

CoreTrustSeal+FAIRenabling

Alignment between the FAIR Principles and CoreTrustSeal 2023-25

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Introduction

This document¹ presents an update² of the alignment between the CoreTrustSeal Trustworthy Digital repository (TDR) Requirements and the FAIR Principles (Findable, Accessible, Interoperable and Reusable) to support repositories on their journey towards TDR status and enabling FAIR digital objects.

Trustworthy Digital Repositories' curation activities naturally align with the FAIR Principles. The active preservation that forms part of a TDR mission enables FAIR digital objects' data and metadata that can persist over time, despite changes to the needs of their designated community of users. However, the indicators, metrics and tests for FAIR digital objects are still evolving, and the formal CoreTrustSeal review process does not explicitly evaluate the FAIR-enabling aspects of repositories.

This document updates the previous³ mappings to align with the release of the revised CoreTrustSeal Requirements for the period 2023-25⁴. Changes in the CoreTrustSeal structure and numbering are reflected in this updated mapping but the fundamental alignments between Principles and Requirements remain stable. This document is shared with a view to validation and re-publication with the endorsement of a number of relevant projects and groups.

There are of course numerous connections from the principles and their indicators, metrics and tests to different parts of the CoreTrustSeal. As for the previous mappings, the design focus has been on identifying the single, most logical and stable location within the CoreTrustSeal Requirements that aligns with each FAIR Principle.

CoreTrustSeal (2023-2025)

To achieve TDR status the CoreTrustSeal Requirements for Trustworthy Digital Repositories set 16 Requirements⁵ across organisational infrastructure, digital object management, and information technology and security. Repositories submit their self-assessment against the Requirements (evidence statements and linked evidence) for review by peers who have already achieved the CoreTrustSeal; the CoreTrustSeal Board validates the results of this review. The

¹ <https://doi.org/10.5281/zenodo.7564703>

² The previous mappings were published as part of the FAIRsFAIR project work to deliver a capability-maturity approach to self-assessing the degrees to which repositories are FAIR-enabling alongside compliance with CoreTrustSeal.

³ Hervé L'Hours, Maaïke Verburg, Jerry de Vries, Linas Cepinskas, Ilona von Stein, Robert Huber, Joy Davidson, Patricia Herterich, & Benjamin Mathers. (2022). Report on a maturity model towards FAIR data in FAIR repositories (D4.6) (V2.0). Zenodo. <https://doi.org/10.5281/zenodo.6699520>

⁴ CoreTrustSeal Standards and Certification Board. (2022). CoreTrustSeal Revision Working Group Change Log and Associated Materials (v01.00). Zenodo. <https://doi.org/10.5281/zenodo.7051237>

⁵ CoreTrustSeal Standards and Certification Board. (2022). CoreTrustSeal Trustworthy Digital Repositories Requirements 2023-2025 Extended Guidance (V01.00). Zenodo. <https://doi.org/10.5281/zenodo.7051096>

Board manages the requirements and review process through an international not-for-profit foundation. The Board consists of members drawn from the community of reviewers.

The CoreTrustSeal is the result of a demand, identified by the Research Data Alliance (RDA), for a single set of core-level repository requirements. The RDA endorsed the Requirements and an RDA working group⁶ mediates their periodic review and revision.

