World Data System Implementation Plan 2018–2019

Trusted Data Services for Global Science

The World Data System (WDS) of the International Science Council (ISC) decided to adopt three Strategic Targets defined in the Strategic Plan 2019–2023 to fulfil its remit and build worldwide multidisciplinary 'communities of excellence' for scientific data services. The overarching objective is to promote data stewardship and support the provision of trustworthy data services for global science. The WDS Scientific Committee (WDS-SC) is advancing these Targets during the period 2018–2019 by guiding the implementation of the WDS programme according to the plan laid out below. For each Strategic Target (ST), the Implementation Plan develops objectives and defines the required resources and risks where appropriate. The deliverables and milestones are also presented with expected dates for delivery.

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Strategic Target 1: Improve the sustainability, trust in, and quality of open scientific data services

Objectives for ST1

a)   Define and provide trustworthiness certification frameworks for WDS Regular and Network Members.

b)   Actively promote Open Data Sharing Principles at national and international levels.

c)   Foster interoperable practices to facilitate data sharing, access, and reuse, including through data publication; in particular, for multidisciplinary research.

d)   Work with policymakers, funders, and other stakeholders to promote sustainable long-term funding for trustworthy scientific data services.

e)   Improve access, use, reuse, and translation of data into products and services for improving society.

Background for ST1

The World Data System should be the international voice to advocate for a sustainable global research data infrastructure (GRDI) and propose mechanisms to better link infrastructures across domains and boundaries.

Scientific data services—with certified technical and scientific capacities—are essential components of the research environment. They play an essential role in ensuring the integrity and availability of datasets, and hence promote trust in science. WDS is committed to increasing the quality of, and trust in, the services provided by its Members, and will concentrate on the above objectives. In this regard, the following progress has been made by WDS thus far to advance objectives a) to e):

- In collaboration with the Data Seal of Approval (DSA), WDS has developed not only a set of Requirements to certify the trustworthiness of data repositories at the core level, but also a new certification authority—the CoreTrustSeal—to oversee their implementation. The CoreTrustSeal Data Repositories Requirements form the framework and basis for sustainability of data repositories and data holdings. They are endorsed outputs of the Research Data Alliance (RDA) and, in addition, have been positively assessed by the European Multi Stakeholder Platform such that they will be nominated for inclusion in the European Commission's official ICT Technical Specifications.

- The scientific data services community has been quick to realize the value of the new certification standard, with eight seals awarded by the start of 2018 (30 as of August 2018), and many more organizations within the process. This process has been assisted by WDS starting a series of regional workshops around trust and certification; with data holders and data producers being brought together from Africa, from Asia–Oceania, and from Latin America and the Caribbean (LAC) in three events held in 2017–2018.

- WDS has demonstrated its willingness and effectiveness at liaising with important stakeholders in the data landscape; in particular, funders and policymakers through its respective activities with the Belmont Forum and with the Organization for Economic Cooperation and Development (OECD). WDS has been taking a leading role in the Belmont Forum's collaborative research action on e-Infrastructure and Data Management, and has helped to generate good practices for Data Management Plans (DMPs) for adoption across the various national funding agencies. It has been working the Global Science Forum (GSF) of OECD through two joint Expert Groups that have produced policy recommendations in the areas of coordination and support of international research data networks, and business models for sustainable research data repositories.

- To improve the quality of open scientific data services, WDS has established a set of Open Data Sharing Principles that express ethical commitments operationalized in the accreditation of WDS Members. Furthermore, a Training Resources Guide has been published on the WDS website to point scientific data services towards available training materials offered by WDS Members and beyond that are acknowledge to be useful.

Required Resources and Risks for ST1

Estimates of development time required to establish each component, together with potential collaborations and status of funding options:

Component	Resource estimate	Contributors	Resources	Impact if realized / probability resources not available
Influence funders to fund GRDI and activities		WDS-SC, WDS International Programme Office (WDS-IPO) WDS representatives in the OECD Expert Groups (3 persons) This needs co-design (20 persons needed)	In-kind contributions	High impact / high probability

Component	Resource estimate	Contributors	Resources	Impact if realized / probability resources not available
Research Data Management landscape and networking		WDS-SC, WDS-IPO, WDS Members Inventory of key contacts activity (5 core group, WDS-SC) Feedback from WDS Members (WDS-IPO, WDS Members) Developing countries (5 core group, WDS-SC, WDS-IPO, AOSP, LAC Network, AO Network)	In-kind contributions	High impact / moderate probability
Promote up-take and expand CoreTrustSeal		WDS-IPO, core group from WDS-SC	WDS-IPO budget, with additional funding sought to support, improve, and extend the certification framework	High impact / moderate probability
Promote regional workshops and mentoring around trust and certification		WDS-IPO, WDS-SC Members (Yasuhiro Murayama, Ingrid Dillo) WDS Members for the mentoring		High impact / moderate probability

