

SERVIR West Africa 2024 Training Program on Data Stewardship and the CoreTrustSeal Requirements: Session 2, R0 Requirement

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Coordinated by AFRIGIST

May 8, 2024, 13:00 – 14:30 GMT (9:00 - 10:30 a.m. EDT)



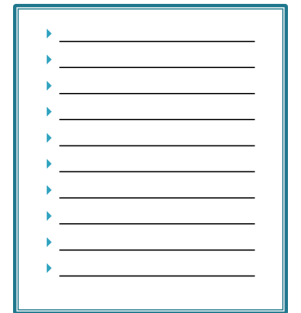
Brief Review of Previous Webinars

- Data Stewardship Concepts, Principles, and Certification Instruments
 - CoreTrustSeal, ISO 16363, Nestor DIN 31644
- Preservation, Designated Community, Sustainability
- CoreTrustSeal Certification requirements
- Organizational aspects of Data Stewardship
- CoreTrustSeal Requirements 2020-2022: R01-R16
- Setting the stage for Planning to Meet the CoreTrustSeal Requirements
- Motivation and R0 Requirement



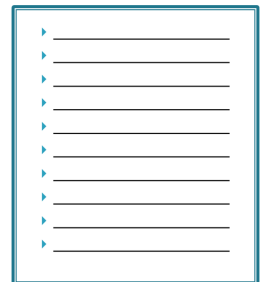
SERVIR West Africa 2024 Training Program on Data Stewardship and CoreTrustSeal Requirements

- Key topic:
 - R0 Requirement
- Instructional format
 - Lecture, questions, and discussion
- Session will be recorded
 - Recording will be posted on the SERVIR West Africa website



Outline for Current Session

- Progress Planning and Participant Introductions (10 minutes)
- Scheduling Training Sessions and CoreTrustSeal Application Preparation (5 minutes)
- Brief Review of Benefits of CoreTrustSeal Certification (10 minutes)
- Brief Review of CoreTrustSeal Certification and Processes (10 minutes)
- Review of CoreTrustSeal Requirements 2023-2025 (10 minutes)
- CoreTrustSeal Requirement 0 (30 minutes)
- Introduction to CoreTrustSeal Requirement 01 (10 Minutes)
- Preparing for Next Session (5)



Progress Planning and Introductions

- CoreTrustSeal application template created for each repository
 - CERSGIS, ICRISAT FMNR, AFRIGIST, AGRHYMET
- Each repository uses template to progressively revise their self-assessment
- Please put additional repository names and your email address in Zoom chat
- Brief introductions by those who have not previously introduced themselves

Scheduling Training Sessions and CoreTrustSeal Application Preparation

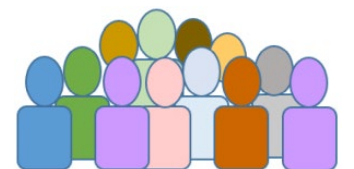
- Plan to schedule sessions twice monthly enabling time for progress
 - Repositories complete template sections between sessions
 - Each session includes review and introduction to subsequent section
- Next session planned for Wednesday, May 22, 2024, 13:00-14:30 GMT
 - Topics: Review of RO Requirement and Introduction to R1 Requirement

Brief Review of Benefits of CoreTrustSeal Certification

Overview of CoreTrustSeal Certification



- Meeting community-developed requirements for trustworthy data repositories
 - Repository community strives to serve as trustworthy data stewards
- Process for cooperative self-improvement of data repositories
 - Opportunity for repositories to improve performance through internal and external assessments
- Peer-reviewed assessments of evidence from data repositories' self-assessments
 - Applications reviewed by representatives of CTS certified repositories and CTS Board
- CoreTrustSeal requirements evolve with community expectations and practices
 - CTS requirements are revised every 3 years based on community recommendations



Benefits of CoreTrustSeal Certification: Overview

- What it means to be a trustworthy digital repository
 - Preserving digital objects to offer long-term access for the designated community
- Certification process improves repository capabilities
 - Peer reviewers describe needed improvements, repository corrects deficiencies
- Recognition as trustworthy by repository stakeholders
 - Host institution, funders, data producers & users, potential & current staff members
- Branding as a trustworthy digital repository offers new opportunities
 - Collaborations, support, partnerships for trusted repository and data
- Certified as having attained the repository community standard
 - Continuously improving digital repository capabilities