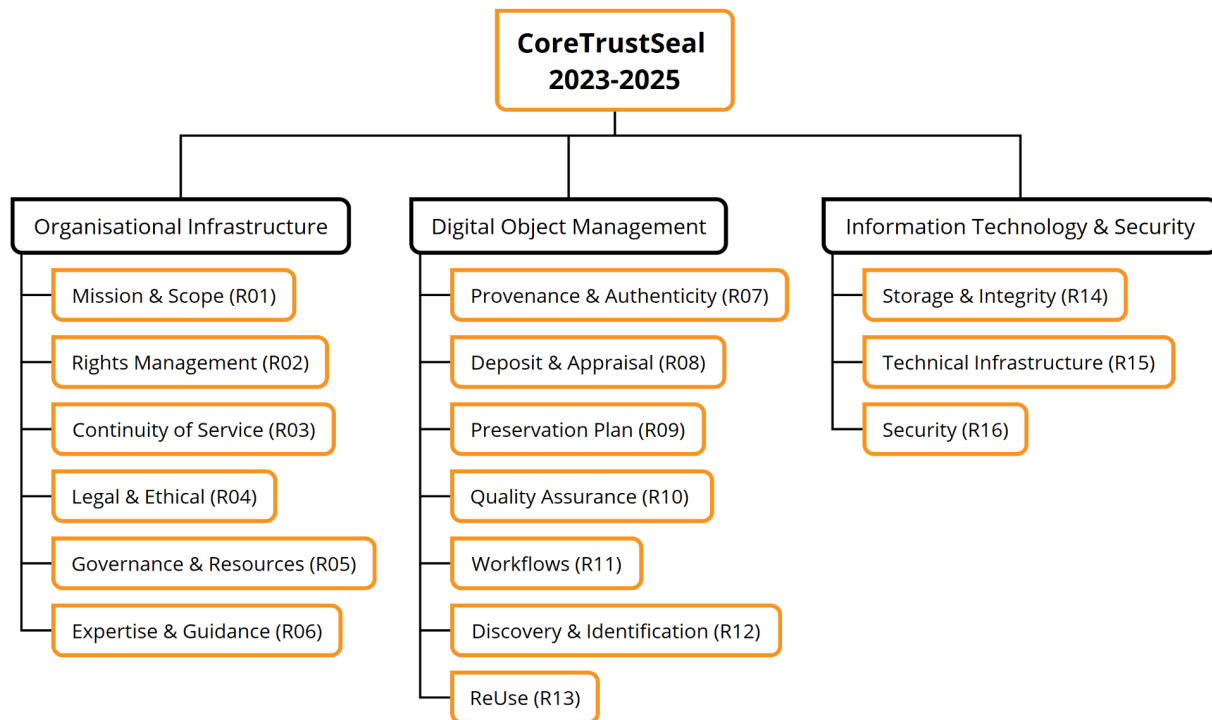


Diagram: CoreTrustSeal Requirements 2023-2025

The FAIR Principles

The FAIR Guiding Principles⁷ for scientific data management and stewardship are Findability, Accessibility, Interoperability, and Reusability. Fifteen elements add more detail to the acronym (see Appendix). An RDA Working Group⁸ has provided 28 indicators associated with the elements. Several active efforts are developing metrics and implementable tests for object FAIRness. Using different assessment methods on the same object often results in different FAIR scores because the metrics are interpreted differently⁹.

⁶ <https://www.rd-alliance.org/groups/coretrustseal-maintenance-wg>

⁷ Wilkinson, M., Dumontier, M., Aalbersberg, I. et al. The FAIR Guiding Principles for scientific data management and stewardship. *Sci Data* 3, 160018 (2016). <https://doi.org/10.1038/sdata.2016.18>

⁸ FAIR Data Maturity Model Working Group. (2020). FAIR Data Maturity Model. Specification and Guidelines (1.0). <https://doi.org/10.15497/rda00050>

⁹ The EOSC-A TF on FAIR Metrics and Data Quality addresses this issue in "FAIR Assessment Tools: Towards an "Apples to Apples" Comparisons" (<https://doi.org/10.5281/zenodo.7463421>). It recommends using FAIR

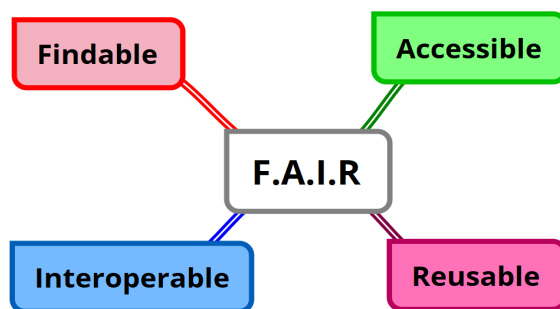
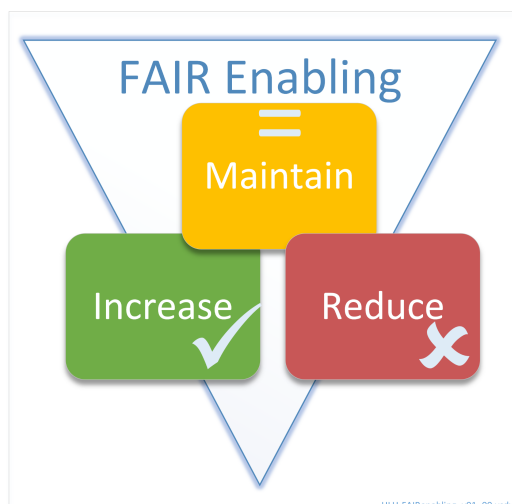


