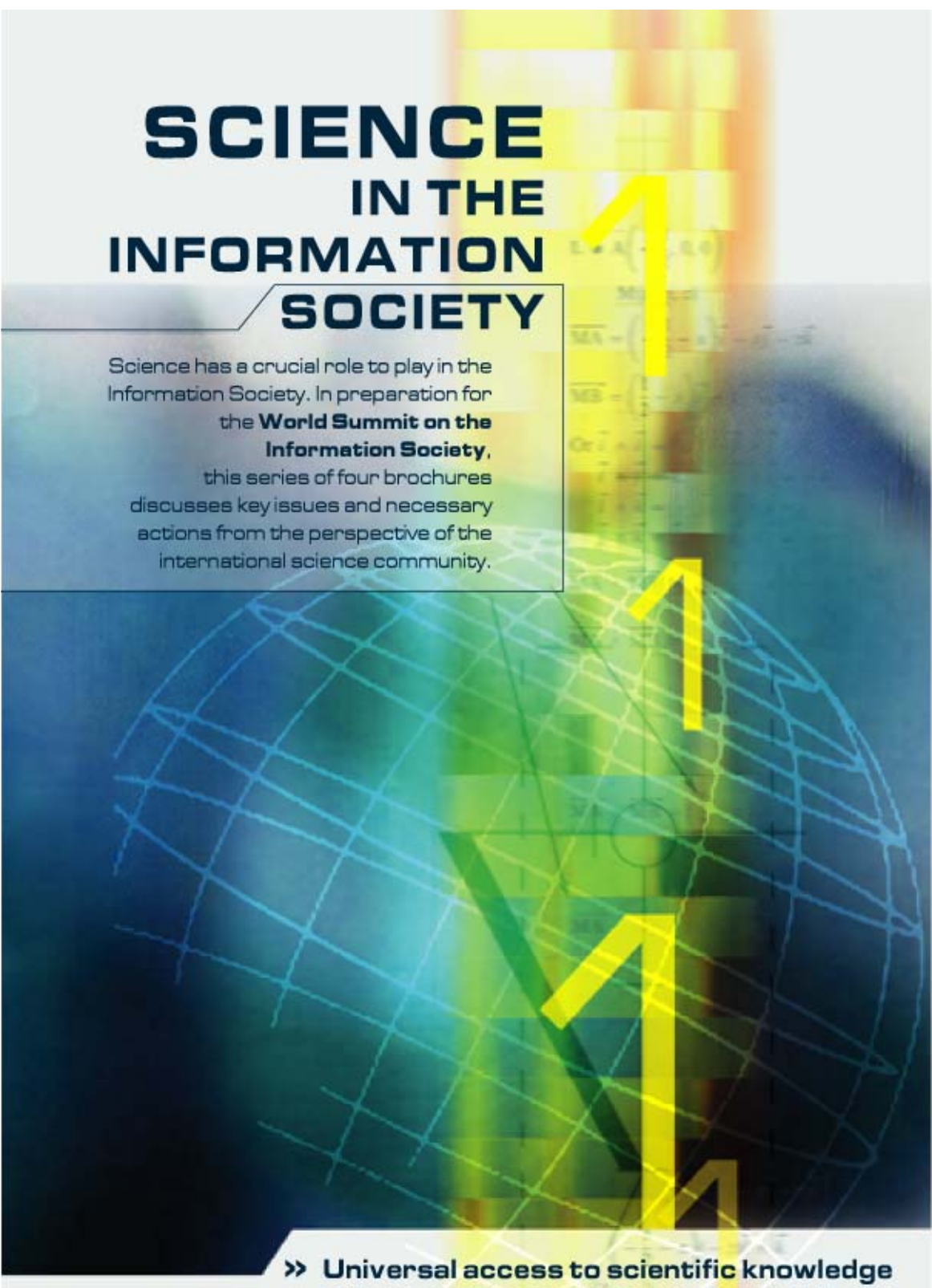
SCIENCE IN THE INFORMATION SOCIETY

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

Scientific research is an important factor underpinning the development of the information society. It leads to the generation of new technologies and to the production of data and information that, when combined with these technologies, can be of enormous benefit to society as a whole.

>> UNIVERSAL ACCESS TO SCIENTIFIC KNOWLEDGE

Scientific knowledge often has international applicability. Information and communication technologies (ICTs) have the capacity to increase accessibility to scientific knowledge internationally. Despite this potential, the knowledge divide appears to be widening. Increasing inequalities in access to ICTs reduce opportunities for individuals and institutions to use scientific knowledge that could help foster innovation, facilitate efficient decision making, and support education and training.

In addition, present systems for the publication and dissemination of scientific information do not provide sufficient access to knowledge originating in many developing countries. While scientific data and information from one country may or may not be specifically relevant to another country's needs, all countries must be able to develop and communicate their own knowledge.

