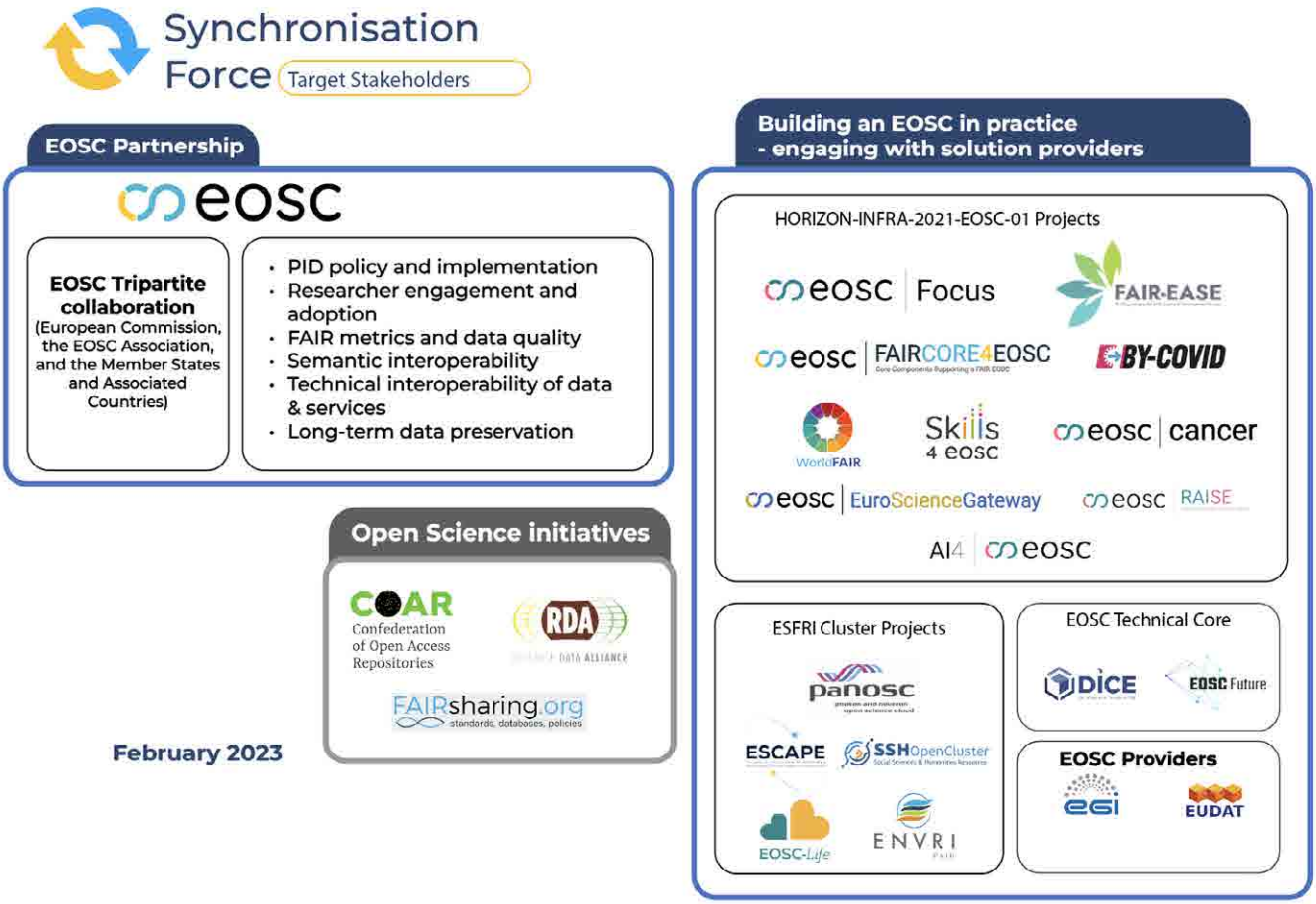
Terminology/Acronym	Description
CESSDA	Consortium of European Social Science Data Archives
COAR	Confederation of Open Access Repositories
CTS	CoreTrustSeal
EC	European Commission
EOSC	European Open Science Cloud
GA	Grant Agreement of FAIR-IMPACT
KPI	Key Performance Indicator
PID	Persistent Identifier
SF	Synchronisation Force
SRIA	Strategic Research and Innovation Agenda
SSH	Social Sciences and Humanities
TDR	Trustworthy Digital Repository

Context and introduction

Building on the successful Synchronisation Force approach from the FAIRsFAIR project[1] (2019-2021), FAIR-IMPACT continues a dialogue for collaboration and harmonisation with various projects, initiatives, and actors in both EOSC and FAIR ecosystems. We do this to reduce redundancy and to ensure that solutions are more widely promoted, sustainable and can be transferred to the relevant EOSC Partnership. This supports current and future EOSC stakeholders to take the next step in implementing FAIR-enabling practices.