Additional Reasons for Attaining CoreTrustSeal Certification



- Serves as a stepping stone to World Data System membership
 - 133 World Data System Members as of March 2024
- Developing archiving capabilities to avoid expatriation of data

THE CONVERSATION

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Africa must keep its rich, valuable data safe from exploitation

Published: November 21, 2017 9:30am EST

- Serve as exemplars for data repositories in Africa

WDS membership March 2024



Source: <https://worlddatasystem.org/members/members-map/>

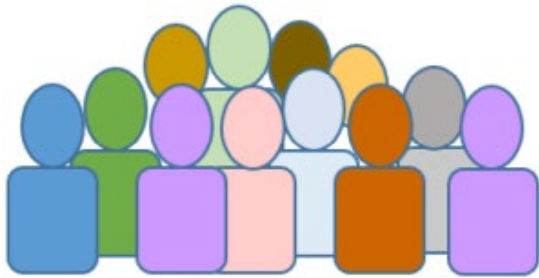
Intrinsic Benefits of CoreTrustSeal Certification



- Validation as a trustworthy digital repository
- Improving repository capabilities
- Receiving independent advice
- Justification to publicly document processes
- Continuous Quality Improvement (CQI)
- Confirmation of organizational performance
- Professional development of repository staff
- Opportunity to improve documentation
- Introspection on service dependencies
- Opportunity to find and correct weaknesses
- Eligibility for World Data System membership
- Participation in the repository community



Extrinsic Benefits of CoreTrustSeal Certification



- Demonstrated trustworthiness
- Evidence of digital preservation practices
- Stakeholder confidence
- Reputation with stakeholders
- Meeting stakeholder expectations
- Improving transparency of repository practices
- Recognition as trustworthy by stakeholders
- Branding as trustworthy to attract new opportunities
- Certified as meeting community requirements
- Improving confidence of data producers
- Increasing awareness of data stewardship role
- Distinction among competitor services
- Serve as an exemplar among data repositories



Questions for Consideration

Data Repository Certification – Why Do Repositories Pursue it?

Digital data repositories are relatively new with development occurring globally

- Why should the data repository work in isolation without the benefit of others' experience?
- Will the effort of applying for certification enable a repository to learn about new resources?
- Will advice from external reviewers contribute to the capabilities of the repository and its staff?

Improving the data repository is laudable and contributes to the services offered

- Will pursuing certification enable the repository to identify ways of improvement?
- Will better service to users result in higher user satisfaction?
- Is identifying and implementing measures to improve efficiency and effectiveness worth pursuing

Additional questions about the benefits of CoreTrustSeal Certification?



Brief Review of CoreTrustSeal Certification and Processes for Attaining CoreTrustSeal Certification


CoreTrustSeal Trustworthy Digital Repositories Requirements 2023-2025

- Current CoreTrustSeal Requirements are for 2023-2025
 - CoreTrustSeal Requirements will be revised in 2025 for 2026-2028
- Revisions reflect changes in community practices
 - Community needs, expectations, and practices change over time
- Consensus among community members guides revisions
 - Applicant and certified repositories comment on current requirements
 - Assembly of reviewers and CoreTrustSeal Board recommend changes
- CoreTrustSeal Requirements evolve incrementally
 - Revisions every 3 years enable repositories to improve over time
 - Recertification is required every 3 years.



Application Process for CoreTrustSeal Certification




- Repository conducts self-assessment for compliance with CTS Requirements
-  • Repository improves processes and publicly available evidence to comply with CTS Requirements
- Repository describes how each CTS Requirement is met and self-assesses Compliance Levels
- Repository identifies links for publicly accessible evidence of compliance with each requirement
- Repository completes online application form to record responses and evidence
 - Repository enters application into the CTS Application Management Tool (AMT)
 - Repository pays CTS Administrative Fee before application is assigned for review (now 3,000 EUR)
- Compliance Levels
 - In Progress: The repository is in the implementation phase
 - Implemented: The requirement has been fully implemented by the repository

