Dissemination of scientific and technical information

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One of the functions of the IAEA is to foster the exchange of scientific and technical information on peaceful uses of atomic energy. But all its other functions, whether for example encouraging research, establishing safeguards, or formulating safety standards, are likely to generate scientific and technical information. Indeed it is difficult to see how the objectives of the Agency – to seek to accelerate and enlarge the contribution of atomic energy to peace, health and prosperity throughout the world – can be achieved without producing information at every turn.

Meetings

Whenever scientists or experts meet, information is created or produced or transferred or disseminated, regardless of whether the results of the meeting are published or documented. The more participants and the longer they meet, the greater this "spontaneous" dissemination of information is likely to be.

Meetings of one kind or another are a fundamental part of the Agency's scientific programme; a programme hammered out by the Director General and his technical staff under the guidance of such groups as the Scientific Advisory Committee, and amended and eventually approved by the Board of Governors and the General Conference.

Agency meetings range from large conferences such as the 1977 Salzburg Conference on Nuclear Power and its Fuel Cycle, attended by approximately 2000 people, to smaller gatherings in which perhaps only a handful of experts participate.

The largest scientific meetings, the conferences and symposia, constitute a major event for the Agency. Their subjects are proposed, about two years in advance, by the Scientific Advisory Committee. The selection of papers is done about five or six months before the meeting by a small selection committee who base their decisions on knowledge of the work being done in various parts of the world and on a study of the extended summaries submitted by the authors outlining their proposed papers. The final papers are submitted officially by Member States through the official channels, and have therefore been refereed and vetted before dispatch to the Agency. An important reason for holding conferences and symposia is to publish these papers in the so-called Proceedings Series. A new feature recently introduced at symposium meetings is the presentation of posters: here only a summary of the work is published in the proceedings, but the scientific community is thus made aware of the work and the authors are free to publish their results in full elsewhere.

In the scientific programme of the Agency there are more than a hundred smaller meetings each year. And this does not count the numerous more informal encounters between individual consultants and staff members that take place all the time. The regular smaller meetings are mostly Technical Committees, Advisory Groups, Consultants' Meetings, International Working Groups, but other groups are from time to time called together with a special aim; one example was the International Nuclear Fuel Cycle Evaluation (INFCE).

The smaller meetings may be held for a number of reasons – e.g. to plan an international project, to discuss a manual, to organize a conference, to modify or approve standards, guides or recommendations – but scientific and technical information of some kind emanates from virtually all these meetings and the normal way of disseminating such information is by publishing it.

Publications

As a check on all this publishing activity – which in priced publications alone runs to about 50 000 different printed pages a year – the Publications Committee exercises an important function. Its basic tasks are to examine all manuscripts submitted (except those of conferences and symposia, and the periodicals), to approve material for publication, to see that it is in an appropriate form, of fitting quality, and to ensure that it does not run counter to Agency policy.

The principal series of Agency publications and documents can be summarized as shown in the table. Sometimes there is a series within a series. The Safety Series, for example, accommodates an important group of codes of practice and guides on reactor safety, produced under the NUSS programme (Nuclear Safety Standards). The Technical Reports Series accommodates the group of publications being produced on Nuclear

