

## CESSDA ERIC Agenda 21-24, Tasks 21-22

### Trust Pillar: Task 1 Trust Activities

# D13 Landscape Workshop and Report

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## Executive Summary

This deliverable reports on two activities of the CESSDA Trust working group. First, the online Trust workshop organised on 11 November 2021 and second, an analysis of the Trust landscape.

The Trust workshop was attended by 25 people representing 22 CESSDA Service Providers (SPs). During the workshop the trust support for CESSDA SPs was presented and discussed as shown in the report "D2 Initial drafts of support plans defining overall needs". The report "TRUST landscape" (D12) was also presented and discussed. The third topic of the workshop was the discussion on the alignment of the Annex II obligations with the Trust principles. The last topic of the workshop was the presentation of the Trust WG work plan for the next year. From the feedback received, the workshop was valuable and interesting for the participants.

Trust is an essential part of open science, FAIR<sup>1</sup>, and the European Open Science Cloud (EOSC<sup>2</sup>). The Trust landscape report provides an overview of ongoing trust-relevant activities and discussions that are of interest to CESSDA<sup>3</sup> and its Service Providers<sup>4</sup> (SPs). Topics covered include repository certification, different types of data services, community principles, metrics, persistent identifiers, and initiatives within and beyond Europe. The report concludes with eleven recommendations for CESSDA and the Service Providers.

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<sup>1</sup> FAIR = Findable, Accessible, Interoperable, Reusable as defined in Wilkinson et al. (2016)

<sup>2</sup> EOSC Association: <https://www.eosc.eu/>

<sup>3</sup> CESSDA: <https://www.cessda.eu/>

<sup>4</sup> CESSDA Consortium: <https://www.cessda.eu/About/Consortium>

## Abbreviations and Acronyms

ADP	Slovenian Social Science Data Archives
APIS	Portuguese Social Information Archive
AUSSDA	Austrian Social Science Data Archive
ARCHIVER	Archiving and Preservation for Research Environments
CDC	CESSDA Data Catalogue
CESSDA	Consortium of European Social Science Data Archives
COAR	Confederation of Open Access Repositories
CSDA	Czech Social Science Data Archive
CURE	curating for reproducibility
DANS	Data Archiving and Networked Services
DARIS	Data and Research Information Services
DATICE/SSRI	Icelandic Social Science Data Service / Social Science Research Institute
DNA	Danish National Archives (formerly DDA)
DDPS	DICE Digital Preservation Service
DICE	Data infrastructure capacity for the European Open Science Cloud
DPC	Digital Preservation Coalition
EOSC	European Open Science Cloud
ERIC	European Research Infrastructure Consortium
ESES	earth, space and environmental sciences
FAIR	Findable, Accessible, Interoperable, Reusable
FAIR4RS	FAIR for Research Software
FORS	Swiss Centre of Expertise in the Social Sciences

FSD	Finnish Social Science Data Archive
GESIS	GESIS - Leibniz Institute for the Social Sciences
ISSDA	Irish Social Science Data Archive
HRPO	health research performing organisations
KPI	key performance indicator
LIDA	Lithuanian Data Archive for Social Sciences and Humanities
MES	FAIR Maturity Evaluation Service
MO	Main Office
NSD	Norwegian Centre for Research Data
NIH	National Institutes of Health
NOSI	Notice of Special Interest
OAIS	Open Archival Information System
ODSS	Office of Data Science Strategy
PID	persistent identifier
PTAB	Primary Trustworthy Digital Repository Authorisation Body Ltd
RDA	Research Data Alliance
SND	Swedish National Data Service
SP	Service Provider
SRIA	Strategic Research and Innovation Agenda
SSH	social sciences and humanities
SSHOC	Social Sciences & Humanities Open Cloud
TDR	trustworthy digital repository
TRUST	Transparency, Responsibility, User focus, Sustainability and Technology

UKDA	UK Data Archive
UKDS	UK Data Service
WDS	World Data System
WG	Working Group

## 1. Trust workshop report

The online Trust workshop was organised on November 11, 2021 and lasted 1,5 hours. The workshop was attended by 25 people representing 22 CESSDA SPs. The participants were provided (via the Basecamp site of the CESSDA working group) with relevant documents, such as the deliverables, in advance of the workshop.

The introduction to the workshop consisted of a brief description of the goals and activities of the CESSDA Trust working group and an outline of the workshop program. The second part of the workshop included an overview of the support activities that the CESSDA Trust working group provides to CESSDA SPs. These support plans are included in the report "D2 Initial drafts of support plans defining overall needs". The third part of the workshop consisted of a presentation and discussion of the trust-landscape as provided by "D12 Landscape report". The fourth part of the workshop addressed how the trust products (e.g. policies and guidelines) comply with the "Annex II obligations" of the CESSDA ERIC statutes. The next part of the workshop consisted of a presentation of the activities of the CESSDA Trust working group in 2022. The final part of the workshop consisted of an open discussion on any issues relating to the workshop and an invitation to participants to complete a feedback form.

Workshop participants learned, with regard to applying for CoreTrustSeal certification, that an organisation should be transparent about ongoing or planned organisational and/or technological changes. While such changes may impact the implementation status of a particular CoreTrustSeal requirement, it is simply a reality that our organisations and practises change (often as a result of changes in the overall research data and archiving landscape). Therefore, the anticipation of change should not per se mean that SP should postpone its planned application. This issue is also something that the Trust Working Group would like to provide feedback on to CoreTrustSeal during the upcoming review of the requirements in 2022. It was suggested that the work done as part of the FAIRsFAIR project on capability maturity could be of use. The idea was expressed to hold a webinar on this topic next year when the results of the FAIRsFAIR<sup>5</sup> and also the EOSC Nordic<sup>6</sup> project are available and can be used.

