The UNESCO General Information Programme and Its Role in the Development of Regional Co-operative Networks

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1. Introduction

The United Nations Educational, Scientific, and Cultural Organization (UNESCO) has been concerned with information matters since its founding in 1946, and in fact occupies a unique position among the specialized agencies of the United Nations insofar as it has specific and sizable programmes devoted to information *per se*, ranging from libraries and archives to information and data systems, and covering methods of information and data handling as well as application areas, covers a wide range of the knowledge spectrum — education, science and technology, the social sciences, culture, and communication — and organizes information exchange among peoples of the world in order to promote international understanding in accordance with its charter. Indeed, Article I of UNESCO's constitution stipulates that the Organization shall:

> 'maintain, increase, and diffuse knowledge . . . by encouraging co-operation among the nations in all branches of intellectual activity . . . the exchange of publications . . . and other materials of information; and by initiating methods of international co-operation calculated to give the people of all countries access to the printed and published materials produced by any of them.'

2. UNISIST: a movement and a programme

Over the years, particular attention has been given to issues related to the flow of scientific and technical information, beginning especially in the mid-1960s, when the international scientific community became aware of the shortcomings of the existing information services for mission-oriented, interdisciplinary research and development. In 1967 UNESCO joined forces with the International Council of Scientific Unions to carry out a feasibility study on the establishment of a world science information system, UNISIST.

According to the study[1] UNISIST was to be planned as a continuing programme, to co-ordinate existing trends toward co-operation and to act as a catalyst for necessary developments in scientific information. The ultimate

goal was the establishment of a flexible and loosely connected network of information systems and services based on voluntary co-operation. UNISIST was to be concerned initially with the natural sciences and engineering, but it was later to be extended to other fields of learning.

The UNISIST Intergovernmental Conference was held in Paris in October 1971 to advise UNESCO on the implementation of the feasibility study. It will be noted that the word 'UNISIST' was never meant to be properly an acronym, but rather to connote phonetically the part that the United Nations agencies, particularly UNESCO, should play in the promotion of an international system for information covering science and technology.

As a result of the 1971 Intergovernmental Conference the UNISIST programme was established in 1972 by the General Conference of UNESCO at its seventeenth session in order to:

(a) undertake activities for improvement of the tools of systems interconnection;
(b) provide assistance for strengthening the functions and improving the performance of the institutional components of the information transfer chain;
(c) help in the development of the specialized manpower essential for the planning and operation of information networks, especially in the developing countries;
(d) encourage the development of scientific information policies and national networks;
(e) assist Member States, especially the developing countries, in the creation and development of their infrastructure in the field of scientific and technical information.

The overall goals of the programme have remained constant since its inception. One objective, originally called 'improving tools of systems interconnection' and later designated as the 'promotion and dissemination of information methods, norms, and standards', has remained the intellectual centre of gravity of the programme. In fact, UNISIST has also been referred to as the set of internationally developed methods, norms, standards, principles, and techniques governing the processing and transfer of information. Two other areas — development of information infrastructures, and education and training — have maintained their pre-eminence in terms of budgetary resources; the training of information users was added to the latter in 1977. Increasing importance has been given to the promotion of policy formulation and planning at the national, regional, and international levels.

However, the information needs of the international community for which the UNISIST programme was set up have evolved with time. Since its creation, UNISIST has increasingly been concerned with information *as it serves the development process*. A second conference, the Intergovernmental Conference on Scientific and Technological Information for Development — UNISIST II,[2], was held in Paris in 1979 to review developments since the UNISIST conference of 1971 and to make recommendations for the future. It found that

'the original recommendations of the 1971 Conference . . . were still relevant to the largely changed economic and social conditions . . . but there was still a great deal more to be achieved because many countries, especially the less-developed ones, still had to develop coherent national policies, set up and co-ordinate the necessary information infrastructures, and establish systematic programmes for education and training of professional information workers and of final users of information'.

The recommendations of UNISIST II were vital in orienting the content of UNESCO's activity in the information area towards the needs of all participants in the development process — not only researchers but also working professionals and decision-makers in the various priority sectors, including increased concern for the 'marketing' of information, user sensitization and training, and consolidation and re-packaging of information to serve users' needs.

Other facets which have received increasing emphasis within the programme, in response to the changing international situation, are operational activities, the introduction of modern information technology in developing countries, and regional co-operation, which is given special consideration in the present paper.

