

# WDS Strategic Plan 2019–2023

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Trustworthy data services for global science

## Introduction

Scientific research provides widely recognized benefits to society. In today’s knowledge economy, investments in science have been shown to provide a high return. By the same token, for science to succeed, investments in data management and preservation are required. Today’s science is more international, transdisciplinary, and data-enabled than ever, requiring scrupulous data stewardship, full and open access to data, and efficient collaboration and coordination. The science landscape is undergoing radical changes, with new expectations on researchers and data producers owing to policies from governments and funders to share data fully, openly, and in a timely manner. Although these requirements represent significant challenges to the community, they are also an opportunity to improve the quality and efficiency of research and its accountability to society. The increased volumes and complexity of datasets needed for research, scientific assessments and operational use call for commensurate, sustainable, coordinated, and trustworthy scientific data services.

Open data sharing can fulfil its potential for science and society only if trust is built as a central concept in its implementation. The certification of data repositories is an important means to provide this trustworthiness across the different stakeholders involved. WDS co-developed, adopted and promotes the CoreTrustSeal certification for research data repositories as a key requirement for its Regular Members.

Users must be able to identify and make use of trustworthy data, data repositories and services to archive and disseminate the data generated by research activities. Data stewardship is recognized as an important responsibility of the scientific community as illustrated by the requirement to prepare data management plans that an increasing number of institutions and funders are placing on their researchers. Trustworthy data repositories and services provide access to FAIR—Findable, Accessible, Interoperable, Reusable—and adequately curated datasets. They assist the community in the preparation and implementation of data management plans to ensure the long-term preservation, reuse and repurposing of these important assets for scientific research and other societally beneficial activities, thus maximizing the return on the initial public investments in research.

It is also important that civil society in general and the scientific community can access, scrutinize, and challenge the datasets underlying public policies and scientific discoveries. For this to happen, the trustworthiness of data services must be verifiable and at the heart of the scientific enterprise. New funding models and strategies, as well as policies, are also needed to ensure the sustainability of these critical scientific data services.

Transdisciplinary scientific research requires integration of datasets across various disciplines and domains. However, existing data services are at various levels of maturity and they did not evolve in unison, which calls for greater coordination across domains and disciplines to achieve sufficient interoperability.

## History

The World Data System (WDS) builds on a strong 50+ year legacy of its predecessor bodies<sup>1</sup> established by what is now the International Science Council (ISC)—and was, at that time, the International Council for Science (ICSU)—to ensure long-term stewardship, curation, archiving, and dissemination of scientific research data generated by the International Geophysical Year (1957–1958). Experience during the International Polar Year (2007–2008) showed that these bodies were not able to respond fully to the expectations placed on them by ICSU. They were thus disbanded by the ICSU General Assembly in 2008 and replaced by the World Data System (WDS) in 2009. The new system aims for better coordination and disciplinary coverage to respond efficiently to the needs of the new scientific research challenges under the ISC umbrella.

## Vision and Mission

In its draft High-Level Strategy<sup>2</sup>, the International Science Council has articulated its long-term vision:

*THE VISION OF THE COUNCIL IS TO ADVANCE SCIENCE AS A GLOBAL PUBLIC GOOD. SCIENTIFIC KNOWLEDGE, DATA AND EXPERTISE MUST BE UNIVERSALLY ACCESSIBLE AND ITS BENEFITS UNIVERSALLY SHARED. THE PRACTICE OF SCIENCE MUST BE INCLUSIVE AND EQUITABLE, ALSO IN OPPORTUNITIES FOR SCIENTIFIC EDUCATION AND CAPACITY DEVELOPMENT.*

As an Interdisciplinary Body of the International Science Council, the mission of the World Data System is to support this 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. WDS coordinates and supports **trustworthy scientific data services** for the provision, use, and preservation of relevant datasets to facilitate scientific research, while strengthening links with the research community.

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<sup>1</sup>The World Data Centres and the Federation of Astronomical and Geophysical data analysis Services

<sup>2</sup>International Science Council High-Level Strategy: <https://goo.gl/yVWJTx>

## Trustworthy Scientific Data Services and Data Communities

To fulfil its remit, WDS is striving to build worldwide ‘**communities of excellence**’ for **scientific data services**. WDS Member Organizations that hold and provide data and data products from wide-ranging fields of research are certified as trustworthy using internationally recognized standards. Members are the building blocks of a searchable common infrastructure, from which data systems that are both interoperable and distributed can be formed.