There is general consensus that there is quite a bit of expertise and knowledge within the CESSDA community on managing research data. For decades, we have had disciplinary expertise that enables long-term preservation, and we know our "designated communities". As things change over time, we should keep each other informed, e.g. via the CESSDA

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<sup>5</sup> <https://fairsfair.eu/>

<sup>6</sup> <https://eosc-nordic.eu/>



working groups. We need to communicate this both within and outside our network. And of course the EOSC is an important factor in this.

In the discussion about the Annex II obligations some comments were made about the AAI infrastructure. However, as CESSDA does not provide access to data through its Data Catalogue, but only to openly available metadata via search and discovery services that do not require an AAI infrastructure, this part of the Annex II obligations cannot be addressed on the CESSDA level but have to be addressed by SPs individually.

## 1.1 Workshop program and participants

November 11, 2021. 10:00 - 11:30

	<i>Topic</i>	<i>Presenter</i>	<i>Duration</i>
1	Introduction - Outline of program	Trond Kvamme - NSD	10"
2	TRUST Support for CESSDA SPs Discussion of "D2 Initial drafts of support plans defining overall needs"	Maja Dolinar - ADP	20"
3	TRUST Landscape Report (D12)	Mari Kleemola - FSD	20"
4	TRUST and compliance with "Annex II"	Birger Jerlehag - SND	20"
5	TRUST WG Plans for 2022	Birger Jerlehag - SND	5"
6	Discussion / Conclusions	Trond Kvamme - NSD	15"

The following SPs were represented in the workshop: AUSSDA (Austria), CROSSDA (Croatia), CSDA (Czech republic), FSD (Finland), GESIS (Germany), SODANET (Greece), TARKI (Hungary), ISSDA (Ireland), DASSI (Italy), DANS (Netherlands), NSD (Norway), APIS (Portugal), SASD (Slovakia), ADP (Slovenia), SND (Sweden), FORS (Switzerland), UKDA (United Kingdom).

## 2. Trust Landscape Overview

### 2.1 Introduction

Trust is an essential part of open science, FAIR<sup>7</sup>, and the European Open Science Cloud (EOSC). This report provides an overview of ongoing trust-relevant activities and discussions that are of interest to CESSDA and its Service Providers (SPs). The previous landscape report by the CESSDA Trust team summarised the results of the CESSDA Trust Workshop 2020 and described the wider Trust Landscape (Kleemola et al. 2021). This report focuses on recent developments.

The *Turning FAIR into reality* report (2018) remains the baseline for many of the ongoing initiatives, and CoreTrustSeal, key performance indicators (KPIs) and automated FAIR assessments continue to be topical issues. Rapid developments can be seen in the building of EOSC and within RDA, and several EU funded projects that include trust work will end in 2022. The outcomes and recommendations relevant to CESSDA need to be identified and integrated where appropriate. In addition, the COVID-19 pandemic has demonstrated the importance and relevance of proper data management in a situation where data needs to be made readily available and understandable for research.

CESSDA and its SPs should advocate the need for, and benefits of, domain or subject-based curation and deposition of data with a discipline specific trustworthy digital repository.

The Trust Landscape overview is part of Sub-tasks 5 and 6 *Alignment with a wider landscape of trust support services* in the CESSDA Agenda 21-22.

### 2.2 Certification of repositories

CESSDA Service Providers need to adhere to the principles of the Open Archival Information System (OAIS) reference model and acquire the CoreTrustSeal<sup>8</sup> certification. A revised version of the CoreTrustSeal Requirements 2020–2022 has been in use from 1st January 2020 onwards.<sup>9</sup> It is expected that the next revision of CoreTrustSeal will be more significant in terms of structure and content. A community consultation to initiate the process of revision of the CoreTrustSeal Requirements is expected to begin in spring 2022 and will afford CESSDA Service Providers (either individually or via the CESSDA Trust Group) the

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<sup>7</sup> FAIR = Findable, Accessible, Interoperable, Reusable as defined in Wilkinson et al. (2016).

<sup>8</sup> CoreTrustSeal: <https://www.coretrustseal.org/>

<sup>9</sup> At the time of writing, three SPs are certified and one is currently in the review process under the 2020-2022 version of the Requirements. Nine SPs are or were (in the case of expired certifications) certified under the 2017-2019 version of the CoreTrustSeal Requirements.

opportunity to suggest changes and improvements to the Requirements. Service Providers should take the revision timetable into account when planning for their CoreTrustSeal (re-)certification application.

### **Different types of data services**

CoreTrustSeal certification has traditionally focused on domain/subject-based repositories. However, the overall landscape is wider. First, data repositories are only a subset of the data services needed to provide trustworthy access to FAIR data. As pointed out in Ramezani et al (2021), FAIR-enabling data services comprise

*any service that acts on at least one component of the 'trinity of data management': the bit sequence, the metadata, and the PID of a digital object. This includes services that bind these components together (e.g. associating metadata with a bit sequence), services that deliver data to the user, services that automatically analyze or transform data, services that aggregate and index metadata, services that store or replicate data, etc. (ibid.)*

In addition to being specialist repositories, CESSDA SPs in many instances perform tasks and functions that allow them to be considered as data services in the above definition. This shows the importance of monitoring the wider data services landscape, including emerging assessment or certification initiatives and procedures beyond CoreTrustSeal in order to make sure that CESSDA SPs continue to be recognised as an important component of this FAIR-enabling data infrastructure.