3. The General Information Programme (PGI)

Another important factor in the evolution of UNESCO's effort to assist Member States in the information field was the long-standing question as to whether it should be structured by sector or by function. In 1976, the General Information Programme (PGI) was created by merging UNISIST with UNESCO's programme concerned with the development of documentation activities, libraries, and archives. An intergovernmental council composed of 30 Member States replaced the former UNISIST steering committee and has guided the planning and implementation of PGI. The creation of PGI has brought a number of benefits: it reduced the number of inconsistencies in UNESCO's dealings with Member States on matters relating to information transfer; it brought together experience in infrastructure development and education and training; and it has provided for an integrated approach to information systems planning and development covering libraries and archives as well as scientific and technological information. PGI, incorporating UNISIST, is now administered within UNESCO's Office of Information Programmes and Services, which also includes the Library, Archives, and Computerized Documentation Service of the Organization, a division responsible for development and dissemination of information software including UNESCO's CDS/ISIS database management package, and a division which is in charge of operational activities in the information field.

Although PGI is the main focus for UNESCO's action in the information area, it should be noted that many other UNESCO programmes contribute to enhancing the flow of scientific and technical information. For example, the UNESCO's Science Sector has established specialized information programmes

concerned with new and renewable energies, hydrology, oceanography, and other matters.

PGI is in fact intended to be a 'transverse programme' which co-ordinates and complements the sectoral information activities of UNESCO while providing basic support for co-operation in the information field and for development of information systems and services in Member States.

PGI/UNISIST activities are essentially designed to enhance the capacity of Member States to handle, transfer, and share information and information resources, and to effectively utilize information and data in development activities. Such information and data may be generated either within the country or abroad. UNESCO's action involves assisting Member States in formulating national information policies; developing library, archives, and information system infrastructures; training information personnel; and making users increasingly aware of the value of information. Such assistance may take the form of advisory consultant missions; the development and dissemination of standards and guidelines for information handling and systems interconnection; provision of modest equipment and software within PGI-sponsored projects; the organization of seminars and conferences; and support for training courses, workshops, and demonstrations of information systems and their use. Large-scale assistance in the development of national or regional information infrastructures is also provided through UNESCO-executed projects which are financed by extra-budgetary sources such as the United Nations Development Programme (UNDP). The PGI/UNISIST programme has provided a framework within which Member States and international organizations can collaborate by sharing resources, developing compatible international information systems, and taking part in programme activities.

A more detailed presentation of the development and objectives of UNESCO's information activities[3] has served as a basis for the above brief description, and a recent review of PGI activities is also available.[4]

4. The regional approach

Over the two decades during which international organizations have assisted in the establishment of national information infrastructures and international information systems, we have witnessed the emergence of regional groupings of countries for co-operation in the areas of political action, economics, and development. In many cases these countries have considered regional co-operation in the field of information as a priority in its own right or as a necessary basis for the strengthening of their co-operation in other fields. EURONET of the European Commission, the International Centre for Scientific and Technical Information (ICSTI) of the Council for Mutual Economic Assistance, the on-going effort of the Arab League Documentation Centre in the League's Secretariat in Tunis, the Pan-African Documentation and Information System (PADIS) sponsored by the United Nations Economic Commission for Africa, the network development efforts of the United Nations Economic Commission for Latin America and the Caribbean, and the

Regional Network for the Exchange of Information and Experience in Science and Technology in Asia and the Pacific (ASTINFO) are good examples of such regional co-operation. There are also sub-regional efforts toward co-operation in the information field, for instance in south and central Asia, the Pacific, the Caribbean area, the southern African region, and the ASEAN group of countries. Regional and sub-regional information networks are also emerging in specialized fields.

UNESCO's action in this area aims at strengthening national capabilities for information exchange and creating the necessary mechanisms for sharing experience and resources and for co-ordinating regional activities. UNESCO here acts as a catalyst for regional co-operation, providing the necessary stimulus, technical back-up, organizational methodologies, standards, and tools, as well as limited financial support.

Two distinct and complementary types of regional co-operation are being promoted within UNESCO's programme: broad co-operative schemes, and specialized operational information networks.

4.1 *Broad schemes for regional co-operation*

Several regional schemes for co-operation in the information field are being encouraged and supported by UNESCO, with the general aims of promoting resource sharing and harmonization of national information policies, development of standardized information-handling tools, elaboration of co-operative projects on information manpower training and information system development, and more effective use of limited international assistance.