## Communities of Excellence for Scientific Data Services

WDS brings its Member Organizations together to coordinate their activities and form communities of excellence and, through that process, to achieve an overall capability that transcends individual ones. Membership in WDS provides the imprimatur of ISC—the leading international and multidisciplinary non-governmental scientific organization—and increases local and international scientific recognition. Membership also increases exposure to potential users and collaborators internationally. It demonstrates that the Member Organizations have a strong and tangible **commitment to open data sharing, data and service quality, and data preservation**—all of which are increasingly considered prime requirements by science funders and are high on policymakers’ agendas since they benefit the scientific community, economy, and society in general.

**Data communities** are formed by the stakeholders consisting of both producers and users of data including (but not limited to) data providers, consumers, brokers, and infrastructure and service providers.

## WDS Strategic Targets

The overall objectives of the World Data System are defined in its Constitution as follows:

- *Enable universal and equitable access to scientific data, data services, products and information*
- *Ensure long-term data stewardship*
- *Foster compliance to agreed-upon data standards and conventions*
- *Provide mechanisms to facilitate and improve access to data and data products*

The strategy for achieving these objectives is outlined in this five-year Strategic Plan, structured round three major targets. The concrete tasks and activities by which these targets will be achieved are outlined in an accompanying two-year Implementation Plan. The Implementation Plan is a living document<sup>3</sup>, which also shows the status of progress towards completion of activities and targets. Both of these documents have been developed by the Scientific Committee in consultation with WDS Members.

<sup>3</sup><https://www.icsu-wds.org/organization/strategic-plan/implementation>

The three major targets are:

## 1. Improve the sustainability, trust in, and quality of open Scientific Data Services

To ensure the integrity of science, long-term preservation of data underlying scientific knowledge should be guaranteed. Long-term preservation enables data to be shared, reused, or used for novel purposes over time thereby contributing to scientific excellence as well as addressing the grand challenges of our society.

Examples in the realm of global environmental assessments abound. The Intergovernmental Panel on Climate Change (IPCC) set up the IPCC Data Distribution Centre (provided by WDS Members: WDC Climate—DKRZ, NASA-SEDAC and UK-NERC-EDC) to preserve high quality and well curated data that serve as foundations for IPCC reports. The Intergovernmental Panel on Biodiversity and Ecosystem Services (IPBES) relies on repositories such as the Global Biodiversity Information Facility (GBIF) to provide the empirical basis for its assessment of biodiversity globally, and for its growing list of indicators to track species threats and progress towards conservation objectives.

Several scientific studies have reported the impossibility of verifying key findings in cancer research because of missing or poor-quality datasets. Trustworthy 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 thus promote trust in science.

The long-term sustainability of the scientific data services that assure long-term preservation is also a vital challenge for the scientific community. With the increase of data-intensive science and the internationalization of research activities, this challenge is becoming even more pressing. The sustainability of data services also requires appropriate coordination of the funding provided by national, regional, and international research funders; coordination of the scientific plans devised by individual research programmes; and support for the operational capacities supplied by scientific data services.

To address the trustworthiness and sustainability challenges facing data repositories, WDS developed since its inception in 2009 a trustworthiness certification framework for its member data repositories and networks thereof. This certification was further developed by merging the WDS catalogue of requirements with another certification—the Data Seal of Approval—emerging from the Social Sciences and Humanities data repositories community. The CoreTrustSeal certification was launched in 2017 and is now internationally recognized<sup>4</sup> as **the** universal catalogue of minimum requirements for trustworthy data repositories. CoreTrustSeal Data Repositories certification is also increasingly recognised by funders who

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<sup>4</sup> Endorsed by the Research Data Alliance and European Commission as an EU ICT specification

are acutely aware of the importance to fund research data infrastructure and data activities that supports the needs of the researchers they fund.

WDS is committed to improve the sustainability of scientific data services and increasing their quality and trustworthiness by concentrating on the following targets:

- a. Defining and providing a trustworthiness certification framework for WDS Regular (CoreTrustSeal) and Network Members.
- b. Actively promoting Open Data Sharing Principles at national and international levels.
- c. Fostering interoperable practices to facilitate data sharing, access and reuse including through data publication, in particular for multidisciplinary research.
- d. Working with policymakers, funders and other stakeholders to promote sustainable long-term funding for trustworthy scientific data services.