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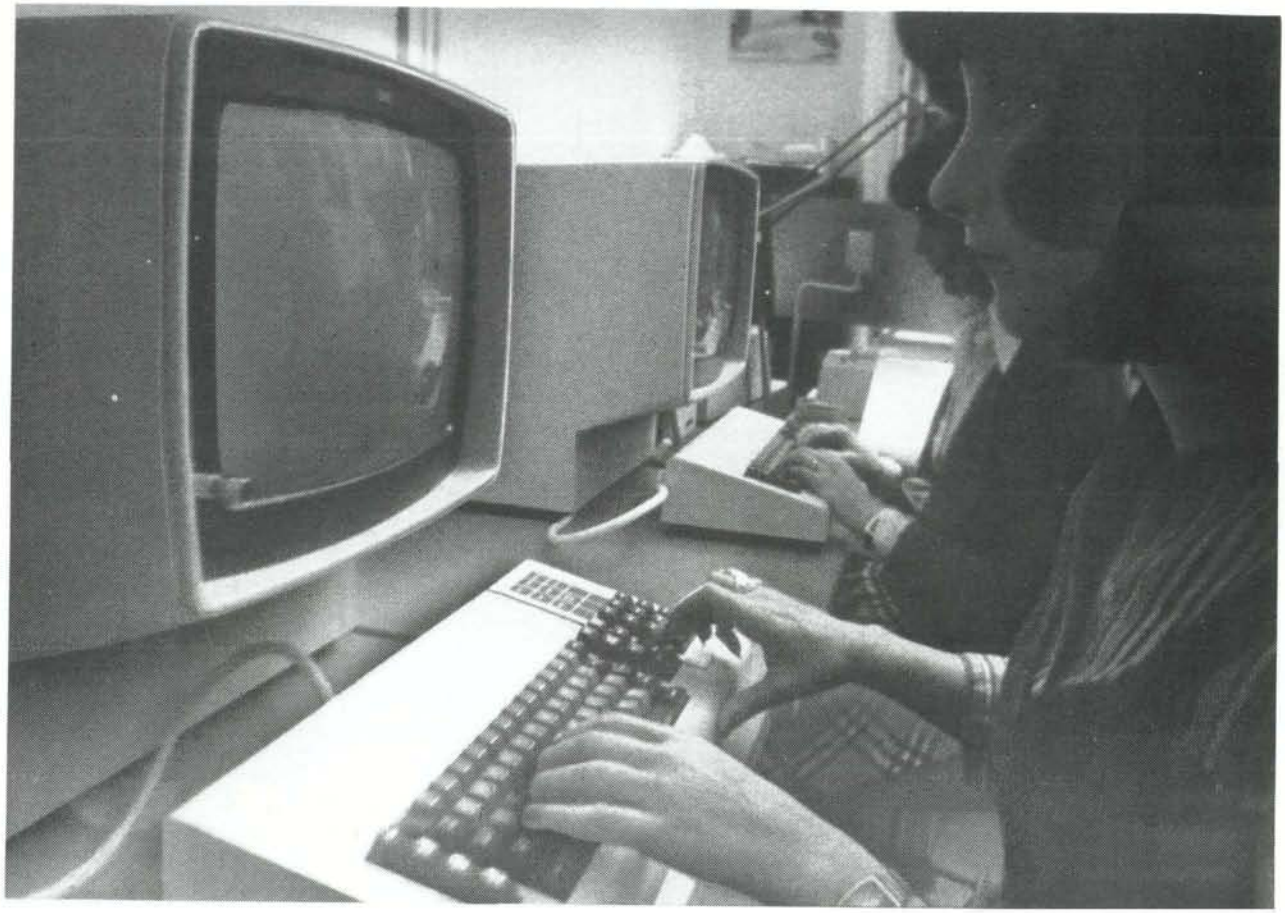

About 75 000 references to nuclear literature are fed into the INIS system every year. On-line sessions by retrieval specialists typically last about 15 minutes and over twenty sessions a day are conducted by external users.

Power and its Fuel Cycle. Many of the reference works are published in separate English, French, Russian, and Spanish editions.

The subjects and disciplines covered by the IAEA are wide, touching on almost the whole gamut of sciences and technologies that have gone hand in hand with mankind's development in the modern world. Perhaps the best way of demonstrating the range of the Agency's scientific activities is to show the way the Publications Catalogue is divided up:

Life sciences: nuclear medicine; radiation biology; dosimetry; entomology; agronomy (soils, irrigation, crop production); food preservation; plant breeding; animal science; pollution.

Nuclear safety and environmental protection: including radiological safety; waste management; nuclear safety.

Physics: theoretical physics; nuclear physics; reactor physics; fission; plasma physics; fusion; direct energy conversion and MHD; neutron physics; solid state physics; nuclear data.

Chemistry, geology and raw materials: radiochemistry; fission chemistry; radioisotope production; radiation chemistry; physical chemistry of nuclear materials; labelled compounds and radiopharmaceuticals; uranium, mining and production; fuel reprocessing; hydrology; desalination; heavy-water production; geology.

Reactors and nuclear power: research reactor utilization; reactor technology; reactor economics; reactor fuels and fuel cycles; reactor evaluation.

Industrial applications: radiation processing; radiation polymerization; fibrous materials; wood plastic composites; radioisotope gauges; tracers; pollution studies; peaceful nuclear explosions.

Miscellaneous: safeguards and inspection; nuclear law; nuclear documentation — INIS.

Much of the Agency's publication work is aimed at the attainment of a better world to live in. Since the Stockholm Environmental Conference of 1972 the Agency has, for example, produced over 100 separate publications dealing just with the subject of the environment.