The most developed effort of this type promoted by UNESCO is probably the Regional Network for the Exchange of Information and Experience in Science and Technology in Asia and the Pacific (ASTINFO), a follow-up to the recommendation of the Second Conference of Ministers Responsible for the Application of Science and Technology to Development and Those Responsible for Economic Planning in Asia and the Pacific (CASTASIA II) held in Manila in 1982.

ASTINFO is intended to promote the exchange of information, data, and experience in the information field. Programme areas include:

(a) creation and strengthening of local and regional databases, especially using modern technology;
(b) creation and strengthening of specialized networks in particular sectors, disciplines or missions;
(c) promotion of the training of information specialists and users;
(d) creation of a general framework for co-operation and systems interconnection.

Some of the specific objectives of the project are as follows:

- to strengthen bibliographic control of the participating countries' own scientific and technological output and establish computer-based bibliographic databases in subject areas of interest to the region, supported by document clearing-houses;

- to stimulate and promote the creation of non-bibliographic databases in science, technology, and socio-economic fields of importance to development in the region;
- to develop and promote the technical and organizational structures and capabilities for cross-border exchange of data and for the sharing of processing facilities;
- to develop specialized information networks in high-priority subject areas and strengthen existing networks;
- to improve the national information infrastructure to meet the needs of the regional network so as to ensure that all those in the country who should benefit from the regional network have access to it;
- to introduce improved or new information services, in particular by utilizing databases available in or outside the region and by improving information support, including consolidated and repackaged information for development;
- to train information specialists;
- to promote awareness and use of existing systems and services, in particular those established by United Nations agencies, and to encourage user training programmes.

ASTINFO was initiated in 1984, and fifteen Member States in the region (Australia, China, India, Indonesia, Iran, Japan, Republic of Korea, Malaysia, Nepal, New Zealand, Pakistan, Philippines, Sri Lanka, Thailand, and Vietnam) are now participating. Each country has established an ASTINFO Coordinating Unit (ACU) and named an ASTINFO Liaison Officer. The main function of an ACU concerns the elaboration of ASTINFO policy and the promotion and monitoring of the Network's development in the country and in the region; and it normally does not operate information systems and services *per se*. The Liaison Officers attached to the ACU participate in a yearly Consultative Meeting organized by UNESCO to review the accomplishments of the Network and to make recommendations on objectives and activities for the coming year.

Furthermore, experienced institutions in the region are welcome to participate in ASTINFO as Associated Centres, which number at present 43; such centres may, for example,

(1) provide short-term on-the-job training in specified fields to information specialists sponsored by other organizations;
(2) organize workshops and seminars on specific topics under UNESCO/ASTINFO sponsorship;
(3) undertake the preparation of information products and tools or the processing of information and data in its fields of competence for use in the Network;
(4) provide expertise when requested to advise other institutions or implement specific activities within the Network;
(5) serve as a centre for testing of software or methods in information handling;

(6) prepare newsletters or other bulletins to disseminate information about activities within ASTINFO;
(7) serve as a referral centre.

In addition, ASTINFO co-operates closely with existing networks with similar objectives which participate as Associated Networks.

UNESCO maintains a Secretariat for ASTINFO in its Regional Office in Bangkok, Thailand, which is responsible for co-ordinating UNESCO's assistance to the region, totalling approximately US$ 1 million from 1983 to the present. The Secretariat also regularly publishes an *ASTINFO Newsletter*.

It can be seen that one of the guiding principles of ASTINFO action is to make full use of the information resources and experience in the region as a means of self-help intended to ensure more efficient, less costly, and more appropriate assistance and co-operation. In this context the ASTINFO Secretariat maintains a register of needs for, and offers of, assistance to facilitate contact between institutions with mutual interests.

Within the framework of ASTINFO, several national institutions in the region have received UNESCO assistance (in the form of consultancy missions, purchase of small equipment such as microcomputers, and software, fellowships for training of information specialists, etc.) to enhance their capacity for information handling and exchange, provision of services, etc. Some of the projects have a regional dimension, such as pilot projects on information services on research in progress (Thailand) and on oceanographic data and information services (India). The former project elaborated and tested a model for the establishment of information services on research in progress in the region, while the latter is intended to develop into a regional information resource centre in the area of oceanography. About thirty specialized regional seminars and short training courses have been organized within the ASTINFO framework on topics such as application of microcomputers in library and information work, curriculum development in information studies, marketing of information, handling of chemical information, and information policy and transborder data flow. A number of studies and consultations have been conducted within ASTINFO on mechanisms for computerized information exchange by telecommunications *within* the region, and a pilot project called ASTINFONET has been formulated for possible future implementation.

