SCIENCE
IN THE
INFORMATION
SOCIETY

Science has a crucial role to play in the Information Society. In preparation for the **World Summit on the Information Society**, this series of four brochures discusses key issues and necessary actions from the perspective of the international science community.

Universal access to scientific knowledge
Decision making and governance
>> **Policy issues for scientific information**
Improving education and training

ICSU
International Council for Science

During the last decade, there have been significant developments in information and communication technologies (ICTs), in legislation on intellectual property rights and copyright, and in methods of commercializing scientific information. These changes in technology, law, and the economics of data access and dissemination have created a tension between the traditional interest in a thriving public domain—in which publicly funded research data is openly and universally available—and the commercial interest in acquisition, ownership, licensing, and sale of scientific data and information.

>> POLICY ISSUES FOR SCIENTIFIC INFORMATION

Most current policy focuses exclusively on enhanced protection of private proprietary information, leaving the role of public domain information poorly addressed. In order to derive the greatest possible social and economic return on public investment and stimulate scientific progress, the science community, in collaboration with relevant institutions and national governments, must develop creative new ways to balance these two competing interests.

KEY PRINCIPLES:

✧ The information produced from publicly funded scientific research is a 'public good' and an investment in the public interest.

✧ Scientific progress relies on full and open access to public data— that is, non-discriminatory and free of charge—and on the open disclosure of results in the scientific literature.

✧ The interests of those who hold intellectual property rights must be balanced with society's need for the open exchange of ideas and information.

✧ Publicly funded research data should be priced no higher than the marginal cost of dissemination and be freely available on the Internet to the greatest extent possible.

The development of policies for the information age is confronted by both opportunities and threats.

◇ Opportunities for ensuring universal and equitable access to scientific data and information are threatened by excessive privatization and commercialization.

◇ Extensive use of digital networks for the production and dissemination of scientific information should benefit all future users—both actual and potential.

◇ Increasing protectionism of intellectual property regimes tends to reduce the availability of public domain data for scientific research.

◇ Encouraging innovative and collaborative approaches to promote data access should have wide benefit but requires public support and investment.

Commercializing weather data

Some 60 per cent of the world's population resides in regions affected by cyclical monsoons. The ability to predict the onset, duration, and severity of monsoons would greatly enhance agricultural management and flood preparation.

In order to develop reliable, predictive models for monsoons, scientists need access to historical atmospheric modelling data—most of which was originally collected by public meteorological services in North America and Europe—to compare with their own observational data.

The USA National Weather Service and National Oceanic and Atmospheric Administration openly provide such data, without any legal protection, and at dissemination cost only. But the EU-funded European Centre for Medium-Range Weather Forecasting (UK) treats its data as a commodity, charging for access on a cost-recovery basis—at prices that most researchers can not afford.

By making it more difficult to integrate global data, such a commercialization policy hampers the international collaboration required to maximize the benefit of scientific data.
www.weather.gov/sp/Borders_report.pdf

ACTIONS REQUIRED

>> **All governments should adopt policies to ensure that data produced from publicly funded research remains openly available to the largest extent possible.** Open availability of scientific data avoids unnecessary duplication of effort, maximizes the return on public investment, promotes verification of research results, and stimulates scientific progress. Scientific data produced with public funding should normally be made available at no more than the marginal cost of dissemination and with no restrictions on re-use.

>> **Involve scientists, as major stakeholders in the information society, in the discussion and development of intellectual property rights and copyright legislation—at both the national and international level.** Any new legislation should strike a careful balance between public and private interests, and the need to enhance science and education through full and open access to data, and the need to adequately protect authors' rights. Any restrictions on access to digital data should clearly indicate exemptions for research and teaching purposes.

>> **Appropriate national policies should be developed to facilitate the exchange of scientific information.** Equipment taxes, import duties and telecommunications pricing strategies can all have negative effects in regards to ensuring universal access to digital information. In many countries, special provisions have been made for research and education institutions; such approaches should be considered elsewhere. At the local community level, public-access stations can play an important role.