Derived from: CoreTrustSeal Standards and Certification Board. (2022). CoreTrustSeal Requirements 2023-2025 (V01.00). Zenodo. <https://doi.org/10.5281/zenodo.7051012>

Review Process for CoreTrustSeal Certification



- 
- 2 Members of the Assembly of Reviewers are assigned to review each CTS application
 - Reviews of new CTS applications are due from reviewers in 2 months
 - New reviewers are paired with experienced reviewers to ensure consistency among reviews
 - Reviewers reassign a Compliance Level to each response and add comments, if needed
 - CoreTrustSeal Standards and Compliance Board reviews applications and reviews
 - Recommendations for improvement or for CTS Certification are sent to applicants
 - Applications can be submitted 4 additional times to receive recommendations for revision
 - CTS Certification is valid for 3 years before renewal is required for subsequent certification
 - Compliance Levels
 - In Progress: The repository is in the implementation phase
 - Implemented: The requirement has been fully implemented by the repository

Derived from: CoreTrustSeal Standards and Certification Board. (2022). CoreTrustSeal Requirements 2023-2025 (V01.00). Zenodo. <https://doi.org/10.5281/zenodo.7051012>

Steps to Meet the CoreTrustSeal Requirements: Improvement, Self-Assessment and Certification



- Improvement
 - Identify opportunities for improving capabilities
 - **What must be done? What resources are needed?**
- Self-Assessment Using Current CoreTrustSeal Requirements
 - Identify areas to be improved and prepare for certification
 - **How have other repositories met a particular requirement?**
- Certification
 - Apply for external review of repository capabilities and request certification
 - **Based on the submitted application, what do the reviewers recommend?**
 - Validation period is 3 years from the date when certification is obtained

Questions on CoreTrustSeal Certification and
Processes for Attaining CoreTrustSeal Certification?

Review of CoreTrustSeal Requirements 2023-2025

Overview of CoreTrustSeal Certification Requirements 2023-2025



- Background Information
 - R0 Context
- Organizational Infrastructure
 - R01 Mission & Scope, R02 Rights Management, R03 Continuity of Service, R04 Legal & Ethical, R05 Governance & Resources, R06 Expertise & Guidance
- Digital Object Management
 - R07 Authenticity & Provenance, R08 Deposit & Appraisal, R09 Preservation Plan, R10 Quality Assurance, R11 Workflows, R12 Discovery & Identification, R13 Reuse
- Technology
 - R14 Storage & Integrity, R15 Technical Infrastructure, R16 Security

Source: CoreTrustSeal Standards and Certification Board. (2022). CoreTrustSeal Requirements 2023-2025 (V01.00). Zenodo. <https://doi.org/10.5281/zenodo.7051012>

Overview of CoreTrustSeal Requirements 2023-2025: Context

R0 Context

- General information about the repository
- Re3data identifier
- Repository Type. Select all relevant types from:
 - Generalist or Specialist; Specialist describes scope
- Overview – Brief Description of Repository
- Brief Description of the Designated Community
- Level of Curation Performed. Select all relevant types from:
 - Content distributed as deposited Basic curation – e.g., brief checking, addition of basic metadata or documentation. Enhanced curation – e.g., conversion to new formats during ingest, enhancement of documentation or metadata; Data -level curation – as in C above, but with additional editing of deposited data for accuracy
- Cooperation and Outsourcing to third parties, partners, and host organizations.
- Applicants renewing – Summary of Significant Changes Since Last Application



Source: CoreTrustSeal Standards and Certification Board. (2022). CoreTrustSeal Requirements 2023-2025 (V01.00). Zenodo. <https://doi.org/10.5281/zenodo.7051012>

CoreTrustSeal Requirements 2023-2025: Organizational Infrastructure

- R1 Mission & Scope
 - The repository has an explicit mission to provide access to and preserve digital objects.
- R2 Rights Management
 - The repository maintains all applicable rights and monitors compliance.
- R3 Continuity of Service
 - The Repository has a plan to ensure ongoing access to and preservation of its data and metadata.
- R4 Legal and Ethical
 - 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.
- R5 Governance & Resources
 - The repository has adequate funding and sufficient numbers of staff managed through a clear system of governance to effectively carry out the mission.
- R6 Expertise & Guidance
 - The repository adopts mechanisms to secure ongoing expertise, guidance and feedback-either in-house, or external.