To address these challenges FAIR-IMPACT set up the Synchronisation Force with representatives from all the project's work packages. The main instrument of the Synchronisation Force is a series of three annual workshops to be delivered in the period of 2022-2024. Key representatives of projects and initiatives in the FAIR and EOSC ecosystem are selected and invited (see Image 1).

Image 1: FAIR-IMPACT Synchronisation Force key stakeholders



This landscape for synchronising consists of the Board of Directors of the EOSC Association and a selection of Task Forces under the EOSC Association that are most relevant for the FAIR-IMPACT focus areas (top-left). FAIR is also in the remit of European projects, especially those in the HORIZON-INFRA-EOSC funding scheme, but likewise in ESFRI Cluster projects, the EOSC Technical Core, as well as in discipline-independent providers (right hand side). Finally, representatives of Open Science initiatives (bottom-left) were invited to the workshop 2022.

1 FAIRsFAIR https://fair-impact.eu/fairsfair-legacy

To set the stage, four topics were defined, which fit the FAIR-IMPACT core areas. Each topic focused on selected recommendations and ambitions from the FAIRsFAIR White Paper[2] (2021), the SRIA[3] (version June 2021) and EOSC Multi-Annual Roadmap[4] (2023-2024). Whereas the FAIRsFAIR Synchronisation Force workshops and White Paper were inspired specifically by the Turning FAIR into Reality Report[5] (2018), we now added more recent strategic documents.

The Synchronisation Force 2022 workshop consisted of six online sessions, between 8 November and 12 December 2022:

- an introduction to FAIR-IMPACT, the goal of the workshop and the request to all workshop participants to provide information about their FAIR activities ahead of the four thematic sessions;
- one session on *Metrics and assessing FAIRness*
- one session on *Persistent Identifiers*
- one session on *Trustworthy and FAIR-enabling repositories*
- one session on *Metadata, semantics and interoperability*
- a final session in which highlights and recommendations from the thematic sessions were presented and discussed with the participants.

More than 120 people registered for the series; attendance in individual sessions ranged from 40 to over 60 people.

Based on the workshop input and discussions, this report provides supporting recommendations for each topic.

2 FAIRsFAIR White Paper https://doi.org/10.5281/zenodo.5744786
3 SRIA https://www.eosc.eu/sites/default/files/SRIA_2022_01.pdf
4 EOSC Multi-Annual Roadmap https://eosc.eu/sites/default/files/2022-05/20220523_MAR_02_GL.pdf
5 Turning FAIR into Reality https://doi.org/10.2777/1524

Highlights and recommendations from the workshop

1. Metrics and assessing FAIRness

Underlying recommendation/ambition: "Provide the metrics and tools to measure the adoption of the FAIR principles for research outputs." (Operational Objective 6 from EOSC Multi-Annual Roadmap[6] (2023-2024), p.15)

Recommendations based on the Synchronisation Force workshop 2022 session

The session on *Metrics and assessing FAIRness* was well attended with around 40 participants in the virtual room. These participants represented a large variety of projects, initiatives, as well as the EOSC Association Task Forces and the European Commission. This resulted in a lively conversation and useful information exchange.

Already in 2018, the *Turning FAIR into Reality* report recommended the development of metrics for FAIR digital objects and suggested a mix of automated and manual assessments. The session showed that in 2022 the importance of making research outputs FAIR is now widely on the radar. This is an area in which quite some progress was made over the last years, resulting in an abundance of different outputs.

During the session several issues were raised. We currently witness a **plethora of different FAIR assessment tools**. These tools are based on different metrics. They use different methods and weighing factors and run different tests to produce an outcome. The result of this is a very complex landscape that is difficult to navigate for the end user and other interested stakeholders.

