Direct access to INIS

by I.S. Zheludev and A.G. Romanenko*

Librarians, researchers, and information specialists throughout the world now have the opportunity for direct access to coverage of almost 95% of the world's literature dealing with the peaceful uses of atomic energy and nuclear science. This opportunity has been provided by the International Nuclear Information System (INIS) of the IAEA.

INIS, with the voluntary collaboration of more than 60 of the Agency's Member States, maintains a comprehensive, computer-resident data-base, containing the bibliographic details plus informative abstracts of the bulk of the world's literature on nuclear science and technology. Since this data-base is growing at a rate of 75 000 items per year, and already contains more than 500 000 items, it is obviously important to be able to search this collection conveniently and efficiently. The usefulness of this ability is enhanced when other data-bases on related subjects are made available on an information network.

During the early 1970s, on-line interrogation of large bibliographic data-bases became the accepted method for searching this type of information resource. Direct interaction between the searcher and the data-base provides quick feed-back resulting in improved literature listings for launching research and development projects. On-line access enables organizations which cannot store a large data-base on their own computer to expand the information resources at their command. Because of these advantages, INIS undertook to extend to interested Member States on-line access to its data-base in Vienna.

The demand for INIS

Facilities for on-line interrogation of the INIS data-base have been available internally to the IAEA staff since 1975. During 1976 several national INIS centres asked the INIS Secretariat to provide external access. This question was discussed by the INIS Liaison Officers at their meeting in November 1976. The resulting recommendation to provide external access was accepted by the Agency. To accomplish the task as economically and simply as possible, direct-dial facilities using the public switched telephone system were employed. The necessary equipment was acquired and telephone connections established in 1977.

During 1978, 10 countries made direct access: Austria, CSSR, France, UK, Hungary, the Netherlands, Denmark, Finland, Norway, and Sweden. By the end of 1978 use of the access service had reached an average of over 100 hours connect-time per month. No special technical problems arose in using the public switched network, however telecommunication costs were high (averaging about US $60/65 per hour for the participating countries to reach Vienna). Some INIS Member States (including some within Europe) did not have suitable direct-dial connections to Vienna, and hence they could not establish the necessary connection to the Agency's computer, an IBM 370 series model. To extend access to these countries, additional telecommunication arrangements were required.

Two basic arrangements were contemplated:

- to develop a leased-circuit, star network centred in Vienna;
- to co-operate with other organizations already operating leased-circuit networks which could provide an economic and reliable access path for INIS data-base users.

The first alternative was judged too expensive and so was dropped. In any case, development of a world-wide computer network *per se* was not seen as part of the Agency's mission. Consequently, the second approach was taken. Two international organizations expressed interest in co-operating: the European Space Agency's Information Retrieval Service (ESA/IRS); and the International Institute for Applied Systems Analysis (IIASA). The computers of these two organizations and that of the IAEA were connected by means of leased lines. At about the same time, the Agency started charging for data-base access and off-line printing, to help offset the added costs of providing the on-line service. On 30 May 1980 the INIS data-base became officially available on the IRS network.

The IRS network, based in Frascati, Italy, serves western Europe and provides a more efficient alternative to the direct dial-up that had been, and still is, offered by INIS. To serve eastern Europe and those other INIS Member States beyond Europe, additional arrangements were made with IIASA and Tymnet Inc.

IIASA has been collaborating with several organizations, such as the Institute for Systems Studies (ISS) in Moscow, to form a network as part of its research programmes. Eastern European countries, such as Czechoslovakia and Hungary, as well as the Soviet Union, are participating. Leased-line circuits to IIASA's site in Laxenburg, Austria, from such countries