Diagram: FAIR: Findable, Accessible, Interoperable, Reusable

CoreTrustSeal+FAIRenabling

The FAIR Principles and associated tests evaluate the characteristics of a digital object at a 'snapshot' in time. Maintaining FAIR characteristics depends on an entity, such as a repository, taking responsibility to curate and preserve for FAIRness over time¹⁰. The body of this text presents the alignment from the FAIR Principles to the CoreTrustSeal Requirements. Once there is consensus on FAIR metrics, tests and outcomes it may be possible to assess the degree of FAIRness across repositories by direct assessment of digital objects. At this stage, the focus is on areas of the CoreTrustSeal Requirements where a repository may undertake work to *enable* the FAIRness of digital objects. Enabling in this context means that the repository seeks to maintain the FAIRness of digital objects deposited with them, avoid any reduction in FAIRness, and increase FAIRness where possible.



Signposting as a way to provide a uniform way for FAIR assessment tools to gather metadata. This is made more challenging by the need for metadata to adhere to community-accepted standards.

¹⁰ Preservation in the context of FAIR and the European Open Science Cloud (EOSC) is the focus of the EOSC Association's Long Term Data Preservation Task Force. See 'EOSC Preservation: Overview Discussion Paper' <https://doi.org/10.5281/zenodo.7516259>

FAIR Enabling to CoreTrustSeal Alignment

This section presents the alignments from the FAIR Principles to the CoreTrustSeal Requirements. Appendix A presents the reverse mapping.