The current assessment tools are mainly **generic**. If domain specificity is missed, the results from the tools are less meaningful. Although the FAIR assessment of all research outputs is recommended, the current assessment tools mainly **focus on (meta)data**. Finally, the session showed that due to the issues mentioned above, a lot of **caution** is needed not **to use assessment results** as absolute numbers to judge upon. Numbers need a narrative to assist organisations in taking next steps on the journey towards FAIR.

The following **recommendations** were suggested in the session to address the issues mentioned above:

- We need to work on a further convergence of metrics and tools, which requires further discussion, synchronisation and alignment;
- We need more domain-sensitive assessment methods, in order to incorporate domain maturity as well as specific good practices and requirements.
- We need assessment tools for other research outputs, like software and semantic artefacts.
- The instrument of FAIR assessment and scoring should be seen and used as the starting point for assistance and improvement.

Shortly after the workshop the EOSC-A Task Force *FAIR Metrics and Data Quality*[7] produced the report *Community-driven Governance of FAIRness Assessment: An Open Issue, an Open Discussion*[8]. The Task Force states that *"FAIRness is "stuck" between an increasingly common research and publishing requirement yet still an unmeasurable set of ideals."* This statement aligns with the findings of the Synchronisation Force session. Their recommendations also show considerable overlap with the recommendations from the session. This provides a solid basis to work together in the coming years to improve the current set of tools to be able to assess FAIRness of research outputs in a transparent and consistent way.

6 EOSC Multi-Annual Roadmap https://eosc.eu/sites/default/files/2022-05/20220523_MAR_02_GL.pdf
7 Taskforce FAIR Metrics and Data Quality https://www.eosc.eu/advisory-groups/fair-metrics-and-data-quality
8 Community-driven Governance of FAIRness Assessment https://doi.org/10.5281/zenodo.7390482

2. Persistent Identifiers

The EOSC Persistent Identifier (PID) policy[9] defines a set of expectations about what persistent identifiers will be used to support a functioning environment of FAIR research in EOSC. In the Synchronisation Force workshop session the key concepts of the EOSC PID policy were discussed, as well as how PID policies and implementations currently look in different contexts.

Underlying recommendation/ambition: "Implement the EOSC PID policy and architecture, including the development of a global PID resolver." (Operational Objective 11 from EOSC Multi-Annual Roadmap[10] (2023-2024), p.15)

Recommendations based on the Synchronisation Force workshop 2022 session

Through online polling the session collected input about the extent to which the EOSC PID Policy is clear and currently being implemented. Although the EOSC PID policy was conceived to be clear, implementation for specific communities is not necessarily straightforward. In practice, *PID authority* and *PID service provider* often seem to be performed by the same actor, and so are *PID manager* and *PID owner*. Therefore, it is recommended to adapt the **EOSC PID Policy role definitions** and provide them with good examples to ensure a comprehensive description of the responsibilities. It should be noted that the EOSC PID Architecture uses different concepts. The **EOSC PID Policy implementation** should be further discussed among PID managers, PID service providers and PID owners**.**

Across different communities there is a wide range of identifiers in use, not all of which necessarily qualify as PIDs according to the EOSC PID Policy definition. Analysis and discussion is recommended to find which extant identifiers are or should be considered emerging PIDs. In this context communities should make recommendations on PID use and describe their use cases, as this helps to create a shared understanding and can contribute to a shared language. Additionally, participants in the concluding workshop session strongly recommended that **PID systems** themselves should be sustainable.

More than half of the participants indicated that their organisation has no PID policy or that they did not know if their organisation has one. It is recommended that all stakeholders develop **explicit PID policies**, either as separate documents or as part of e.g. a data policy. FAIR-IMPACT will support this by providing PID policy templates.

A few recommendations emerged from the session to address the gaps and challenges identified.

- We need to discuss and illustrate the roles identified in the EOSC PID Policy.
- Contracts and documentation should be aligned with the EOSC definitions of the roles.
- We should analyse which of the various identifiers in use should or could be considered PIDs in the EOSC context. The sustainability of PID systems should be taken into account.

9 EOSC PID policy https://data.europa.eu/doi/10.2777/926037
10 EOSC Multi-Annual Roadmap https://eosc.eu/sites/default/files/2022-05/20220523_MAR_02_GL.pdf

3. Trustworthy and FAIR-enabling repositories

According to the *Turning FAIR into Reality* report, depositing research data with Trustworthy Digital Repositories (TDRs) and, where possible, certified repositories is crucial for realising a FAIR ecosystem.