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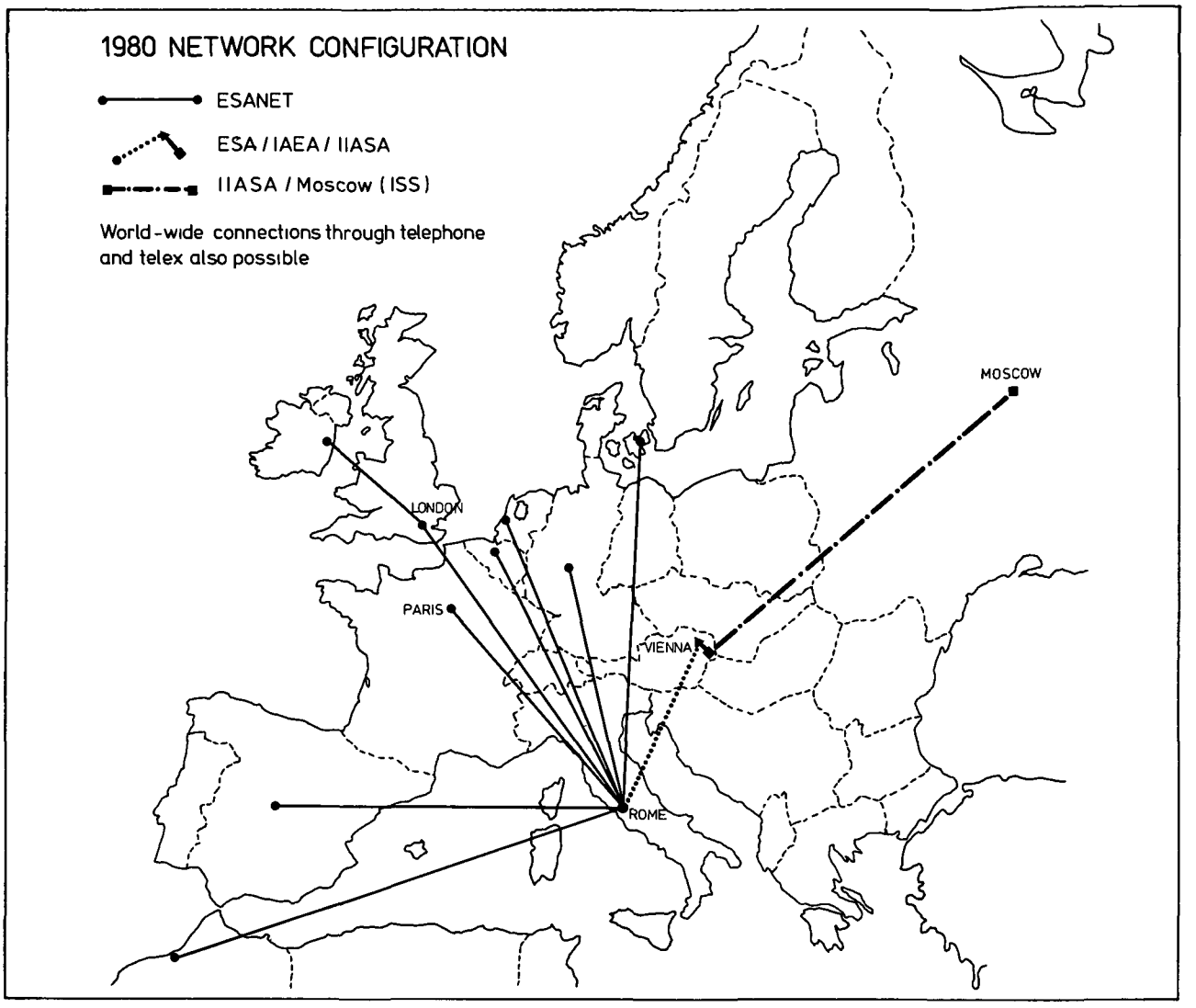


The international network of connections through which the INIS data-base can be accessed.

are being set up (see map). By means of a leased-line between the IAEA and IIASA, the INIS data-base is thus made available to the INIS Member States in that region.

Tymnet is an international commercial network, whose major traffic flows are into and out of the USA. In 1977 Tymnet established a node (or entry point) in Vienna, under the auspices of Radio Austria. Until October 1979 this node was able to accommodate only calls to the network from terminals in Austria. It was then up-graded to permit connection of computers (hosts) in Austria to the network. The IAEA then connected its computer to Tymnet as a host, and the INIS Member States which could access the Tymnet network were advised that direct access to the INIS data-base was available to them by that means. A variety of technical and administrative problems have delayed some countries' individual arrangements, but the feasibility of the Tymnet option was proved when successful searches were conducted from terminals as distant from Vienna as New Zealand.

As Tymnet does not have total global coverage, service through the telex network was investigated in order to reach countries not otherwise served. Experimental arrangements were made in 1980 with Radio Austria, which is responsible for overseas telex connections to and from Vienna. As a result, telex connections to the IAEA computer are now possible, thus making any telex machine in the world that can connect to Vienna, a candidate on-line access point. Although the speed of this connection method is limited to normal telex speed (5 characters per second), it is still satisfactory for basic information retrieval, training, and demonstration.

Since 1977, therefore, the Secretariat has significantly improved the INIS programme by enabling external users to search the data-base on-line, thereby bringing its exploitation of modern methods of information transfer on a par with other leading scientific and technical information services.

Obtaining direct access to INIS

The INIS on-line service is available only to Member States participating in INIS; the present number is 65. Sixteen made use of the on-line service in 1980 (see graph). Organizations in Member States wishing to make on-line access must first request authorization from their

national INIS Liaison Officer. The names and addresses of the Liaison Officers appear in each issue of *INIS Atomindex*, the printed version of additions to the data-base, which is published approximately every two weeks. Liaison Officers in many cases can also offer advice on the technical mode of access most suitable for their part of the globe. Depending on the mode selected, further arrangements are made with the pertinent network operators and the INIS Secretariat in Vienna (see Table p.14). Liaison Officers also assist in registering users, by forwarding to the Secretariat in Vienna a standard authorization form with the address and details of each candidate user. Depending on the arrangements made between a particular Liaison Officer and the Secretariat, the charge for on-line service may be made directly to the user or through the Liaison Officer. (Search-result printouts are always sent directly to the user.)

