

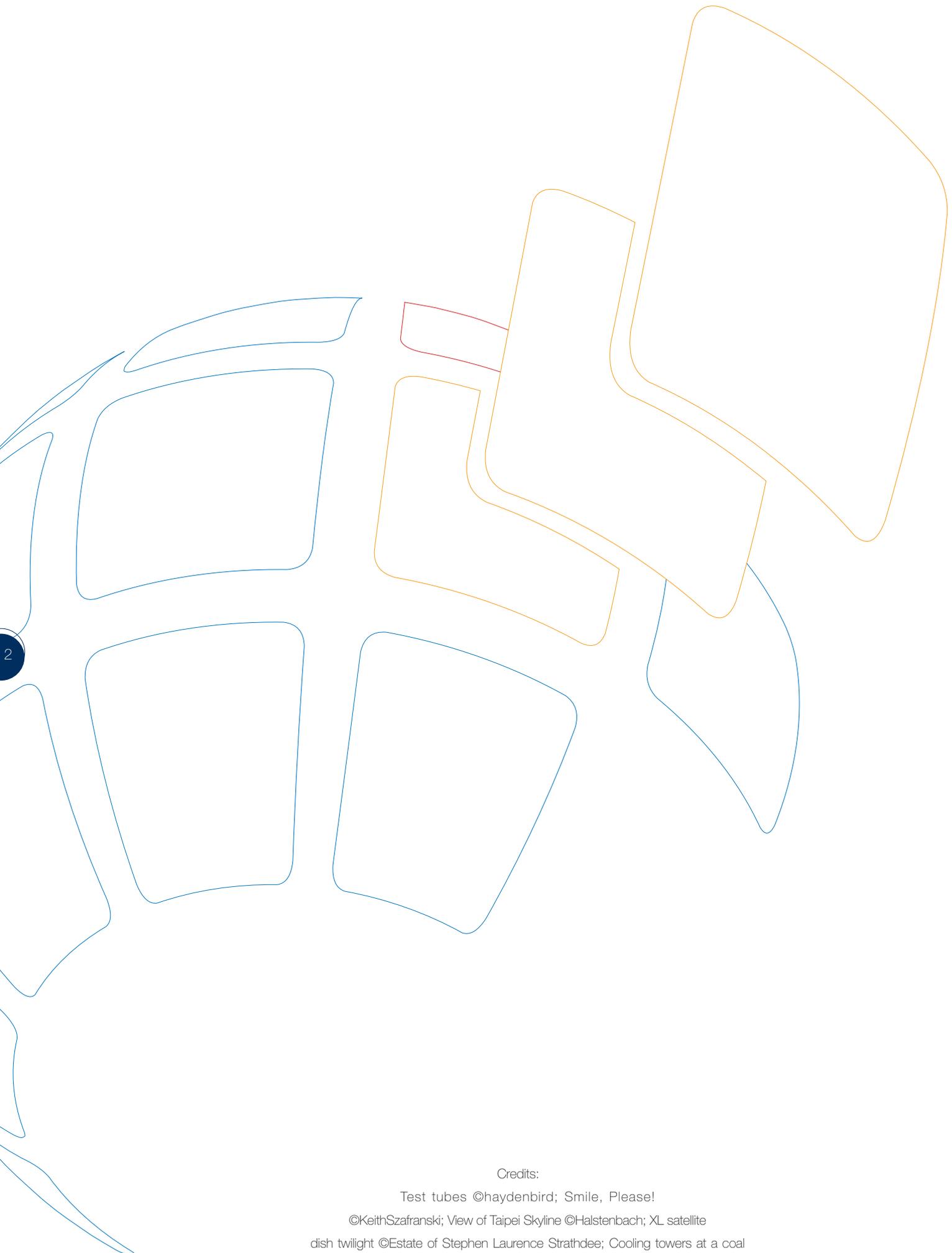


ICSU
WORLD DATA SYSTEM

ICSU World Data System Strategic Plan 2014–2018

Trusted Data Services for Global Science





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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.

Introduction

Today's research endeavours are more international, transdisciplinary, and data-enabled than ever, which requires scrupulous data stewardship, full and open access to data, and efficient collaboration and coordination. The research landscape is also undergoing radical changes, with new and pressing expectations on researchers based on policies from governments and funders to share data fully, openly, and in a timely manner. Although these requirements represent significant challenges to the research 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 generated by and needed for research—in particular the research to address the most pressing societal issues—call for commensurate, sustainable, coordinated, and trusted scientific data services.

For example, researchers must be able to identify trusted data services to archive and disseminate data generated by their activities to prepare a data management plan as required by an increasing number of institutions and funders. Adequately curated datasets available through trusted data services will facilitate the 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 research community in particular 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, 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.

The ICSU World Data System (ICSU-WDS) builds on a strong and proven 50+ year legacy of its predecessor bodies¹ established by the International Council of 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 ICSU World Data System (ICSU-WDS) in 2009. The new system vows for a better coordination and disciplinary coverage to respond efficiently to the needs of the new scientific research challenges under the ICSU umbrella.

¹The World Data Centres and the Federation of Astronomical and Geophysical data analysis Services

An Example: Future Earth

To support Future Earth—a 10-year international research programme on global sustainability coordinated by ICSU and other partners—ICSU-WDS is working with Future Earth Science Committee, Projects, and Secretariat to define data management principles and identify opportunities and likely challenges in relation to data. Recognizing the increasing need for social sciences data in Future Earth research, ICSU-WDS is also expanding its member data services in this area. Moreover, ICSU-WDS and its sister organization CODATA are co-organizing SciDataCon, a conference intended to provide an international platform to make explicit the connection between the research questions—in particular those arising from Future Earth in SciDataCon 2014—and the necessary role of data policy, management, and analysis in addressing these questions.