## 2. Nurture active disciplinary and multidisciplinary scientific data services communities

Modern scientific challenges facing humankind—in particular those dealing with environmental sustainability—are multidisciplinary by nature. The transdisciplinary scientific research needed to tackle these challenges must be supported by internationally coordinated and integrated multidisciplinary and trustworthy scientific data services, which cannot exist and succeed without effective underlying disciplinary scientific data services. WDS membership includes disciplinary and multidisciplinary communities of varying

SciDataCon is the conference intended to provide an international platform to make explicit the connection between research questions—in particular those arising from multidisciplinary and transdisciplinary research—and the necessary role of data policy, management, and analysis in addressing these questions. SciDataCon is convened together with the Committee on Data of the International Science Council (CODATA) and is part of the high-profile International Data Week organized in partnership with the Research Data Alliance.

levels of maturity: some communities are already well developed, and have achieved sustainable mechanisms for international coordination, while others are still in the early stages of coordination. By providing a platform for these communities to interact and share good practices, and by promoting collaborations in the context of multidisciplinary scientific programmes, WDS can accelerate both maturation of less advanced communities and the emergence of a global community supporting scientific data services. To this end, WDS will strive to:

- a. Support existing data communities whose practices serve their members and the scientific community well.

- b. Strengthen emerging communities by helping them identify their needs, organize their activities, and by diffusing and promoting the benefits of trustworthiness certification.
- c. Provide mechanisms that facilitate cross-disciplinary interactions and activities.
- d. Contribute towards scientific development by improving the analytical environment.

### 3. Make trustworthy data services an integral part of international collaborative scientific research

Experiences, such as the International Polar Year 2007–2008, provide ample evidence that appropriate acquisition, handling, sharing, and dissemination of scientific data is of critical importance to the success of international collaborative scientific endeavours in the long-term. Appropriate provisions must be made at an early stage, and as an integral part of the scientific planning, to identify and secure reliable and trustworthy scientific data services to support research activities. Through the membership of certified data services, WDS is in a unique position to foster the involvement of these data services in international

**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.

scientific programmes, particularly those sponsored by the International Science Council which address the most critical societal challenges. The availability of high-quality and well curated open data both from natural and social sciences trustworthy data services facilitates data integration in support of interdisciplinary and transdisciplinary (policy oriented) research. These resources are thus critical to facilitate the development of decision support systems and ultimately to benefit the betterment of society.

Together with its Members, partner organizations, and other stakeholders, WDS will ensure that relevant activities—such as Working Groups and joint projects—are sufficiently promoted within the scientific community and that their deliverables, such as the Scholix framework for data and literature interlinking contribute to the overarching scientific goals of this community. To this end, WDS will endeavour to:

1. Involve WDS Members more closely in international collaborative scientific research.
2. Promote the use of best practices in international collaborative research programmes.

## Looking forward

WDS takes a leadership role in bringing together the key national, regional, and international, disciplinary and multidisciplinary scientific data repositories and services to coordinate activities and create the strong network

needed to support international research and assessment programmes with quality-assessed scientific and operational data. This objective is ambitious for a small organization that relies on voluntary participation, but achievable. WDS has historical legitimacy, particularly in the Natural Sciences, through its predecessor bodies and institutional legitimacy, as an Interdisciplinary Body of the International Science Council, *the global voice of science, with a powerful presence in all regions of the world and representation across the natural (including physical, mathematical and life) and social (including behavioural and economic) sciences.*

WDS publicizes its activities widely and builds on strong partnerships with like-minded organizations such as the Research Data Alliance (RDA) and the Committee on Data—its sister organization under the umbrella of the ISC—to achieve its targets.

## Membership and Governance

WDS is governed by its Scientific Committee (the WDS-SC), which is appointed by ISC's Executive Board. The Scientific Committee is responsible for developing and prioritizing plans for WDS and guiding their implementation.

Member Organizations<sup>5</sup> join voluntarily in one of the four membership categories—Regular, Network, Partner, or Associate Member.

- Regular and Network Members hold, serve, or produce data; and include virtual data centres. They undergo a review for certification and are required to sign a Letter of Agreement with ISC.
- Partner and Associate Members either provide backing to WDS or are simply interested in supporting the endeavour. Although Partner and Associate Members are generally invited to join, they must also sign an agreement with ISC.

## Working Groups and International Programme and Technology Offices

The WDS-SC creates Working Groups to coordinate and facilitate the implementation of specific activities or projects addressing the goals and objectives of WDS, as well as to build on voluntary contributions from WDS Members and other interested stakeholders.

The International Programme Office is responsible for the promotion of WDS activities. The Programme Office also supports the implementation of WDS-SC plans and WDS Working Group activities.

The International Technology office is responsible for operating and managing the contribution of WDS to operational systems that form part of Global Research Data Infrastructure.

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<sup>5</sup><https://www.icsu-wds.org/community/membership>