The Agency's Publications Catalogue now runs to 300 pages and well over 1000 priced books (excluding

Principal series of IAEA publications and documents

Priced

Proceeding Series
Technical Reports Series
Panel Proceedings Series
Safety Series
Safeguards Information Series
Technical Directories
Legal Series
Periodicals: e.g.
- Nuclear Fusion
- Meetings on atomic energy

Computerized information system publications: e.g.
- International Nuclear Information Service
  - INIS Atomindex
  - INIS Reference Series
- Computer Index of Neutron Data
  - CINDA
- Computer Index to Atomic and Molecular Collision Data
  - CIAMDA
- Nuclear power reactors in the world
- Operating experience with nuclear power stations

Unpriced

Technical documents: e.g.
- IAEA-TECDOC Series
- International Centre for Theoretical Physics ICTP Series
- International Working Group
  - IWG Series
- International Nuclear Data Committee
  - INDC Series
- Research and Laboratories
  - IAEA-RL Series
- Newsletters

Information periodicals and booklets: e.g.
- IAEA Bulletin
- Public Information booklets and leaflets on various subjects, published and updated on a regular basis

INIS) have been published since the Agency's inception; this number would be noticeably larger if one included all the language versions where books have been published in cover-to-cover translation. Most of these 1000-odd books are still available. Although many copies of the publications are distributed free to Member States, the income to the Agency from sales is over a million dollars per year: this is the main Agency activity that brings a sizeable revenue.

Computerized information systems

• *International nuclear information system (INIS):* About one half of the 50 000 different printed pages published annually emanate from computerized information systems, the largest and most important of which is INIS. INIS was designed and operated by the Agency in collaboration with its Member States and several other international organizations. Its purpose is to provide an announcement and abstracting service covering the world's nuclear literature, using modern computer and micrographic techniques.

Although INIS was originally conceived in 1965, it was in 1969 that the Board of Governors approved the setting-up of the programme on an experimental basis. The first products, a printed journal and associated computer tapes, were issued in April 1970. At present, 67 Member States of the IAEA and 14 international organizations participate in the programme with a combined input of approximately 75 000 published items, i.e. references to nuclear literature, per year. By the end of 1981, the INIS bibliographic file included over 640 000 items. In addition, the number of publications (reports, standards, patents, theses, etc.) available in microfiche from the INIS Clearinghouse totalled over 150 000. The portion of the INIS bibliographic file that covers the years 1975 to the present, over 75% of the total, is maintained as computerized data base for on-line searching. About 35 countries receive updates to the data base in the form of magnetic tape for use in their national nuclear information dissemination efforts.

INIS is totally dependent upon international co-operation. The collection and preparation of input and the dissemination of output are completely decentralized, taking place in the Member States. Only the processing, checking and merging of the data are centralized in Vienna. The decentralized approach has resulted in a very comprehensive coverage of the

nuclear literature, has assisted in improving the national information infrastructures in both developed and developing countries, and has spread the cost of data gathering and processing equitably between the large and small producers and users of the literature. Twice each month the new material is published in *INIS Atomindex*, broken down into about 100 different categories, and indexed by subject, by author, and by document source (institution, university, corporation, etc.). The journal also includes a conference index by data and by place, as well as a report and patent number index. By means of INIS Atomindex any user, whether scientist, engineer, or manager, can determine quickly what has been recently published in his area of interest.

About 65% of the literature cited on INIS Atomindex is of a conventional nature, i.e. books, monographs, journal articles, etc. The balance is "non-conventional literature", and is not readily available through commercial channels. As a service to its users, the INIS Secretariat prepares microfiche copies of all non-conventional documents included in the INIS data base, and makes these microfiches available for sale either individually or on a subscription basis. This enables libraries to maintain a cheap and compact file of all difficult-to-acquire documents cited.

For those user institutions that would like to provide either on-line or batch computer search and retrieval services within their organization, INIS supplies an update of the INIS data base on magnetic tape twice monthly concurrently with the publication of *INIS Atomindex*. The local information centre or library thus has a very powerful tool for making retrospective searches of the entire data base, and for the production of special compilations of selected new material tailored to the interests of the individual user. This is known as Selective Dissemination of Information. A current awareness service of this type often eliminates the need for the individual user to review personally each issue of INIS Atomindex. For various reasons many Member States do not find it economical or feasible to set up their own computerized INIS file, so the Agency provides on-line access to the master file in Vienna for those Member States able to reach Vienna via telex, dial telephone or an established telecommunications network. At present, approximately 33 Member States use this service.

To improve the quantity and quality of the information being submitted to INIS, and to help the Member States make optimum use of the output products, the INIS Secretariat conducts training seminars in Vienna, and also arranges for and participates in regional training seminars hosted by Member States. In a decentralized system, such as INIS, it is imperative that the participating Member States receive guidance and training on acquisition criteria, on input preparation and on how to make optimum use of the INIS output products. In addition, Member States are invited to send selected staff members to Vienna for on-the-job training with the INIS Secretariat. Many of the developing countries in the IAEA would like to develop a modern information centre in order to provide information services to their users, but require some assistance in setting up an organization suited to their needs. To the degree that funds and manpower permit, the INIS Secretariat provides consulting services on request either to help establish or to improve nuclear information centres in Member States.