>> **Develop special programmes for scientific collaboration across the digital divide, thereby facilitating exchange of scientific information and knowledge.** ICTs offer new and exciting opportunities for merging scientific knowledge and expertise from all countries to address issues of mutual concern and importance. Local, regional, and international scientific networks need to be strengthened.

>> **Promote different models of scientific information production and dissemination, including those particularly appropriate to developing countries.** The Internet provides new opportunities for distributed, production validation and dissemination of scientific information, including open access journals, open data archives and other novel approaches. Robust, validated, and affordable software is needed to support wider adoption of these models.

Promoting sustainable development

The government of Namibia proactively supports the use of ICTs to promote sustainable development. In 1998, it launched a national programme —Information and Communication Services for Sustainable Development—to help achieve this objective through a policy of open access.

A networking approach has been developed to strengthen and promote data sharing and access to spatial data from the country's environmental monitoring programmes. In turn, this helps define appropriate ways to communicate environmental information on key issues, such as desertification, to decision-makers and the wider Namibian public.

An information portal now provides access to a national atlas and regional profiles. All data on the portal can be freely downloaded and is also distributed on CDs for those who do not have Internet access. In addition, hard copies of publications are sent to all state libraries. www.dea.met.gov.na

Building research capacity

The Ptolemy Project is a research partnership between the Office of International Surgery at the University of Toronto and the Association of Surgeons of East Africa (ASEA). It uses the vast resources of the University of Toronto's library (the third largest research library in North America) to help build health research capacity in East Africa.

In order to conform to subscription agreements with publishers, participating surgeons are appointed as 'research affiliates' of the University. This allows them to access popular medical journals, health information resources, library services, and online tutorials. Participants are also given in-country support and training in the use of these various services.

A recent evaluation highlights the success of the Ptolemy Project. Participants praised it for delivering useful, timely, and relevant content to African surgeons through a simple, practical, and replicable model that effectively bridges the digital divide to build clinical, teaching, and research capacity. www.utoronto.ca/ois/ptolemy.htm

SCIENCE IN THE INFORMATION SOCIETY

In March 2003, more than 60 invited experts—leading scientists and repre-
sentatives of international organizations—gathered at UNESCO in Paris to
consider the role of science in the information society.[1] Participants develo-
ped an overall **Agenda for Action** for consideration by all parties interested in
using information and communication technologies (ICTs) for a better society.

AGENDA FOR ACTION

>> Ensure that all universities and research institutions have affordable and
reliable high-speed Internet connections to support their critical role in in-
formation and knowledge production, education and training.

>> Promote sustainable capacity building and education initiatives to ensure
that all countries can benefit from the new opportunities offered by infor-
mation and communication technologies (ICTs) for the production and
sharing of scientific information and data.

>> Ensure that any legislation on database protection guarantees full and
open access to data created with public funding. In addition, restrictions
on proprietary data should be designed to maximize availability for acade-
mic research and teaching purposes.

>> Promote interoperability principles and metadata standards to facilitate
cooperation and effective use of collected information and data.

>> Provide long-term support for the systematic collection, preservation, and
provision of essential digital data in all countries.

>> Promote electronic publishing, differential pricing schemes, and appro-
priate open source initiatives to make scientific information accessible on
an equitable basis.

>> Encourage initiatives to increase scientific literacy and awareness of how
to interpret web-based scientific information.

>> Support urgently needed research on the use of information technologies
in key areas, such as geographical information systems and telemedicine,
and on the socio-economic value of public domain information and open
access systems.

>> Recognize the important role for science in developing and implementing
the new governance mechanisms that are necessary in the information
society.

1. Further information on the workshop can be found at www.icsu.org and www.codata.org.
See also www.unesco.org/wsis.