FAIRSFAIR
Fostering Fair Data Practices in Europe

FAIRsFAIR's contribution to EOSC: sustainable solutions for a FAIR Open Science ecosystem

"The basic condition of success in ensuring EOSC sustainability is performance: how EOSC as an ecosystem operates and how the resources it federates are used and acknowledged by researchers".

Solutions for a sustainable EOSC. A FAIR Lady (olim Iron Lady) report from the EOSC Sustainability Working Group.

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How do we ensure a FAIR sustainable EOSC ecosystem? How can we ensure that the value we have created, built by, for and endorsed by the communities it serves remains valuable and alive? Who will ensure that the essential resources needed to feed these services and infrastructure are not depleted? For a healthy EOSC ecosystem to thrive, we need to understand the elements of that landscape, what resources are needed and how they can be maintained and developed over time. We can chart the costs of FAIR and map both current and new financial and business models to them.

The EOSC Sustainability Working Group has grappled with these issues in the first EOSC Phase recently publishing the **FAIR Lady Report**[1] in 2021. A vital responsibility of the newly formed EOSC Association will be to flesh out more details on how to sustain this EOSC international research infrastructure in the years ahead with its Taskforce on Defining Funding Models for EOSC. EC-funded and EOSC-related projects are similarly considering how to make their efforts and investment count for years to come by considering how to sustain the valuable contributions they are making to the FAIR ecosystem. **This includes FAIRSFAIR which has taken two approaches to make headway with this important topic. On the one hand, it has brought together other projects and key EOSC stakeholders to discuss Sustainability in three FAIR Synchronisation Workforce meetings, with the most recent in April-June 2021. On the other, FAIRSFAIR is exploring what project assets need to be maintained and developed over time, and in what way to serve the EOSC community in the mid to longer term.** This article describes both processes which will help build a FAIR ecosystem for the European Open Science Cloud and encourage researchers to "*participate in a culture of sharing the results of their research*"[2].

1. Solutions for a sustainable EOSC: a FAIR lady report https://www.eoscsecretariat.eu/news-opinion/solutions-sustainable-eosc-fair-lady-report
2. Solutions for a sustainable EOSC. A FAIR Lady (olim Iron Lady) report from the EOSC Sustainability Working Group https://op.europa.eu/en/publication-detail/-/publication/581d82a4-2ed6-11eb-b27b-01aa75ed71a1/language-en/format-PDF/source-175468053

Financially sustaining the FAIR EOSC project ecosystem

Between April and June 2021 FAIRsFAIR brought together its partners, fellow projects partners funded by the EC by the same action-line (the so-called "INFRA-EOSC-5b projects) and stakeholders from the extended EOSC community in a series of events to explore to what extent the six pillars of the **Turning FAIR into a Reality Report**[3] from the European Commission expert group on FAIR data (TFiR) have been implemented[4]. One of these workshops focussed on the topic of governance and sustainability. It zoomed in on recommendations 14 and 15 of the TFiR Report in particular:

Investment in FAIR services, Recommendation 14: **Provide strategic and coordinated funding** where "Funders should adopt a coordinated approach to supporting core infrastructure and services, building on existing investments where appropriate. Funding should be tied to certification schemes, sustainable business models and other community-vetted indicators that demonstrate viability." While it is evident that the EC is strategically investing in FAIR through its scores of EC-funded projects, EC projects are generally not directly funding FAIR although they are investing funds to develop services to serve their communities now and in the future. Projects are indeed using or developing community-approved metrics and certification schemes that validate service delivery such as EOSC-Nordic's community support with FAIR certification and guidance. FAIRSFAIR activities build on existing standards, promote open standards and avoid vendor lockin as do other projects. Some projects go further, e.g. EOSC Pillar, with open calls to directly assist new services to initially join the EOSC Pillar portfolio and ultimately the EOSC catalogue. On what to fund, it was noted that it is important to invest in a disciplinary interoperability framework, including ontologies and vocabularies. Projects like FAIRSFAIR or ESCAPE can also influence funders when engaging with them on FAIR, which, in turn, can see further investment in FAIR in the future. Go FAIR is exploring certification for FAIR aspects ranging from technical components to organisations. and trying to establish a policy-driven five percent of project funding dedicated to FAIR data stewardship: sustainable, vocabularies, resources etc. They also bring together parties in a pilot pilot programme to make it easy for funders to require and for grantees to produce FAIR Data Recommendation 15 on the other hand, **Providing sustainable funding** addresses the *Sustainability of FAIR ecosystem components*.