In the FAIRsFAIR project a first version of an assessment framework for the FAIRness of services (Koers et al. 2020) has been released. It starts to look at the various aspects of services (in the broadest possible definition) and what is desirable for FAIR and the EOSC. This is a useful starting point for CESSDA SPs and other repositories in thinking about how they fit in with the wider EOSC services across the functions and lifecycle of research. Of course, many SPs offer other data services beyond 'traditional' repository functions as well. This work may also be useful in helping to clarify the added value of trustworthy digital repositories offering preservation services for their designated communities in contrast to more technically-driven deposit/storage/access systems that cannot ensure the accessibility and usability of data into the future.

Secondly, in the data repository landscape generalist repositories are seeking ways to be recognised as trustworthy providers of services for the research community. The CoreTrustSeal Board carried out a community consultation in 2020, soliciting feedback on questions of certification scope, generalist and specialist Trustworthy Data Repositories (TDRs), and repository and data services providers. The report proposes "to define each successful CoreTrustSeal applicant as either representing a specialist (e.g., domain or

subject-based) or a generalist repository”, the latter comprising domain-agnostic repositories with potentially heterogeneous collections and a non-specialist designated community. The report also acknowledges that software providers and providers of technical infrastructure and associated services which support trustworthy digital repositories are vital components of the data ecosystem. (CoreTrustSeal Standards and Certification Board 2021.)

In that CESSDA Service Providers fall into the category of “specialist repositories”, they continue to be one of the primary target groups for CoreTrustSeal certification and will in all likelihood remain unaffected by potential limitations or extensions of CoreTrustSeal scope when it comes to technical service providers or generalist repositories.

Notwithstanding, it is important for CESSDA and its SPs to continue to emphasise the need for deposition of data with a discipline specific trustworthy digital repository as recommended by policy makers including Science Europe (2018), while acknowledging that resources do not permit all data to be curated to this level. CESSDA should support work to identify different types of repositories and efforts to design selection/recommendation systems (like re3data.org<sup>10</sup> or FAIRsharing<sup>11</sup>) at the same time as promoting the importance of specialist curation informed by domain expertise to prevent social sciences data ending up in non-expert data curation and preservation infrastructure.

A critical reason for using disciplinary TDRs is their ability to understand the needs of their Designated Community and to offer active preservation of the data and metadata. This is a key differentiator between a generic repository technology system (e.g. Figshare<sup>12</sup>, Zenodo<sup>13</sup>) and an actively preserved and curated collection. As disciplinary repositories serving the social science community, one of the strengths of CESSDA SPs is their excellent knowledge of the user group(s) they serve. As discussed in the *D1. Definition and Identification of Common Evidence Candidates* report<sup>14</sup>, it is recommended to create a common social science designated community statement to support (future) CESSDA SPs in creating statements that adequately reflect their expertise. This will be an important factor (among others), to distinguish themselves from generic repository services.

To ensure trust, the differences in curation responsibility and in the expectations of services provided must be clear to all stakeholders: repositories, reviewers, depositors, users, and

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<sup>10</sup> re3data.org <https://www.re3data.org/>

<sup>11</sup> FAIRsharing: <https://fairsharing.org/>

<sup>12</sup> Figshare: <https://figshare.com/>

<sup>13</sup> Zenodo: <https://zenodo.org/>

<sup>14</sup> CESSDA Trust Pillar: Task 1 Trust Activities (Agenda 21-24) “D1 Definition and Identification of Common Evidence Candidates”. Version 2.0. Restricted and unpublished report, 2021-08-11.

fundings. The value of data assets is maximised when deposited in domain or subject-based repositories that meet specialist (disciplinary) standards as required by the Designated Community and are able to support data, depositors and end users from that community.

### **Certification support practices**

The CESSDA Trust approach has been validated by being referenced and used by SSHOC<sup>15</sup>, FAIRsFAIR<sup>16</sup> and EOSC Nordic<sup>17</sup> projects. All three projects will end in 2022 and many key deliverables are due in the next few months. The outcomes and recommendations relevant to CESSDA, of these and other European projects dealing with trust issues, need to be identified and integrated where appropriate.

Forthcoming SSHOC D8.3 Report on TDR status and certification solutions for SSHOC repositories (due in February 2022) will cover certification solutions for SSH repositories. A shared support practice across SSH ERICs would be possible and CESSDA could play a key role in providing certification support service for SSH communities and also more widely.

EOSC Nordic is using the F-UJI tool developed by FAIRsFAIR to automatically test the FAIRness of metadata records and will provide guidance and recommendations on FAIR metadata. FAIRsFAIR provides recommendations to support FAIR data principles, transition support program, and policy support program.

Several CESSDA Service Providers are using Dataverse or are considering using it. In March 2021, Dataverse published a guide that describes how the core functionality and design principles of Dataverse, as well as support from the Dataverse community itself, can help a Dataverse repository complete their CoreTrustSeal application.<sup>18</sup>

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<sup>15</sup> SSHOC, "Social Sciences and Humanities Open Cloud", has received funding from the European Union's Horizon 2020 project call H2020-INFRAEOSC-04-2018, Grant Agreement #823782. Available at: <https://www.sshopencloud.eu>

<sup>16</sup> FAIRsFAIR, FAIRsFAIR "Fostering FAIR Data Practices In Europe" has received funding from the European Union's Horizon 2020 project call H2020-INFRAEOSC-2018-2020 Grant agreement #831558 Available at: <https://www.fairsfair.eu/>

<sup>17</sup> EOSC-Nordic project has received funding from the European Union's Horizon 2020 research and innovation programme, Grant agreement #857652. Available at: <https://eosc-nordic.eu/>

<sup>18</sup> Dataverse Software Guide for CTS Certification. Version 1, published 2021-03-08. <https://dataverse.org/cts-guide>

## 2.3 Community Principles

### FAIR now and over time

The *Turning FAIR into reality* report (2018) by the European Commission Expert Group remains the common reference in Europe and beyond. The FAIR synchronisation force<sup>19</sup> has been set up to maintain a dialogue across the EOSC and FAIR ecosystems and promote adherence to *Turning FAIR into Reality*. Grootveld et al. (2021) outlines progress towards implementing the Turning FAIR into Reality report.