Inequalities in access to information and in the availability of relevant technologies lead to differences in productivity, creativity, innovation, and income. If the United Nations' Millennium Development Goals —including the reduction of poverty—are to be realized, equitable access to scientific knowledge must be made a priority.

KEY PRINCIPLES:

- **Universal and equitable access to scientific knowledge**
- **Equal opportunities for all to create, disseminate, and use information**

CHALLENGES

In order to achieve universal access to scientific information, a number of major challenges must be overcome.

- Access to scientific information, produced largely in developed countries, is prohibitively expensive for poorer countries.
- Unequal opportunities exist internationally for the creation of, and access to, scientific information.
- There is limited awareness of existing open access programmes for scientific information in educational and research institutions in many developing countries.
- Many developing countries lack the necessary technical infrastructure to benefit from recent ICT advances that would allow quicker and easier access to scientific knowledge.
- In some countries, the lack of incentives to perform scientific research, aggravated by the problems of accessing up-to-date scientific information, makes it difficult to retain skilled scientific researchers.

Developing global protocols

Expansion of the Internet and the development of author self-archiving (e-print) systems give researchers more control over the communication and distribution of their work. Many researchers now choose to share their results immediately by depositing papers or drafts into such digital repositories as well as—or even instead of—published academic journals.

But e-print archives can only realize their full potential if they are adopted by scientific communities in parallel with an agreement on interoperability protocols. The Open Archives Initiative was established to create a forum to discuss and develop common web protocols for e-print archives. It also promotes their global acceptance and accessibility across physical, organizational, and disciplinary boundaries. These protocols ensure that various e-print archives can interact, thereby making it possible to access any paper from any computer, as if all the material was held in one virtual public library. www.openarchives.org

ACTIONS REQUIRED

>> **Strengthen and enhance existing information and communications infrastructures to provide affordable and technically appropriate connectivity for all communities of scientific information users**. Provision of adequate infrastructure is a prerequisite for ensuring universal access to scientific information.

>> **Encourage human and institutional capacity building.** Educational and research institutions and others familiar with ICT applications should work together to develop training facilities, including specialist training in open access approaches to information management. Both North-South and South-South networking are necessary in this regard.

>> **Publicise and support programmes that promote equitable access to scientific information in developing countries.** Better co-ordination between the various existing programmes should be encouraged to maximize their impact. More publicity and communication at a local level is necessary. The demand for affordable access to scientific information is far in excess of the capacity to deliver and effective programmes require additional financial support in order to fill this gap.

>> **Improve bilateral transfer of scientific knowledge between developed and developing countries.** Programmes to ensure that the results of scientific research in developing countries are submitted for publication in international science journals should be encouraged. The creation of new science publications, using low-cost electronic approaches, also needs to be promoted in developing regions.

>> **Develop institutional repositories for the preservation and dissemination of the results of scientific endeavour.** Scientists are increasingly publishing their results in open-access institutional archives, as well as in conventional literature. The development and use of institutional archives, including digital libraries and their related software, should be supported.

Facilitating access

A growing number of initiatives aim to provide developing countries with low-cost access to online scientific information.

- The **Programme for the Enhancement of Research Information (PERI)**, operated by the International Network for the Availability of Scientific Publications, provides low-cost access to more than 8000 full-text online journals and databases. PERI's online services improve access to local research results, as well as locally facilitated training in Internet use and publishing skills for researchers, publishers, editors, and librarians. www.inasp.info/peri/

- Through the **Health InterNetwork Access to Research Initiative (HINARI),** an initiative of the World Health Organization, accredited public institutions can take advantage of free or very low-cost access to more than 2000 leading biomedical journals. www.healthinternetwork.org

- The **electronic Journals Delivery Service (eJDS) Programme**, run by the Third World Academy of Sciences and the Abdus Salam International Centre for Theoretical Physics, distributes scientific articles via e-mail to scientists in developing country institutions, where insufficient bandwidth makes it difficult to download material from the Internet. www.ejds.org/

Building capacity

Managed by the International Network for the Availability of Scientific Publications, **African Journals OnLine (AJOL)** aims to promote the awareness and use of journals published in Africa and to strengthen the science sector of African academic publishing. It provides Internet access to the tables of contents of more than 50 journals published in Africa, backed by web links to electronic versions of articles (where available) and a delivery service for document photocopies.

INASP has also established a pilot project to help ten leading African journals develop online publishing capacity. By offering full-text, electronic delivery, these African journals will be better equipped to compete successfully with journals published in other parts of the world. The pilot project will evaluate whether electronic delivery increases journal use and sustainability. www.inasp.info/ajol/

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In March 2003, more than 60 invited experts—leading scientists and representatives of international organizations—gathered at UNESCO in Paris to consider the role of science in the information society.[1] Participants developed 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 information 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 information 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 academic 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 appropriate 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.

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Strengthening international science for the benefit of society.

Founded in 1931, ICSU is a non-governmental organization representing a global membership that includes both national scientific bodies (101 members) and international scientific unions (27 members).