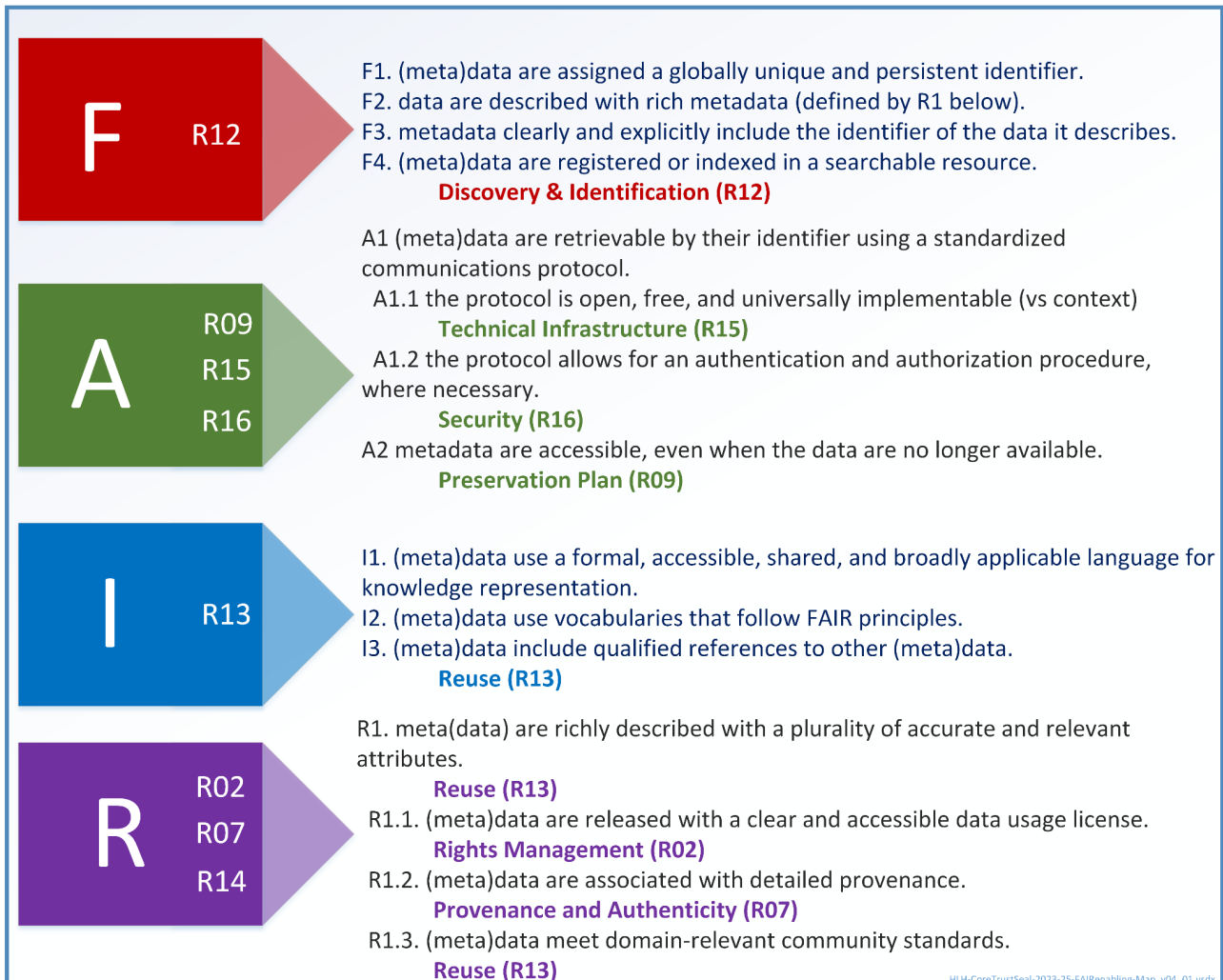


Diagram: FAIR enabling to CoreTrustSeal 2023-2025 Alignment. Overview

Findable

All of the FAIR Principles associated with Findable have a natural and close alignment with CoreTrustSeal Discovery and Identification (R12).

Discovery & Identification (R12)

R12. The repository enables users to discover the digital objects and refer to them in a persistent way through proper citation.

- F1. (meta)data are assigned a globally unique and persistent identifier.
- F2. data are described with rich metadata (defined by R1 below).
- F3. metadata clearly and explicitly include the identifier of the data it describes.
- F4. (meta)data are registered or indexed in a searchable resource.

Accessible

The topic of 'access' is strongly implied by CoreTrustSeal and must form part of a TDR mission. There are also elements of Discovery and Identification (R12) that are dependencies for delivering access. However, overall, the Access FAIR Principles align more naturally with the technical, security and preservation Requirements.

Technical Infrastructure (R15)

R15. The repository is managed on well-supported operating systems and other core infrastructural software and hardware appropriate to the services it provides to its Designated Community.

- A1. (meta)data are retrievable by their identifier using a standardized communications protocol.
- A1.1 the protocol is open, free, and universally implementable.

Security (R16)

R16. The repository protects the facility and its data, metadata, products, services, and users.

- A1.2 the protocol allows for an authentication and authorization procedure, where necessary.

Preservation Plan (R09)

R09. The repository assumes responsibility for long-term preservation and manages this function in a planned and documented way.

- A2. metadata are accessible, even when the data are no longer available.

Interoperable

The CoreTrustSeal focuses on preservation for ReUse by a designated community of users. The interoperability requirements of that community define what the repository must deliver.

Reuse (R13)

R13. The repository enables reuse of the digital objects over time, ensuring that appropriate information is available to support understanding and use.

- I1. (meta)data use a formal, accessible, shared, and broadly applicable language for knowledge representation.
- I2. (meta)data use vocabularies that follow FAIR principles.
- I3. (meta)data include qualified references to other (meta)data.

Reusable

The CoreTrustSeal focuses on preservation for ReUse (R13) by a designated community of users. Other Principles align more specifically with rights management (R02) and provenance (R07).

Reuse (R13)

R13. The repository enables reuse of the digital objects over time, ensuring that appropriate information is available to support understanding and use.

- R1. meta(data) are richly described with a plurality of accurate and relevant attributes.

Rights Management (R02)

R02. The repository maintains all applicable rights and monitors compliance.

- R1.1. (meta)data are released with a clear and accessible data usage license.

Provenance and Authenticity (R07)

R07. The repository guarantees the authenticity of the digital objects and provides provenance information.

- R1.2. (meta)data are associated with detailed provenance.

Reuse (R13)

R13. The repository enables reuse of the digital objects over time, ensuring that appropriate information is available to support understanding and use.

- R1.3. (meta)data meet domain-relevant community standard.