While the FAIR principles are at the heart of data management and open science, they do not specify how digital objects are made FAIR or for how long they should be kept FAIR, and they say nothing about the inevitable changes to the data environment and the users' needs. The work to apply the FAIR principles has highlighted that digital objects are dependent on the infrastructure of people, processes and technology that care for them. Keeping data FAIR over time is discussed in a working paper by SSHOC, EOSC-Nordic and FAIRsFAIR titled *FAIR + Time: Preservation for a Designated Community*. The added value of a trustworthy digital repository is the key role they play in enabling data to become and remain FAIR over time. This is a task that requires domain specific expertise. (L'Hours et al. 2021a.)

The FAIR Working Group of the EOSC Executive Board (2021) considers the CoreTrustSeal as the right level for research data repositories and recommends testing of the CoreTrustSeal+FAIR approach proposed by the FAIRsFAIR project. A CESSDA-relevant FAIRsFAIR output is on CoreTrustSeal+FAIRenabling, Capability and Maturity (L'Hours et al. 2021b). This milestone provides alignment between the CoreTrustSeal Requirements and the FAIR data Principles. It includes consideration of the FAIR Data Indicators (RDA) and their application in digital objects tests with the F-UJI tool. The mappings are supported by a capability-maturity approach intended to allow repositories to assess their current level of progress in terms of documentation evidence (policies, procedures etc) in place for assessment. There is not yet a formal relationship between CoreTrustSeal and FAIR as this will need to be validated in the next community review of requirements. However, the availability of a mappings and a methodology for judging current CoreTrustSeal+FAIR status and evidence readiness is of immediate value to repositories seeking to be both TDR and FAIRenabling. It provides a method for repositories to self-assess as a CoreTrustSeal TDR that enables FAIR data. The EOSC Nordic project has tested this approach in autumn 2021.

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<sup>19</sup> FAIR synchronisation force: <https://www.fairsfair.eu/advisory-board/synchronisation-force>

## TRUST Principles

In 2020 a group of authors from the digital repository community, including representatives of CoreTrustSeal, the Primary Trustworthy Digital Repository Authorisation Body Ltd for ISO16363 (PTAB), research data centers and publishing houses, published “a set of guiding principles to demonstrate digital repository trustworthiness” (Lin et al 2020). Just like the FAIR principles, on which they were in part modelled, the TRUST principles are not a new certification standard but seek to provide a “common framework to facilitate discussion and implementation of best practice in digital preservation by all stakeholders” (ibd.).

The TRUST Principles have already been endorsed by several organisations committed to the stewardship of digital resources and research data in particular, including some CESSDA Service Providers and CoreTrustSeal<sup>20</sup>. It is recommended that CESSDA also endorses the TRUST principles to emphasize its active commitment in promoting and facilitating the preservation and dissemination of social science data by trusted digital repositories. RDA VP18 in October 2021 will include a session on TRUST principles (also see below).<sup>21</sup>

## Criteria that matter

*Data Repository Selection: Criteria that Matter* (Cannon et al. 2021) have been developed over the past three years by a group of (mainly) publishers facilitated by the FAIRsharing initiative. A large number of organizations and individuals have expressed concern about the criteria and the process through which the criteria were developed (COAR et al. 2021). Publishers’ guidance to support researchers selecting a repository should not substitute or conflict with guidance already available to researchers from their institutions, disciplinary communities, or funders. There is a risk that CESSDA SPs as well as many other repositories will not comply with criteria skewed towards the needs of publishers. The work continues under RDA/Force11 FAIRsharing WG.<sup>22</sup>

## 2.4 Metrics: KPIs and automated FAIR assessment

All repository services have some kind of organisational embedding, and it is this organisational aspect that the CoreTrustSeal certification is focused on. Other evaluation

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<sup>20</sup> One can identify the co-signatories and endorse the TRUST Principles at <https://www.rd-alliance.org/trust-principles-rda-community-effort>

<sup>21</sup> RDA VP18 session on TRUST principles: <https://www.rd-alliance.org/plenaries/rda-18th-plenary-meeting-virtual/trust-principles-and-challenges-implementation-0>

<sup>22</sup> RDA/Force11 FAIRsharing WG: <https://www.force11.org/group/biosharingwg>

methods relevant for CESSDA and SPs are key performance indicators (KPIs) and (automated) FAIR assessments. The first collection of CESSDA KPIs took place in summer 2021 and Trust sub-task 2 will contribute to aligning KPIs, certification and Annex 2 requirements. Therefore this report focuses on automated FAIR assessment.

The two most adopted automated FAIR assessment methods are the FAIR Maturity Evaluation Service<sup>23</sup> (Wilkinson et al. 2019) and the F-UJI Automated FAIR Data Assessment Tool<sup>24</sup> (Devaraju et al. 2020), both of which are still evolving. Both are also open for anyone to use to test any metadata record. The F-UJI assessment is based on 16 out of 17 core FAIR object assessment metrics developed within FAIRsFAIR and each corresponding to a part or the whole of a FAIR principle<sup>25</sup> (the FAIR Maturity Evaluation Service, in comparison, consists of 22 object assessments). The EOSC Nordic project has tested and continues to test a sample of metadata records from Nordic and Baltic repositories using these tools. Since the end of 2020 the main testing tool used by the project has been the F-UJI tool.