UNESCO's assistance within ASTINFO has been complemented by support from several international and bilateral assistance agencies and has been carried out in co-operation with other concerned international organizations, both intergovernmental and non-governmental.

Although ASTINFO is actually a regional information programme rather than an operational system, one of its major goals is the promotion of operational information networks in priority areas for the region. In this context one of UNESCO's major activities in Asia and the Pacific, within the overall framework of ASTINFO, has been the establishment of a regional information network in the area of medicinal and aromatic plants, called APINMAP,

which will be described in the following section. The close relationship between these two activities reflects the complementarity of the promotional and operational approaches to regional co-operation in the information field.

Another regional co-operation scheme along the same lines as ASTINFO is the Sub-Regional Network for the Exchange of Information and Experience in Science and Technology for Development in the Caribbean Region (CARSTIN), which was initiated in 1984 as a follow-up of a recommendation of the first meeting of Caribbean Ministers responsible for Science and Technology held in 1983. Twelve countries have designated National CARSTIN Co-ordinating Units (CCUs), and a number of Associated Centres are also affiliated to the Network, which is supervised by a Management Committee of representatives of the CCUs. By 1988, five sub-regional pilot projects had been initiated, four seminars and training courses had been organized, a number of studies and common information-handling tools prepared, and assistance given to several Member States in the definition of national information policies and infrastructures. One of the most innovative of the pilot projects concerns the establishment of a regional technology evaluation information support system based at the Caribbean Industrial Research Institute (CARIRI) in Trinidad and Tobago. CARSTIN's activities have been supported by about US$ 200 000 under the United Nations Development Programme (UNDP), by more modest support through UNESCO's Regular Programme, and by other international and bilateral co-operation agencies.

The CARSTIN mechanism has in general been greatly appreciated by the participating countries and has achieved a number of successful results, particularly considering the relatively low level of user and government awareness of information benefits and of infrastructure development at the start of the project. An evaluation[5] has recommended that the institutional basis for the network be strengthened in the coming years (e.g. with the creation of a permanent secretariat) and that it continue to concentrate on priority activities in close collaboration with other co-operative efforts in the region.

As a final example of general regional co-operation in the information field, one should mention the Arab Regional Information System Network (ARIS-NET).

In June 1978 in Cairo, the League of Arab States (LAS) convened a meeting of the heads of information and documentation centres in the Arab countries and Arab League Specialized Organizations, which formulated the basic guidelines for the development of such a regional information system and network.

The next year LAS took action to implement the decisions of the meeting. As the first step it was considered necessary to establish the Arab League Documentation Centre (ALDOC), as a model for the region. ALDOC was also intended to become the focal point and springboard for the development of the regional information network.

In 1980 a UNDP-financed project, executed by UNESCO, was approved to support the programme for the strengthening and development of ALDOC. This project, involving a UNDP input of nearly US$ 3 million started in 1981 and terminated in 1988.

As a result of the project, ALDOC built up an integrated information system with a library and documentation service supported by computer, as well as microfilm, audio-visual, and reprographic systems, to serve both the Secretariat of the League of Arab States and the Arab countries at large. ALDOC has recruited and trained a permanent staff of 68 to manage its different operations and can function as a regional training centre.

At the national level, the present status of the information/documentation infrastructures in the Arab region is satisfactory in many countries. However, despite the advances achieved so far by these countries, there has been little or no inter-country co-operation or standardization of information technologies used by most of them. For this reason, and to provide support for the less-developed countries of the region in the area of information system development, the Arab League Co-ordination Committee consisting of the heads of Arab Organizations of the LAS further discussed in 1983 the conceptual design of an integrated information network for the Arab region and recommended its early implementation. This decision was also endorsed by the Ministerial Meeting of the Economic and Social Council of the LAS (AL-ECOSOC) at its meeting held in February 1984.