Deliverables/Milestones for ST1

ST#1a Influence funders to fund research data infrastructure and activities

ST#1a.1) Follow-up on the OECD-GSF reports: outreach on the outcomes to the community, including WDS Members, as well as more generally (**Nov 2018**)

ST#1a.2) OECD-GSF report on sustainable business models: outreach to funding agencies and to developing countries (**Nov 2018**)

ST#1a.3) OECD-GSF report on international coordination of data networks: select recommendations to work further in the WDS framework (**Apr 2019**)

ST#1b Co-design of activities with funders

ST#1b.1) Continue work with the Belmont Forum e-Infrastructure and Data Management activity, including on DMPs (**Ongoing**)

ST#1b.2) Identify other potential co-design activities (**Ongoing**)

ST#1b.3) Inform WDS Members about funding opportunities (e.g., through calls by the Belmont Forum) (**Ongoing**)

ST#1c Expand WDS key contacts and networks

ST#1c.1) Create a dynamic list of key contacts, and extract any potential funding sources from this list (**Oct 2018**)

ST#1c.2) Continue regular communication with and obtain feedback from WDS Members (**Ongoing**)

ST#1c.3) Explore avenues to work with the ISC Member Organizations, Member Unions and Associations, and Affiliated Members (**Nov 2018**)

ST#1d Promote and expand CoreTrustSeal up-take

ST#1d.1) Use conferences, meeting, webinars, and so on as opportunities for outreach (**Ongoing**)

ST#1d.2) Create a sustainable business model for the entity (**Completed**)

ST#1d.3) Work with the CoreTrustSeal to examine opportunities for certification of digital repositories that hold scientific outputs other than data (**Dec 2019**)

ST#1e Regional workshops around trust and certification

ST#1e.1) Work with data repositories interested to become WDS Members but not ready for certification and establish a new membership category and mentoring programme with WDS Members (**Nov 2018**)

ST#1e.2) Connect with the African Open Science Platform (**Nov 2018**)

ST#1f Continue to promote open data sharing principles (**Ongoing**)

Strategic Target 2: Nurture active disciplinary and multidisciplinary scientific data services communities

Objectives for ST2

a) Provide models of best practice for data management and data sharing to communities as a tangible knowledge base for capacity building, including the documentation and dissemination of approaches and practices employed by successful communities/WDS Members to:

   i. Promote adherence to standards and conventions.

   ii. Accelerate the process of identifying commonalities.

b) Promote better interaction within and across data communities to increase awareness of other approaches and practices:

   i. Within disciplinary communities to promote best practices.

   ii. Across disciplinary communities to encourage cross-fertilization.

c) Build bridges between data communities through workshops and fora, including the SciDataCon Conference co-organized with the Committee on Data (CODATA) of the ISC.

Background for ST2

The science required to address the problems facing humankind—for example, the challenge of meeting the Sustainable Development Goals (SDGs)—is transdisciplinary by nature. This transdisciplinary science must be supported by internationally coordinated and integrated multidisciplinary scientific data services, which cannot exist and succeed without effective underlying disciplinary scientific data services. WDS membership includes disciplinary and multidisciplinary communities of varying levels of maturity: some communities have achieved sustainable mechanisms for international coordination, while others have not. By providing a forum for these communities to interact and share good practices, and by promoting collaborations in the context of transdisciplinary scientific programmes, WDS can accelerate both maturation and the emergence of a global community supporting scientific data services.

Communication channels with the different data communities include, but are not limited to, the WDS Members' Forum (now known as Data Repositories Day), SciDataCon, special international workshops and conferences arranged by WDS, webinars, WDS representation in other international conferences and meetings, as well as journal publications. WDS also promotes and supports new data initiatives through regional workshops and targeted activities. Examples of such workshops include the Africa Data Initiatives Workshop (April 2017), the Asia–Oceania Conference (September 2017)—which has resulted in the formation of the WDS Asia–Oceania Network—and the LAC Scientific Data Management Workshop (April 2018).

Alignment of the DSA and WDS certifications (see Strategic Target 1) provides a benchmark for the performance of WDS Members. Periodic recertification and ongoing assessments against the WDS Maturity Model assures continued improvement towards best practice. These procedures not only enable existing WDS Members to evaluate themselves in respect of performance and potential strategies for improvement, but also informs prospective members and data communities at large about best practices and the emerging data landscape.

