IAEA

THE INTERNATIONAL NUCLEAR INFORMATION SYSTEM (INIS)

The First Forty Years

1970-2010

Claudio Todeschini
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FOREWORD

The Statute of the International Atomic Energy Agency (in what follows referred to as the IAEA or "the Agency") that came into force in July 1957, contains in Article III, paragraph A.3 the statement that:

> *The Agency is authorized: to foster the exchange of scientific and technical information on peaceful uses of atomic energy;*

and further in Article VIII, paragraph C that:

> *The Agency …… shall take positive steps to encourage the exchange among its members of information relating to the nature and peaceful uses of atomic energy and shall serve as an intermediary among its members for this purpose.*

It was with the desire to more adequately fulfill the statutory function mentioned above that during the 1960's the Agency began exploring the possibility of establishing a scheme that would provide computerized access to a comprehensive collection of references to the world's nuclear literature. The outcome of these efforts was the establishment of the International Nuclear Information System (INIS) that was authorized by the Agency's Board of Governors in February 1969 and produced its first products in May 1970.

The system was designed as an international cooperative venture, requiring the active participation of its members that would therefore need to invest human and financial resources in order to make it function. It started operations with 25 members and the success and usefulness of the system has been proven by the fact that present membership is 146.

The present report describes the road that led to the creation of INIS, hopefully gives an insight into the enthusiasm that led its participating members to make it such a success and follows the changes made to the system to adapt not only to the rapid developments in information technology in the ensuing 40 years but particularly to the changes dictated by the changing requirements, capabilities and needs of its members and of the users of the system.

The report also describes the present operation of the system, the current methods used to collect and process the data on nuclear literature and the various products and services that the system places at the disposal of its users.

It may be well at the onset to consider the role that INIS was intended to play by the founding figures who helped establish the system but also by its subsequent users and managers:

- At what may be considered the "political" level, INIS was and is to be a demonstration of the fact that in an area of human endeavour as sophisticated as nuclear science and technology, countries of the most diverse political, social, economic and cultural backgrounds, from all corners of the globe and at all levels of technical development, could fruitfully cooperate in the critical area of information exchange;
- At the "technical" level, INIS was established and is today a channel for information exchange that employs the very latest technology available and thus has proved over the decades to be instrumental in bringing such cutting edge technology to countries or geographical areas that lacked such facilities or infrastructures;

- At the "pragmatic" level, INIS was and is the tool used by scientists, engineers, technical persons and managers in the nuclear industry to keep abreast with developments in the subject areas covered by the database;
- From the perspective of "Knowledge Management", and in particular Knowledge Preservation, INIS is the repository of references to publications that contain the cumulative scientific knowledge in the areas of the peaceful applications of nuclear science and technology as recorded in scientific journals but also, of particular value, INIS is the repository of the full text of other publications, so called "grey literature", not easily available through normal commercial channels.

In the operation of INIS, and its role as outlined above, it is clear that the Member Countries (and Member International Organizations), were and are to play an absolutely critical role and the system rises or falls as its Members support it and cooperate with each other in its operation or allow their support to flag. INIS was a trailblazer in the world of information exchange as a system whose key characteristic was its "decentralized" nature. Never before had an information exchange activity had such geographically and linguistically disparate nodes, each performing specific tasks on a common project. Developments in the very last few years have made some inroads into the fully decentralized nature of the original INIS design, as a certain level of pragmatism for the continued successful operation of the system has required that adjustments be made to the strictly decentralized mode of operation.

As mentioned above, the first output products of INIS appeared in May 1970. The year 2010 thus signals a notable milestone. The 40th year of INIS operations takes place in a world that is much changed, particularly so in the nuclear sciences but especially so in the areas of knowledge management and preservation. Today's methods of information technology are unrecognizable compared to those of 1970 and access to the most disparate sources of information, in our case nuclear information, is rapid, efficient and exhaustive, depending on the particular channels one uses to arrive at the desired information. INIS has established itself as one of the key channels through which to obtain the desired nuclear information. The present report tells the story of INIS and helps to commemorate the 40th anniversary of this success story. It is a success story for the system and for the IAEA, the organization under whose aegis the system has been operating. But above all it is a success story for the Members of INIS that have made it what it is and have helped users of information in the peaceful applications of nuclear science and technology to make this a better world.

1 HISTORICAL OVERVIEW

Developments in science and technology proved to be immensely important during the course of World War II. Nowhere was this more evident than in the application made of atomic energy, culminating as it did in August 1945 with the dropping of atomic bombs on Hiroshima and Nagasaki, quickly leading to the end of hostilities in the Pacific theatre[1]. The military, other governmental agencies, universities, research centres and industry expanded the resources devoted to research, development and applications in many fields of science and technology and particularly so in nuclear physics and nuclear sciences in general. These developments were driven by military applications but also by a growing interest in civil applications of atomic energy for power generation, in medicine, agriculture and other industrial applications. It was soon evident that ready access to scientific and technical information was essential and programmes were set up to manage the information already available and to include newly generated information and knowledge. Because of the recent military events closely related to atomic energy as mentioned above, these national information programs in the atomic sciences were usually set up within government agencies and thus centralized and usually well funded information management activities were the norm in the immediate post war years.

1.1 Major Sources of Nuclear Information Prior to INIS

Information management activities in nuclear science and technology were established in parallel in numerous countries in the 1940s and were progressively enhanced as developments in computer technology increased their usefulness; we shall describe briefly those of the USA, the USSR and in Europe.

1.1.1 Unites States of America

The U.S. Army's Manhattan Engineer District established in 1942 and located in Oak Ridge, Tennessee, had been responsible for the "Manhattan Project" that developed the first atomic bombs. The Manhattan Engineer District library operations and related technical information activities were also located in Oak Ridge. The Technical Information Branch had already instituted several abstracting services, including *Abstracts of Project Reports, Abstracts of Declassified Documents, Guide to Published Research on Atomic Energy* and *Reports Added to the Technical Library*. In 1946 Congress passed the *Atomic Energy Act* as a result of which the Army's Manhattan Engineer District programs and facilities were transferred to the newly created US Atomic Energy Commission (AEC) which became effective on 1 January 1947. Under the AEC, a Technical Information Division was formed in April 1947 that continued the abstracting services established under the Manhattan Engineer District and also made available a complete, integrated library service. Under continued public pressure for access to information on the atomic programs, in late 1947 a unified *Public and Technical Information Service* was established by the AEC[2].

During 1948 the AEC established a Panel on Technical Information that, in October 1948, recommended the establishment of an abstracting journal to be called *Nuclear Science Abstracts* (NSA). NSA was to incorporate information on the published results of all research and

[1] See Henry D. Smyth, "Atomic Energy for Military Purposes", (the "Smyth Report"), Princeton University Press, Princeton, 1945. Subsequently Prof. Smyth was a member of the Board of Governors of the IAEA, representing the USA at the meeting of the Board on 26 February 1969 at which the Board approved the establishment of the INIS System. See document GOV/OR.408 of 9 April 1969.

[2] See William. M. Vaden, "The Oak Ridge TechnicaI lnformation Center: A Trailblazer in Federal Documentation", U.S. Department of Energy, Office of Scientific and Technical Information, Oak Ridge, Tennessee, 1992.

development in the nuclear sciences, therefore not only information on AEC and other industry reports but also on journal articles, books etc. and was to appear 24 times per year. From 1948 until its discontinuation in 1976, NSA was to become the most authoritative source of information in the nuclear area and its printed copies were to be found on the shelves of libraries of practically any research centre, academic or other learned institution as well as industrial enterprises dealing with any aspect of nuclear science.

A milestone in international cooperation in matters of atomic energy was the "Atoms for Peace" address given by US President Dwight D. Eisenhower to the 470th Plenary Meeting of the United Nations General Assembly on 8 December 1953[3]. In his address Pres. Eisenhower raised the idea of the establishment of an international agency that might oversee research and development activities in the atomic area and ensure the peaceful applications of such developments. Making available scientific and technical information in the atomic area would be an integral part of the responsibilities of such an agency.

The *Atomic Energy Act* of 1954 authorized the AEC to make more information available to U.S. industry and foreign countries. Exchange of information was a central component of the "Atoms-for-Peace" initiative called for under the Atomic Energy Act of 1954. This led to bilateral agreements with the UK, Canada, Belgium, Switzerland, and the Netherlands to exchange information. In 1957, AEC began sharing information with Eastern block countries.

Under the "Atoms-for-Peace" initiative, the AEC provided to its bilateral partners "libraries", i.e. collections of documents and other materials which it published and also subscriptions to NSA itself. The development of NSA was further accelerated by the series of United Nations Conferences on the Peaceful Uses of Atomic Energy. At these conferences, the first two of which were held in the 1950s, countries released vast amounts of information that had previously been held secret. These actions of "declassification" led NSA to bring this large volume of newly available information to the scientific community by including it in its abstracting service. By 1968 NSA was receiving material on the basis of exchange agreements with 316 institutions in 44 foreign countries[4].