A regional meeting for the launching of the Arab Regional Information System Network (ARIS-NET) was organised by ALDOC, UNDP, and UNESCO in 1987, to focus attention on the ARIS-NET project concepts, plans, and approaches and to seek the experience, expertise, and co-operation of the participants. The meeting recommended the implementation of a project for ARIS-NET with ALDOC as co-ordinator, and in co-operation with concerned international and regional organizations. The network is being launched in a one-year UNESCO-executed introductory project starting this year with about US$ 500 000 in UNDP support.

It is expected that by the end of project the following basic groundwork for the network will have been completed: an ARIS-NET steering committee will be established and functioning; a model national information system will be formulated and tested by at least three participating countries; a programme for ARIS-NET will be developed for the consideration of new participating countries; and a regional training centre in information/documentation technologies and services will be established at ALDOC and put at the disposal of Arab States to train national staff.

Ultimately, the potential beneficiaries of the information services to be provided by ARIS-NET should cover the whole range of the active population among the Arab countries, at various levels of developmental activity, from policy-makers and planners at the top to farmers and other 'grass-roots' users at the bottom. However, it will initially cover specifically the staff of government offices, institutions, and enterprises which will be linked to ARIS-NET information services. These services will be provided through national information centres participating in ARIS-NET and through specialized regional sub-networks to be developed, as well as through ALDOC itself. ARIS-NET can therefore be considered as a conceptual and methodological framework

for information service developments, backed up by regional and national information infrastructures providing operational information services.

4.2 *Specialized regional information systems*

UNESCO is also promoting the development of operational co-operative information systems in fields of priority interest to its Member States, either through the units within UNESCO responsible for the subject fields in question (for example, in water resources and new and renewable sources of energy), or directly by PGI in close consultation with the other concerned programmes.

For example, UNESCO has been supporting since 1984 the development of the Asian Pacific Information Network on Medicinal and Aromatic Plants (APINMAP). The general objective of the network is to provide a framework for co-operation among Member States, through jointly developed information tools and related user services, so that the user communities in the region have access to information they need in the field of medicinal and aromatic plants. Eleven Member States have officially joined the network (Australia, China, India, Republic of Korea, Nepal, Pakistan, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam). Activities were launched in 1986–87, and the APINMAP Statutes were adopted at the First Management Board Meeting (Bangkok, 1987). A flexible decentralized network structure has been adopted with national nodes in each participating country, responsible for data input and for serving their national users, a Network Centre (located in the Philippines) responsible for technical co-ordination and the merging of national inputs into integrated databases, and a Secretariat (in Bangkok) responsible for the promotion and for the overall administration of the network and of its Management Board. Almost all national nodes have set up national co-ordinating mechanisms in order to involve national institutions active in the field of medicinal and aromatic plants in the collection of data.

APINMAP has already made a start towards the production of tangible outputs since two databases have already been initiated: one on sources of information on research carried out in the region (register of research institutions, researchers, and research projects) and an integrated bibliographic database with abstracts of research publications (informal reports, research papers, etc.). Standard applications have been developed on UNESCO's Mini-micro CDS/ISIS software for the above databases, with the aim of establishing microcomputer-based services at each national node.

Total UNESCO investment between 1984 and 1988 amounted to approximately US$ 260 000, of which about one-third supported the Network's conceptual and structural framework (feasibility and technical studies, organization of the Management Board meetings, activities of the Secretariat) and about two-thirds went towards development of services and infrastructures (assistance to the Network Centre and to the national nodes in the form of microcomputer equipment, consultancy services, and financial contributions). Further support is foreseen over the next four years for developing other needed information products and services — for example, factual

databases and, perhaps ultimately, critical analysis of information on specific topics — and strengthening user links with a view to progressively bringing APINMAP to self-sufficiency.

Another specialized regional network in which UNESCO is actively involved is the Pan African Network for a Geological Information System (PANGIS) which was launched in 1986 at the initiative of the International Centre for Training and Exchanges in the Geosciences (CIFEG) in Paris.

The objective of PANGIS is to facilitate the collection and dissemination of information on the earth sciences that African countries urgently need for their development. It consists of a group of European and African documentation centres involved in African geology, linked to each other for the exchange of information, supply of data, support for training and, where possible, assistance in the preparation of publications and syntheses.

The first step in PANGIS's development is the setting up of a bibliographic database of information in the Geological Survey organizations of the African countries.