CoreTrustSeal Requirements 2023-2025: Digital Object Management

- R07 Provenance & Authenticity
 - The repository guarantees the authenticity of the digital objects and provides provenance information.
- R08 Deposit & Appraisal
 - The repository accepts data and metadata based on defined criteria to ensure relevance and understandability for users.
- R09 Preservation Plan
 - The repository assumes responsibility for long-term preservation and manages this function in a planned and documented way.
- R10 Quality of Service
 - The repository addresses technical quality and standards compliance, and ensures that sufficient information is available for end users to make quality-related evaluations.
- R11 Workflows
 - Digital object management takes place according to defined workflows from deposit to access.
- R12 Discovery & Identification
 - The repository enables users to discover the digital objects and refer to them in a persistent way through proper citation.
- R13 Reuse
 - The repository enables reuse of the digital objects over time, ensuring that appropriate information is available to support understanding and use.



CoreTrustSeal Requirements 2023-2025: Information Technology & Security



- **R14 Storage & Integrity**
 - The repository applies documented processes to ensure data and metadata storage and integrity.
- **R15 Technical Infrastructure**
 - 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.
- **R16 Security**
 - The repository protects the facility and its data, metadata, products, services, and users.

Questions on CoreTrustSeal Requirements 2023-2025?

CoreTrustSeal Requirement 0

Overview of CoreTrustSeal Requirements 2023-2025: Context

R0 Context

- General information about the repository
- Re3data identifier
- Repository Type. Select all relevant types from:
 - Generalist or Specialist; Specialist describes scope
- Overview – Brief Description of Repository
- Brief Description of the Designated Community
- Level of Curation Performed. Select all relevant types from:
 - Content distributed as deposited Basic curation – e.g., brief checking, addition of basic metadata or documentation. Enhanced curation – e.g., conversion to new formats during ingest, enhancement of documentation or metadata; Data -level curation – as in C above, but with additional editing of deposited data for accuracy
- Cooperation and Outsourcing to third parties, partners, and host organizations.
- Applicants renewing – Summary of Significant Changes Since Last Application

Assignment from Previous Session

- Review requirements for R0 within the context of your repository
- Discuss among managers and staff within your repository
- Draft description for an re3data identifier for your repository
 - Requirements: <https://www.re3data.org/suggest>
 - Search for descriptions of other repositories: <https://www.re3data.org/search>

CoreTrustSeal Requirement 0, Background Information and Context

- Re3data identifier
 - Re3data is a **Registry of Research Data Repositories**
 - Internationally recognized global registry of repositories
 - Assists potential depositors, users, and others in discovering data repositories
 - Users of Re3data can search for a repository by entering a topic as a query
- Repositories are described in the Re3data registry
 - Title of repository
 - Subject(s) covered by the content of the repository
 - Content type(s)
 - Country where the repository is located
 - Brief narrative description of the repository

CoreTrustSeal R0: Repository Registration in re3data.org

re3data.org Registration Policy

To be registered in re3data.org a research data repository must

- be run by a legal entity, such as a sustainable institution (e.g. library, university)
- clarify access conditions to the data and repository as well as the terms of use
- **have focus on research data**

A research data repository is a subtype of a sustainable information infrastructure which provides long-term storage and access to research data that is the basis for a scholarly publication. Research data means information objects generated by scholarly projects for example through experiments, measurements, surveys or interviews.

A research data repository listed in re3data.org is either:

- a data provider if it offers research data and its metadata (ideally exposing metadata via interfaces),