But as NSA evolved and grew, its complexity and cost had increased more or less in proportion to the quantity of literature available. In the 1960s the director of the AEC's technical information program[5] realized he would probably not be able to secure sufficient resources to continue the development and expansion of NSA into the future; so he began to search for a mechanism to involve other countries in the effort that would be required[6].

At the third U.N. Conference on the Peaceful Uses of Atomic Energy that took place in 1964, the director of the US AEC's technical information program invited many of the information specialists present to a meeting where he challenged them to consider the prospect that the AEC would not be able to continue NSA in its current form and to think about options for the future. Thus was planted the seed that ultimately led to the establishment of the International Nuclear Information System (INIS), just as President Eisenhower's address to the UN General Assembly in 1953 had been the seed that had led to the establishment of the IAEA.

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[3] See http://www.iaea.org/About/history_speech.html for an electronic copy of the original speech.
[4] Vaden, op. cit. p. 215
[5] Edward J. Brunenkant
[6] John E. Woolston "Intergovernmental Cooperation for Mission-Oriented Information Systems: A Memoir", in The History and Heritage of Scientific and Technological Information Systems: Proceedings of the 2002 Conference , ASIS&T Monograph Series. Published for the American Society for Information Science and Technology and the Chemical Heritage Foundation by Information Today, Inc., Medford, New Jersey, 2004, p.373-390

The *Energy Reorganization Act* of 1974 abolished the US AEC and established the Energy Research and Development Administration (ERDA). The *Department of Energy Act* of 1977 abolished ERDA and established the Department of Energy (DOE). These acts broadened the role of the Office of Scientific and Technical Information (OSTI) in the collection, preservation, and dissemination of non-nuclear related energy information. Building on the international cooperative relationships already in place, exchanges were expanded into non-nuclear areas and began involving the newly formed International Energy Agency (IEA). In 1974, OSTI initiated the building of the Energy Science and Technology Database (EDB) encompassing the full scope of energy, all literature types, and with worldwide coverage[7].

During the 1980s, OSTI was instrumental in establishing the international Energy Technology Data Exchange (ETDE), an implementing agreement under the IEA. OSTI has served as the Operating Agent for this agreement since its inception. ETDE was established for the purpose of sharing both nuclear and non-nuclear energy information.

1.1.2 U.S.S.R.

In the USSR, the Academy of Sciences Institute of Scientific Information attempted to collect all scientific and technical literature published in the USSR and in foreign countries, abstracted it and published its *Referativnyi Zhurnal* (Journal of Abstracts). This has been published continuously since 1952. In the early 1960s the Institute received the entire Soviet literature covering the relevant fields, and also 12.500 foreign periodicals. The Institute had exchange agreements for scientific publications with 1085 foreign organizations in 60 countries.

This activity is now carried out by the successor organization, the *All-Russian Scientific and Technical Information Institute of the Russian Academy of Sciences* - Vserossiisky Institut Nauchnoi i Tekhnicheskoi Informatsii (VINITI)[8], created in 1956. *Referativnyi Zhurnal* is a monthly periodical where abstracts, summaries, bibliographical descriptions of scientific documents from primary serial editions, scientific conferences proceedings, books, deposited scientific papers and other scientific and technical publications from all over the world, are published. VINITI includes in its publications references to about one million documents annually of which about 30% are from Russian sources. All the issues have year and/or number indexes: author, subject, patent, source indexes and, in some issues, a specialized index. The electronic version of *Referativnyi Zhurnal* is similar to the printed version and it is distributed as an independent information product. Abstracts are organized according to the VINITI Classification Index (VINITI Rubricator) and each abstract has a serial number within a regular issue.

1.1.3 European Countries

The Physical Society of London and the Institution of Electrical Engineers (IEE) agreed in 1898 on a collaboration that resulted in the publication of *Science Abstracts*, an abstracting service whose costs were mainly borne by the two above mentioned societies but also received support from The Institution of Civil Engineers, The Royal Society and The British Association for the Advancement of Science. The author index at the end of the first year of publication of *Science Abstracts* is littered with names of eminent scientists including Ampère, Becquerel, Boltzmann, Coulomb, Dewar, Edison, Heaviside, Hertz, Laplace, Marconi, Maxwell, Michelson, Pérot & Fabry, Poincaré, Pockels, Planck, Röntgen, Siemens, Thompson, Townsend, van der Waals and

[7] See http://www.osti.gov/ostihist.html
[8] See http://www.viniti.ru/english/vinabout.html

Zeeman[9]. The coverage extended to just over 100 scientific and engineering periodicals, thus providing a comprehensive record of principal papers published in Europe and America in the fields of electrical engineering and physical science. In May 1903 it was decided to split the publication into two parts: A (Physics) and B (Electrical Engineering). This decision allowed the subject scope, particularly in physics, to widen substantially.

The international aspect of *Science Abstracts* was recognised in 1950 by UNESCO which, together with the endorsement of the International Abstracting Board of ICSU (International Council of Scientific Unions), led to the appointment of *Science Abstracts, Series A, Physics Abstracts* as the officially recognised English language abstracting journal in Physics.

In 1966 a *Series C* was added (Control Abstracts) and in January 1967 the IEE launched INSPEC (Information Service in Physics, Electrotechnology and Control) a service which embraced the current six publications of *Science Abstracts* and the development programme. The computerized production system was designed so that a single machine entry would contain all the information necessary to allow for the production of all the various publications including annual and cumulative indexes and also for future machine retrieval requirements.

During 1969 a detailed study on the evaluation of indexing languages was begun. The project investigated the retrieval effectiveness of natural language (title, abstract), controlled language, free indexing, hybrid language (controlled subject heading together with an uncontrolled modifier line as used by NSA of the US AEC). The findings of this research project showed that controlled language was superior in performance overall, but that the use of free indexing was in turn superior to the use of other natural language fields. Free index terms also reflect the terminology in use in the literature.

By the end of 1997, INSPEC had reached 5.75 million records and was growing at a rate of over 300,000 records per annum[10].

In France, in order to satisfy the needs for scientific and technical information to support the war effort scientifically, a decree by the President of the Republic of October 1939 created the Centre National de la Recherche Scientifique (CNRS). The CNRS went on to collect bibliographic data on published literature and publish the data, starting in 1941, in the *Bulletin Analytique* which subsequently became the *Bulletin Signalétique* in 1955[11].

Parallel to the above developments, Frédéric Joliot-Curie succeeded in having the Commissariat à l'Énergie Atomique (CEA), established in October 1945. The CEA, though itself not producing an international bibliography in the atomic sciences, was obviously interested in access to scientific and technical information in that field. The CEA cooperated with the CNRS by contributing to the *Bulletin Signalétique.*

In the 1970's the CNRS, whose bibliographic products were by then referred to as the *Bibliographie Internationale*, established large computerized data bases for the exact sciences (PASCAL 1973) as well as the social sciences (FRANCIS 1978) derived from its *Bibliographie Internationale.*

In Germany, *"Physikalische Berichte"* (Physics Reports) first appeared in 1920, and are to be regarded as a continuation of *"Fortschritte der Physik"* (Progress in Physics) (Vol. 1 – 1845 - published 1847), of the *"Halbmonatliches Literaturverzeichnis"* (Semi-monthly Literature List), and

[9] See http://www.iee.org/publish/inspec/100years/history1.cfm
[10] See http://www.iee.org/publish/inspec/100years/history8.cfm
[11] See http://biblio-fr.info.unicaen.fr/bnum/jelec/Solaris/d04/4lemaguer.html#RTFToC2

of the *"Beiblätter zu den Annalen der Physik"* (Supplements to Physics Annals). The journal appeared again after the Second World War with the 26th Volume, dated July/August 1947.

The journal was published on behalf of the Physical Society of Baden Württemberg and from 1953 onwards by the Association of German Physical Societies. Original titles of papers covered were given without any translation. As from 1950 the volumes contain a list of collaborators and a register of the periodicals used for *"Physikalische Berichte"*. Each volume also contains a classification arranging the material under 11 main headings.

The European Coal and Steel Community (ECSC) founded in 1951 (Treaty of Paris) by France, West Germany, Italy, Belgium, Luxembourg and the Netherlands to pool the steel and coal resources of its member-states, was followed by the European Economic Community (EEC) founded in March 1957 (Treaty of Rome) by the same states and by the European Atomic Energy Community, or EURATOM, also founded in March 1957, by a second treaty of Rome, signed the same day as the above mentioned treaty which instituted the EEC. One of the tasks set for EURATOM by the treaty was to promote research and ensure the dissemination of technical information in the area of atomic energy. Under the EURATOM Directorate General XIII, a centre for Information and Documentation was established in Luxemburg and in 1962 work started on the design and development of a European Nuclear Documentation System (ENDS) which was planned as a computer based bibliographic system covering not only the scientific literature published in the member countries of EURATOM but with world-wide coverage[12]. ENDS became operational in 1967. Collaboration between EURATOM and the US AEC started immediately in various activities: through the "Atoms-for-Peace" initiative EURATOM became a depository library, while the exchange of data between NSA and ENDS started in 1964. While EURATOM provided data to NSA on literature published in the EEC countries, the US AEC provided indexed data on the current contents of NSA which was incorporated into ENDS[13]. As of 1968 the UK Atomic Energy Authority (UK AEA) contributed data on all UK literature to the ENDS system.

