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D4.4 Coordination Plan for a sustainable network of FAIR-enabling Trustworthy Digital Repositories

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Lead Author (Org)	Ilona von Stein (DANS)
Contributing Author(s) (Org)	Hervé L'Hours, Benjamin Mathers (UKDA), Linas Cepinskas, Maaïke Verburg, Mustapha Mokrane, Ingrid Dillo (DANS), Patricia Herterich (DCC), Olivier Rouchon (CINES)
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Abbreviations and Acronyms

FAIR	Findable, Accessible, Interoperable, Reusable
EOSC	European Open Science Cloud
TDR	Trustworthy Digital Repository
WP	Work Package

Executive Summary

This paper is deliverable 4.4 of FAIRsFAIR task 4.2 “Build a European network of FAIR-enabling Trustworthy Digital Repositories (TDRs)” within the FAIRsFAIR Certification work package (WP4). The objective of this task is to build a European network with respect to FAIR data in FAIR-enabling repositories. In this deliverable, FAIRsFAIR advocates for and explores the idea of a European network of TDRs (now) and suggests possible future expansions in scope (later).

It suggests an aspirational two-pronged scope:

Scope **Now**: an initial network of existing and aspiring **Trustworthy Digital Repositories** that engage with enabling FAIR (meta)data, with the overall aim being to increase the number of FAIR-enabling TDRs; the cooperative development of common standards and practices. An initial focus would be on **Europe** and the **European Open Science Cloud (EOSC)**-infrastructure.

Scope **Later**: a wider network of existing and aspiring trustworthy **data services** that engage with enabling FAIR (meta)data, with the aim of increasing the number of FAIR-enabling trustworthy data services; the cooperative development of common standards and practices. Focus reach **beyond Europe** and inclusive of **other federated research (meta)data infrastructures around the world**.

Goals and stakeholders reflecting the scope are considered, as well as possible sustainability measures that can be undertaken to progress towards a network of European FAIR-enabling TDRs (now) and of global FAIR-enabling data trustworthy data services (later). Community strategy discussions with all stakeholders involved are vital to make a proposed network work.

This text includes immediate actions that can be undertaken under the remit of FAIRsFAIR (now) and those that can only be envisaged and proposed by the project (later). The remit of the FAIRsFAIR project is European and on Trustworthy Digital Repositories, but the eventual need, and the expectation for the medium to long term is that such a network become global and include services from across the research lifecycle where Trust is an important dependency.

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1. Synopsis

A key condition to the success of the European Open Science Cloud (EOSC) is that FAIR data are maintained in trustworthy repositories. In particular, repositories should be encouraged to meet trustworthiness standards to ensure long term digital preservation for their data holdings.

In the FAIRSFair project we have developed various repository support approaches:

- Within WP2, twelve repositories were selected to focus on making repositories more semantically interoperable and machine-actionable¹
- WP3 supported repositories to become familiar with FAIR-enabling practices in general², and
- WP4 selected 10 repositories for support towards CoreTrustSeal certification³, and worked with those repositories on aligning CoreTrustSeal trustworthiness certification for repositories with FAIR data principles⁴.

The activities undertaken in these work packages have led to groundwork that needs to be continued and sustained. Our support activities initiated a first group of repositories that could serve as a nucleus to prefigure a wider possible network of repositories.

This aspirational work advocates for a sustainable network of European FAIR-enabling Trustworthy Digital Repositories (TDRs) (now) and global trustworthy data services (later). TDRs here are defined as entities with a mature standard and certification model while other services (and associated standards and certification expectations) are equally relevant, but remain to be defined.

This work is not a guide to choosing or implementing a repository trustworthiness standard, or meant to dive into the details of repository standards, but does mean to provide a way of showing how a body of repositories can move towards common standards of trustworthiness.

Taking into account this two-spronged scope, this work considers its scope and possible goals, reflects on stakeholders that could or should be involved, and presents initial thinking on how such a network might be sustained. These ideas and recommendations will feed into the FAIRSFair overall sustainability report (D1.6 Sustainability Plan, expected February 2022).