The CESSDA Data Catalogue (CDC) and six CESSDA Service Providers are included in the EOSC Nordic sample of repositories. Their results from both the FAIR Maturity Evaluation Service (MES) and the F-UJI tests are presented in Table 1. The percentages shown are the estimated total average FAIR-scores (based on individual scores for Findable, Accessible, Interoperable and Reusable) for typically between 10 and 20 sample metadata records from each SP. The table shows that on average the F-UJI tool generates lower scores for all the evaluated SPs. It should be noted that the scores may fluctuate between test runs due to changes in F-UJI and changes in metadata records. (Jaunsen et al. 2020.)

*Table 1: Selected FAIR assessment results for CESSDA*

Repository	FAIR MES*	F-UJI-score**
Aila (FSD)	70.91%	45.83%
SND	48.64%	32.92%
DNA	47.73%	37.50%
DATICE/SSRI	45.45%	30.83%
LIDA	31.82%	15.91%

<sup>23</sup> FAIR Maturity Evaluation Service: <https://fairsharing.github.io/FAIR-Evaluator-FrontEnd/>

<sup>24</sup> F-UJI tool: <https://www.f-uji.net/>

<sup>25</sup> See: <https://www.fairsfair.eu/fairsfair-data-object-assessment-metrics-request-comments>



NSD	29.55%	5.83%
CDC	24.03%	13.10%

\* May 2020 (Jaunsen et al, 2020, Appendix A, table A2) ; \*\* April 2021 (Jaunsen 2021)

The overall average for all repositories in the EOSC Nordic sample in the April 2021 test was 19.62%. In general, the CESSDA SPs' FAIR scores tend to be higher than the average but there is room for improvement. By adding more machine-understandable metadata in their catalogues, CESSDA and the SPs could raise their scores. In addition, the assessment tools should also be further developed to better align with community standards, and CESSDA should participate in shaping the SSH standards used in the tools.

## 2.5 Persistent Identifiers

Persistent identifiers are an essential component of the FAIR ecosystem. CESSDA has a PID policy<sup>26</sup> and a PID Checklist<sup>27</sup>. CESSDA and the SPs are well positioned when it comes to PIDs for datasets. However, efficient data citation as well as data citation analysis measuring the impact of published data are still complex and sometimes poorly understood processes (Larrousse & Gray 2021). A PID on study level or for a dataset is only a starting point. It should also be possible to give PIDs to authors, contributors and funders, and to cite parts of studies (for example, variables). SSHOC is developing actionable citations (Larrousse et al. 2021) and PID Forum<sup>28</sup>, hosted by the National Information Standards Organization (NISO), provides an open discussion forum for PID questions and challenges and a place for community collaboration and coordination.

## 2.6 Trust-related initiatives

### **EOSC and associated landscape**

European Open Science Cloud (EOSC) is a major effort to connect research data services across Europe. The EOSC FAIR WG report on certification of services (2021) makes several recommendations that were summarised in the previous CESSDA landscape report (Kleemola et al. (2021); see also chapter *FAIR now and over time* above). This chapter

<sup>26</sup> CESSDA ERIC Persistent Identifier Policy 2019. Principles, Recommendations and Best Practices. Version 2.0. <https://doi.org/10.5281/zenodo.3611327>

<sup>27</sup> CESSDA ERIC Checklist for the Usage of Persistent Identifiers. Version 1.0, 2019. <https://doi.org/10.5281/zenodo.3611333>

<sup>28</sup> PID Forum: <https://www.pidforum.org/>, Twitter: <https://twitter.com/ForumPid>

highlights recent EOSC recommendations and materials on trust that are of interest to CESSDA and its SPs.

In July 2020, the EOSC Association<sup>29</sup> was established as a legal entity. Following a call for EOSC Association Task Force Members in summer 2021, an EOSC Task Force on Long Term Data Preservation was established with the aim to “provide recommendations for the EOSC board on the vision and sustainable implementation of long-term data preservation policies and practices, as well as suggestions to later strategy execution”<sup>30</sup>. CESSDA Trust Working Group Leader Hervé L’Hours is co-chairing the Task Force.

One of the main takeaways from EOSC Symposium 2021 was that the definition of sustainability needs to cover both financial and other aspects, for example, long-term digital preservation (Bertacchini 2021). The Strategic Research and Innovation Agenda (SRIA) by the EOSC Executive Board (2021) states that existing work on FAIR metrics and certification should be extended to ensure support and applicability across disciplines:

*Repositories and other services enable FAIR by assigning persistent identifiers and supporting discovery and reuse. These services need to be robust and trustworthy, and existing frameworks for certification are being revised with FAIR criteria in mind. Support for services to self-certify is needed to strengthen the ecosystem and ensure the Web of FAIR Data and Related Services for science can be relied upon.*

One of the KPIs listed in the SRIA is the percentage of the repositories in EOSC that will have a certification such as CoreTrustSeal; the target for this KPI is 30% by 2025 (ibid).

As part of the FAIR Forever Project, the Digital Preservation Coalition (DPC) has conducted a study commissioned by the EOSC Secretariat, resulting in 19 recommendations concerning the role of digital preservation in the emerging EOSC. Three of these are directly addressed at research repositories, calling them to:

- adapt workplans to include quality improvement mechanisms where these do not already exist, including DPC Rapid Assessment Model, establishing thereby a strategic framework to achieve baseline certification for primary preservation services, or identifying preservation pathways for data;
- provide strategic framework for audit of data management plans;
- identify costs of action versus inaction with respect to high value, critically endangered content. (Currie & Kilbride 2021.)