Underlying recommendations/ambitions:

"Percentage of the repositories in EOSC that will have a certification such as CoreTrustSeal is 30% by 2025." (KPI for SRIA[11] objective "Establish a sustainable and federated infrastructure enabling open sharing of scientific results", p.148)

"Provide continuous guidance and assistance to small repositories to engage with certification processes. (...) If the federated data layer is to include small repositories, which are important in a substantial range of domains and geographies, guidance, support and capacity building for these repositories is also required." (Recommendation 5 from FAIRsFAIR White Paper[12], p.12)

Recommendations based on the Synchronisation Force workshop 2022 session

The TDR session had more than sixty participants including representatives from the EOSC Association and Task Forces, COAR, INFRA-EOSC projects, repositories, and research performing organisations.

The session showed that there is a good deal of current activity related to developing and supporting **networks of TDRs** to share experiences, including work being carried out by the EOSC Task Force on long term digital preservation, ENVRI-FAIR Task Force Triple Stores and data storage certification, and CESSDA (Consortium of European Social Science Data Archives)[13] community support. There is also activity at the **national level** such as the work being done by Research Data Alliance (RDA) in France[14] to provide training and guidance as well as financial support for self-assessment and review of CoreTrustSeal (CTS)[15]. **Research Infrastructures** are also active in undertaking work relating to trustworthiness. For example, ELIXIR[16] provides badges to core resources that are of key importance to the life-science community, which could be considered in the broader context of trustworthiness.

During the session, some key issues were raised. The first is that the process of **preparing for certification** can be more valuable than achieving certified status. Participants also stressed that there are **different types of certification** available and also other ways to become more trustworthy. Rather than pushing for a single certification route, it is better to allow repositories and their user communities to co-determine the best route for their needs. Either way, **transparency is crucial**: service users' trust is based on the clarity of information that the repository or data service provider presents. Services like re3data.org[17] and FAIRsharing[18] help to make such information about the repositories and their FAIR-enabling capabilities more visible. In a similar vein, CoreTrustSeal certification requires explicit, public information from the repository.

Several gaps and challenges were identified during the session. We need to make clear what is meant by the terms **'large' and 'small' repositories,** which are often used. These terms were not seen as helpful by the session participants who suggested that it may be more useful to focus on **resource levels and scope of the repository**. The ongoing work being carried out by the EOSC Task Force on long term preservation work can be useful in this respect. Financial and skills **support is crucial** for carrying out self-assessments and the availability of resources to

11 SRIA https://www.eosc.eu/sites/default/files/SRIA_2022_01.pdf
12 FAIRsFAIR White Paper https://doi.org/10.5281/zenodo.5744786
13 CESSDA https://www.cessda.eu/
14 RDA in France https://grants.rd-alliance.org/national-nodes/rda-france
15 CoreTrustSeal https://www.coretrustseal.org/
16 ELIXIR https://elixir-europe.org/
17 Re3data https://www.re3data.org/
18 FAIRsharing https://fairsharing.org/

help guide the process. In particular, there is a need for **beginner level support** and help for those repositories with fewer resources to understand the potential benefits that may be realised through certification, the process(es), and how to become more trustworthy and FAIR-enabling. As noted above, we should avoid a single certification route but rather embrace multiple routes to demonstrating trustworthiness. To this end, **mappings** between CoreTustSeal and domain-specific certification processes could be valuable. The EOSC *Task Force on Long Term Data Preservation*[19] recommendations (in progress) of a European network of FAIR-enabling, trustworthy repositories could also help address this. Participants felt there may be potential to reuse the *RDA Data Repository Attributes Working Group*[20] set of minimal, common attributes/criteria for data repositories for such mappings. The perceived **lack of legitimacy** of certification bodies was also considered a challenge that must be addressed. Finally, participants stressed that we must aim to **collaborate globally** rather than just across Europe. Bodies such as COAR and their members must be part of these discussions.

A few recommendations emerged from the session to address the gaps and challenges identified.

- We must focus on making a wider range of aspects relating to trust transparent rather than just focusing on achieving certified status.
- There must be cooperation across the current initiatives to build and sustain a network of TDRs - not just in Europe but globally.
- An incremental approach to adoption of good practices is what we should be striving for and we should build on previous work to support this such as COAR's *Community Framework for Good Practices in Repositories*[21].
- More sustainable support is needed for repositories to become trustworthy and/or certified and there is potential to replicate the national approach being implemented in France through RDA.