2. Why do we want to advocate for a network?

The uptake of trustworthiness standards by European repositories indicates a clear demand for support in achieving TDR status. The support in achieving TDR certification provided by FAIRSFair

¹ FAIRSFair D2.3 Set of FAIR data features <https://doi.org/10.5281/zenodo.5361952>; FAIRSFair D2.6 First reference implementation of the data repositories features <https://doi.org/10.5281/zenodo.5362027>

² FAIRSFair Repository Support Webinar Series <https://fairsfair.eu/events/webinars/repository-support-webinars>

³ FAIRSFair D4.3 Report on the certification support and guidance for repositories and reviewers <https://doi.org/10.5281/zenodo.5137552>

⁴ FAIRSFair M4.3 CoreTrustSeal+FAIR-enabling, Capability and Maturity <https://doi.org/10.5281/zenodo.5346822>

and other sources has the potential to be extended and expanded through the development of a community of TDRs. The ongoing trend for consolidation of and interoperability between actors in the research data lifecycle is exemplified in Europe by the development of the EOSC, but the demand for high quality data and metadata that aligns with the FAIR principles is global. Throughout the Turning FAIR into Reality report⁵, the EOSC governance⁶ and the emerging EOSC Task Forces⁷ these repositories are acknowledged as key (meta)data hubs as dependencies for a range of interoperable services. The role of FAIR-enabling repositories as trustworthy nodes in scientific infrastructures goes beyond the provision of data and metadata. Active preservation ensures that (meta)data assets retain their FAIRness and their value over time. The best practices, standards and assessments for TDRs are already advanced, e.g. through CoreTrustSeal⁸, DIN 31644 (nestor Seal)⁹ and ISO16363¹⁰. These can provide important reference points for developing broader, integrated and interoperable trustworthy data services that store, curate and reuse a range of linked FAIR digital objects (e.g. the work undertaken in the Archiver project¹¹ to develop commercial long term preservation solutions should also support a European network of FAIR-enabling TDRs).

An initial motive (from the FAIRsFAIR perspective) to advocate for and explore the idea of a network of FAIR-enabling TDRs is to foster the initial FAIRsFAIR engagement to support a network with a wider scope. Throughout the FAIRsFAIR project, various repository programmes and initiatives have been organised to support data repositories (see synopsis). Other projects that have already engaged with FAIR¹² include SSHOC¹³ and EOSC Nordic¹⁴ who have offered support to repositories who are seeking certification as a TDR, and are seeking to sustain the efforts. Ongoing work on FAIRsFAIR and EOSC Nordic is seeking to validate the alignment of TDR Requirements with the FAIR Principles¹⁵. These initial groups of support providers and receivers could provide the seed for the initial establishment of such a community and could be a starting point in facilitating a European network of FAIR-enabling TDRs (now) and a network of trustworthy data services around the world (later).

Coordination of repository efforts is needed; compliance with trustworthiness standards is best supported by community efforts. Take Europe as an example, there are various coordination networks for digital repositories in disciplinary contexts (for e.g. CLARIN¹⁶, SSHOC¹⁷, CESSDA¹⁸ or

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<https://op.europa.eu/en/publication-detail/-/publication/7769a148-f1f6-11e8-9982-01aa75ed71a1/language-en/format-PDF/source-80611283>

⁶ <https://www.eoscsecretariat.eu/eosc-governance>

⁷ <https://www.eosc.eu/task-force-faq>

⁸ <https://www.coretrustseal.org/why-certification/certified-repositories/>

⁹ https://www.langzeitarchivierung.de/Webs/nestor/EN/Zertifizierung/nestor_Siegel/nestor_siegel_node.html

¹⁰ <http://www.iso16363.org/iso-certification/certified-clients/>

¹¹ <https://archiver-project.eu>

¹² FAIR + Time: Preservation for a Designated Community <https://doi.org/10.5281/zenodo.4783116>

¹³ <https://sshopencloud.eu/>

¹⁴ <https://www.eosc-nordic.eu/webinar-step-4-fairification-on-data-metadata/>

¹⁵ M4.3 CoreTrustSeal+FAIRenabling, Capability and Maturity <https://doi.org/10.5281/zenodo.5346822>

¹⁶ <https://www.clarin.eu/>

¹⁷ <https://sshopencloud.eu/>

¹⁸ <https://www.cessda.eu/>

ELIXIR¹⁹) that suggest support for a community approach to repository alignment. Some of these networks are already using repository certifications such as CoreTrustSeal to align compliance with trustworthiness standards. Some coordination at regional/national level also exists within this context (e.g. the Nordic e-Infrastructure Collaboration (NeIC)²⁰ or Dutch Digital Heritage Network²¹), yet a coordination network at a cross-disciplinary and cross-border level does not exist.