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<sup>29</sup> EOSC Association Statutes: [https://www.eosc.eu/sites/default/files/EOSC\\_Statutes.pdf](https://www.eosc.eu/sites/default/files/EOSC_Statutes.pdf)

<sup>30</sup> Charter for the EOSC - Task Force - Long Term Data Preservation (EOSC TF LTP). Version 0.5 (08-06-2021):

[https://www.eosc.eu/sites/default/files/tfcharters/eosca\\_tflongtermdatapreservation\\_draftcharter\\_20210614.pdf](https://www.eosc.eu/sites/default/files/tfcharters/eosca_tflongtermdatapreservation_draftcharter_20210614.pdf).

Of these, the last one (identifying costs of action vs. inaction) is especially interesting to CESSDA and its Service Providers from the viewpoint of long-term preservation.

The DICE project<sup>31</sup> is a follow-up of EOSC-hub and builds infrastructure for EOSC. One of the activities DICE is carrying out is the development of a digital preservation service (DDPS) related to the B2SHARE service. The service will be ready in early 2023 and is potentially relevant for CESSDA SPs.

The ARCHIVER project<sup>32</sup> aims at introducing improvements in the area of archiving and digital preservation services, supporting the IT requirements of European scientists and providing end-to-end archival and preservation services.

The Dutch Certification Signpost<sup>33</sup> (in Dutch only) provides guidance for repositories seeking certification in the field of digital preservation.

### **Network of FAIR-enabling Trustworthy Digital Repositories**

One of the objectives of the FAIRsFAIR project has been to build a European network with respect to FAIR data in FAIR-enabling repositories. They suggest a two-pronged approach (von Stein et al. 2021.):

- 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.

### **Research Data Alliance**

Research Data Alliance (RDA) is the main global discussion platform on issues related to open data. The ongoing Working Groups and Interest Groups focusing on FAIRness, trust and/or certification issues are listed below by their status.

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<sup>31</sup> DICE project: <https://www.dice-eosc.eu/>

<sup>32</sup> ARCHIVER project: <https://www.archiver-project.eu/>

<sup>33</sup> De Wegwijzer Certificering voor Digitale Archieven: <https://wegwijzercertificering.nl/nl>

Status RDA Working Groups / Interest Groups: recognized and endorsed

- [RDA/WDS Certification of Digital Repositories IG](#)
- [CURE-FAIR WG](#)
- [FAIR Data Maturity Model WG](#)
- [FAIR for Research Software \(FAIR4RS\) WG](#)
- [Raising FAIRness in health data and health research performing organisations \(HRPOs\) WG](#)
- [Open Science Graphs for FAIR Data IG](#)
- [FAIR for Virtual Research Environments WG](#)

Status RDA Working Groups / Interest Group: not yet endorsed/in Council review

- [GO FAIR Liaison IG](#)

Status RDA Working Groups / Interest Groups: completed

- [FAIRsharing Registry: Connecting data policies, standards and databases RDA WG](#)

## Trust programs beyond Europe

This section briefly lists developments outside Europe that the CESSDA Trust Group is following as they are larger initiatives whose work is likely to have an impact on the future trust landscape (e.g. the CoreTrustSeal revision of requirements and the development of support structures for certification).

- Canada: Portage Network Data Repository Expert Group<sup>34</sup>
- Australian Research Data Commons: Trusted Data Repositories Community of Practice<sup>35</sup>
- A repository cohort established in partnership with CoreTrustSeal and the World Data System and supported by the Council of Data Facilities to advance the implementation of FAIR principles in ESES repositories<sup>36</sup>
- The National Institutes of Health's (NIH) Office of Data Science Strategy (ODSS) has announced a *Notice of Special Interest to strengthen NIH-funded biomedical data repositories* to better enable data discoverability, interoperability, and reuse by aligning with the FAIR and TRUST principles and using metrics to measure their effectiveness<sup>37</sup>

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<sup>34</sup> Portage network: <https://portagenetwork.ca/network-of-experts/data-repositories-expert-group/>

<sup>35</sup> Australian Research Data Commons: <https://ardc.edu.au/news/call-for-expressions-of-interest-trusted-data-repositories-community-of-practice/>

<sup>36</sup> Enabling FAIR Data project: <https://eos.org/aqu-news/advancing-fair-data-in-earth-space-and-environmental-science>

<sup>37</sup> NOSI to Support FAIR Biomedical Repositories: <https://datascience.nih.gov/data-ecosystem/support-fair-biomedical-repositories>

## 2.7 Conclusion and recommendations for CESSDA and the Service Providers

The *Turning FAIR into reality* report (2018) remains the baseline for trust work in Europe. CoreTrustSeal, key performance indicators (KPIs) and automated FAIR assessments continue to be topical issues. Rapid developments can be seen in the building of EOSC and within RDA.

In addition to making digital objects FAIR, it is essential that they are kept FAIR. Digital objects are dependent on the infrastructure of people, processes and technology that care for them. The added value of a trustworthy digital repository is the key role they play in enabling data to become and remain FAIR over time. This is a task that requires domain specific expertise. CESSDA and its Service Providers should advocate the need for, and benefits of, domain/subject-based curation and deposition of data with a discipline specific trustworthy digital repository.

The CESSDA Trust team will continue to provide support for CoreTrustSeal certification in 2022. The next revision of CoreTrustSeal (in 2022) will be significant in terms of structure and content and Service Providers should take this into account when planning their certification timetable. CESSDA and its Service Providers tend to score relatively well in automated FAIR assessments but regardless, they should enhance their machine-actionable metadata. In addition, CESSDA should collaborate with relevant assessment tools to better align the tools with community standards. Important is the notion of FAIR-enabling trustworthy digital repositories, and FAIRsFAIR is developing a method for repositories to self-assess as a CoreTrustSeal TDR that enables FAIR data.