PANGIS operates at three levels:

(a) national networks of specialized libraries and documentation centres in participating African countries (in universities, mining companies, research institutes, etc.) which are responsible for collection and dissemination of information under the co-ordination of the National Geological Survey Organization;
(b) sub-regional networks organized in Southern Africa (within SADCC — the Southern African Development Co-ordination Conference), North Africa (by OARM — the Arab Organization of Mineral Resources), and French-speaking Africa (with the support of BIEF — Banque Internationale d'Information des Etats Francophones);
(c) the international level with CIFEG, in contact with European correspondents.

The exchange of information (on diskettes) works both ways: Europe to Africa, for the dissemination of information published principally in international journals which are often inaccessible to African geologists; and Africa to Europe, for the diffusion of information published nationally or regionally, but which, because of insufficient means, is often not distributed outside the producing country or region.

In addition to searches in, and products from, the database, of which relevant sub-sets are available in the participating countries, the circulation of information is facilitated by the quarterly bibliographic bulletin *African Geology*, which is distributed free of charge to African institutions on request. It is published by CIFEG in association with collaborating centres in Europe and with support from UNESCO. A complementary information bulletin on international geological co-operation, *PANGEA*, is also published by CIFEG.

In addition, a register of 2500 geologists from the African continent has been prepared, including the speciality and position of each, and will be published in the near future.

National PANGIS centres have been set up in Zimbabwe and Uganda with support from CIFEG and from UNESCO. Five additional installations are foreseen in 1989 with financing from UNESCO and BIEF. Each PANGIS installation receives a microcomputer, a documentary database package with a standard PANGIS application, and an extensive training programme of an initial training of one month and further on-site training in the country concerned. The average international costs for the implementation of PANGIS in a documentation centre of an African country is about US$ 30 000. It takes approximately one year for a participating country to become fully operational within the PANGIS network.

An application for participation in PANGIS must be initiated by the African country itself. A discussion at national level is highly recommended in order to prepare a consensus on the collection and diffusion of geological information. The successful installation of PANGIS in a country depends to a large degree on the nomination of African geological documentalists who are personally motivated and assured of support from the organization in which they work.

A further development in PANGIS services is being foreseen: the archiving and dissemination of primary documents with the help of CD-ROM in the African documentation centres. A first step is being taken by entering all of the bibliographic references dealing with the geology of Africa on CD-ROM.

5. Conclusions on regional and international co-operation

Developing countries wishing to benefit fully from information systems and to take part in international co-operation in the information field encounter specific problems, including the following.

(1) Information systems and services are under-utilized in most developing countries, due mainly to over-emphasis on the passive supply of 'traditional' information services rather than to understanding and responding to users' needs.
(2) In many countries, access to home-produced information and data is not satisfactory.
(3) Access to foreign and international information and data is restricted by its high cost, the dispersion of information sources, and the users' limited ability to read foreign languages.
(4) The national co-ordinating mechanism and the policy institutions for information systems and services are inadequate, and, consequently, information does not receive priority funding; this insufficiency may also lead to, or prevent the reduction of, certain legal and administrative barriers to information flow and information system development.
(5) Information technology support, trained information manpower, and other basic information infrastructure is in general underdeveloped.

Behind these 'objective' problems are a number of human factors which affect information users in developing countries and which in many cases are shared within a given region or sub-region. These include:

(1) language difficulties which arise from the facts that information is produced in a great variety of languages, and that information specialists tend to use their own professional jargon which is not always understood by potential users;
(2) difficulties arising from the cultural environment when information products and sources are insufficiently attuned to the local culture and practices of those to whom they cater; in particular, information technology, both in theory and practice, may be alien to local perceptions and experience and this may cause misunderstandings and resistance to change;
(3) difficulties of a psychological or intellectual nature which relate particularly to the presentation of information; the great volume, variety, and complexity of information to be processed can put a strain on local users or processors, with the result that users may be reluctant or unable to use the information services available.

This situation is exacerbated in developing countries where user awareness of information and educational levels may be lower, and where the constraints on users' access to information are greater.

Although it is clear that international co-operation has an essential role to play in assisting the developing countries to benefit fully from the information age, it is important to understand that one cannot dissociate 'information' from the society in which it is generated, processed, and used. Hence, any international co-operative information system will be influenced by, and has to cope with, the different socio-economic and socio-political characteristics of the participating countries.

It should also be noted that, although certain international support actions have been beneficial, especially those designed to solve specific information problems or to increase the information capability of particular countries, the enormous efforts made to develop new systems and services have been of less immediate value for lack of receiving infrastructure and user involvement.