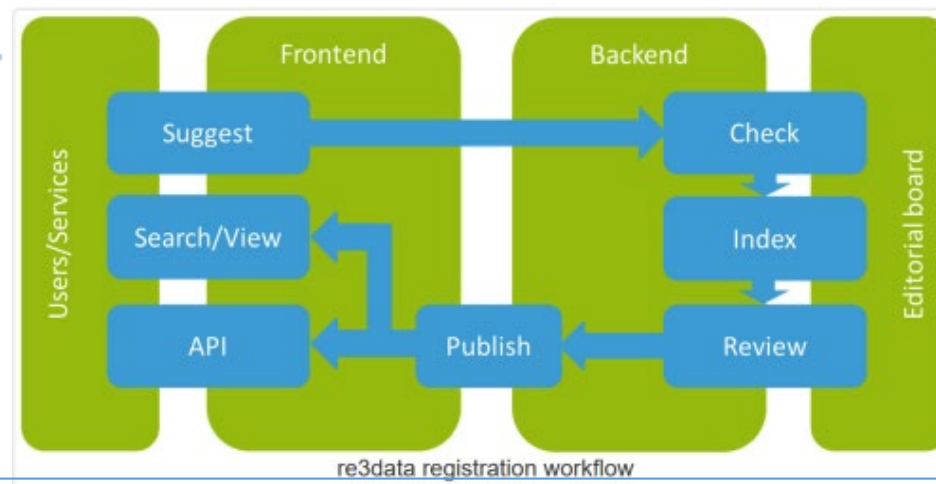
and/or

- a service provider (e.g. a portal) if it harvests the metadata of research data from data providers as a basis for building value-added services.

Required Information:
Repository Name (Language)
Repository URL
Description (Language)
Data License Choices, URL
Suggester's email
Optional Fields

How can I add a research data repository to re3data?

Research data repository (RDR) operators can **suggest** their infrastructures to be listed in re3data via an application form providing the name and URL as well as other properties of the RDR . The project team thoroughly analyzes the website of the RDR using a handbook that gives practical information on how to obtain the metadata properties of the re3data schema. A repository is indexed when the minimum requirements of the re3data policy are met, meaning that mode of access to the data and repository as well as the terms of use must be clear explained on the repository web sites and **the repository must have a focus research data**. Before a new record of a RDR is published in re3data all gathered information is reviewed by a second team member (see figure below). Afterwards the RDR will be visible to the public.



CoreTrustSeal Requirement 0, Background Information and Context

- Repository Type. Select all relevant types from:
 - Select a repository type (Generalist vs. Specialist - specialist must specify domain and/or disciplines(s))
 - The repository needs to describe the disciplines represented by the content that the repository disseminates. Additional information related to the discipline(s) represented provides context for the reviewers to understand the repositories role in supporting the represented disciplines.

Questions for Discussion

- How might the disciplines represented by the repository be described?
- Since subsequent questions will ask about the Designated Community and its knowledge base, how might the holdings of the repository be described in terms of the disciplines or domains represented in the content that is distributed?

CoreTrustSeal Requirement 0, Background Information and Context - Continued -

- Overview – Brief Description of Repository
 - *Provide a short overview of key characteristics of the repository, reflecting the repository type selected. This should include information about the scope and size of data collections, data types and formats. Further contextual information may also be added.*

Source: 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>

Questions for Discussion

- In what ways can the repository be described for reviewers and the public?
- Which aspects of the repository should be described to provide an overview of the repository and the services offered?

CoreTrustSeal Requirement 0, Background Information and Context - Continued -

- Brief Description of the Designated Community
 - *A clear definition of the Designated Community demonstrates that the applicant understands the scope, knowledge base, and methodologies-including preferred software/formats-of the group(s) of users at whom the curation and preservation measures are primarily targeted. The definition should be specific so that reviewers can assess whether that community is being served in the responses to other requirements.*

Source: 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>

Questions for Discussion

- How will the Designated Community be described for reviewers and the public in terms of their disciplinary backgrounds and education?
- How will the knowledge base of the Designated Community be described in terms of its expertise and its understanding of the methodologies, tools, services, and software utilized to analyze data in the formats provided by the repository?

CoreTrustSeal Requirement 0, Background Information and Context - Continued -

- Level of Curation Performed. Select all relevant types from:
 - A Content distributed as deposited
 - B Basic curation – e.g., brief checking, addition of basic metadata or documentation.
 - C Enhanced curation – e.g., conversion to new formats during ingest, enhancement of documentation or metadata;
 - D Data -level curation – as in C above, but with additional editing of deposited data for accuracy
- Level of Curation Explanation
 - Please add the description for your levels of curation.
 - The repository needs to describe how the level of curation or levels of curation are managed, as this will inform reviewers how the repository completes curation. Reviewers will look at the Curation Explanation frequently when reviewing responses to other requirements.