Appendix A: CoreTrustSeal to FAIR- Alignment Table

CoreTrustSeal 2023-2025		FAIR Principle (Nature)
Mission & Scope (R01)	R01. The repository has an explicit mission to provide access to and preserve digital objects.	
Rights Management (R02)	R02. The repository maintains all applicable rights and monitors compliance.	R1.1. (meta)data are released with a clear and accessible data usage license
Continuity of Service (R03)	R03. The Repository has a plan to ensure ongoing access to and preservation of its data and metadata.	
Legal & Ethical (R04)	R04. The repository ensures to the extent possible that data and metadata are created, curated, preserved, accessed and used in compliance with legal and ethical norms.	
Governance & Resources (R05)	R05. The repository has adequate funding and sufficient numbers of staff managed through a clear system of governance to effectively carry out the mission.	
Expertise & Guidance (R06)	R06. The repository adopts mechanisms to secure ongoing expertise, guidance and feedback-either in-house, or external.	
Provenance & Authenticity (R07)	R07. The repository guarantees the authenticity of the digital objects and provides provenance information.	R1.2. (meta)data are associated with detailed provenance
Deposit & Appraisal (R08)	R08. The repository accepts data and metadata based on defined criteria to ensure relevance and understandability for users.	
Preservation Plan (R09)	R09. The repository assumes responsibility for long-term preservation and manages this function in a planned and documented way.	A2. metadata are accessible, even when the data are no longer available

Quality Assurance (R10)	R10. The repository addresses technical quality and standards compliance, and ensures that sufficient information is available for end users to make quality-related evaluations.	
Workflows (R11)	R11. Digital object management takes place according to defined workflows from deposit to access.	
Discovery & Identification (R12)	R12. The repository enables users to discover the digital objects and refer to them in a persistent way through proper citation.	F1. (meta)data are assigned a globally unique and persistent identifier F2. data are described with rich metadata (defined by R1 below) F3. metadata clearly and explicitly include the identifier of the data it describes F4. (meta)data are registered or indexed in a searchable resource
Reuse (R13)	R13. The repository enables reuse of the digital objects over time, ensuring that appropriate information is available to support understanding and use.	I1. (meta)data use a formal, accessible, shared, and broadly applicable language for knowledge representation. I2. (meta)data use vocabularies that follow FAIR principles I3. (meta)data include qualified references to other (meta)data R1. meta(data) are richly described with a plurality of accurate and relevant attributes R1.3. (meta)data meet domain-relevant community standards
Storage & Integrity (R14)	R14. The repository applies documented processes to ensure data and metadata storage and integrity.	
Technical Infrastructure (R15)	R15. The repository is managed on well-supported operating systems and other core infrastructural software and hardware appropriate to the services it provides to its Designated Community.	A1. (meta)data are retrievable by their identifier using a standardized communications protocol A1.1 the protocol is open, free, and universally implementable
Security (R16)	R16. The repository protects the facility and its data, metadata, products, services, and users.	A1.2 the protocol allows for an authentication and authorization procedure, where necessary

Appendix B: The FAIR Data Principles. Wilkinson et al¹¹

To be Findable:

- F1. (meta)data are assigned a globally unique and persistent identifier
- F2. data are described with rich metadata (defined by R1 below)
- F3. metadata clearly and explicitly include the identifier of the data it describes
- F4. (meta)data are registered or indexed in a searchable resource

To be Accessible:

- A1. (meta)data are retrievable by their identifier using a standardized communications protocol
 - A1.1 the protocol is open, free, and universally implementable
 - A1.2 the protocol allows for an authentication and authorization procedure, where necessary
- A2. metadata are accessible, even when the data are no longer available

To be Interoperable:

- I1. (meta)data use a formal, accessible, shared, and broadly applicable language for knowledge representation.
- I2. (meta)data use vocabularies that follow FAIR principles
- I3. (meta)data include qualified references to other (meta)data

To be Reusable:

- R1. meta(data) are richly described with a plurality of accurate and relevant attributes
 - R1.1. (meta)data are released with a clear and accessible data usage license
 - R1.2. (meta)data are associated with detailed provenance
 - R1.3. (meta)data meet domain-relevant community standards

¹¹ Wilkinson, M., Dumontier, M., Aalbersberg, I. et al. The FAIR Guiding Principles for scientific data management and stewardship. *Sci Data* 3, 160018 (2016). <https://doi.org/10.1038/sdata.2016.18>

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This paper integrates and updates prior work substantially provided in the following papers:

Hervé L'Hours, Maaïke Verburg, Jerry de Vries, Linas Cepinskas, Ilona von Stein, Robert Huber, Joy Davidson, Patricia Herterich, & Benjamin Mathers. (2022). Report on a maturity model towards FAIR data in FAIR repositories (D4.6) (V2.0). Zenodo. <https://doi.org/10.5281/zenodo.6699520>

CoreTrustSeal Standards and Certification Board. (2022). CoreTrustSeal Trustworthy Digital Repositories Requirements 2023-2025 Extended Guidance (V01.00). Zenodo. <https://doi.org/10.5281/zenodo.7051096>

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