"We cannot afford to lose what has already been built."
***Mark Allen**, Director, Strasbourg Astronomical Data Centre and FAIR Champion*

The INFRAEOSC-5 projects - EOSC Pillar, EOSC-Nordic, EOSC Synergy, NI4OS Europe, ExPaNDS, and FAIRsFAIR - are formally addressing the sustainability of FAIR in a range of ways. FAIRSFAIR for example, will deliver sustainability plans for certain project assets post project and a possible network of Trustworthy Digital Repositories to ensure sustainability (see below for more information). The PaNOSC and ExPaNDs projects are both charting the costs of making data FAIR at 6 ESFRI photon and neutron facilities for example. They are also examining business models to sustain developments beyond the project. In 2022 EOSC-Pillar will produce a business model and sustainability study with recommendations drawing on the results of a survey amongst institutions, universities, research infrastructures, funding bodies and others and interviews with a dozen service providers on the topic of funding. NI4OS-Europe is also looking at a range of business models. A cost-benefit analysis is being undertaken at national levels with some partners together with their ministries in the context of national open science clouds. In conclusion, theseprojects are taking leadership here with their significant efforts. They will be vital to pave the way for an EOSC ecosystem to thrive for years to come.

To further sustain the FAIR ecosystem, more work could be done to consistently record and become aware of the costs of FAIR since costs vary dependent on a range of factors, including the maturity of the service or infrastructure and its FAIRness or technical supporting infrastructure.

3. Turning FAIR into reality. Final report and action plan from the European Commission expert group on FAIR data. 26-11-2018 https://op.europa.eu/it/publication- detail/-/publication/7769a148-f1f6-11e8-9982-01aa75ed71a1
4. During the FAIRsFAIR week from 7 to 15 April 2021 - https://www.fairsfair.eu/events/fairsfair-week-2021 - one project workshop was dedicated to brainstorming around the sustainability of FAIRsFAIR results. FAIR sustainability was also at the core of the session dedicated to Pillar 6: Investment, Sustainability and Governance of the Turning FAIR into Reality Report, during the Third series of the Synchronisation Force online workshops, from 29 April to 10 June 2021 https://fairsfair.eu/events/fairsfair-third-synchronisation-force-workshop

Sustaining the assets of FAIRSFAIR

As part of FAIRSFAIR's management tasks, FAIRSFAIR also initiated activities in 2021 to identify those project's outputs, outcomes and assets that deserve to outlast the project. While the project is still defining its overall Sustainability plan, (due in February 2022), FAIRsFAIR hasso far identified the following key assets:

The F-UJI tool[5] enables the automated assessment of the FAIRness of data held in repositories. F-UJI's sustainability builds on the spirit of Open Source software which is used, maintained and continuously improved upon. A global broad user community is currently contributing to F-UJI via GitHub and promoting it.

Community members are either already using F-UJI for FAIR assessments or evaluating the value of F-UJI in other EOSC project contexts including some important EOSC players (EOSC Nordic, EOSC Synergy, ARCHIVER). The aim is to establish the tool as a core part of the EOSC FAIR ecosystem thus, sharing sustainability efforts with the EOSC infrastructure.

A second asset is the **FAIR-Aware tool**[6] which helps researchers and data managers assess how much they know about the requirements for making datasets FAIR before uploading them into a data repository. FAIR-Aware was developed using open source standards and distributed under an open licence to facilitate reuse and adoption.

For example, a French version has already been launched hosted by INIST in France[7], while DANS is hosting the original English version[8] of the FAIR-Aware tool. DANS has committed to host the tool after the completion of the FAIRsFAIR project. In the FAIRsFAIR project there are ongoing efforts to promote ways in which the FAIR-Aware tool can be used as a resource in both online and face-to-face training courses[9].

FAIRsFAIR has also supported work to improve the functionality of DataCite's **Repository Finder Tool**[10] . This enables DataCite's re3data service to find FAIR-enabling repositories. The Repository Finder Tool will be transferred to DataCite Commons, which is DataCite's integrated discovery service for PIDs.

This will enable users to search for FAIR repositories – including using faceted search –, and connected PIDs within DataCite Commons. DataCite and the Karlsruhe Institute of Technology will be responsible for maintaining and extending the implemented service functions. In addition to CoreTrustSeal[11] , repository managers, organizations (e.g. AGU), future project partners and scientific communities are expected to contribute to the service as stakeholders and users of the provided services.
FAIRsFAIR work to develop a framework for Assessing Capability Maturity and Engagement with FAIR-enabling Practices (**ACME-FAIR**) will lead to another tool for organisations to self-assess how they enable researchers, and the professional staff who support them, to put the FAIR principles into practice.

A global broad user community is currently contributing to F-UJI. The aim is to establish the tool as a core part of the EOSC FAIR ecosystem thus, sharing sustainability efforts with the EOSC infrastructure.

5. https://www.fairsfair.eu/f-uji-automated-fair-data-assessment-tool
6. https://www.fairsfair.eu/fair-aware
7. https://doranum.fr/enjeux-benefices/outil-fair-aware/
8. http://fairaware.dans.knaw.nl
9. A demo of the tool, including trainer functionalities, will be given at the Open Science Fair 2021, September 20-23 (virtual event)
10. https://repositoryfinder.datacite.org/
11. https://www.coretrustseal.org/

Sustaining the assets of FAIRSFAIR

The ACME-FAIR framework is intended to be used at the level of the research data support function within Research Producing Organisations, Research Funding Organisations or Research Data Infrastructures and aims to complement the Science Europe organisational framework for Sustainable Access to Research Data and their Long-term Preservation, which is aimed at strategic-level management of the organisation. Accordingly, as the framework is further developed, there is ongoing collaboration with Science Europe. **The network of FAIR-enabling Trusted Digital Repositories as a model for sustainable FAIR in practice.** The FAIRsFAIR coordination plan for a sustainable network of FAIR-enabling Trusted Digital Repositories (due in November 2021) will clarify funding, income streams and business models that contribute to the sustainability of repositories.