FAIRsFAIR supported repositories as well as repositories engaged in SSHOC and EOSC Nordic support expressed the need for sustaining repository support actions over time. All of those projects are seeking post-project approaches to sustainability, and indeed, one of the options is to work towards a network of existing and aspiring trustworthy TDRs. In October 2021, FAIRsFAIR - as well as SSHOC and EOSC Nordic, did a cross-project coordinated mini poll on whether or not their supported repositories would be interested in participating in such a network and any discussions about its development. The initial level of interest was very high (almost all answered yes). This provides an excellent basis for the further development and creation of a wider network.

3. Designing, Implementing and Sustaining a network of FAIR-enabling TDRs

This work is based on the premise that repositories will make a greater contribution to supporting EOSC and FAIR data management if they coordinate their efforts. The scope of such a network can reach beyond the development of peer-support for achieving current TDR certification requirements. In addition to implementing its own actions, a higher level network could communicate inputs from and promote cooperation between existing partnerships. A higher level network would help achieve this (compared to the current status quo) by having a narrower focus, in turn permitting a focus on coordinating communications and outcomes across the various regional, national and international networks (and the standards employed by them) that are currently in existence. As technologies, methods and user communities evolve there is a need to update existing practices and create new ones in order to maintain FAIR data in trustworthy repositories.

3.1 Scope and goals of the network

By (financial/political) design the FAIRsFAIR project is primarily European focussed. However, cooperative development of standards and practices does not stop at borders, thus in an ideal world global infrastructures should be considered. Furthermore, in an EOSC FAIR-enabling ecosystem such FAIR-enabling services (other than repositories) would play a key role in ensuring trust and FAIR-enablement. (Trustworthy) data services are also a key component within this ecosystem (at

¹⁹ <https://elixir-europe.org/>

²⁰ <https://neic.no/>

²¹ <https://netwerkdigitaalergoed.nl/en/>

least aspirationally), so efforts to provide technological solutions and the connection between (trustworthy) research data services and TDRs would need to be considered as well²².

In order for such a network to function effectively, whilst simultaneously ensuring inclusivity, we propose a two-staged scope:

Scope **Now**: Existing and aspiring **Trustworthy Digital Repositories** that engage with enabling FAIR (meta)data, with the overall aim being to increase the number of FAIR-enabling TDRs; the cooperative development of common standards and practices. An initial focus would be on **Europe and EOSC**.

Scope **Later**: Existing and aspiring trustworthy **data services** that engage with enabling FAIR (meta)data, with the aim of increasing the number of FAIR-enabling trustworthy data services; the cooperative development of common standards and practices. Focus reach **beyond Europe** and inclusive of **other federated research (meta)data infrastructures around the world**.

The goal(s) of the network would be to help foster the following points via a network:

- increase and promote FAIR-enabling practice across European TDRs (now) and federated research (meta)data services (later)
- strengthen Trustworthy Digital Repository presence by unifying the voice of TDRs (now) and trustworthy data services (later)
- increase the level of repository community engagement on revision of and development of minimal and ideal practice on a range of relevant issues, such as domain metadata standards and semantic resources
- exchange knowledge and practice to align where possible and to develop compatible local practices where necessary e.g. for different national, disciplinary or digital object context
- work beyond repositories and engage with other data-related services and service users

All of these varying communities (of practice, of knowledge) are necessary and complementary. The specific scope, membership, priorities and timelines of any community must be based on detailed discussions with all of the relevant stakeholders involved. Defining community agreed goals is an important first step, providing the resources and the mechanisms to reach those goals and to keep progressing is the next. The construction of a network implies connections, communication(s) channels, cooperation and outcomes. Nevertheless, networks can be built using many other different models and degrees of formality, all of which might be considered by coordination actors (see section 3.3.1).