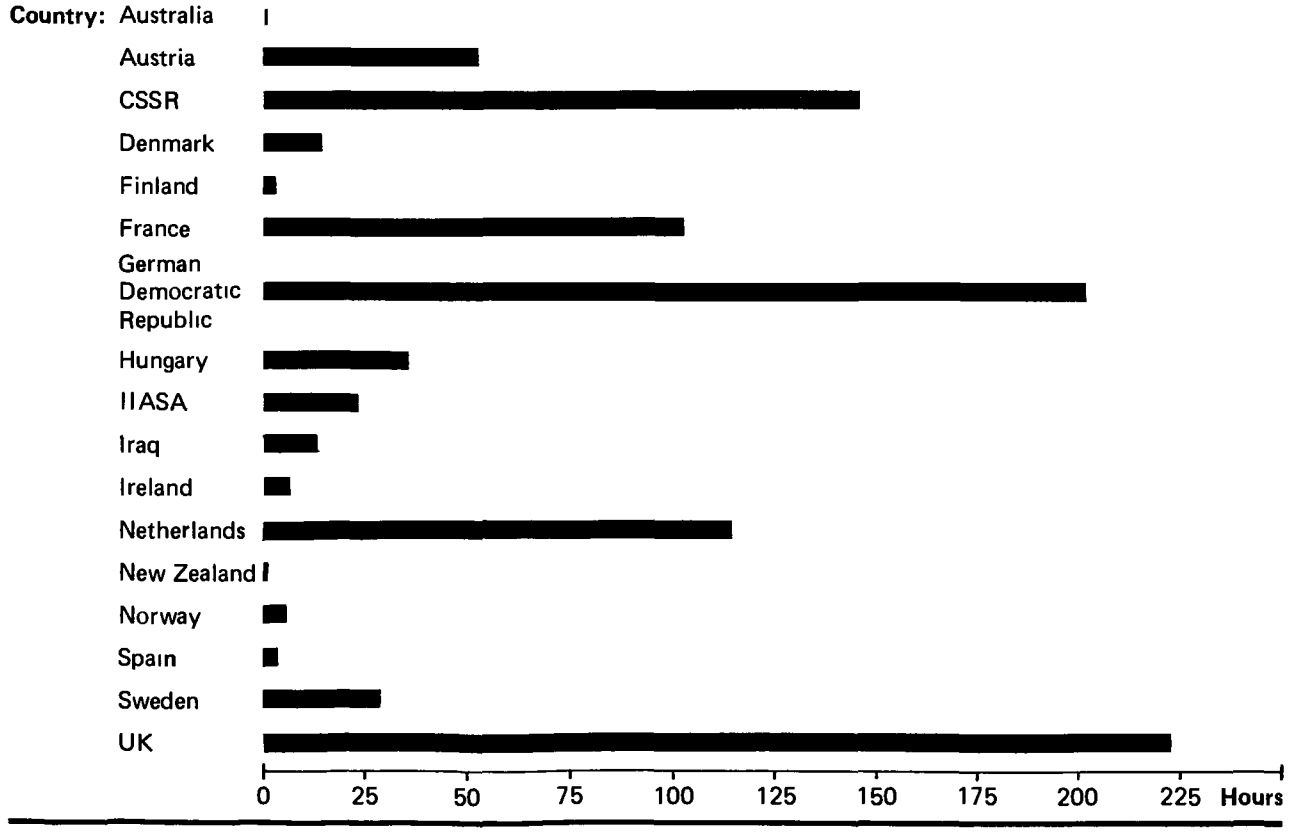
It should be noted that, through an agreement with the Food and Agricultural Organization (FAO), a bibliographic data-base dealing with food and agriculture (AGRIS) is also stored on the IAEA computer. AGRIS is searchable in a manner similar to INIS, using the STAIRS language, and its external availability follows the INIS arrangements outlined above, except that AGRIS Liaison Officer authorization is instead required.

Slightly different arrangements are necessary for organizations opting for access over the European Space Agency's Information Retrieval Service. After INIS Liaison Officer approval is obtained, the prospective user should contact the ESA/IRS National Centre in his country or the Service's headquarters in Frascati, Italy. They make both the registration and the billing arrangements.