The **repository certifications in FAIRsFAIR** are also relevant as they address business models and long-term sustainability of activities and contain outputs which can inform funders seeking to sustain a FAIR data ecosystem. The FAIRsFAIR sustainability plan will include a possible network of Trustworthy Digital Repositories which commit to ensure sustainability of these activities.

The CoreTrustSeal+FAIR. The CoreTrustSeal is one of several organisations that has taken up the mantle of providing a way for repositories to demonstrate that they are trustworthy and reliable custodians of researcher's digital assets. More recently the spotlight has also fallen on the need to ensure that data is Findable, Accessible, Interoperable and Reusable (FAIR), yet there are few ways for repositories to demonstrate that they are both of these concepts in a single, unified certification. *CoreTrustSeal+FAIRenabling* will be one of the few ways that repositories can do so.

The ideal scenario - still under discussion - for ensuring uptake of the ongoing alignment of CoreTrustSeal Requirements and the FAIR Data Principles is to add lightweight components to the CoreTrustSeal in its next revision process (beginning 2022) that allows for an applicant to request, and be awarded, a CoreTrustSeal+FAIR-enabling designation that reflects the evidence provided. Ongoing work around the reliability and representativeness will identify the degree to which FAIR object assessments (whole collection or sampled) can be integrated into a CoreTrustSeal+FAIR Review.

In future, alignment statements will be associated with documented processes that could be managed via current CoreTrustSeal statutes and rules of procedure or via parallel and cooperative maintenance groups such as those offered by the Research Data Alliance (RDA).

Mobilising people. FAIRsFAIR has established several **expert groups**, including FAIR Experts & Ambassadors, FAIR Champions, HLAC and **the Synchronisation Force** core team that will be actively running until the end of the FAIRsFAIR Project in February 2022. The outputs produced by these groups will impact future reports, projects and FAIR implementation, continued knowledge-exchange on FAIR and lessons learnt can serve the future FAIR ecosystem well. Members also effectively act as ambassadors to their communities, sharing the outcomes with their networks at events, distributing materials to their contact lists and pointing to relevant use cases or people.

The CoreTrustSeal+FAIR. *The CoreTrustSeal is one of several organisations that has taken up the mantle of providing a way for repositories to demonstrate that they are trustworthy and reliable custodians of researcher's digital assets.*

Sustaining the assets of FAIRSFAIR

FAIRSFAIR recommends continuing to mobilise these groups, as well as integrating one or more of these FAIRsFAIR groups with one or more of the nascent groups of the EOSC Association.

People are also at the core of FAIRsFAIR training and education programmes, schools and events. Over the course of 2021, FAIRsFAIR is running a series of data steward instructor training courses in partnership with national bodies such as the National Open Research Forum in Ireland. These events are targeted to those who are new to the field of data stewardship and aims to provide them with the basic skills they need to get started in their roles.

A key aim for these events is also to help establish national and/or regional peer networks of data stewards. The adoption handbook "How to be FAIR with your research data – a teaching and training handbook for higher education institutions" is also being developed by the project partners. The handbook will provide higher education institutions with model courses, curricula and practical material to start integrating research data management and FAIR data skills within their programmes at the different levels (Bachelor, Master, Doctoral).

All training materials are deposited on Zenodo with an appropriate licence to allow re-use. A description of the schools (including the programme and links to materials) will be disseminated amongst organisations that could run similar events such as the EOSC trainers Community of Practice or the RDA to be recognised as an official output of the organisation.

FAIRsFAIR's **policy enhancement recommendations** are intended to help policymakers at all levels to review their policies and amend them to better align with the FAIR principles[12]. FAIRsFAIR is working with a cohort of policymakers over the second half of 2021 to review current and emerging policies against these recommendations and to provide practical recommendations on where they may be made more FAIR-enabling (see '*Changes in Data Policy and Practice - an updated analysis*', due March 2022).

This will complement the recommendations around how to ensure continued investment in FAIR, as they are envisaged in *Pillar 6 of the TFiR Report* and further assessed by the FAIRsFAIR Synchronisation Force in its last report[13], which have implications for funders, but for other stakeholders, too.

The adoption handbook "How to be FAIR with your research data will provide higher education institutions with model courses, curricula and practical material to start integrating research data management and FAIR data skills within their programmes at Bachelor, Master and Doctoral level".

12. Joy Davidson, Claudia Engelhardt, Vanessa Proudman, Lennart Stoy, Angus Whyte (2019). D3.1 FAIR Policy Landscape Analysis. https://doi.org/10.5281/zenodo.3558173
13. https://doi.org/10.5281/zenodo.5336658

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