19 EOSC Task Fore on Long-Term Data Preservation https://www.eosc.eu/advisory-groups/long-term-data-preservation
20 RDA Data Repository Attributes Working Group https://www.rd-alliance.org/groups/data-repository-attributes-wg
21 COAR Framework https://www.coar-repositories.org/files/COAR-best-practices-framework-for-repositories-Version-2-July-19-2022.pdf

4. Metadata, semantics and interoperability

The session on semantic artefacts – a broader term to include ontologies, terminologies, taxonomies, thesauri, vocabularies, metadata schemas and standards – had nearly sixty participants. Semantic artefacts are essential for supporting semantic interoperability, which in turn is essential for a functioning EOSC. Multiple scientific communities were surveyed:

Session featured panellists:

1. Biomedicine: Nicolas Matenzoglu & Pier Luigi Buttigieg
2. Ecology/biodiversity: Naouel Karam & Ilaria Rosati
3. Agri-food: Clement Jonquet
4. Social sciences & humanities: Arnaud Gingold
5. Industry: Hedi Karray
6. Astronomy: Baptiste Cecconi
7. Earth Sciences: Jean-Christophe Desconnets, V. Agazzi, Christelle Pierkot

Underlying recommendations/ambitions

"Develop domain and cross-domain interoperability frameworks at the level of vocabularies, ontologies, and metadata schema." (Recommendation 1 from FAIRsFAIR White Paper[22], p.8)

"Further develop and implement semantic technologies, particularly in domains where their use is less advanced." (Recommendation 2 from FAIRsFAIR White Paper[23], p.9)

Recommendations based on the Synchronisation Force workshop 2022 session

The session started by introducing a few definitions, based on previous analysis and common legacy of the FAIRsFAIR project:

- **Semantic artefacts:** a broader term to include ontologies, terminologies, taxonomies, thesauri, vocabularies, metadata schemas and standards (Legacy of FAIRsFAIR and adopted in the EOSC Interoperability Framework)
- **Semantic artefact catalogues:** encompass any existing ontology repositories, registries, vocabulary/terminology services and metadata schemas catalogues.
- **(Semantic) Crosswalks and mappings:** formal links between the content of these semantic artefacts.

The main outcomes of the discussion revolve around the following aspects. For what concerns **development, use and governance of semantic artefacts,** every disciplinary community has its own semantic artefacts - thesauri, ontologies - which usually look very discipline oriented. Some domains lack semantic artefacts whereas other domains, such as Social Science and Humanities, are so large that they apply different semantic artefacts. There are also overlapping semantic artefacts across domains, thus the need for crosswalks and mappings. In general there are a lot of differences in data types, data collection, theories, and methods per domain. In some cases semantic artefacts are also managed by international alliances but there is no global governance or coordination although different scientific domains clearly demonstrated different levels of maturity.

22 FAIRsFAIR White Paper https://doi.org/10.5281/zenodo.5744786
23 FAIRsFAIR White Paper https://doi.org/10.5281/zenodo.5744786

Limitations in the usage of semantic artefacts are quite common across disciplines and cases. They range from findability issues, quality/FAIRness and curation of the artefacts, to lack of governance and strategy, a lack of guidance on which ones to use, and long-term availability and maintenance. Sometimes multilingualism is also an issue.

Several **semantic artefact catalogues** exist and can help address some of the challenges related to semantic artefacts (governance, findability, FAIRness, mappings, etc.) BioPortal[24], AgroPortal[25], OBO Foundry[26], GFbio Terminology Service[27], Research Vocabularies Australia[28], NERC Vocabulary Server[29], and FAIRSharing[30] were mentioned as examples. They feature different levels of services: from simple metadata description libraries to complete repositories supporting the content of the semantic artefacts in addition to their metadata. Agri-food and ecology/biodiversity, both identified as use cases in FAIR-IMPACT, seem to have a stronger awareness about the catalogues of reference. Other communities, such as Astronomy, Earth Science, and Social Sciences and Humanities cope with different levels of maturity of catalogues.

When dealing with **crosswalks and mappings**, the general feeling is that here is where work still needs to be done. Some tools are emerging, some mappings are available, for instance in the Astronomy community. There are already quite a few best practices and use cases to look at to build reference crosswalks, like the SSSOM initiative testes by the Biology/biomedical community, but there is still a lack of shared strategies about how to deal with crosswalk and mappings between semantic artefacts in different domains.