²² e.g. FAIRSFAR D2.7 Framework for assessing FAIR Services <https://doi.org/10.5281/zenodo.5336234>

3.2 Which stakeholders should be involved in the network?

Identifying key stakeholders is part of the process of building a network or a community. Potential network members have the knowledge and connections to help monitor changes to the landscape and define improvements in standards and practices.

3.2.1 Stakeholders Now

The FAIRsFAIR repository support activities initiated a first group of repositories, that could prefigure a wider repository network. 10 repositories undertook the trustworthiness certification route via CoreTrustSeal. Repository certification is a long term commitment and it is hoped that those repositories will continue to adapt their policies and practices to demonstrate their trustworthiness, e.g. by renewing their certification every three years. FAIRsFAIR partner organizations that were involved in the support programme (DANS, UKDA, DCC, PANGAEA, CINES) could also be part of the initial network. In addition, other European repository support initiatives could be included such as the CESSDA Trust Group support²³, the development of CoreTrustSeal support for SSHOC²⁴ and the EOSC Nordic project²⁵, all of whom undertake programme development with a view to improving trustworthy repository practices. Other potential avenues that could be developed include existing national-level help for repositories that want to get started with certification²⁶, including through the participation of national service providers in EOSC. European repositories with current TDR certifications such as CoreTrustSeal, nestor and ISO16363 should also be an integral part of the network. In addition, the EOSC Association and the European Commission (via the EOSC Partnership) can play a critical role in the development of said network by encouraging the uptake and dissemination of TDR standards, and by highlighting the need for sustainability, e.g. through the EOSC Task Force Long Term Data Preservation²⁷ and the Horizon Europe Work Programme 2023-2024 currently under development.

In addition, FAIRsFAIR has also taken the approach of considering FAIR data objects in their repository context where data is being taken care of and preserved. The notion of FAIR data over time is strongly linked to the stewardship and long term preservation missions of TDRs. Activities and efforts relating to FAIRness assessments of digital objects should also be considered in the network, such as F-UJI which is an automated tool for FAIR assessments of digital objects²⁸. The initial candidate stakeholders may have a focus on research data objects, but they (and their digital objects) in turn depend on a range of other linked digital objects including metadata, ontologies, code and publication(s)

²³ <https://www.cessda.eu/About/Working-Groups/Trust>

²⁴ SSHOC D8.2 Certification Plan for SSHOC Repositories <https://doi.org/10.5281/zenodo.4558303>

²⁵ <https://www.eosc-nordic.eu/certification-support-seminar-on-fair-data/>

²⁶ e.g. but not limited to 1) Dutch Signpost for certification in the cultural heritages <https://wegwijzercertificering.nl/nl> (in Dutch) and 2) RDA France active national support to CoreTrustSeal certification <https://www.ouvrirlascience.fr/certification-des-entrepots-et-services-de-donnees/> (in French)

²⁷ https://www.eosc.eu/sites/default/files/tfcharters/eosca_tflongtermdatapreservation_draftcharter_20210614.pdf

²⁸ <https://www.fairsfair.eu/f-uji-automated-fair-data-assessment-tool>; F-UJI GitHub <https://github.com/pangaea-data-publisher/fuji/issues> and F-UJI web client www.f-uji.net

3.2.2 Stakeholders Later

Extending the definition of relevant stakeholders to include organisations providing (trustworthy) data services is crucial if we aim to take account of the full research data life cycle. The initial candidates for inclusion in the network would be primarily from the data-focussed repositories, but there is also an acknowledged need for greater interoperability, and therefore trust, across the partners and services in the EOSC and beyond.

Stakeholder selection will also need to include services that engage with and/or facilitate FAIR (meta)data and FAIR data management to obtain the widest possible range of digital objects, e.g. registries. Registries are repositories of metadata rather than data and metadata, so their service model may have stronger alignment with TDR requirements, but a range of trustworthy data services are needed to maximise the benefits and minimise the risk of research infrastructures across the (meta) data lifecycle.