An activity at ENDS that was to prove of particular interest for the subsequent development of INIS was the work on the development of a controlled terminology for the nuclear area. Documents presenting a structured terminology in a particular field began to be referred to as a "thesaurus"[14]. What is probably the first example of such a thesaurus in the computer age was the *"Thesaurus of ASTIA Descriptors"* published in 1960 by the US Defense Technical Information Center (DTIC). The Engineers Joint Council (EJC) of New York published the EJC Thesaurus in 1964 and subsequently elaborated the *"Thesaurus Rules and Conventions"* of November 1966 while a *"Manual for Building a Technical Thesaurus"* had been published by the US Department of Defense in April 1966[15]. EURATOM developed for indexing records in its ENDS system a "EURATOM Thesaurus"[16] of nuclear terminology. EURATOM derived the majority of its terms from the US AEC "Subject Headings List" (used for indexing NSA) and the ASTIA Thesaurus and achieved convertibility with the English language descriptor lists of the ZAED and DESY centres in Germany[17]. Following an agreement with the US AEC, the EURATOM thesaurus was also used for

[12] Rudolf Brée, "World Cooperation in Nuclear Science Information", Special Libraries, May-June 1970, p. 229-232
[13] Rudolf Brée, op. cit., p.230
[14] From the Greek Θεσαυρός, a treasury or storehouse of knowledge. The earliest modern example was the "Thesaurus of English Words and Phrases" compiled by Peter Mark Roget in 1852.
[15] "Manual for Building a Technical Thesaurus", Project LEX, Office of Naval Research, Department of Defence, ONR-25, April 1966
[16] EURATOM Thesaurus, Euratom Nuclear Documentation System, Luxembourg, Centre for Information and Documentation-CID, EUR 500e, 1964, 80p.
[17] M.R.Hyslop, "Sharing Vocabulary Control" in Special Libraries, Vol. 56, No. 10, Dec. 1965, p. 708-714

indexing the records entered into NSA. With the end of 1973, EURATOM ceased operation of the ENDS System[18].

For a full list of abstracting services in areas related to nuclear science in the early 1960s, see the Agency's document PL-40/2/Rev.1, Appendix D, 15 May 1962.

1.2 Genesis of INIS

As already mentioned in the FOREWORD to the present document, the Statute of the Agency contains in Article III, paragraph A.3 the statement that:

> *The Agency is authorized: to foster the exchange of scientific and technical information on peaceful uses of atomic energy;*

and further in Article VIII, paragraph C that:

> *The Agency ……. shall take positive steps to encourage the exchange among its members of information relating to the nature and peaceful uses of atomic energy and shall serve as an intermediary among its members for this purpose.*

To provide a framework within its administrative structure necessary for the execution of its responsibilities in the area of information exchange, the Agency was established with a Division of Scientific and Technical Information (STI) within the Department of Training and Technical Information. The STI Division comprised four Sections: 1) Conferences, 2) Editing and Publication, 3) Documentation and 4) Library.

Shortly after the Statute came into force, the Agency began taking concrete steps to implement the role it had been given by its Member States as expressed by the above paragraphs of the Statute. Its initial efforts consisted of building up a technical library, with the assistance of gifts from the US AEC, and by inviting leading scientists in Member States to write reviews on various nuclear topics, publishing these reviews, holding scientific meetings and publishing their proceedings, and publishing manuals on safety and other topics. In October 1960, the IAEA began the publication of its first scientific periodical, the quarterly *Nuclear Fusion* journal.

1.2.1 Panel on Scientific and Technical Information, Vienna, 1959-1962

At the invitation of the Director General in March 1959, a "Panel on Scientific and Technical Information" was constituted. It was to meet three times during the next three years and provide advice to the Agency on how best to establish channels for the Members to exchange scientific and technical information on the peaceful uses of atomic energy. The Panel had its first meeting in Vienna on 13-17 July 1959[19]. The Panel, among other things, recommended that the Agency should regularly publish a list of acquisitions of the Agency's Library, classified by subject using a classification system analogous to that applied by *Nuclear Science Abstracts*[20]. The Agency should also publish bibliographies in the field of nuclear energy, as well as lists of bibliographies being planned, in preparation and completed in Member States. Specific recommendations were also

[18] As reported by Carlo Vernimb at the Second Consultative Meeting of INIS Liaison Officers, Vienna, November 1973, PL-586/INF/4, p.7

[19] Report of the first meeting of the Panel on Scientific and Technical Information, Vienna, August 1959, STI/PANEL/8

[20] First mention of that US AEC publication as a reference tool for an Agency publication.

made with regard to nuclear terminology, bringing to light already at this early stage the importance that was given to the need for standardization in this area. The panel suggested that rather than establishing an independent terminological activity, the Agency should be proactive in coordinating the terminological work already taking place in some of the Member States in the areas of nuclear science and technology.

Already at its fourth meeting, the Agency's General Conference in September 1960 had passed the following resolution on the exchange of scientific abstracts[21]:

> *1. Requests the Director General, if necessary in collaboration with appropriate organizations, to examine the possibility of arranging within the Agency for an international exchange of the abstracts which are already published on the subject of the peaceful applications of nuclear science and to submit a report on the matter to the Board of Governors during 1961; and*
>
> *2. Further requests the Director General, in consultation with the United Nations Educational, Scientific and Cultural Organization, to prepare a study on the organization and operation of scientific abstracting services dealing with the peaceful applications of nuclear science, to serve as a basis for further action, and to submit the study to the Board of Governors for suitable and early action.*

The second of the above requests makes reference to UNESCO that at this time was in the process of establishing the UNISIST programme, defined as an "Intergovernmental Programme for Co-operation in the Field of Scientific and Technological Information". The Agency, in particular after this request on the part of its General Conference, was well disposed toward and actively pursued means of cooperation with UNESCO in its efforts in the area of scientific information.

A second meeting of the "Panel of Scientific and Technical Information", with enlarged membership, took place in October 1960[22]. Besides encouraging the Agency to continue and strengthen its efforts in activities already under way as a result of recommendations of the first meeting of the Panel, such as the sponsoring of Conferences, Symposia and Seminars, publishing the resulting proceedings, continuing the publication of the *"List of Bibliographies"*, and the *"List of Periodicals in the Nuclear Field"*, it specifically mentioned that the *"List of References on Nuclear Energy"* should enlarge its scope. It also recommended that the Agency publish a large number of bibliographies in closely defined subjects[23]. But most interesting, as a prelude to things to come with respect to the exchange of nuclear abstracts, the Panel discussed the resolution (reproduced above) that had been adopted by the General Conference of the Agency at its Fourth Meeting in September 1960[24]. The Panel pointed out that a well-developed and widely accessible nuclear abstracting service already existed, and recommended that the Agency should use it as a basis for future developments[25]. This was the first time that, through the mechanism of the Panel which it had set up, the Agency took official notice of the existence and wide distribution of the US AEC's *"Nuclear Science Abstracts"*. In view of the fact that, for the Panel that made the recommendation, its member from the United States was the Director of the US AEC's technical information program[26], responsible for publication of NSA, one can begin to see that already at this time there was writing on the wall that suggested the convergence of interests on the part of the

[21] Document GC(IV)/RES/78
[22] Report of the second meeting of the Panel on Scientific and Technical Information, Vienna, January 1961, STI/PANEL/10
[23] STI/PANEL/10, recommendation 2.(vii), p.4
[24] Document GC(IV)/RES/78
[25] STI/PANEL/10, recommendation 5., p.5
[26] Edward J. Brunenkant

Agency to provide some kind of international abstracting service in the nuclear sciences and on the part of the USA to find partners to share the burden of creating and operating such a service.

A third meeting of the "Panel of Scientific and Technical Information" took place in Vienna in April 1962[27]. The documents prepared for the work of the Panel contained among others, the following proposed recommendations[28]:

> *(i) The Agency, in co-operation with United Nations Educational, Scientific and Cultural Organization, assist developing Member States in the organization of effective information services, including abstracting. This aid be provided through training courses, fellowships and material assistance in terms of publications and equipment.*
>
> *(j) The Agency, in co-operation with other specialized agencies of the United Nations, encourage the research and development work on the techniques and equipment for mechanizing storage and retrieval of information, abstracting and translation work. The Agency's co-operation should supplement the national efforts now being directed toward the solution of these problems.*
>
> *(k) The Agency, in consultation with other appropriate organizations of the United Nations, give preliminary thought to the possibility of convening an international conference on science abstracting, including nuclear science, and other allied problems of interest, during the next 2-3 years.*

While not fully supporting the above suggested recommendations, the Panel did agree with the need for the Agency to play an active role in development work on mechanized storage and retrieval of science information and thus:

> *The Panel was of the view that the Agency should cooperate with UNESCO in that Organization's efforts to encourage the research and development work on mechanized storage and retrieval of information, and the broader study of science abstracting and other allied problems at the international level*[29].