For all of these reasons, which have been treated in greater detail elsewhere,[6] regional co-operation in which developing countries can help each other by sharing experience and scarce national and international resources in keeping with common priorities and politico-cultural outlook is in many cases a very attractive solution.

We have presented here two types of approach to regional co-operation which are being actively pursued within UNESCO's General Information Programme: schemes for general co-operation in the field of scientific and technical information, and specialized operational information networks. The former approach can set the stage for a powerful and co-ordinated development of information activities, but, since the goals are ambitious and the impact is generally of a long-term nature, this type of co-operation requires a very strong political support in the participating countries, a dedicated organizational and promotional effort, and a relatively high level of international funding. Also, the results should be evaluated not only in terms of better

information services and use, but also of an improved political and psychological basis for future information development.

The second type of co-operation holds the advantage of providing a very strong potential impact in a relatively short period with a relatively limited budget, albeit in a single priority field of information. This is true in large part because the users can be directly involved at an early stage in the supervision and development of the system, and because the limited objectives may make possible relatively simple and inexpensive solutions in terms of infrastructure, training and information technology. Innovative information services involving, for example, factual databases and information evaluation or repackaging activities, can often readily be developed, tested and used, and subsequently serve as models for information work in other sectors. It is very important, however, to foresee organizational, financial, and intellectual support, at the international level if necessary, over a sufficiently long period (typically about five years) to allow such a specialized system to become fully operational and self-sustaining.

Both approaches to regional co-operation have proved very successful and are expected to be continued and expanded in UNESCO's programme in the future. This tendency is in keeping with the Organization's overall policy of decentralization and of concentration of effort in a small number of projects which can be ensured of real impact. In this context, the improvement in national capacities to participate in, and benefit from, regional co-operation and information systems is increasingly seen as a measure of the effectiveness of international support for national efforts in the information field.

In the foregoing discussion we have limited ourselves to mechanisms for formal co-operation, with emphasis on concrete development activities. But one should also stress the very important role of professional co-operation at the regional level and particularly the contribution of international non-governmental organizations such as IATUL. In fact, strong, professional collaboration in sharing and transfer of experience, sensitization of governments and decision-makers, and improvement of the status and training of information workers are key factors in the success of all efforts to improve information access at the national, regional, and international levels. UNESCO is working very closely with the concerned professional communities, both information specialists and users, in the development of its programme, and would greatly welcome any suggestions or offers of co-operation which may emerge from the present meeting.

In conclusion, we can see that countries around the world are becoming fully conscious of the importance of scientific and technical information for decision making, problem solving, effective planning, research, and development. There is so much to be gained from a better exchange of information that, in this age of interdependence, it is unlikely that any country can consider itself self-sufficient insofar as scientific and technical information is concerned. As we near the 1990s it is clear that trends will continue to be for increased international and regional co-operation to facilitate the flow of scientific and technical information, with the close co-operation of all parties concerned,

users, information specialists, information systems and services, governments, and international organizations.

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Initialisms

ACU	ASTINFO Co-ordinating Unit
ALDOC	Arab League Documentation Centre
AL-ECOSOC	League of Arab States, Economic and Social Council
APINMAP	Asian Pacific Information Network on Medicinal and Aromatic Plants
ARIS-NET	Arab Regional Information System Network
ASTINFO	Regional Network for the Exchange of Information and Experience in Science and Technology in Asia and the Pacific
BIEF	Banque Internationale d'Information des Etats Francophone
CARIRI	Caribbean Industrial Research Institute
CARSTIN	Sub-Regional Network for the exchange of information and experience in Science and Technology for Development in the Caribbean Region
CCU	CARSTIN Co-ordinating Units
CIFEG	International Centre for Training and Exchanges in the Geosciences
ICSTI	International Centre for Scientific and Technical Information
LAS	League of Arab States
OARM	Arab Organization of Mineral Resources
PADIS	Pan-African Documentation and Information System
PANGEA	title of a journal
PANGIS	Pan-African Network for a Geological Information System
PGI	(Unesco) General Information Programme
SADCC	Southern African Development Co-ordination Conference
UNDP	United Nations Development Programme
UNISIST	refers to the set of methods, norms, standards, principles and techniques developed within the framework of the Unesco General Information Programme; previously was the Intergovernmental Programme for Cooperation in the field of Scientific and Technological Information, integrated within PGI in 1976.