CESSDA needs to continue to closely monitor the evolution of the trust landscape, especially in the context of EOSC but also globally. The CESSDA Trust Group has a wide range of existing connections, and the CESSDA Trust approach has been validated by being referenced and used by SSHOC, FAIRsFAIR and EOSC Nordic. A common SSH trust support programme or framework would provide synergies. CESSDA is well connected and well positioned to have an impact in the future developments of the trust landscape.

Based on the landscape analysis and the discussion in the landscape workshop, the CESSDA Trust Group has formulated eleven recommendations for CESSDA. These recommendations are listed in Table 2 and they are grouped by the stakeholder who would have the responsibility to take initiative or coordinate actions related to the recommendation.

*Table 2. Recommendations for CESSDA and the SPs (MO = Main Office).*

	<b>Recommendation</b>	<b>Action/ initiative</b>
1	Closely follow the discussions accompanying the building of EOSC and happening within RDA to be able to react adequately to any rapid developments sparked there.	MO
2	Identify outcomes from projects like SSHOC, FAIRsFAIR and EOSC Nordic relevant to CESSDA and integrate where appropriate to enable CESSDA to take advantage of synergies from common SSH practices.	MO
3	Aim at playing a key role in providing certification support service for SSH communities and also more widely.	MO
4	Support work to identify different types of repositories and efforts to design selection/recommendation systems (like re3data.org or FAIRsharing).	MO
5	Participate in shaping the (SSH) standards used in automated FAIR assessment tools.	MO
6	Explore the development of routines and policies enabling the assignment of PIDs not only on dataset or study level, but also to authors, contributors and funders, and to parts of studies.	MO
7	Endorse the TRUST principles.	MO and SPs
8	Emphasize the need for domain/subject-based curation and deposition of data with a discipline specific TDR.	MO and SPs
9	Include more machine-understandable metadata in the catalogues.	MO and SPs
10	Provide feedback for CoreTrustSeal revision.	MO and SPs
11	Take into account the forthcoming Revision of CoreTrustSeal Requirements into when planning the (re-)certification timetable.	SPs

### 3. Conclusion

The CESSDA Trust working group team will continue to provide support for CoreTrustSeal certification in 2022. SPs preparing a CoreTrustSeal application are encouraged to get in contact with the Trust team as early as possible. Since the next revision of CoreTrustSeal (in 2022) will be significant in terms of structure and content, Service Providers should take this into account when planning their certification timetable.

The trust landscape is developing rapidly. The Turning FAIR into reality report (2018) remains the baseline for many of the ongoing FAIR and EOSC related initiatives. In addition to making digital objects FAIR, it is essential that they are kept FAIR over time. CESSDA and its Service Providers should advocate the need for, and benefits of, domain/subject-based curation and deposition of data with a discipline specific trustworthy digital repository. The eleven recommendations for CESSDA and SPs that are stated in this report (page 20) form the basis for further activities of the CESSDA Trust working group and for which cooperation with CESSDA and SPs is of eminent importance.

At the end of 2022 a workshop will be organised in which the state of art concerning trust issues will be presented and discussed in order to enhance the trustworthiness of data curated by the CESSDA SPs.

## 4. References related to the Trust landscape

*All URLs checked 8.12.2021*

Bertacchini, Veronica, Drago, Federico, Flicker, Katharina, Gebreyesus, Netsanet, Grant, Annabel, Jones, Bob, Liinamaa, Iris, Märkälä, Anu, Marinos-Kouris, Christos, Meerman, Bert, Saurugger, Bernd, & Smith, Zachary. (2021). EOSC Symposium 2021 Report. Zenodo.

<https://doi.org/10.5281/zenodo.5176089>

Cannon, Matthew, Graf, Chris, McNeice, Kiera, Chan, Wei Mun, Callaghan, Sarah, Carnevale, Ilaria, Cranston, Imogen, Edmunds, Scott C., Everitt, Nicholas, Ganley, Emma, Hrynaszkiewicz, Iain, Khodiyar, Varsha K., Leary, Adam, Lemberger, Thomas, MacCallum, Catriona J., Murray, Hollydawn, Sharples, Kathryn, Soares E Silva, Marina, Wright, Guillaume, ... (Moderator) Sansone, Susanna-Assunta. (2021). *Repository Features to Help Researchers: An invitation to a dialogue*. Zenodo.

<https://doi.org/10.5281/zenodo.4683794>

COAR, CoreTrustSeal, European University Association, Science Europe, & World Data System. (2021). Joint Position Statement on "Data Repository Selection - Criteria That Matter" (Version 1). Zenodo.

<https://doi.org/10.5281/zenodo.4649136>

CoreTrustSeal Standards and Certification Board. (2021). CoreTrustSeal: Specialists, Generalists, and Repository & Data Service Providers (v02.00). Zenodo.

<https://doi.org/10.5281/zenodo.4568875>

Currie, Amy, & Kilbride, William. (2021). FAIR Forever? Long Term Data Preservation Roles and Responsibilities, Final Report (Version 7). Zenodo.

<https://doi.org/10.5281/zenodo.4574234>

Devaraju, Anusuriya, Huber, Robert, Mokrane, Mustapha, Herterich, Patricia, Cepinskas, Linas, de Vries, Jerry, ... Angus White. (2020, October 12). FAIRsFAIR Data Object Assessment Metrics (Version 0.4). Zenodo.