In fact much was happening during the 1960s in a number of countries both in the ever increasing volume of scientific and technical literature being published in scientific journals, in "Report Literature", in pre-prints etc., and in the efforts being made to automatize or computerize the information about this literature and the establishment of appropriate distribution systems[30].

Despite the efforts started in the previous years, by 1964 the Agency began to be concerned that it was not adequately meeting its statutory obligations to foster the exchange of nuclear information among its Members. This arose mainly from the fact that, as mentioned above, new literature dealing with the peaceful uses of nuclear science and technology was accumulating faster than the abstracting journals of the world could handle with their limited budgets and the fact that the existing national abstracting services, while singly offering incomplete coverage of the world's literature, were performing substantial duplication and frequently offering their products in a limited national distribution paradigm that furthermore was carried by the national language.

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[27] See document PL-40/4/Rev.1, Vienna, June 1962

[28] Document PL-40/2/Rev.1, para.52, p.16, Vienna, June 1962

[29] Document PL-40/4/Rev.1, para.9, B, p.5

[30] Bernhard Gross, "Present and Future Trends of Scientific Information", Atomic Energy Review, Vol.4 (1966), Special Issue No.1, p.85-96, Vienna, International Atomic Energy Agency.

The Director of the Agency's Division of Scientific and Technical Information at the time, Bernhard Gross, a Brazilian physicist who had been from 1958 to 1960 a member of the IAEA's Scientific Advisory Committee, set in motion specific actions that he hoped would lead to the realization of a vision that he presented in an article written at the invitation of Dr Sigvard Eklund, the Agency's Director General that concluded as follows[31]:

> *International abstracting needs coordination. ……. Even if one maintains that each major nation needs abstracting journals in its own language, this seems to be a particularly inefficient duplication of work. One solution would be a single central organization for each field, which would receive all relevant material in page proof, translate it where necessary, and publish a single international journal which might be multilingual. ….. Another solution would be for each country to process its own material in all fields and then make it available to a single central organization covering all fields. Finally, a single organization might process all material.*
>
> *It will be necessary for each country, or sometimes region, to systematically organize its own material, ... and set up clearinghouses for collection and distribution. Individual centres must then be integrated into a world-wide network which collectively provides a world centre with all material. This will best be associated with, or operated by, an international organization. It is understood that what has been said here refers to a single field of science; different fields would be the responsibility of different international organizations. Such a system would leave the present structure of national centres untouched, and thus safeguard the vital interests of individual nations, until the time came when all could be merged.*
>
> *Once the necessary computer capability has become available, an international fully integrated network of automated documentation centres can be established. Each centre will have the same facilities, with machine systems for mechanical storage, retrieval, reproduction and distribution, and clearinghouse facilities for storage, reproduction and distribution of documents. Centres will be linked by means of the international satellite communication system which is already being built up. The operation of such a fully mechanized system will be more efficient, more economical and more powerful than that of any manual system, provided that the development of the information industry is kept in line with the demands and the spirit of the scientific community.*

It is interesting to see that the thinking at the Agency was already moving in the direction of some kind of international abstracting service, based on the cooperation of national centres that would make available to an international centre the information on their national literature. The suggestion is also made that such an international centre would best be operated under the aegis of an International Organization.

To pursue the vision outlined above, the appropriate authorities of the USA and USSR were approached to assure their cooperation. The USA agreed in principle to provide NSA information on tape; details, in particular possible inclusion of EURATOM keywords, were left in abeyance. The USSR informed that they would be ready to provide duly coded abstracts of their literature in English, originally in a typed-out format.

To discuss the project, a panel was convened in June 1965 with the participation of scientists from USA, USSR, Canada, the UK and EURATOM. The information received at that panel shifted the aim of the project. The US representative indicated major changes in the future preparation of

[31] Bernhard Gross, (1966), op. cit., p.95-96

NSA. The present printed version might be reduced in scope, if not discontinued, and in the long run its role might be taken over by a computerized version, available on tape only for suitably equipped, appropriate institutions. To assure a comprehensive printed version, which would best be produced by an international organization, countries producing information would have to process their own material and make it available in a form suitable for direct reproduction. This information caused considerable apprehension among some of the participants.

The Agency's representatives appreciated the serious consequences of the US AEC's indicated change of policy for NSA. To avoid a situation in which the Agency might be faced by a *fait accompli*, the Agency sought clarification from Dr Glenn Seaborg, Chairman of the US AEC. Dr Seaborg confirmed the policy presented by the US representatives at the June 1965 Panel and proposed that the Agency convene an international panel of experts in the autumn of 1966 to advise the Agency on further action to be taken. This panel would subsequently be referred to as *"Working Group on International Nuclear Information System"*. Inasmuch as this working group played a pivotal role in the establishment of INIS, it may be said that Dr Seaborg[32] is one of the key personalities in the history of INIS. But behind Dr Seaborg stood his Director of the US AEC's technical information program, Edward J. Brunenkant, under whose responsibility the AEC had been publishing and distributing *Nuclear Science Abstracts*. It had become clear to Brunenkant that if further progress was to be made, the discussion needed to be promoted to another level and, in view of cold war antagonisms, to a level where foreign-policy and diplomatic concerns could be taken into account. Brunenkant talked with the US State Department. The ensuing discussions between the US AEC and the State Department led to the suggestion made to the Director General of the IAEA that the Agency invite, in the summer of 1966, two consultants, one Soviet and one American, to meet in Vienna and to stay long enough to explore all options and determine whether a program could be defined that was acceptable to both parties[33].

1.2.2 US-USSR Consultants on an International Nuclear Information System, 1966

In preparation for the meeting of the *Working Group on International Nuclear Information System*, and following the suggestion mentioned above, the IAEA Director General invited two consultants, one from the Union of Soviet Socialist Republics, Dr. L.L. Isaev[34] of the State Committee for the Utilization of Atomic Energy, and the other from the United States of America, Dr. R.K. Wakerling of the Lawrence Radiation Laboratory, Berkeley, California, to outline an information-handling system, located in Vienna and under the aegis of the IAEA, that would provide comprehensive coverage of the nuclear literature, using up-to-date co-operative procedures to obtain its data and the latest computerized techniques for storage and retrieval.

The two consultants began to use the name "INIS" and they recommended that the IAEA, in consultation with its Member States, try to establish a system to which all of them could adhere. Each country would be invited to prepare bibliographic input for the documents produced in its own national territory. The exact arrangements for the contribution of abstracts of each piece of literature were left to be decided in technical fora. It became clear that the consultants were describing something that governments could see as a "win-win" situation. It appeared that Gross's and Brunenkant's vision of a single global program would be realized. The Soviet Union had agreed that English would be the "carrier language" for information to be processed by computer; the

[32] Dr Glenn T. Seaborg, 1912-1999, Nobel Prize in Chemistry 1951, Chancellor of the University of California at Berkeley, Chairman of the US Atomic Energy Commission 1961-1971, discoverer of the element Plutonium and nine other elements. Element 106 "Seaborgium" is named after him.
[33] Woolston, 2004, op. cit., p.376
[34] Subsequently representative of the IAEA's Director General at the United Nations in New York. Became the only Soviet member of the American Society for Information Science.

Soviet Union for its part would get a new window on western computer technologies and by cooperating on such a sensitive topic as atomic energy, the United States and the U.S.S.R. could give themselves and the rest of the world a glimmer of hope for a break in the cold war[35].

The paper resulting from the discussions of the two consultants was the first documented proposal for an **International Nuclear Information System (INIS)**; it became a working document for the *Working Group on International Nuclear Information System*.

1.2.3 Working Group on International Nuclear Information System, 1966

The Working Group, consisting of 23 representatives from 12 Member States and 3 International Organizations (plus 5 observers) met at the Agency on 12–14 December 1966.

The working paper presented to the Working Group[36], outlined the general characteristics of the proposed system. It first highlighted the developments that suggested the **need** for such an international system, namely the unchecked increase of report and journal literature, the duplication and lack of economy in indexing and abstracting services, the sluggishness of abstracting and distribution, and the difficulty of providing all legitimate users with information. There was obviously great duplication at the national scientific and technical information organizations, and in the publications used to bring the information to the attention of the ultimate users. Yet none of the existing publications was sufficiently comprehensive. Even the most effective abstracting publications such as *Nuclear Science Abstracts*, did not cover the pertinent literature of the world to the breadth and depth desired by its producers. Because of its specialization in the field and its international status, the Agency believed that it was in a propitious position to initiate and advance that venture in international cooperation which would satisfy the need as outlined above.

The **general outline of the proposal** for the establishment of INIS was based on the following logic: some literature handling functions are best centralized and others decentralized. The selection, scanning, descriptive cataloguing, indexing and abstracting of appropriate material for the system should be decentralized, which would also have the advantage that literature in the national language would be dealt with by local native speakers. Overall coordination would be centrally organized. The processing of the material, with the subsequent production of the various output products of the system and the dissemination of these products, would best be done centrally.