Furthermore, a wider network must take account of the technical solutions supporting digital preservation and the existing and emerging connections between research data services and TDRs, e.g. DICE²⁹ and the Archiver Project. Repository support approaches that are already utilising trustworthiness certifications, in particular CoreTrustSeal, should be built upon, and existing networks with a wider scope and a range of stakeholders should also be developed. Examples of such networks include the Australian Research Data Commons (ARDC)³⁰, the NDRIO-Portage CoreTrustSeal Certification Support Cohort & Funding in Canada³¹ and the US National Institutes of Health (NIH) support initiative³².

3.3 How might the network be sustained?

Whilst we recognise that upcoming community strategy discussions are vital in building a network, we hereby propose possible sustainability measures that can be undertaken to further progress towards a network of European FAIR-enabling TDRs (now) and global network inclusive of trustworthy data services (later). Please note that these suggested steps and timelines are not (all) necessarily proposed within the timeframe of the FAIRSFair project (end date February 2022).

Table 1. Possible actions for sustaining a network

Goal	Action(s)	Timeline	Key actors	All stakeholders
<ul style="list-style-type: none"> Increase and promote FAIR-enabling 	<ul style="list-style-type: none"> Continue initial engagement with FAIRSFair 	Nov 2021 - Feb 2022 (end of FAIRSFair project)	<ul style="list-style-type: none"> FAIRSFair partner organizations 	<ul style="list-style-type: none"> FAIRSFair partner organizations

²⁹ <https://www.dice-eosc.eu>

³⁰ <https://ardc.edu.au/news/call-for-expressions-of-interest-trusted-data-repositories-community-of-practice/>

³¹ <https://portagenetwork.ca/news/repositories-selected-for-ndrio-portage-coretrustseal-support-funding/>. Also instructive how Portage started out as a research library group (CARL) and has now been absorbed into an infrastructure consortia (NDRIO). Portage will be fully rebranded to Digital Research Alliance of Canada in Spring 2022.

³² <https://grants.nih.gov/grants/guide/notice-files/not-od-21-089.html>

practice across European TDRs (now) and federated research (meta)data services (later).	supported repositories.		(DANS, UKDA, DCC, PANGAEA, CINES)	(DANS, UKDA, DCC, PANGAEA, CINES) <ul style="list-style-type: none"> Other European repository support initiatives (CESSDA Trust support overview, development of CoreTrustSeal support for SSHOC and the EOSC Nordic project)
	<ul style="list-style-type: none"> Continue cross-project alignment with research infrastructures and projects undertaking repository support processes. Share information, challenges and steps to overcome these. 	Nov 2021- Feb 2022 and beyond	<ul style="list-style-type: none"> FAIRsFAIR, CESSDA, SSHOC, EOSC Nordic Horizon Europe successful projects (2021-2027) 	<ul style="list-style-type: none"> CoreTrustSeal (certified repositories, CoreTrustSeal Board and Reviewers) EOSC Association and the European Commission through the EOSC Partnership (including EOSC-A Task Forces) Research Data Alliance community-driven initiative
<ul style="list-style-type: none"> Strengthen Trustworthy Digital Repository presence by unifying the voice of European TDRs (now) 	<ul style="list-style-type: none"> Organise an initial meeting/webinar for a European network of FAIR-enabling TDRs. 	mid-January 2022	<ul style="list-style-type: none"> FsF supported repositories and partner organizations, EU certified repositories, CoreTrustSeal Board & Reviewers, EOSC-A Task Force Long-term preservation, European Commission, Archiver and DICE 	
<ul style="list-style-type: none"> Strengthen Trustworthy Digital 	<ul style="list-style-type: none"> Possible Birds of a Feather meeting at RDA 	June 2022		

Repository presence by unifying the voice of TDRs and trustworthy data services around the world (later)	Plenary 19			
<ul style="list-style-type: none"> • Increase the level of community engagement on revision of and development of minimal and ideal practices. 	<ul style="list-style-type: none"> • Actions to follow from initial meetings in January and Spring 2022 	Timeline to follow from initial meetings in January and Spring 2022		

3.3.1 Coordination actors

For a proposed coordination function beyond national frontiers to work, the alignment should be cross-border and cross-disciplinary. However, to help coordinate actions and progress towards the network, there is a need for a range of coordination actors covering different aspects of the coordination plan. It is crucial to build on existing community efforts, such as repository trustworthiness certification through CoreTrustSeal, existing coordination networks for digital repositories in disciplinary contexts and other global, regional and national networks.