Required Resources and Risks for ST2

Component	Resource estimate	Contributors	Resources	Impact if realized / probability resources not available
Document and disseminate approaches and practices	Dedicated time	WDS-IPO, WDS International Technology Office (WDS-ITO), WDS Members	In-kind contributions	High impact / low probability
Foster transdisciplinary and regional networks	Funding or in-kind contribution for workshops and other activities	WDS-IPO, WDS-SC, WDS Members	In-kind contributions	Moderate impact / moderate probability

Deliverables/Milestones for ST2

ST#2a Provide and disseminate models of best practice

ST#2a.1) Develop appropriate Maturity Models for different communities to provide a benchmarking tool to Members (**Apr 2018**)

ST#2a.2) Develop and publish an online tool for Maturity Model implementation for incremental improvement and self-evaluation of maturity (**Sep 2018**)

ST#2a.3) Work with existing WDS Members to ensure that standards are being employed (**Dec 2018**)

ST#2b Promote better interaction within and across data communities

ST#2b.1) Utilize opportunities to collaborate with other data organizations; for example, CODATA, RDA, OECD, Digital Research Infrastructure for the Arts and Humanities, and the Trans-Atlantic Platform (**Ongoing**)

ST#2b.2) Cross-fertilize and promote best practices in data management, including practical aspects; for example, via the WDS Data Repositories Day (**Ongoing**)

ST#2b.3) Outreach to expand WDS membership, focussing on broadening disciplinary and geographical scope (**Ongoing**)

ST#2b.4) Foster ongoing dialogue about harmonization of data provision from all disciplines to facilitate transdisciplinary research required to address societal problems **(Ongoing)**

ST#2b.5) Foster and sustain the next generation of data scientists by promoting the continued development of the WDS-ECR network (**Ongoing**)

ST#2c Build bridges between data communities

ST#2c.1) Start a networking activity with an extra focus on the actors in developing countries **(Ongoing)**

Strategic Target 3: Make trustworthy data services an integral part of international collaborative scientific research

Objectives for ST3

a) Create awareness of the needs and benefits of trustworthy data services in scientific research towards all stakeholders.

b) Make it easy to find and then to use these services.

c) Involve the growing number of WDS Members more closely in international collaborative multidisciplinary scientific research.

Background for ST3

Data stewardship starts with funding allocation, and needs the promotion of DMPs, requirements for deposit in trusted repositories and open access, and appropriate licenses. Inclusion of these aspects in global funding programmes and initiatives—in particular, promotion of scientific openness and maintenance of free exchange of data—form an important part of the WDS objectives.

Availability of trusted repositories for deposit and long-term sustainable curation of digital objects is a growing need, and promoting trusted repositories as partners in international programmes is a priority for WDS. The successful development of the CoreTrustSeal in collaboration with DSA, and its supporting business infrastructure, will assist with extension of geographic and disciplinary scope of WDS. This will be supplemented by targeted actions to engage specific potential Members and networks with a view to certification and membership.

Collaboration with OpenAIRE has been established as a means of developing a metadata aggregation for WDS, and this collaboration will also now be developed to provide value-added services in respect of brokering and Knowledge Network information. Future multidisciplinary application of data and digital objects depend heavily on meeting minimum requirements in respect of metadata completeness and interoperability specifications, these are addressed by Strategic Target 1, but form an integral part of advocacy, training curricula, and outreach.

WDS has successfully developed a curriculum outline for training of early career scientists, and with this in place, training opportunities are being sought. This contribution will assist with awareness at an early stage of a researcher's career, and will be supplemented in future with continued interactions with global research programmes and initiatives. In this regard, existing engagements with OECD, Belmont Forum, RDA, Future Earth, the Group on Earth Observations, and the European Union need to be strengthened, and new linkages forged with the United Nations system and the SDGs, the World Health Organization and health-related initiatives, and national and international data services.

Required Resources and Risks for ST3

Component	Resource estimate	Contributors	Resources	Impact if realized / probability resources not available
Training Courses	Funding to at least cover the minimal expenses of trainers	WDS-IPO, WDS-SC, WDS Members, INASP, and other experts	Must be located from external sources	High impact / moderate probability
WDS Metadata Catalogue and Broker		WDS-ITO, WDS-IPO, OpenAIRE	WDS-ITO and pro bono by OpenAIRE	Moderate impact / moderate probability
WDS Knowledge Network		WDS-ITO, WDS-IPO, OpenAIRE, South African Environmental Observation Network (SAEON)	WDS-ITO, and pro bono by SAEON	Moderate impact / moderate probability

Deliverables/Milestones for ST3

ST#3a Provision of WDS training

ST#3a.1) Finalize the online training tool in collaboration with INASP (**Mar 2019**)

ST#3b Development of WDS tools and services

ST#3b.1) Release a first implementation the OpenAIRE aggregator embedded into the WDS website (**Sep 2018**)

ST#3b.2) Establish a brokering service (**Sep 2018**)

ST#3b.3) Establish a SCHOLIX node as a Knowledge Network implementation (**Sep 2018**)

ST#3c Raising awareness of trustworthy data services