- *Numerical nuclear data base:* Nuclear data are numerical constants of nature which describe the nuclear and atomic behaviour of all elements and isotopes which make up our environment. Large accurate data files are indispensable to scientists and engineers in the solution of nuclear problems. Because of the high cost of nuclear data generation, and the non-availability of the technology in most developing countries, nuclear data co-ordination and exchange on an international scale is necessary. Through its Nuclear Data Section, the IAEA operates an international nuclear data centre co-ordinating the generation and validation of the data and ensuring its worldwide availability. It provides nuclear data for important applications such as nuclear safety and safeguards, and acts as a focal point for the transfer of nuclear data techniques to developing countries through training courses and technical co-operation projects.

All experimental nuclear data generated in the world are compiled by four co-operating nuclear data centres (USA, USSR, OECD/NEA, and IAEA). Starting in 1970 these data have been systematically exchanged at a rate of about 30 magnetic tapes per year. The IAEA provides nuclear data services primarily to developing Member States. In 1981 it received 620 requests from 52 Member States, 240 for numerical nuclear data, 30 for data processing codes and 350 for reports. As a result of these requests, the Nuclear Data Section distributed approximately 1.2 million data points to developing countries and gave detailed advice regarding their use and computer processing. In 1981 more than 100 scientists from 25 developing countries participated in various training activities of the Nuclear Data Section.

As indicated in the table, the IAEA periodically publishes two major bibliographic data indexes, CINDA for nuclear data and CIAMDA for atomic data, and distributes them to over 1200 libraries and research groups. The IAEA also produces an average of 20 nuclear data reports per year, distributes some 40 nuclear data reports generated in Member States, and translates annually about 10 nuclear data reports from Russian into English. These reports are distributed to approximately 400 to 500 scientists.

- *Energy and economic data bank:* In order to perform analyses of the role of nuclear power in the Member States, the Economic Studies Section of the Agency's Division of Nuclear Power collects worldwide data, by country, on energy consumption and production as

well as economic and demographic statistics. These data are collected from external sources such as the UN Statistical Office, the World Bank, the International Monetary Fund, and the Organization for Economic Co-operation and Development and of course from the Member States themselves. The data have been computerized for ease in updating and manipulation.

The data base is presently used to provide information for many internal Agency reports on energy resources and usage, and, together with computer models, to project energy, electricity, and nuclear power demand, especially in developing countries. The data bank is also used as a source of information for responding to questions from Member States and from IAEA management.

- *Power reactor information system:* This contains the latest available information on the nuclear power reactors in IAEA Member States, and covers such things as monthly and yearly energy production figures, categorized information on some 10 000 power reactor shut-downs or outages, planned and unplanned; and data on power reactors in the planning stage, under construction, in operation or shut down. This system is used to produce a number of regular IAEA publications, in particular *Nuclear power reactors in the world* and *Operating experience with nuclear power stations.* The data are also used to prepare reports on the operation and efficiency of nuclear power reactors, and as a source for forecasting future nuclear potential on a country, regional and global basis. There are plans to allow Member States direct on-line access to the data base in the future.

- *International uranium geology information system (Inturgeo):* Another computerized data base developed and maintained by the Agency is Inturgeo, which contains information about the geology, characteristics, and resource potential of uranium deposits and occurrences throughout the world, along with summaries on the mining and milling techniques being used. Data for the system is collected from geological literature, Member States and IAEA technical co-operation projects and experts. The data stored in the Inturgeo's geo-system are available to all Member States and may be retrieved in detail or summarized in various ways. This information is expected to be especially useful to developing countries establishing national uranium exploration and evaluation programmes. Inturgeo has been funded by the USA and has received contributions of data from Argentina, Brazil, Canada and the USA. Current activity is directed toward acquiring data for Latin America, Africa, India, and Asia.

Vienna International Centre Library

Dissemination of scientific and technical information on the peaceful uses of atomic energy is also undertaken by the VIC Library, which is operated by the IAEA, but serves all organizations located at the Vienna International Centre. Before the move to the Vienna International Centre in 1979, the Library served only the IAEA. It has an extensive collection on the peaceful uses of atomic energy, available to Member States for consultation, reproduction or loan. The Library is also a repository for the reports included in the INIS system, mainly in microfiche, which can be duplicated on request.

One of the most important services rendered to Member States by the Library is the lending of films covering various aspects of atomic energy. The Library has a collection of over 300 films, some in several copies, which are available to Member States on request.