A few recommendations emerged from the session to address the gaps and challenges identified.

- More cross-disciplinary work is needed to align semantic artefacts with the same terms or concepts.
- Maintenance, sustainability, and governance of semantic artefacts deserve attention and agreement across disciplinary communities.
- The FAIR-at-large community should intensify the work on crosswalks and mappings to produce more best practices.
- Recommended practices should be shared and collected.

24 BioPortal https://bioportal.bioontology.org
25 AgroPortal https://agroportal.lirmm.fr
26 OBO Foundry https://obofoundry.org
27 GFbio https://terminologies.gfbio.org
28 Research Vocabularies Australia https://vocabs.ardc.edu.au
29 Nerc http://vocab.nerc.ac.uk
30 FAIRSharing https://fairsharing.org

Conclusions and next steps

The workshop was delivered according to plan and successfully brought together many participants from different EOSC and FAIR initiatives. Several of them had participated in the earlier FAIRsFAIR Synchronisation Force workshops (2019-2021), and likewise, several participants indicated they look forward to the FAIR-IMPACT Synchronisation Force workshop 2023. The collected information is available from the project website[31] as well as published on Zenodo (see Appendices). It will help the various work packages and project partners to identify the current state of FAIR developments more broadly.

31 FAIR-IMPACT Synchronisation Force https://fair-impact.eu/synchronisation-force

Appendices

Underlying materials

Available in the FAIR-IMPACT community in Zenodo[32]:

- ☐ Data provided by workshop participants in the collaborative spreadsheet[33] (separate spreadsheets per session)
- ☐ Slides from opening session[34]
- ☐ Slides from 'Metrics and assessing FAIRness'[35]
- ☐ Slides and polling results from 'PIDs'[36]
- ☐ Slides from 'Trustworthy and FAIR-enabling repositories'[37]
- ☐ Slides from 'Metadata, semantics and interoperability'[38]
- ☐ Slides from concluding session[39]

The collaborative notes from three thematic sessions are available from the project drive, but without long-term commitment. Because the PID session consisted mainly of polling and breakout activity, there are no session notes.

- ☐ Notes from 'Metrics and assessing FAIRness'[40]
- ☐ Notes from 'Trustworthy and FAIR-enabling repositories'[41]
- ☐ Notes from 'Metadata, semantics and interoperability'[42]

32 FAIR -IMPACT Zenodo community https://zenodo.org/communities/fair-impact/
33 Workshop spreadsheet https://doi.org/10.5281/zenodo.7457122
34 Opening session https://doi.org/10.5281/zenodo.7318689
35 Session on Metrics and assessing FAIRness https://doi.org/10.5281/zenodo.7446410
36 Session on PIDs https://doi.org/10.5281/zenodo.7457304
37 Session on Trustworthy and FAIR-enabling repositories https://doi.org/10.5281/zenodo.7446757
38 Session on Metadata, semantics and interoperability https://doi.org/10.5281/zenodo.7446806
39 Concluding session https://doi.org/10.5281/zenodo.7446827
40 Notes from session on Metrics and assessing FAIRness https://docs.google.com/document/d/1r80vD5ZJQuXcgYBs_yjV_VqRYQgUToa9Y9ODcuZb3-A/edit?usp=share_link
41 Notes from session on Trustworthy and FAIR-enabling repositories https://docs.google.com/document/d/1qPcueblPCxrvnfwXhlkggJ6JtqFor3Bi1BcMRoSad6U/edit?usp=share_link
42 Notes from session on Metadata, semantics and interoperability https://docs.google.com/document/d/1onsxlTfM_9KbOBRGWNvPwhU6IOkRbXslQTlnF8B4iXA/edit?usp=share_link

Participant list

The 120 workshop participants represent the following organisations:

#	Affiliation	Organisation type	Country	Number of participants
1	ATHENA RC / OpenAIRE	Service providers, Research Performing Organisations	Greece	1
2	Barcelona Supercomputing Center (BSC)	National Level Initiatives, Research Communities & Infrastructures, Research Performing Organisations, Data Infrastructures, Service providers	Spain	4
3	BIH QUEST Center for Responsible Research at Charité – Universitätsmedizin Berlin	Research Communities & Infrastructures	Germany	1
4	CERN	Research Performing Organisations	Switzerland	1
5	CINECA/EUDAT	Service providers, Data Infrastructures	Italy	1
6	CINES	Data Infrastructures	France	1
7	CLARIN ERIC	Research Communities & Infrastructures	Netherlands	2
8	CNR	Service providers, National Level Initiatives, Research Communities & Infrastructures	Italy	2
9	CNRS, Observatoire astronomique de Strasbourg	Service providers, Research Performing Organisations	France	1
10	COAR	Data Infrastructures	Canada	1
11	CODATA	Other	France	1
12	CREAF	Research Performing Organisations	Spain	1
13	CRG	Service providers, Data Infrastructures	Spain	1
14	CSC - IT Center for Science	Service providers, Data Infrastructures	Finland	3
15	DANS-KNAW	Service providers, National Level Initiatives, Research Communities & Infrastructures, Data Infrastructures	Netherlands	7
16	DeiC	Research Communities & Infrastructures	Denmark	1
17	Digital Curation Centre, University of Edinburgh	Service providers, Research Communities & Infrastructures	United Kingdom	2
18	Digital Repository of Ireland	Research Communities & Infrastructures, Research Performing Organisations, National Level Initiatives	Ireland	2

#	Affiliation	Organisation type	Country	Number of participants
19	DKRZ	Research Performing Organisations, Data Infrastructures	Germany	2
20	DKRZ / IPCC DDC	Research Communities & Infrastructures	Germany	1
21	DONA Foundation	Service providers, Research Communities & Infrastructures, Data Infrastructures	Switzerland	1
22	e-Science Data Factory	Other	France	1
23	ELIXIR Hub	Research Communities & Infrastructures	United Kingdom	1
24	ELIXIR Norway, Department of Informatics, University of Oslo	Service providers, National Level Initiatives, Research Communities & Infrastructures, Data Infrastructures	Norway	1
25	EMBL-EBI	Research Performing Organisations	United Kingdom	1
26	ENIT	Research Performing Organisations	France	1
27	EOSC Association	Policy Making Organisations	Belgium	1
28	EOSC Association	Scientific Societies & Academies	Germany	1
29	ERINHA	Research Communities & Infrastructures	Belgium	1
30	EUDAT	Service providers	Finland	1
31	Euro-BioImaging ERIC	Research Communities & Infrastructures	Finland	1
32	European Clinical Research Infrastructure Network (ECRIN-ERIC)	Research Communities & Infrastructures	France	1
33	European Commission	Research Funding Organisations, Policy Making Organisations	Belgium	1
34	European Commission - DG RTD	Research Funding Organisations, Policy Making Organisations	Belgium	1
35	Finnish Social Social Science Data Archive	Data Infrastructures	Finland	1
36	FIZ Karlsruhe	Service providers	France	1
37	Forschungszentrum Juelich	Research Performing Organisations	Germany	1
38	Foundation for Research and Technology - Hellas (FORTH)	Research Performing Organisations	Greece	1

#	Affiliation	Organisation type	Country	Number of participants
39	GARR	Service providers, National Level Initiatives, Other	Italy	2
40	GÉANT	Service providers	Netherlands	1
41	GO FAIR Foundation	Research Performing Organisations	Austria	1
42	GWDG	Service providers, Research Communities & Infrastructures, Research Performing Organisations, Data Infrastructures	Germany	1
43	Harvard Medical School	Research Performing Organisations	Germany	1
44	Heidelberg University	Research Communities & Infrastructures, Research Performing Organisations, Data Infrastructures	Germany	1
45	Helmholtz Metadata Collaboration / Alfred Wegener Institute	Research Performing Organisations, Data Infrastructures	Germany	1
46	Helsinki University Library	Research Performing Organisations	Finland	1
47	HH	Citizen Science Organisations, Scientific Societies & Academies	Algeria	1
48	Ifremer / French RI Data Terra	Service providers, National Level Initiatives, Data Infrastructures	France	1
49	Independent	Service providers, Research Communities & Infrastructures, Research Performing Organisations, Policy Making Organisations, Data Infrastructures	France	1
50	Independent Consultant	Other	Greece	1
51	INRAE	Research Communities & Infrastructures, Individuals in Science, Research Performing Organisations	France	3
52	Inserm	Research Performing Organisations	France	1
53	Institute of Applied Biosciences, Centre for Research and Technology Hellas	Research Performing Organisations	Greece	1
54	Jisc	Service providers, National Level Initiatives, Research Communities & Infrastructures	United Kingdom	1
55	KU Leuven	Research Performing Organisations	Belgium	1