<http://doi.org/10.5281/zenodo.4081213>

EOSC Executive Board FAIR Working Group (2021). Recommendations on certifying services required to enable FAIR within EOSC. <https://doi.org/10.2777/127253>, published: 2021-01-08.

EOSC Executive Board (2021). Strategic Research and Innovation Agenda (SRIA) of the European Open Science Cloud (EOSC). Version 1.0 15 February 2021.

[https://www.eosc.eu/sites/default/files/EOSC-SRIA-V1.0\\_15Feb2021.pdf](https://www.eosc.eu/sites/default/files/EOSC-SRIA-V1.0_15Feb2021.pdf)

Grootveld, Marjan, Hodson, Simon, Pittonet Gaiarin, Sara, Davidson, Joy, & Dillo, Ingrid. (2021). D5.6 Report 3 of the Synchronisation Force (V1.0\_DRAFT). Zenodo.

<https://doi.org/10.5281/zenodo.5336658>



- Jaunsen Andreas Ortmann, Kleemola Mari, Alaterä Tuomas J., Lehvaslaiho Heikki, Hasan Adil, Nordling Josefine, & Assinen Pauli. (2020). D4.1 An assessment of FAIR-uptake among regional digital repositories (Version 1.0). Zenodo. <https://doi.org/10.5281/zenodo.4045401>
- Jaunsen, Andreas (2021). FAIR assessments and preliminary results. Presentation at EOSC Nordic webinar FAIRification STEP 3 on data/metadata, 29 April 2021. <https://www.eosc-nordic.eu/content/uploads/2021/05/EOSC-Nordic-Step3-Andreas-Jaunsen-20210429.pdf>
- Mari Kleemola, Darren Bell, Recker, Jonas, René van Horik, Jerlehag, Birger, & Maja Dolinar. (2021). D5 One workshop and workshop report presenting the current state of the Trust Landscape and implications for CESSDA Service Providers (Version 1). Zenodo. <https://doi.org/10.5281/zenodo.4727786>
- Koers, Hylke, Herterich, Patricia, Hooft, Rob, Gruenpeter, Morane, & Aalto, Tero. (2020). M2.10 Report on basic framework on FAIRness of services (1.0). Zenodo. <https://doi.org/10.5281/zenodo.5473015>
- Nicolas Larrousse, & Edward J. Gray. (2021). Recommendations for FAIR Data Citation in the Social Sciences and Humanities. Zenodo. <https://doi.org/10.5281/zenodo.5361718>
- Nicolas Larrousse, Edward Gray, Daan Broeder, Cesare Concordia, Jan Brase, & Athina Papadopoulou. (2021). D3.5 Report on citation enabled SSH catalogues and SSH citation exploitation (v1.0). Zenodo. <https://doi.org/10.5281/zenodo.5603306>
- Lin, D., Crabtree, J., Dillo, I. et al. The TRUST Principles for digital repositories. Sci Data 7, 144 (2020). <https://doi.org/10.1038/s41597-020-0486-7>
- L'Hours, Hervé, van Horik, René, Kleemola, Mari, Recker, Jonas, Štebe, Janez, & Jerlehag, Birger . (2020, January 22). CESSDA Trust Group: Overview of Support Approaches (Version v01.00). Zenodo. <http://doi.org/10.5281/zenodo.3621378>
- L'Hours, Hervé, Kleemola, Mari, von Stein, Ilona, van Horik, René, Herterich, Patricia, Davidson, Joy, Rouchon, Olivier, Mokrane, Mustapha, & Huber, Robert. (2021a). FAIR + Time: Preservation for a Designated Community (01.00). Zenodo. <https://doi.org/10.5281/zenodo.4783116>
- Hervé L'Hours, Ilona von Stein, Jerry deVries, Linas Cepinskas, Joy Davidson, Patricia Herterich, Robert Huber, & Benjamin Jacob Mathers. (2021b). M4.3 CoreTrustSeal+FAIRenabling, Capability and Maturity (1.0). Zenodo. <https://doi.org/10.5281/zenodo.5346822>

Ramezani, Sara, Aalto, Tero, Gruenpeter, Morane, Herterich, Patricia, Hooft, Rob, & Koers, Hylke. (2021). D2.7 Framework for assessing FAIR Services (V1.0\_DRAFT). Zenodo. <https://doi.org/10.5281/zenodo.5336234>.

Science Europe (2018). Practical Guide to the International Alignment of Research Data Management. [https://www.scienceeurope.org/media/jezkhnoo/se\\_rdm\\_practical\\_guide\\_final.pdf](https://www.scienceeurope.org/media/jezkhnoo/se_rdm_practical_guide_final.pdf)

Ilona von Stein, Hervé L'Hours, Linas Cepinskas, Benjamin Mathers, Ingrid Dillo, Maaïke Verburg, Mustapha Mokrane, Patricia Herterich, & Olivier Rouchon. (2021). D4.4 Coordination Plan for a sustainable network of FAIR-enabling Trustworthy Digital Repositories (1.0\_DRAFT). Zenodo. <https://doi.org/10.5281/zenodo.5726691>

Wilkinson, M., Dumontier, M., Aalbersberg, I. et al. (2016). The FAIR Guiding Principles for scientific data management and stewardship. *Sci Data* 3, 160018. <https://doi.org/10.1038/sdata.2016.18>

Wilkinson, M.D., Dumontier, M., Sansone, S.A. et al. Evaluating FAIR maturity through a scalable, automated, community-governed framework. *Sci Data* 6, 174 (2019). <https://doi.org/10.1038/s41597-019-0184-5>

Turning FAIR into reality (2018). Final report and action plan from the European Commission expert group on FAIR data. DOI: 10.2777/1524. <https://op.europa.eu/s/skKU>