Vision & Mission

In its Strategic Plan 2012–2017², ICSU has articulated its long-term vision *of a world where excellence in science is effectively translated into policy making and socio-economic development. In such a world, universal and equitable access to scientific data and information is a reality and all countries have the scientific capacity to use these and to contribute to generating the new knowledge that is necessary to establish their own development pathways in a sustainable manner.*

As an ICSU Interdisciplinary body, the mission of the World Data System 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. ICSU-WDS aims to facilitate scientific research under the ICSU umbrella by coordinating and supporting **trusted scientific data services** for the provision, use, and preservation of relevant datasets to facilitate scientific research under the ICSU umbrella, while strengthening their links with the research community.

Trusted Scientific Data Services and Data Communities

To fulfil its remit, ICSU-WDS is striving to build worldwide '**communities of excellence**' for **scientific data services** by certifying Member Organizations—holders and providers of data or data products—from wide-ranging fields by using internationally recognized standards. WDS Members are the building blocks of a searchable common infrastructure, from which a data system that is both interoperable and distributed can be formed.

Communities of Excellence for Scientific Data Services

ICSU-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 ICSU—the leading international and multidisciplinary nongovernmental scientific organization—and increases local and international scientific recognition.

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.

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.

Membership and Governance

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

Member Organizations³ 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 ICSU.
- Partner and Associate Members either provide backing to ICSU-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 ICSU.

²ICSU Strategic Plan II, 2012–2017; International Council for Science, Paris

³<https://www.icsu-wds.org/community/membership>

Working Groups and International Programme Office

The WDS-SC creates Working Groups to coordinate and facilitate the implementation of specific activities or projects addressing the goals and objectives of ICSU-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 ICSU-WDS activities. The Programme Office also supports the implementation of WDS-SC plans and WDS Working Group activities.



WDS Strategic Targets

The overall objectives of ICSU-WDS 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 current five-year Strategic Plan, structured round five 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 document⁴, 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.

The five major targets are:

1. Make trusted 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 research data is of critical importance to the success of international collaborative scientific endeavours. 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, ICSU-WDS is in a unique position to foster the involvement of these data services in international scientific programmes, particularly those sponsored by ICSU. Together with its Members, partner organizations, and other stakeholders, ICSU-WDS will ensure that relevant activities—such as Working Groups and joint projects—are sufficiently promoted within the scientific

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community and that their deliverables contribute to the overarching scientific goals of this community. To this end, ICSU-WDS will endeavour to:

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

2. Nurture active disciplinary and multidisciplinary scientific data services communities

Modern scientific challenges facing humankind—in particular those dealing with environmental and sustainability research—are multidisciplinary by nature. The transdisciplinary scientific research needed to tackle these challenges 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 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 forum for these communities to interact and share good practices, and by promoting collaborations in the context of multidisciplinary scientific

⁴<https://www.icsu-wds.org/organization/strategic-plan/implementation>

programmes, ICSU-WDS can accelerate both maturation of less advanced communities and the emergence of a global community supporting scientific data services. To this end ICSU-WDS will strive to:

- Support existing data communities whose practices serve their members and the scientific community well.
- Strengthen emerging communities by helping them to identify their needs and to organize their activities.
- Provide mechanisms that facilitate cross-disciplinary interactions and activities.
- Contribute towards scientific development by improving the analytical environment.

3. Improve the funding environment

Modern scientific research norms dictate that long-term preservation of data underlying scientific knowledge should be guaranteed to ensure the integrity of science. Long-term preservation also enables data to be shared, reused, or used for novel purposes. The long-term sustainability of the scientific data services that assure long-term preservation is one of the most vital challenges 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 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. ICSU-WDS seeks to play a key role in this coordination by working with its Members to:

- Promote international, national, and disciplinary policies that lead to sustainable long-term funding.
- Engage and work with research funders to increase resources for data services, including as part of research funding.

4. Improve the trust in and quality of open Scientific Data Services

Several high-profile cases have highlighted the need for open sharing of quality-assured data underlying published scientific

knowledge. For example, the integrity of data underlying critical climate research was challenged in the so-called Climategate, and several scientific studies have reported the impossibility of verifying key findings in cancer research because of missing or poor quality datasets. 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. ICSU-WDS is committed to increasing the quality of, and trust in, the services provided by its Members, and will concentrate on the following targets:

- Provide a certification framework for WDS Regular and Network Members.
- Actively promote policies of full and open access to data at national and international fora.
- Foster interoperable practices to facilitate data sharing.
- Facilitate access to, and use or reuse of datasets—including through publication—in particular for multidisciplinary research.

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

ICSU-WDS will take a leadership role in bringing together the key national, regional, and international, disciplinary and multidisciplinary scientific data services to coordinate activities and create the strong network needed to support international research programmes with quality-assessed scientific

Trust in this context can be measured in several ways: Accreditation of data providers or datasets provides a measure of the scientific expertise and technical competence of the data repository. The existence of transparent metadata allows for reuse of datasets and the quality of the data is measured through verification.

research data. This objective is ambitious for a relatively young and small organization that relies on voluntary participation, but ICSU-WDS has historical legitimacy, particularly in the Natural Sciences, through its predecessor bodies and institutional legitimacy, as an Interdisciplinary Body of the ICSU, the leading non-governmental organization for planning and coordinating global research in the area of the environment. ICSU-WDS will publicize its activities widely and build on strong partnerships with like-minded organizations to achieve its targets.





World Data System

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