In terms of specific actors in a 'coordination' role, FAIRsFAIR - as well as SSHOC and EOSC Nordic, did a cross-project coordinated mini poll on whether or not their supported repositories would be interested in participating in such a network and any discussions about its development. This received positive interest from many project supported repositories. This provides an excellent basis for the further development and creation of a wider network. In addition, the initial workshop to take place mid-January 2022 (see table 1) will seek volunteers for next steps.

4. Next steps

This document advocates for and explores the idea of a European network of FAIR-enabling Trustworthy Digital Repositories (now) and FAIR-enabling (trustworthy) data services around the world (later). It is meant as an initial step to put pen to paper. Extensive engagement and feedback, as proposed in section 3.3 and Figure 1, are necessary in order for such a network to meet the needs of those involved and to define further actions.

Building and maintaining the proposed network will inevitably take time and resources, but also implies synergies and efficiencies. Defining and applying common best practices reduce duplication of effort and improve interoperability. Agreed disciplinary requirements improve domain integration and transparency and comparison of practices and outcomes. Shared efforts to monitor the opportunities and threat implied by technical changes in repository and use environments, and the changing and emerging needs of those reusing data will reduce costs and enable faster responsiveness of infrastructures to researcher needs. Monitoring technical and user changes are also critical to supporting preservation decisions and designing clear specifications for new requirements.

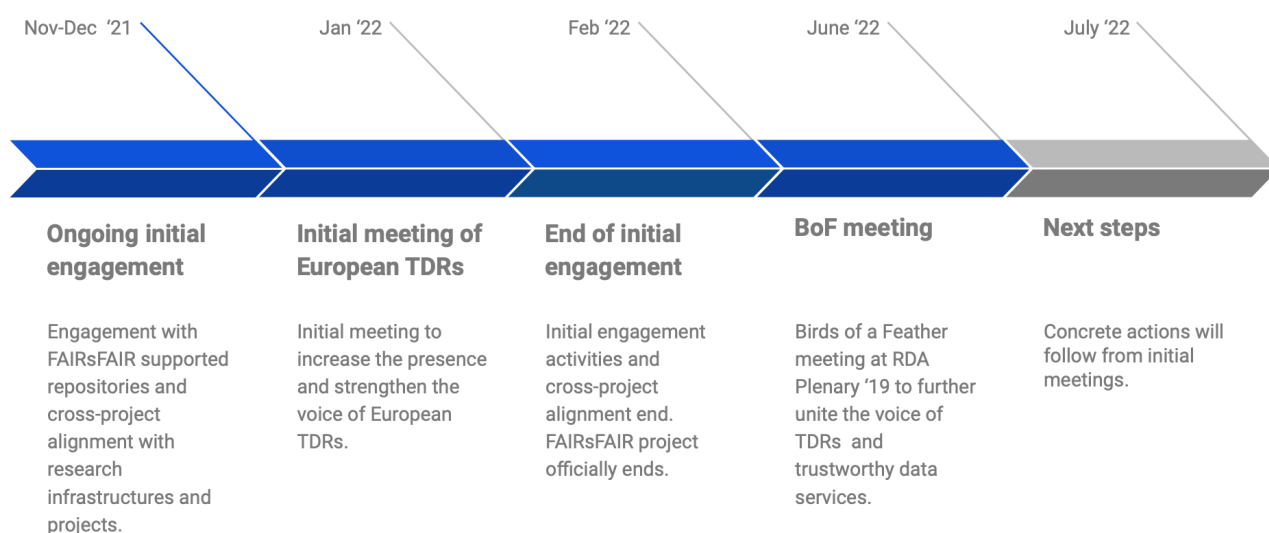


Figure 1. Timeline for setting a Network of (European) FAIR-enabling TDRs