



SCHOLARLY COMMUNICATION

The Future of Data Policy

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ADVANCES IN INFORMATION AND COMMUNICATION technologies have brought about an information revolution, leading to fundamental changes in the way that information is collected or generated, shared, and distributed [1, 2]. The importance of establishing systems in which research findings can be readily made available to and used by other researchers has long been recognized in international scientific collaborations. Acknowledgment of the need for data access and sharing is most evident in the framework documents underpinning many of the large-scale observational projects that generate vast amounts of data about the Earth, water, the marine environment, and the atmosphere.

For more than 50 years, the foundational documents of major collaborative scientific projects have typically included as a key principle a commitment to ensuring that research outputs will be openly and freely available. While these agreements are often entered into at the international level (whether between governments or their representatives in international organizations), individual researchers and research projects typically operate locally, within a national jurisdiction. If the data access principles adopted by international scientific collaborations are to be effectively implemented, they must be supported by the national policies and laws in place in the countries in which participating researchers



are operating. Failure to establish a bridge between, on the one hand, data access principles enunciated at the international level and, on the other hand, the policies and laws at the national level means that the benefits flowing from data sharing are at risk of being thwarted by domestic objectives [3].

The need for coherence among data sharing principles adopted by international science collaborations and the policy and legal frameworks in place in the national jurisdictions where researchers operate is highlighted by the Global Earth Observation System of Systems¹ (GEOSS) initiated in 2005 by the Group on Earth Observations (GEO) [1, p. 125]. GEOSS seeks to connect the producers of environmental data and decision-support tools with the end users of these products, with the aim of enhancing the relevance of Earth observations to global issues. The end result will be a global public infrastructure that generates comprehensive, near-real-time environmental data, information, and analyses for a wide range of users.

The vision for GEOSS is as a “system of systems,” built on existing observational systems and incorporating new systems for Earth observation and modeling that are offered as GEOSS components. This emerging public infrastructure links a diverse and growing array of instruments and systems for monitoring and forecasting changes in the global environment. This system of systems supports policymakers, resource managers, science researchers, and many other experts and decision makers.

INTERNATIONAL POLICIES

One of GEO’s earliest actions was to explicitly acknowledge the importance of data sharing in achieving its vision and to agree on a strategic set of data sharing principles for GEOSS [4]:

- There will be full and open exchange of data, metadata and products shared within GEOSS, recognizing relevant international instruments, and national policies and legislation.
- All shared data, metadata, and products will be made available with minimum time delay and at minimum cost.
- All shared data, metadata, and products free of charge or no more than cost of reproduction will be encouraged for research and education.

¹ www.earthobservations.org/index.html



These principles, though significant, are not strictly new. A number of other international policy statements promote public availability and open exchange of data, including the Bermuda Principles (1996) and the Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities (2003) [5].

The Bermuda Principles were developed by scientists involved in the International Human Genome Sequencing Consortium and their funding agencies and represented an agreement among researchers about the need to establish a basis for the rapid and open sharing of prepublication data on gene sequences [6]. The Bermuda Principles required automatic release of sequence assemblies larger than 1 KB and immediate publication of finished annotated sequences. They sought to make the entire gene sequence freely available to the public for research and development in order to maximize benefits to society.

The Berlin Declaration had the goal of supporting the open access paradigm via the Internet and promoting the Internet as a fundamental instrument for a global scientific knowledge base. It defined “open access contribution” to include scientific research results, raw data, and metadata, and it required open access contributions to be deposited in an online repository and made available under a “free, irrevocable, worldwide, right of access to, and a license to copy, use, distribute, transmit and display the work publicly and to make and distribute derivative works, in any digital medium for any responsible purpose, subject to proper attribution of authorship.” [7]

In fact, the GEOSS principles map closely to the data sharing principles espoused in the Antarctic Treaty, signed almost 50 years earlier in Washington, D.C., in 1959, which has received sustained attention in Australia, particularly in relation to marine data research.² Article III of the Antarctic Treaty states:

1. In order to promote international cooperation in scientific investigation in Antarctica, as provided for in Article II of the present Treaty, the Contracting Parties agree that, to the greatest extent feasible and practicable: ...
(c) scientific observations and results from Antarctica shall be exchanged and made freely available. [8]

The data sharing principles stated in the Antarctic Treaty, the GEOSS 10-Year Implementation Plan, the Bermuda Principles, and the Berlin Declaration, among

² Other international treaties with such provisions include the UN Convention on the Law of the Sea, the Ozone Protocol, the Convention on Biodiversity, and the Aarhus Convention.



others, are widely acknowledged to be not only beneficial but crucial to information flows and the availability of data. However, problems arise because, in the absence of a clear policy and legislative framework at the national level, other considerations can operate to frustrate the effective implementation of the data sharing objectives that are central to international science collaborations [5, 9]. Experience has shown that without an unambiguous statement of data access policy and a supporting legislative framework, good intentions are too easily frustrated in practice.

NATIONAL FRAMEWORKS

The key strategy in ensuring that international policies requiring “full and open exchange of data” are effectively acted on in practice lies in the development of a coherent policy and legal framework at a national level. (See Figure 1.) The national framework must support the international principles for data access and sharing but also be clear and practical enough for researchers to follow at a research project level. While national frameworks for data sharing are well established in the United States and Europe, this is not the case in many other jurisdictions (including Australia). Kim Finney of the Antarctic Data Centre has drawn attention to the difficulties in implementing Article III(1)(c) of the Antarctic Treaty in the absence of established data access policies in signatories to the treaty. She points out that being able to achieve the goal set out in the treaty requires a genuine willingness on the part of scientists to make their data available to other researchers. This willingness is lacking, despite the treaty’s clear intention that Antarctic science data be “exchanged and made freely available.” Finney argues that there is a strong need for a data access policy in Antarctic member states, because without such a policy, the level of conformance with the aspirations set out in the Antarctic Treaty is patchy at best [10] [1, pp. 77–78].

In the U.S., the Office of Management and Budget (OMB) Circular A-130

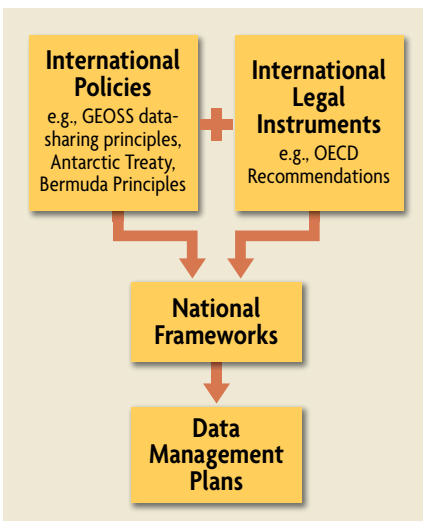


FIGURE 1.
A regulatory framework for data-sharing arrangements.



establishes the data access and reuse policy framework for the executive branch departments and agencies of the U.S. federal government [11] [1, pp. 174–175]. As well as acknowledging that government information is a valuable public resource and that the nation stands to benefit from the dissemination of government information, OMB Circular A-130 requires that improperly restrictive practices be avoided. Additionally, Circular A-16, entitled “Coordination of Geographic Information and Related Spatial Data Activities,” provides that U.S. federal agencies have a responsibility to “[c]ollect, maintain, disseminate, and preserve spatial information such that the resulting data, information, or products can be readily shared with other federal agencies and non-federal users, and promote data integration between all sources.” [12] [1, pp. 181–183]

In Europe, the policy framework consists of the broad-reaching Directive on the Re-use of Public Sector Information (2003) (the PSI Directive) [13], as well as the specific directive establishing an Infrastructure for Spatial Information (2007) (the INSPIRE Directive) [14] and the Directive on Public Access to Environmental Information (2003) [15], which obliges public authorities to provide timely access to environmental information.