The INIS data base is on IRS as a *distributed* data-base, i.e. the full and latest INIS data-base residing on the IAEA computer in Vienna is available concurrently to users through the leased-line and software arrangements established by ESA and IAEA. These arrangements enable ESA/IRS users to search the Frascati computer data-bases (e.g. Chemical Abstracts) using the ESA/IRS developed software known as QUEST. To search INIS, a user merely invokes the appropriate "change-data-base" command in QUEST and is shifted over to INIS on the IAEA's computer and placed in the hands of STAIRS software. Both QUEST and STAIRS are easy-to-use, English-word-based, search languages. The distributed data-base availability of INIS on ESA/IRS should therefore be distinguished from versions of INIS appearing on Euronet, an information network established by the Commission of the European Communities. These latter versions are derived from magnetic tapes mailed from Vienna, to INIS national centres who are also Euronet hosts. Euronet contact points can provide further information.

The costs for on-line service typically have three components: telecommunications, data-base access (sometimes called file access), and ancilliary services (such as mailing printout-lists and delivering documents). The user must also take into account the cost of renting or buying his terminal and staff costs when considering the total costs of on-line searching.

Cumulative connect times for Jan–Nov 1980 to INIS database by external users (Times < 1 h omitted)



Arrangement sequence for direct access to INIS, Vienna

Scope of access	Mode of access*	Liaison Officer approval required?	Network connection arrangement	User registration
World-wide	Direct-dial telephone, telex	Yes	With national telephone/telegraph authorities	With IAEA
World-wide but only in countries with Tymnet nodes	Tymnet	Yes	With Tymnet	With IAEA
Member countries of European Space Agency	ESA/IRS	Yes	with ESA/IRS through ESA national centre	
Countries collaborating with IIASA on networking	Through IIASA	Yes	With IIASA	With IAEA

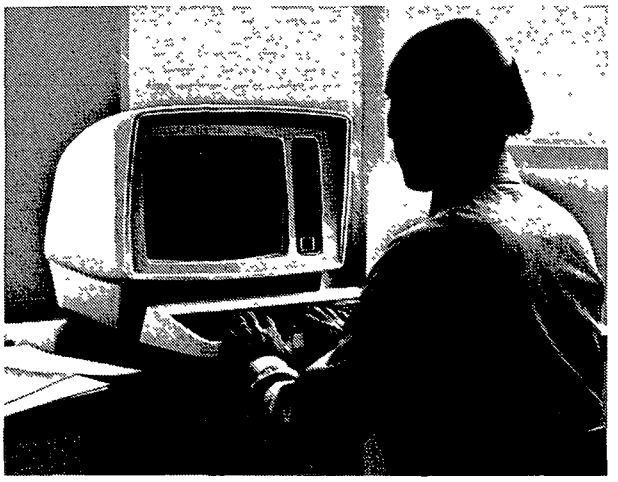
* Terminals used should be teletype-compatible, for asynchronous, half-duplex transmission up to 300 baud (bits/second).

For the three basic cost components, the current picture for INIS is:

- *Telecommunications:* depends on the network or system used; charges reportedly vary from $8 to $120 per connect-hour, with long-distance dial-up generally the most expensive.
- *Data-base access:* 260 Austrian Schillings (approx. $20*) per connect-hour for access made entirely over the public telephone system; 400 Austrian Schillings (approx. $31) for access made using established information networks.
- *Printing search results:* 2 Austrian Schillings (approx. $0.15) per page, with a minimum charge of 20 Austrian Schillings per mailing. Automatic execution of a user's stored search-sequences (called profiles) is available at 35 Austrian Schillings per execution, with the resultant printing at the above page rate. These profiles are executed every time the data-base is updated (24 times per year) and are the basis of INIS's Selective Dissemination of Information (SDI) service.

* The exchange rate of $1 = AS 13.0 was correct at the time of writing. Fluctuations in currency rates may alter this figure.

INIS on-line sessions by retrieval specialists typically last 15 minutes. More than twenty sessions a day are conducted by external users.



Future developments

Having established various network connections, the energies of the INIS Secretariat are now being directed toward improvements in the on-line interrogation process itself. Most of these are refinements in the sorting and display of search results on the screen or page and in search-sequence possibilities. It is also planned to add an on-line ordering feature to enable users to request microfiche copies of documents directly from INIS. Work is also underway in support of international efforts to develop a common command language for the search process in general. Standardization of search commands would be a valuable step in increasing the use of multiple data-bases and the efficiency of comprehensive search work. In the longer run, INIS anticipates possible direct linkages with some of the major international scientific publishers, permitting rapid on-line announcement of the very latest literature. Increased compatiblity of numerical data-banks with bibliographic data-bases is also seen as long-run development, which should be of considerable value to users focusing on experimental findings and establishment of standard reference values.

The progress made by INIS and other scientific and technical informaton systems in developing international on-line search services has been dramatic. The outlook promises even more dramatic developments in the years ahead.

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