It was proposed that the participating countries and organizations be responsible for scanning all the literature they produce in the field of nuclear science and technology and selecting that which falls within the agreed subject scope of the System. Bibliographic information and subject analysis in a form suitable for computer input, an abstract of each item, and a copy of the full text of non-journal items would be sent routinely to a Centre at the IAEA. The text material, i.e. abstracts and full text of non-journal documents, would be put into a suitable microform at the Centre and made available on request. The descriptive information about the documents and the subject indexing would be prepared for input into a computer system.

The Centre would create and collect computer programs to produce a variety of bibliographic products. To begin with, magnetic tapes containing the descriptive information and subject analysis of all documents would be produced and distributed to participants on a periodic basis - hopefully every 2 weeks. Consideration would be given to the publication of an International Nuclear Sciences Abstracting Journal once the Centre had become fully operational.

[35] Woolston, 2004, op. cit., p.376
[36] Document PL-233/1

With regard to the **organization and coordination** of INIS, the working paper suggested that the establishment of such an information system and the creation of a Centre at the IAEA to coordinate its operation would be one of the major activities of the Agency, requiring additional staff and expanded computer facilities. Because of the close and continuing relationships necessary between the IAEA and the participating countries and organizations, the paper proposed that an international advisory body be established to provide policy guidance.

The paper stressed that special attention should be given to the requirements of **developing countries**. These countries, and even many of the industrialized nations had not yet reached a stage where they could fully profit from a system that was entirely machine based and thus would only make available products which required the use of sophisticated computer equipment and a nation-wide mechanized documentation organization. Therefore the printed accession lists and abstracting journals would remain indispensable output products for quite some time to come.

The task of chairing the sessions devoted to the drafting and adoption of the meeting's final report had been given to John E. Woolston, Atomic Energy of Canada Ltd., who had already been a member of the Panels that had met in the period 1959-1962 and are referred to in section 1.2.1 above. Woolston's description of the meeting, at some of its most critical moments, is so vivid and uncanny in its capacity to transmit the atmosphere of the discussions and the relevance of what was taking place beyond the strict technical matters of a proposed information system and indeed having a political significance of international reach going well beyond the confines of the IAEA, that it is worth reproducing it here in part[37]:

> *The meeting was extraordinary. It was held in the IAEA's impressive conference hall, where the participants—all essentially information specialists—sat in the semicircle of front-row seats that had been designed for the IAEA's governors. However, behind each (or most) of the participants was at least one other person, an official stationed in Vienna and representing that participant's own national government. These "advisers" were sitting there because their governments saw the meeting as a significant political event—and they were very anxious that it should succeed. Given a chance that the United States and the U.S.S.R. would agree to cooperate, the rest of the world wanted to make sure that no obstacle would be put in the way—indeed, that the "technical experts" would not be allowed to endanger the result by quarreling over trivialities, such as rules for bibliographic descriptions or the choice of techniques for retrieving information by subject! This meeting gave support to the concept that, in general, each country should take responsibility for reporting the documents produced within its own geographic territory and that these various "inputs" should be merged to create master files. But most participants were thinking of NSA as the standard against which any alternative should be judged. They were skeptical about the IAEA's ability to meet this standard, and many of them would have been content to see INIS as a means for giving international status to NSA and enhancing its coverage of the whole world's relevant literature.*
>
> *Much of the discussion focused on the question of whether participating countries should provide abstracts. Having already agreed that English would be the language for material processed by computer, the Soviet Union was understandably reluctant to take on the huge job of translating abstracts for all its own material. At one point it seemed that the United States and the U.S.S.R. were about to agree that INIS could begin simply as an announcement service giving references without abstracts. A very respected participant eloquently protested. I noticed, however, that his intervention was followed by a whispered but animated conversation with his adviser. He asked for the floor again, and when I was able to recognize him, he withdrew everything he had said in his first statement. Looking back, I think this was*

[37] Woolston, 2004, op. cit., p.376-377

the moment when we, the information specialists, all realized that the die had been cast: there was going to be something called "INIS," and the IAEA would be responsible for its management and probably also for its operation. Now it was up to us to cooperate and to make compromises so that the product would be as useful as possible.

The report of the Working Group[38] states that the group welcomed the initiative of the Agency and accepted in principle the concept of an **International Nuclear Information System (INIS)** as outlined in the working paper. It stressed the need for the Agency to play a leading role in its development. It also recommended that the Agency invite national and regional organizations to submit agreed input information for inclusion into the INIS network and that the Agency make output available (microfiches, magnetic tapes, acquisition list, information services, etc.) on a gradually expanding basis as INIS was progressively implemented. The recommendation also included the agreement that English would be the language in which the information would be stored in the computer system. Interestingly, the group recommended that the Agency discuss with the Government of the United States and of other Member States to have *Nuclear Science Abstracts* become an international journal published in the United States within the framework of INIS and under the auspices of the Agency. Clearly, as Woolston mentions in his memoir, there was skepticism among some of the members that the Agency would be capable of fully taking over the task of producing an international equivalent of *Nuclear Science Abstracts*.

An essential requirement for a mechanized information-handling system was that the input data be prepared to agreed standard formats. The working group's recommendation that the preparation of input data for INIS should he decentralized having been accepted, rules which national and regional services should use in preparing bibliographic descriptions and content analyses were required. Initial elaboration of such rules was carried out through a number of technical meetings that were held during 1967.

1.2.4 Political misgivings about the establishment of an international nuclear information system

Events during 1966 and 1967, as they relate to the possible realization of an international information system in the peaceful applications of nuclear science and technology, betray the *realpolitik* of the time. There were of course many technical questions that would have to be clarified, standards that would need to be applied, agreements that needed to be reached on details for which there were no standards, compatibility between computers to be established, agreements on the supports to be used for the transfer of computerized data, etc. etc. But while these were matters that information specialists could be expected to thrash out and reach agreements on, the vested interests of some of the main players, even the personalities of some of the specialists involved and, above all, the political will of their masters, were serious matters that were playing not a blatant but nevertheless a significant role in the further decisions needed to move the INIS "project" down the road to possible realization. These were the years of the Cold War and all matters related with nuclear energy were extremely delicate. Traditionally the Head of the Documentation Section at the Agency had always been and was at that time a Soviet citizen while his supervisor, the Director of the Division of Scientific and Technical Information (STI) had always been and was at that time from a "Western" country. The STI Division on the other hand, was in the Agency's Department of Training and Technical Information, headed by a Deputy Director General who had always been and was at that time a Soviet citizen. The desire to cooperate on technical and information matters even by men who esteemed each other in their professions, was tempered by nuances of mutual suspicions that were inevitable in the international atmosphere of the day. An example of this quickly became apparent: numerous players were of the opinion that the nuclear terminological work performed by EURATOM (clearly an organization belonging to the

[38] Document PL-233/18/Rev.1

"Western" camp) in the development of the EURATOM Thesaurus could be of great value for INIS as it had already proven to be for NSA. While one side had reservations about handing over the result of its efforts for use by an international organization of the U.N. Family, the other side had reservations about envisaging any official role within the IAEA for a "Western" organization by adopting a tool it had developed. Scientists and engineers in the West had access to a wide range of nuclear science and technology information, for instance through *Nuclear Science Abstracts*, and in the services provided by the Nuclear Energy Agency of the OECD in Paris, such as its nuclear data centre. Among the Western members of the Agency's Board of Governors there was, at first, a Cold War reluctance to proceed to a comprehensive exchange of nuclear information with the Soviet Union and its allies. One Governor went so far as to suggest that pieces of information should be exchanged initially on a one-for-one basis with the USSR[39].

The recommendations of the 1966 *Working Group on International Nuclear Information System* had given an enthusiastic thrust towards the establishment of an international system to be called INIS, mention being made in the working paper that if the project was recommended for implementation and approved by the Director General of the IAEA, INIS could have been operational by mid 1968[40].

When one follows the events of 1967 and 1968 in this regard, one cannot escape the notion that there was some "foot dragging" on the part of some of the players. Was this due to the mutual suspicions referred to above or the skepticism mentioned by Woolston in his memoir? Be that as it may, a number of steps were taken during 1967, some purely administrative inasmuch as the "Documentation Section" of the STI Division was renamed the "INIS Section", but one other being a step that proved to be of notable significance for the final establishment of INIS. Effective April 1967, John E. Woolston from Canada, who had taken part in many of the groups called by the Agency up to that time to give it guidance in the establishment of the system, was appointed Director of the Division of STI. Woolston brought to his new responsibilities not only technical knowledge and experience in the field of mechanized information management but in particular the energy, drive and enthusiasm necessary to move the project forward, coupled with an understanding of human interactions and a delicate diplomacy in dealing with people of wildly disparate extractions that proved to be the essential ingredient for the unique teamwork needed to make INIS possible. Not without reason Woolston was later to be referred to as "the father of INIS".

Another relevant step during 1967 was the establishment of a Computer Section within the Division of STI and the purchase of a computer, an IBM 360/model 30 with 64K memory, with disc and tape drives[41]. It is interesting to note that the justification presented to the Board of Governors of the IAEA in requesting their approval for the purchase of a computer was based largely on the fact that a computer would be needed for the operation of INIS and that, if a computer were purchased for such a purpose, there could also be other uses for it at the Agency such as keeping some of the financial accounts! The Agency was also fortunate in hiring Gianpaolo Del Bigio who, in the words of Woolston[42]: *"...was a young Italian systems analyst ... who inspired and led the programming effort; his basic concepts can still be traced in INIS as it exists to-day and in many of the other systems that followed"*[43].