Source: 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>

Questions for Discussion

- Is only one level of curation applied to all data products or is more than one level of curation applied in some circumstances?
- If a higher level of curation is applied to data products, are there cases where the lower level of curation also is applied?
- Is the level of curation that is applied completed in a manner that involves the submitter of the data?

CoreTrustSeal Requirement 0, Background Information and Context - Continued -

- (6) Cooperation and outsourcing to third parties, partners and host organizations.
 - List or describe insource partners within the host organization that contribute to the repository and its operations.
 - List or describe outsource partners that are external to the host organization that contribute to the repository and its operations.

Note: Insource partners may offer support, services, or guidance that the repository leverages to serve its Designated Community.

Outsource partners may be sponsors, contractors, or vendors that support the repository's services.

Source: 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>

Questions for Discussion

- Which units of the host organization contribute to or support the work of the repository?
- What external entities, such as sponsors or other organizations supported by the same sponsors, are involved with the repository as either partners or collaborators?
- What contractors or service providers are working with the repository to meet its objectives?

CoreTrustSeal Requirement 0, Background Information and Context - Continued -

- (7) Applicants renewing their CoreTrustSeal Certification
 - *Summary of significant changes since last application. CoreTrustSeal certification has an expectation of continuous improvement over time. Repositories undergoing recertification should highlight briefly any significant changes including to technical systems, Designated Community or funding during the previous three years. This could include any steps taken to move from 'In Progress' to 'Implemented' Requirements since the last certification.*
 - *Only applicable to repositories that have receive CoreTrustSeal Certification*

This question should only be answered by repositories that are renewing CoreTrustSeal Certification.

Source: 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>

Questions for Discussion

- How can the repository and the Designated Community be described for reviewers and the public?
- Which aspects of cooperation, partnerships and outsourcing should be described?

Introduction to R01, Mission & Scope

- R01. The repository has an explicit mission to provide access to and preserve digital objects.
- Repositories take responsibility for the curation of digital objects, and for ensuring that materials are held in the appropriate environment for appropriate periods of time. For Trustworthy Repositories it must be clear to depositors and users that active preservation of and continued access to the digital objects is an explicit role of the repository.
- The response statement and evidence should include references to the following items:
 - The mission to actively preserve and provide access to digital objects
 - The level of approval that the mission has received.
- Evidence for this Requirement could include an approved public mission statement, roles mandated by funders, or a policy statement signed off by a governing board.

Preparing for Next Session

Preparing for Next Session: Activities in Your Repository

- Template assigned to each repository for self-assessment
- Review requirements for R0 within the context of your repository
- Discuss among managers and staff within your repository
- Draft description for an re3data identifier for your repository
 - Requirements: <https://www.re3data.org/suggest>
 - Search for descriptions of other repositories: <https://www.re3data.org/search>
- Draft responses to R0 for your repository within your template

Questions?

Looking Forward at the Remaining CoreTrustSeal Requirements

CoreTrustSeal Requirements 2023-2025: Organizational Infrastructure



- R1 Mission & Scope
- R2 Rights Management
- R3 Continuity of Service
- R4 Legal and Ethical
- R5 Governance & Resources
- R6 Expertise & Guidance

Source: CoreTrustSeal Standards and Certification Board. (2022). CoreTrustSeal Requirements 2023-2025 (V01.00). Zenodo. <https://doi.org/10.5281/zenodo.7051012>

CoreTrustSeal Requirements 2023-2025: Digital Object Management



- R07 Provenance & Authenticity
- R08 Deposit & Appraisal
- R09 Preservation Plan
- R10 Quality of Service
- R11 Workflows
- R12 Discovery & Identification
- R13 Reuse

Source: CoreTrustSeal Standards and Certification Board. (2022). CoreTrustSeal Requirements 2023-2025 (V01.00). Zenodo. <https://doi.org/10.5281/zenodo.7051012>