#	Affiliation	Organisation type	Country	Number of participants
56	Leibniz Institute of Vegetable and Ornamental Crops (IGZ) e.V.	Research Communities & Infrastructures, Research Performing Organisations, Data Infrastructures	Germany	2
57	Leibniz-Institut für Katalyse e.V., Rostock, Germany & NFDI4Cat	Research Communities & Infrastructures, Research Performing Organisations	Germany	1
58	LifeWatch ERIC	Service providers, Research Communities & Infrastructures, Research Performing Organisations	Italy	1
59	MARIS	Data Infrastructures	Netherlands	1
60	Independent	Other	Belgium	1
61	National Oceanography Centre - British Oceanographic Data Centre	Service providers, National Level Initiatives, Research Communities & Infrastructures, Research Performing Organisations, Individuals in Science, Data Infrastructures	United Kingdom	2
62	National research Council	Service providers, National Level Initiatives, Research Communities & Infrastructures, Research Performing Organisations, Data Infrastructures	Italy	2
63	Nationale Forschungsdatennfrastruktur (NFDI) e.V.	National Level Initiatives, Data Infrastructures, Research Communities & Infrastructures	Germany	2
64	NFDI4BIOIMAGE	National Level Initiatives	Germany	1
65	NOC-BODC, Blue Cloud	Research Communities & Infrastructures	United Kingdom	1
66	Observatoire Astronomique de Strasbourg	National Level Initiatives, Research Performing Organisations, Policy Making Organisations, Data Infrastructures	France	1
67	Observatoire de Paris	Research Performing Organisations	France	1
68	OpenAIRE	Service providers, Research Communities & Infrastructures, Policy Making Organisations, Data Infrastructures	Greece	2
69	OPERAS	Research Communities & Infrastructures	Belgium	1
70	OPERAS-Aix Marseille University	Research Communities & Infrastructures	France	1
71	Premotec GmbH	Service providers	Switzerland	1

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72	Radboud University Nijmegen	Research Performing Organisations	Netherlands	1
73	Research Data Alliance	Research Communities & Infrastructures, Scientific Societies & Academies	Belgium	1
74	Semanticly	Service providers	Greece	1
75	Tampere University	Research Performing Organisations, Data Infrastructures	Finland	1
76	The University of Manchester	Research Performing Organisations, Research Communities & Infrastructures	United Kingdom	2
77	The University of Manchester / ELIXIR	Research Communities & Infrastructures, Research Performing Organisations	United Kingdom	1
78	Trust-IT	Other	Italy	2
79	UC3M	Research Performing Organisations	Spain	1
80	UK Data Service	Service providers	United Kingdom	1
81	UK Data Service, University of Essex	Service providers, National Level Initiatives, Research Communities & Infrastructures, Research Performing Organisations, Data Infrastructures	United Kingdom	1
82	Uni-Freiburg	Service providers, Research Performing Organisations, Data Infrastructures	Germany	1
83	Università del Salento	Other	Italy	1
84	University Medical Center Groningen	Service providers, Research Communities & Infrastructures, Research Performing Organisations, Data Infrastructures	Netherlands	1
85	University of Copenhagen	Research Performing Organisations	Denmark	1
86	University of Edinburgh	Research Performing Organisations	United Kingdom	1
87	University of Essex, UK Data Archive	Service providers, Data Infrastructures	United Kingdom	1
88	University Of Ljubljana, Faculty of Social Sciences, Slovenian Social Science Data Archives	Service providers, National Level Initiatives, Research Communities & Infrastructures, Research Performing Organisations, Individuals in Science, Data Infrastructures	Slovenia	1

#	Affiliation	Organisation type	Country	Number of participants
89	University of Oslo	Research Performing Organisations	Norway	1
90	University of Oxford	Research Performing Organisations	United Kingdom	1
91	University of Oxford, UK; ELIXIR-UK; FAIRsharing	Service providers, Research Communities & Infrastructures, Research Performing Organisations, Data Infrastructures	United Kingdom	1
92	VU	Research Performing Organisations	Netherlands	1
93	Western Norway University of Applied Sciences	Research Communities & Infrastructures, Research Performing Organisations	Norway	2

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