[39] David Fischer, "History of the International Atomic Energy Agency; the first forty years", IAEA, 1997, ISBN 92-0-102397-9, p.405

[40] See document PL-233/1, p.6

[41] An earlier machine, an IBM 1401, was little more than a large calculator.

[42] Woolston, 2004, op. cit., p.377

[43] Del Bigio later left the IAEA and went to UNESCO in Paris where he developed the ISIS (and subsequently the micro-ISIS) software used world-wide for cataloguing and library management.

1.2.5 Study groups and panels for development of input arrangements and rules for INIS, 1967

During 1967 a number of panels and study groups were called together by the Agency. In particular there was a *Study Group on Nuclear Science Abstracts* that met in September and a *Panel on Descriptive Cataloguing for INIS* that met in December.

In the report of the 1966 *Working Group on International Nuclear Information System*, the participants recommended:

> *"that the Agency ..... discuss with the Government of the United States and the Governments of other Member States to have Nuclear Science Abstracts as an international journal published in the United States within the framework of INIS and under the auspices of the Agency"*[44]

The wording of the above recommendation betrays the thinking of the Group that in working towards the establishment of some nuclear abstracting journal on the part of the Agency, the most efficient approach was that of "transmuting" NSA from a purely US product (albeit with contributions from some other countries on the basis of a number of bilateral agreements) to a truly international product, still published in the USA but clearly under the administrative responsibility of the IAEA and with contributions from all those Members States of the Agency willing and able to prepare data on the nuclear literature published within their national confines.

The Agency convened the *Study Group on Nuclear Science Abstracts* in Vienna in September 1967 in order to discuss this question. The views expressed by the individual members of the group were interesting and revealing; while the Soviet participant[45] *"…… strongly objected to a proposal that the Agency should be actively involved in supporting NSA",* the US participant[46] opined "….. *that the need for NSA within the developing countries would no doubt continue longer than within the US ……. and because a major and vital function of the Agency is the dissemination of nuclear information to Member States, it would seem desirable that the Agency play a meaningful role in the preparation of a nuclear abstracts journal".* The participant from the UK[47] thought that *"…… it was desirable and proper that the Agency should play a positive role in promoting the necessary bilateral arrangements between the US and Member States and by providing input descriptive of the Agency's own publications ...."*[48]. In the event, and under the diplomatic Chairmanship of the Director of STI, the participants agreed to recommend that the Agency support the initiative of the NSA publishers in expanding their bi-lateral arrangements to provide an additional input to NSA from the Member States, with the Agency acting as an intermediary in such cooperative arrangements[49].

The participants also recommended that a first detailed description of a total system should be obtained as soon as possible and that a decision on the method for the indexing of the literature be postponed until such a detailed description of the total system were available.

Next the Agency convened in December 1967 a *Panel on Descriptive Cataloguing for INIS* whose important contribution to the further development of INIS was the recommendation that the "Communications Format" for input to the system be based on the MARK II format of the Library

[44] See document PL-233/18/Rev.1, recommendation 10(c)
[45] Lev L.Isaev from the USSR who had been one of the two consultants invited by the Director General of the IAEA in 1966 to outline an information handling system.
[46] Edward J. Brunenkant, US AEC
[47] R.M.Fishenden, UKAEA
[48] See document PL-272/1, p.2-3
[49] See document PL-272/1, p.4

of Congress for machine-readable cataloguing and which was analogous to a then pending UNESCO/ICSU (International Council of Scientific Unions) proposal. The Panel recommended that the rules they presented be seriously considered by the group that would prepare the first reference design for INIS[50].

As has been suggested in some of the foregoing sections and as transpires from the positions taken at the Panels and Working Groups by the delegates from some of the larger countries, mutual suspicions existing at the time in the tense atmosphere of the cold war, were at play in the moves being made by the various players. As mentioned in section 1.2.4 above, by the end of 1967 the Director of the Division of STI was John Woolston from Canada. His Division, as mentioned in the same section above, was within the Department of Training and Technical Information, which by then had changed its name to Department of Technical Operations. The Department was headed by a Deputy Director General in the person of Prof. I.S. Zheludev from the USSR. Prof. Zheludev, whose technical background was in nuclear energy, had gained the reputation of being a person with whom one could reason logically and in a constructive manner on matters of policy or the value of taking certain directions rather than others for the benefit of the Agency's Member States. He also had the reputation, however, of being a staunch defender of the policy line he had chosen out of personal conviction or superior will and it was reputedly practically impossible to make him budge if he deemed an action would be contrary to that conviction.

Woolston later recounted to the author of the present Report that during the winter of 1967/68 he, Woolston, was in the Soviet Union to discuss with Soviet Authorities various matters, among them the further steps to be taken for the establishment of INIS. Prof. Zheludev also attended the meetings. During a day with no meetings Zheludev had invited Woolston to visit him at his dacha outside of Moscow. During the day the two men, a Canadian and a Russian, took a long walk in the icy, snow covered countryside, something both were probably familiar in doing, in view of the similarities of the climate of their respective countries. They of course discussed the matters of the meetings and during the walk strengthened a certain "warmth" in their personal rapport (ironical, given the climatic conditions) that coloured their future interpersonal relations. Subsequently Woolston felt that his "boss" at the Agency took a more flexible line and became a strong supporter of the key role the Agency should play in the operation of the INIS system. Could it be that we owe, at least in part, the successful pursuit of the development of INIS during the following year to that icy walk by those two men who on that occasion found they had more things in common than things on which they differed?

1.2.6 INIS Study Team, Vienna, 4 March – 28 June, 1968

It became clear during the course of 1967, and the work of the groups described in section 1.2.5 above confirmed the fact that it was now necessary to establish a detailed description of a total INIS system. This was not a matter that could be concluded in a couple of days. The Agency therefore convened a team of experts who were set the task of developing such a detailed description and was stationed for the period 4 March to 28 June 1968 at IAEA Headquarters in Vienna. The Team consisted basically of 7 members: H. Coblans (U.K.) (leader), I.V. Tikhonov (U.S.S.R.), G. Del Bigio (I.A.E.A.), W. Vaden (U.S.A.), L.L. Isaev (U.S.S.R.), G. Wenske (Federal Republic of Germany), L. Rolling (Euratom). For one month (l3 May to 14 June) C. Gottschalk (U.S.A.) took part in all the deliberations of the Team and specially concerned himself with the revision of the "Rules Recommended for Input".

[50] See document PL-273/1/Rev.1, p.3

The *INIS Study Team Report*[51] became the basis for all further developments on the system. The experts estimated that the number of items of nuclear literature to be handled by INIS per annum would be between 80 and 100 thousand. Interestingly, the Team agreed that: *"INIS should not be concerned with the publication of an international abstracting periodical"*, though it did recommend that every item of input reported to the system be accompanied by an abstract (in the original language) in microform[52].

With regard to the subject scope, the Team was confronted with differing opinions: there were those who, while recognizing the mission oriented nature of INIS, did not want to include references to literature that was already fully reported by discipline oriented information systems in areas such as Physics, Chemistry, Medicine, Biology etc., and there were others, mostly users from developing countries, who hoped that INIS would include references to literature in the nuclear related areas of those disciplines. The Team finally agreed that initially INIS should adopt a minimum "core" scope in nuclear science but at the same time define a possible list of additional subject fields that could be added if at least half of the countries to be consulted would favour such inclusion. The "core" scope was obtained by merging and adjusting the NSA scope[53] with the current EURATOM practice[54].

On the subject of indexing the literature and which information retrieval language to use, the Team *"... was faced with what was probably its most difficult task. ....."*[55] The choice of the various methods available was narrowed down to three:

a) Universal Decimal Classification (U.D.C.);
b) Subject Headings (with a modifier line) as operating for NSA;
c) Keywords, for example as in the ENDS system of EURATOM.

The final choice fell on indexing using keywords, which required the adoption or development of a thesaurus of controlled terminology and would then entail the continued maintenance of the thesaurus.

In July the report was communicated to a number of organizations throughout the world for feedback. The comments, together with the report itself, were submitted to an international panel[56] composed of 37 experts from 23 Member States and four international organizations, which met at Headquarters from 28 to 31 October.

