

Conference paper

Legacy and future of the World Data System certification of data services and networks

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Summary

The World Data System (WDS) was created in October 2008 as an Interdisciplinary Body of the International Council for Science (ICSU), building on the 50+ year legacy of the World Data Centres and Federation of Astronomical and Geophysical data analysis Services established by ICSU to manage data generated from the International Geophysical Year (1957–1958). ICSU-WDS is striving to build worldwide ‘communities of excellence’ for scientific data services by certifying holders and providers of data or data products—and networks of these—from wide-ranging scientific domains using internationally recognized standards. Certification criteria and a procedure for evaluating candidates for membership were developed by the WDS Scientific Committee (WDS-SC) to ensure the trustworthiness of WDS Members in terms of authenticity, integrity, confidentiality, and availability of data and services. Certification is important because it promotes confidence in the usability and persistence of shared data resources. It also helps data services improve their practices and procedures.

The ICSU-WDS mission

The WDS mission is to support ICSU’s vision by promoting long-term stewardship of, and universal and equitable access to, quality-assured scientific data and data services, products, and information across a range of disciplines in the Natural and Social Sciences, and the Humanities. Furthermore, ICSU-WDS is committed to fostering compliance with agreed-upon data standards and conventions, and providing mechanisms to improve access to data. ICSU-WDS aims to facilitate scientific research, in particular under the ICSU umbrella, by coordinating and supporting trusted scientific data services¹ for the provision, use, and preservation of relevant datasets, while strengthening their links with the research community. To achieve these objectives, ICSU-WDS has adopted a set of Data Sharing Principles² and has outlined its strategy in a five-year Strategic Plan for 2014–2018³, structured around five major targets:

1. Make trusted data services an integral part of international collaborative scientific research.
2. Nurture active disciplinary and multidisciplinary scientific data services communities.
3. Improve the funding environment for trusted data services.
4. Improve the trust in and quality of open scientific data services.

5. Position WDS as the premium global multidisciplinary network for quality-assessed scientific research data.

WDS Members

WDS Member Organizations from wide-ranging disciplines are the building blocks of worldwide 'communities of excellence' for scientific data. Not only do these Members participate towards advancing WDS strategic objectives; their data holdings, services, products, and information are the cornerstone of the federated data system. As of 30 May 2016, ICSU-WDS had 95 Member Organizations⁴ in four different categories:

61 Regular Members: Organizations that are data stewards and/or data analysis services.

10 Network Members: Umbrella bodies representing groups of data stewardship organizations and/or data analysis services, some of which may or may not be WDS Regular Members. Usually serve as coordinating agents for nodes that have common characteristics and mostly common disciplines.

6 Partner Members: Organizations that are not data stewards or data analysis services, but that contribute support or funding to ICSU-WDS and/or WDS Members

18 Associate Members: Organizations that are interested in the WDS endeavour and participating in our discussions, but that do not contribute direct funding or other material support

Member Organizations are formally accepted into ICSU-WDS by its Scientific Committee. Regular and Network Members are certified according to internationally recognized standards, while Partners and Associates are co-opted.

WDS certification of data services and networks

As part of the process of building ICSU-WDS, certification criteria and a procedure for evaluating candidates for membership were developed by the WDS-SC to ensure the trustworthiness of WDS Members in terms of authenticity, integrity, confidentiality, and availability of data and services. Certification is important because it promotes confidence in the usability and persistence of shared data resources. It also helps data services, and the networks that oversee them, to improve their practices and procedures.

The WDS certification was defined by incorporating best practices from existing standards developed by other organizations and projects (e.g., the Open Archival Information System Reference Model⁵, Online Computer Library Center, Inc.⁶, network of expertise in long-term storage of digital resources in Germany⁷, World Meteorological Organization Information System⁸, Center for Research Libraries⁹, and Data Seal of Approval¹⁰ [DSA]), whilst striking a balance between simplicity and robustness.

The certification process is based on two catalogues of evaluation criteria¹¹: one for Regular Members and another for Network Members. The catalogue of criteria for WDS Regular Members has 17 criteria grouped under 4 headings:

1. WDS general requirements

2. Organizational framework
3. Management of data, products, and services
4. Technical infrastructure

Network Members—which are umbrella bodies—vary greatly in their structure and responsibilities (e.g., central bureau, coordinating committee, secretariat, programme office, etc.), as well as in how they take responsibility for the competence and on-going performance of individual network components. As a result, the catalogue of criteria for Network Members has less emphasis on management of data, products, and services and on technical infrastructure. Instead, it contains an additional section covering the network's organization and aims, and how it takes on responsibility for the quality of its components.

Evaluation criteria and procedures

Candidates for WDS membership demonstrate their compliance against the relevant catalogue of criteria, supplying evidence by means of an online application form and following guidance provided for each criterion. In some cases, the questions can simply be answered positively or negatively, whereas in others, answers require non-standardized information from applicants that indicates the degree of their compliance and maturity. Applications are assessed by two reviewers appointed from—or by—the WDS-SC, which functions as a certification authority. Successful applicants are accredited as a WDS Regular or Network Member and are reviewed again within three-to-five years.

Future of WDS certification

In 2013, the Repository Audit and Certification Working Group¹² (WG) was established under the Research Data Alliance–WDS Certification of Digital Repositories Interest Group to nurture a DSA–WDS partnership, with the objectives of realizing efficiencies, simplifying assessment options, stimulating more certifications, and increasing impact on the community. The WG has delivered a harmonized Catalogue of Common Requirements for core certification of repositories that is drawn from DSA and WDS criteria, as well as a set of Common Procedures for their assessment. The former is expected to replace the current DSA guidelines and the catalogue of criteria for WDS Regular membership. ICSU-WDS will continue to accredit networks of data services using its existing Network Member catalogue.

Acknowledgements

The authors would like to thank current¹³ and former¹⁴ members of the WDS Scientific Committee who contributed to establishment of the WDS certification and to the many experts nominated by accredited WDS Members who acted as reviewers.

Competing Interests

The authors declare that they have no competing interests.

Notes

- 1 Scientific data services assist organizations in the capture, storage, curation, long-term preservation, discovery, access, retrieval, aggregation, analysis, and/or visualization of

scientific data, as well as in the associated legal frameworks, to support disciplinary and multidisciplinary scientific research

- 2 <https://www.icsu-wds.org/services/data-sharing-principles> DOI: 10.5281/zenodo.34354
- 3 <https://www.icsu-wds.org/organization/strategic-plan> DOI: 10.5281/zenodo.19169
- 4 <https://www.icsu-wds.org/community/membership>
- 5 <http://public.ccsds.org/publications/archive/650x0m2.pdf>
- 6 <http://www.oclc.org/home.en.html>
- 7 http://www.langzeitarchivierung.de/Subsites/nestor/EN/nestor-Siegel/siegel_node.html
- 8 <http://www.wmo.int/pages/prog/www/WIS/>
- 9 <http://www.crl.edu/>
- 10 www.datasealofapproval.org/en/
- 11 <https://www.icsu-wds.org/files/wds-certification-summary-11-june-2012.pdf>
- 12 <https://www.icsu-wds.org/community/working-groups/certification>
- 13 <https://goo.gl/QG4Ecb>
- 14 <https://goo.gl/7f7IWF>