CoreTrustSeal Requirements 2023-2025: Information Technology & Security



- R14 Storage & Integrity
- R15 Technical Infrastructure
- R16 Security

Source: CoreTrustSeal Standards and Certification Board. (2022). CoreTrustSeal Requirements 2023-2025 (V01.00). Zenodo. <https://doi.org/10.5281/zenodo.7051012>

Online Guidance and Related Resources for Improving Data Stewardship and Attaining CoreTrustSeal Certification 2023-2025

- CoreTrustSeal Standards and Certification Board. (2022). CoreTrustSeal Requirements 2023-2025 (V01.00). Zenodo. <https://doi.org/10.5281/zenodo.7051012>
- 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>
- CoreTrustSeal Standards and Certification Board. (2022). CoreTrustSeal Trustworthy Data Repositories Requirements: Glossary 2023-2025 (V01.00). Zenodo. <https://doi.org/10.5281/zenodo.7051125>
- 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>
- Apply for CoreTrustSeal Certification: <https://www.coretrustseal.org/apply/>
- CoreTrustSeal Requirements (& webinars): <https://www.coretrustseal.org/why-certification/requirements/>
- CoreTrustSeal Administrative Fee (& waiver): <https://www.coretrustseal.org/apply/administrative-fee/>
- CoreTrustSeal: <https://www.coretrustseal.org/>

Online Resources for Improving Data Stewardship and Attaining CoreTrustSeal Certification (Continued)

- Consultative Committee for Space Data Systems. 2012. Reference Model for an Open Archival Information System (OAIS). CCSDS 650.0-M-2. Also published as ISO 14721:2012. <https://public.ccsds.org/Pubs/650x0m2.pdf>
- Consultative Committee for Space Data Systems (CCSDS). 2011. Audit and Certification of Trustworthy Digital Repositories. CCSDS 652.0-M-1. Also published as ISO 16363:2012. <https://public.ccsds.org/pubs/652x0m1.pdf>
- Group on Earth Observations (GEO). 2016. Global Earth Observations System of Systems (GEOSS) Data Management Principles. http://earthobservations.org/open_eo_data.php#
- Group on Earth Observations (GEO). 2016. Global Earth Observations System of Systems (GEOSS) Data Sharing Principles. http://earthobservations.org/open_eo_data.php#

Online Resources for Improving Data Stewardship and Attaining CoreTrustSeal Certification (Continued)

- Carroll, S.R., et al. 2020. The CARE Principles for Indigenous Data Governance. *Data Science Journal*, 19(1). <https://doi.org/10.5334/dsj-2020-043>
- Lin, D., et al. 2020. The TRUST Principles for digital repositories. *Scientific Data* 7, 144. <https://doi.org/10.1038/s41597-020-0486-7>
- Wilkinson, M, et al. 2016. The FAIR Guiding Principles for scientific data management and stewardship. *Scientific Data* 3, 160018. <https://doi.org/10.1038/sdata.2016.18>

Online Resources for Improving Data Stewardship and Attaining CoreTrustSeal Certification (Continued)

- International Science Council (ISC) CODATA international discussion list
 - http://lists.codata.org/mailman/listinfo/codata-international_lists.codata.org
- Research Data Alliance (RDA) <https://www.rd-alliance.org/>
 - <https://www.rd-alliance.org/groups/rdawds-certification-digital-repositories-ig.html>
- Group on Earth Observations (GEO)
 - <https://earthobservations.org/>
- World Data System (WDS)
 - <https://www.worlddatasystem.org/>

Online Resources for Improving Data Stewardship and Attaining CoreTrustSeal Certification (Continued)

- Downs, 2021. Improving Opportunities for New Value of Open Data: Assessing and Certifying Research Data Repositories. *Data Science Journal*. <https://doi.org/10.5334/dsj-2021-001>
- Downs RR. 2019. International Standards for Trustworthy Data Repositories. National Institutes of Health (NIH) Trustworthy Data Repositories Workshop. Rockville, MD. <https://doi.org/10.7916/d8-h7xf-ha70>
- Downs RR. 2021. Adopting the TRUST Principles for Digital Repositories with the GEOSS Data Management Principles and the GEOSS Data Sharing Principles. ESIP 2021 Winter Meeting (Virtual). <https://doi.org/10.6084/m9.figshare.13607747.v1>
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Thank you!

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