With the report of the INIS Study Team, it was now clear what the specific characteristics of INIS would be and it is well to lay down what these characteristics were:

a) INIS would be a "Mission Oriented" system devoted to providing information on literature covering all the peaceful applications of nuclear science and technology;[57]
b) INIS would be a "decentralized" system based on the cooperation between national or regional INIS centres located in the participating countries and INIS Headquarters located at the IAEA in Vienna;
c) The INIS centres would be responsible for scanning the national literature, selecting the in-scope documents, preparing the bibliographic references and providing the subject indexing for the selected items and forwarding this as input to INIS Headquarters; the centres would also be responsible for sending to Vienna (on a typed worksheet or in

[51] Report of the INIS Study Team, Vienna, July 1968, PL-308
[52] See document PL-308, p.29
[53] US AEC, Subject Scope of Nuclear Science Abstracts, Oak Ridge, DTIE, January 1968, TID-4552, rev.5
[54] PL-308, Appendix C
[55] PL-308, p.17
[56] Panel on the preparation of the final proposal for INIS, Vienna, 28-31 October 1968
[57] See Alvin Weinberg (Chairman, The President's Panel of Science Information), "Science, Government, and Information," (known as The Weinberg Report), The White House, January 1963

microform) an abstract for each item of literature and the full text (in microform or hard copy) of every item of non-conventional literature (NCL)[58]; upon receipt of the output products from INIS Headquarters, the national centres would be responsible for providing national information services to their scientists, engineers, academic and research institutions etc.;

d) INIS Headquarters would be responsible for collecting the input, processing, checking and exercising quality control, preparing the output products and distributing them to the participating Members;

d) In addition, INIS Headquarters, in consultation with the participating Members, would be responsible for issuing the Rules, Formats, Guidelines and Authorities to be used for preparing the input and for exploiting the output products. These documents would be issued as reports comprising the *"INIS Reference Series"*.

The Study Team also defined the various supports that could be used to provide different parts of the input, namely:

a) Typed worksheets for the bibliographic references or
b) Punched paper tape for the bibliographic references or
c) Magnetic tape for the bibliographic references;
d) Typed worksheets or microform for the abstracts;
e) Hard copy or microform for the full text of NCL.

1.2.7 Panel on the Preparation of the Final proposal for INIS, Vienna, October 1968

A panel on the preparation of the final proposal for INIS met in Vienna on 28-31 October 1968. The members of the Panel were drawn from countries and organizations that had substantial nuclear programs and also had experience in computerized handling of scientific information and in particular nuclear information, but it also included representatives from developing countries since it was generally recognized that the system that was being planned would be particularly relevant for information transfer to those countries that wished to benefit from the experience and knowledge already gathered by other members.

The Panel considered in great detail the *INIS Study Team Report* and made a number of specific recommendations, the main one of which read:

> *"The Panel recommends to the Director General that the Secretariat should prepare a proposal for the implementation of INIS beginning in 1970, and submit this to the governing bodies of the Agency ……..* "[59]

Furthermore the Panel endorsed the view that the Agency should be responsible for the production twice a month of magnetic tapes as well as a printed *"INIS List of References"* covering all items reported to the system. With regard to the different subject control systems, the Panel adopted in principle the system that is based on co-ordinate indexing using keywords. It endorsed the concept of a Microfiche Clearinghouse as a component of INIS. The Clearinghouse would make available microfiche copies of non-conventional literature supplied to the Agency by Member States as well as microfiche copies of the consolidated files of abstracts. The Panel also agreed that, during the preliminary phase, i.e. the first two or three years, INIS should have no responsibility for the publication of an international abstracting periodical[60].

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[58] Non-conventional Literature, or NCL, literature not usually available through normal commercial channels, e.g. technical reports, patents, theses, conference papers, etc.
[59] Report of the Panel on the Preparation of the Final Proposal for INIS, October 1968, PL-308/10, p.1
[60] PL-308/10, p.4

Finally the Panel recommended the formation of an INIS Advisory Committee that should include at least one member from a developing country.

1.2.8 IAEA Board of Governors, Approval of INIS, 26 February 1969

The recommendation for the establishment of INIS was foreshadowed by the Director General of the IAEA in his statement to the General Conference of the Agency in September 1968[61]. In a memorandum to the Board of Governors[62] of the IAEA for their meetings in February 1969, the Director General described the objectives and structure of the proposed system, and presented a recommendation that the **International Nuclear Information System (INIS)** should be set up on an operational basis in 1970.

The Four Hundred and Eighth meeting of the Board on 26 February 1969 was a lively affair as reflected in the official record of the meeting[63]. Many of the Governors commented on the cost of setting up and operating such a system, some believing that the cost was moderate and certainly justified by the advantages to be drawn both by industrialized as well as developing countries in the use of the information products to be derived from it, while others feared large budgetary requirements in coming years. Frequent references were made to the need of cooperation with EURATOM so as to avoid duplication and draw benefits from the development work it had already done, particularly in the creation of a thesaurus of nuclear terminology. There seemed to be consensus on the need of a trial period during which operations would cover a limited subject scope and would be reviewed by some advisory body.

It was to be through the words of Mr Timbs, the Governor from Australia, who summarized the consensus of the Board as set forth in document GOV/OR.408, para 40, that the discussions reached a conclusion. Upon the recommendation of Mr Trivedi, the Governor from India, Timbs added a last paragraph (para. 51) to stress that in developing INIS the needs of developing countries should be given special attention.

Thus it was on that 26 February 1969 that the Board of Governors of the IAEA approved the setting-up of the International Nuclear Information System (INIS) on an operational basis as early as possible in 1970 and authorized the Director General to request the participation of Member States therein and to operate INIS on the general lines agreed upon during the discussions of the Board as set forth in document GOV/OR.408, paras 40 and 51 which read:

a) Operations would commence with a limited subject scope and be capable of being developed step by step;

b) The progress achieved would be evaluated annually, and there would be no implied commitment with regard to the level of funds to be budgeted for INIS in each successive year;

c) The Agency would, as far as possible, take maximum advantage of the work of other effective systems for collecting information, including the EURATOM system. The Director General should, where feasible, enter into contractual arrangements to give effect to this principle;

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[61] See document GC(XII)/OR.119, para.44

[62] THE INTERNATIONAL NUCLEAR INFORMATION SYSTEM, Memorandum by the Director General, GOV/1319, 29 January 1969

[63] Document GOV/OR.408, 9 April 1969

d) The operation of INIS would be reviewed annually by an advisory committee, the members of which would be appointed by the Board after receipt of nominations by the Director General;

e) The membership of the advisory committee:
i) Would not be limited to nationals of Members serving on the Board of Governors and
ii) Would consist of representatives of
a) Producers of input for INIS;
b) Administrators; and
c) Users of output from INIS.

f) In developing INIS, the Agency would as far as possible, take note of the needs of developing countries.

One can consider this decision of the Board as the culmination of the slow but steady work that started in 1959 and as of 1966 began taking a direction that would finally take the Agency and its collaborating Member States to the production of a comprehensive abstracting journal in the nuclear sciences and a corresponding computerized database.

In a letter dated 8 July 1969, the Director General of the IAEA invited Member States to participate in INIS and to name a national INIS Liaison Officer who would be the official contact through whom the IAEA Secretariat would provide information about the system. In his letter the Director General suggested that participating countries should endeavour to submit data for INIS by 1 April 1970 since the Agency was planning to issue the first output products in May 1970.

1.2.9 The Mission of INIS

Although there had been some early attempts at providing a definition of the "Mission of INIS", these had been inconclusive. A definition was adopted following the development of the original design of INIS in 1968; it read as follows:

> **"To produce and disseminate in a decentralized manner a computer based bibliographic database containing records and abstracts of the literature produced throughout the world on the peaceful applications of nuclear science and technology and to collect and make available the full text of those items not readily available through normal commercial channels."**

In view of the continued commitment of the IAEA to cooperation with UNESCO already mentioned in section 1.2.1 above, Woolston provided to UNESCO full details of the progress on the development of INIS[64].

1.2.10 Expert Group on INIS Subject Scope, Vienna, May 1969

Possibly because of the unease that was felt in some quarters about the readiness of the Agency to handle all operations for the start up of the system but mostly about the capability of

[64] John E. Woolston, "The International Nuclear Information System (INIS)", UNESCO Bulletin for Libraries, Vol.23, No.3 p.135-138, 147, May-June 1969

Member States to provide full data on the nuclear literature published in their countries, there had already been suggestions that INIS should start operations with a limited subject scope. This is reflected in the very first paragraph of the official decision of the Board of 26 February 1969 that reads: "*Operations would commence with a limited subject scope and be capable of being developed step by step"*. Thus the Agency convened a group of experts in Vienna in May 1969 to advise it on the subject areas of the total INIS scope that should be covered in the initial period of operations.

The Group first reviewed the total subject scope as it had been defined by the *INIS Study Team*[65]. The result of the discussions was a revised document defining the full subject scope[66]. It then went on to define the "limited subject scope" under which INIS was to begin operations[67]. The limited scope included the following fields:

Reactors and Reactor Materials;
Uranium Production and Fuel Cycles;
Nuclear Techniques in Food and Agriculture;
Health, Safety and Waste Management;
Isotope Production;
Industrial Applications of Radiation;
Peaceful Nuclear Explosions;
Handling of Radioactive Materials;
Safeguards, Legal and Economic Questions.

The *INIS Study Team* had estimated that the number of items to be handled annually by INIS when operating under full scope was between 80 000 and 100 000. For the reduced scope requested by the Board, estimates were for about 25 000 items per year.