In negotiating the PSI Directive, the European Parliament and Council of the European Union recognized that the public sector is the largest producer of information in Europe and that substantial social and economic benefits stood to be gained if this information were available for access and reuse. However, European content firms engaging in the aggregation of information resources into value-added information products would be at a competitive disadvantage if they did not have clear policies or uniform practices to guide them in relation to access to and reuse of public sector information. The lack of harmonization of policies and practices regarding public sector information was seen as a barrier to the development of digital products and services based on information obtained from different countries [1, pp. 137–138]. In response, the PSI Directive establishes a framework of rules governing the reuse of existing documents held by the public sector bodies of EU member states. Furthermore, the INSPIRE Directive establishes EU policy and principles relating to spatial data held by or on behalf of public authorities and to the use of spatial data by public authorities in the performance of their public tasks.

Unlike the U.S. and Europe, however, Australia does not currently have a national policy framework addressing access to and use of data. In particular, the current situation with respect to public sector information (PSI) access and reuse is fragmented and lacks a coherent policy foundation, whether viewed in terms of



interactions within or among the different levels of government at the local, state/territory, and federal levels or between the government, academic, and private sectors.³ In 2008, the “Venturous Australia” report of the Review of the National Innovation System recommended (in Recommendation 7.7) that Australia establish a National Information Strategy to optimize the flow of information in the Australian economy [16]. However, just how a National Information Strategy could be established remains unclear.

A starting point for countries like Australia that have yet to establish national frameworks for the sharing of research outputs has been provided by the Organisation for Economic Co-operation and Development (OECD). At the Seoul Ministerial Meeting on the Future of the Internet Economy in 2008, the OECD Ministers endorsed statements of principle on access to research data produced as a result of public funding and on access to public sector information. These documents establish principles to guide availability of research data, including openness, transparency, legal conformity, interoperability, quality, efficiency, accountability, and sustainability, similar to the principles expressed in the GEOSS statement. The openness principle in the OECD Council’s Recommendation on Access to Research Data from Public Funding (2006) states:

A) Openness

Openness means access on equal terms for the international research community at the lowest possible cost, preferably at no more than the marginal cost of dissemination. Open access to research data from public funding should be easy, timely, user-friendly and preferably Internet-based. [17]

OECD Recommendations are OECD legal instruments that describe standards or objectives that OECD member countries (such as Australia) are expected to implement, although they are not legally binding. However, through long-standing practice of member countries, a Recommendation is considered to have great moral force [2, p. 11]. In Australia, the Prime Minister’s Science, Engineering and Innovation Council (PMSEIC) Data for Science Working Group, in its 2006 report “From Data to Wisdom: Pathways to Successful Data Management for Australian Science,” recommended that OECD guidelines be taken into account in the development of a strategic framework for management of research data in Australia [18].

The development of a national framework for data management based on

³ There has been little policy advancement in Australia on the matter of access to government information since the Office of Spatial Data Management’s Policy on Spatial Data Access and Pricing in 2001.



principles promoting data access and sharing (such as the OECD Recommendation) would help to incorporate international policy statements and protocols such as the Antarctic Treaty and the GEOSS Principles into domestic law. This would provide stronger guidance (if not a requirement) for researchers to consider and, where practicable, incorporate these data sharing principles into their research project data management plans [5, 9].

CONCLUSION

Establishing data sharing arrangements for complex, international eResearch collaborations requires appropriate national policy and legal frameworks and data management practices. While international science collaborations typically express a commitment to data access and sharing, in the absence of a supporting national policy and legal framework and good data management practices, such objectives are at risk of not being implemented. Many complications are inherent in eResearch science collaborations, particularly where they involve researchers operating in distributed locations. Technology has rendered physical boundaries irrelevant, but legal jurisdictional boundaries remain. If research data is to flow as intended, it will be necessary to ensure that national policies and laws support the data access systems that have long been regarded as central to international science collaborations. In developing policies, laws, and practices at the national level, guidance can be found in the OECD's statements on access to publicly funded research data, the U.S. OMB's Circular A-130, and various EU directives.

It is crucial that countries take responsibility for promoting policy goals for access and reuse of data at all three levels in order to facilitate information flows. It is only by having the proper frameworks in place that we can be sure to keep afloat in the data deluge.

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