The group recommended that 1 May 1970 should be the target date for the first INIS output products, that initially INIS should operate on a once-per-month instead of a twice-per-month cycle, and that no literature published before 1 January 1970 should be entered into the system. It also proposed that the date to be envisaged for implementation of the full subject scope should be 1 January 1972[68].

1.2.11 Contract with EURATOM for the development of a Thesaurus for use by INIS

It has been mentioned in a number of the earlier sections that many of the early Panels, consultants' meetings and Working Groups had pointed out that the indication of subject content of each literature item to be reported to INIS was of great importance. As early as 1962, at the third meeting of the "Panel of Scientific and Technical Information", the Panel had recommended that*".... the Agency should accept responsibility for publishing ... an annotated glossary of nuclear science terms...."*[69] The INIS Study Team discussed this matter at great length[70] and its final choice for indexing the literature fell on *"... using keywords, for example as in the ENDS system of EURATOM"*. During the meetings of the Board of Governors of the IAEA in February 1969[71], there were repeated references by the Governors to the advisability of drawing on the expertise

[65] Report of the INIS Study Team, July 1968, PL-308, Appendix C
[66] INIS Subject Categories with Scope descriptions, Vienna, April 1969, PL-355/1/Rev.1
[67] Document PL-355/9/Rev.1
[68] Document PL-355/10/Add 1
[69] Document PL-40/4/Rev.1, recomm.(4), p.4
[70] See section 1.2.6 above
[71] See section 1.2.8 above

already gathered by EURATOM, particularly in the development of its thesaurus of nuclear terminology and this was reflected even in the decisions of the Board[72]. The Board also noted that, although no agreements had yet been reached with EURATOM, discussions were in progress.

Woolston, as Director of STI, was pursuing with vigour the possibility of close cooperation with EURATOM on the question of the thesaurus. This is how Woolston recalls events in that connection[73]:

> *One potential stumbling block was the issue of obtaining a "thesaurus." Since INIS would use keyword indexing, we needed a structured list of eligible terms. Just such a product had been developed by EURATOM in Luxembourg, and it was far more fully researched than anything we could produce in the time available. EURATOM was an intergovernment organization—one forerunner of the present European Union—and the member states of EURATOM were all member states of the IAEA. But EURATOM itself had no formal status with the IAEA, and in the political climate of the day the Soviet Union would have obstructed any attempt to give it such status. However, EURATOM was justifiably proud of its achievement and was not about to let us use the thesaurus without some recognition for its work.*
> *The person in charge of information at EURATOM was Rudolf Brée, a German whom I had first met many years before in Canada. We began to talk and in the process got to know and trust each other. We were determined to find a solution and avoid a political storm. So too was my immediate superior at the IAEA, Ivan Zheludev of the U.S.S.R. In the end we were able to convince our organizations to accept a rather simple process: the IAEA would give a "commercial" contract to EURATOM to develop and deliver an "INIS thesaurus" along with a manual and software, and EURATOM would host an IAEA staff member to participate in the work and to act as liaison with the INIS team in Vienna.*

The contract between the IAEA and EURATOM was finally signed in November 1969; it included the payment of a certain sum of dollars that could be viewed as substantial or fairly insignificant depending on how one might "value" the effort that had been invested in the development of the thesaurus and the software for its maintenance. An INIS staff member[74] was stationed in Luxembourg for the duration of the contract (November 1969 till June 1970) to work closely with the EURATOM staff on the adaptation of the thesaurus for INIS needs and to act as liaison between Rudolf Brée (mentioned by Woolston above) and his staff and the INIS staff in Vienna.

The adaptation of the EURATOM thesaurus for INIS use was no simple matter. Although it represented a voluminous amount of work, it contained errors and inconsistencies, which was understandable in such a large volume but its major drawback was its total lack of a well defined structure. Furthermore, it consisted of two parts, the first part being an alphabetic listing of the terms each of which had certain other terms associated with it, while the second consisted of "Terminology Charts" which were a mixture of text and graphic displays of the text intended to illustrate the interrelationships between terms.

During the period of the contract, many errors and inconsistencies were corrected, terms were added and deleted and the "Terminology Charts" brought up to date with the final terminology to be handed over to the Agency. There were however, lengthy discussions about the interrelationships between terms because of the lack of well defined principles on which the structure was to be founded, due in part to the fact that, at that time, there were still no internationally recognized

[72] See para. c) of the decisions of the Board in section 1.2.8 above
[73] Woolston, 2004, op. cit., p.377
[74] Claudio Todeschini, the author of the present Report.

guidelines for the establishment of thesauri. While the INIS staff member stationed in Luxembourg raised these problems and questioned the usefulness of the terminology charts, the EURATOM staff was adamant about their belief that the charts were an integral and necessary component of the thesaurus. The charts were therefore completed and handed over together with the alphabetic listing of the terms. While in Luxembourg, the INIS staff member also wrote the manuscript of the first version of the INIS indexing manual[75], to be used by indexers at national INIS centres for the selection of indexing terms from the new INIS Thesaurus.

Near the end of June 1970, when the INIS staff member that had been stationed in Luxembourg returned to Vienna, an informal meeting between IAEA and EURATOM staff took place in Vienna at which the thesaurus in its two parts and the software for its maintenance and updating were officially handed over to the IAEA. The thesaurus was first published in printed form in October 1970[76].

1.2.12 Preparations for receipt of initial input to INIS; publication of the "INIS Reference Series"

As mentioned in section 1.2.8 above, the Director General, in his letter inviting Member States to participate in INIS, had suggested that participating countries should endeavour to submit data for INIS by 1 April 1970 since the Agency was planning to issue the first output products in May 1970. Much preparation was needed in expectation of the processing of this first input.

Within the Division of STI, the INIS Section, which at that time was headed by M. Ivanov from the USSR, had been fortunate in bringing onto its staff as Systems Analyst Charles Gottschalk from the USA who had participated in the work of the 1968 INIS Study Team and had an intimate knowledge of the design of the system. The Section was organized into a number of Units as follows:

a) Bibliographic Control Unit (BCU) headed by a Librarian and consisting primarily of descriptive cataloguers. The unit was to be responsible for the descriptive cataloguing of the Agency's own publications and for the quality control and corrections of the descriptive cataloguing of member's input;

b) Subject Control Unit (SCU) consisting of a number of "subject specialist", scientists and engineers with varied scientific backgrounds so that the sum of the areas of their expertise roughly matched the total subject scope of INIS; the Unit also contained a "Thesaurus specialist". The unit was to be responsible for categorizing and indexing the Agency's own publications and for quality control and corrections of the subject analysis contained in member's input; also responsible for maintaining and updating the terminology of the thesaurus and evaluating proposals for additions to the terminology;

c) Clearinghouse, responsible for the collection of abstracts on microfiche and the full text of NCL literature on microfiche and in particular for the photographic production in-house of the microfiche of the full text of NCL sent to Vienna in hard copy.

During the course of 1969, eleven documents of the *INIS Reference Series* were published, providing national inputting centres with the rules, instructions, formats and specifications for preparing input. Those documents of the *INIS Reference Series* dealing with the bibliographic description of the pieces of literature, providing therefore the rules for descriptive cataloguing, were prepared under the general guidance of Charles Gottschalk, the INIS Systems Analyst mentioned above, but under the specific responsibility of the head of the Bibliographic Control Unit, Elisabeth

[75] C.Todeschini, "INIS: Manual for Indexing", IAEA-INIS-12, August 1970 revised in January 1974

[76] INIS: THESAURUS, IAEA-INIS-13(Rev.0), Vienna, October 1970; INIS: Terminology Charts, IAEA-INIS-13A(Rev.0), Vienna, October 1970.

Ruckenbauer, an Austrian librarian. The knowledgeable and steady hand with which Ruckenbauer was to guide the Bibliographic Control Unit for the next 20 years became legendary and was one of the corner stones of stability combined with flexibility for which INIS was known by its participating Members and beyond. The Agency's Computer Section, administratively also under the authority of the Division of STI, and in particular the group under Del Bigio, provided INIS with the computer support needed and developed the computer programs required for processing and checking the input and preparing the output magnetic tapes and the file to be used for printing the monthly bulletin **"INIS Atomindex"** that contained the bibliographic references to the items of literature reported to the system. Although the possibility of having *"INIS Atomindex"* printed outside the Agency had been explored, the decision had then been made to have it printed in-house.

The "INIS Secretariat", as the staff of the INIS Section within the Division of STI became known, also soon established the pattern by which the Secretariat communicated with the Members of INIS. This communication was based on three channels: 1) INIS Technical Notes, 2) INIS Circular Letters and 3) INIS Information Letters. A Technical Note was prepared by the Secretariat whenever it became necessary to have the whole membership agree on some question, problem or new development. The Note presented the problem or question, the reasons for its application to the system, the possible alternatives for solving the problem or different directions to be followed and requested the members to provide comments, suggestions or possible alternative solutions. Once agreement on how to proceed had been reached between the members and the Secretariat, the latter issued a Circular Letter which laid down the rules, guidelines, formats or whatever which were to be used by all members. Essentially therefore the Circular Letters were ad hoc additions to the documents of the *INIS Reference Series*. Information Letters provided the Members with routine statistical data on volumes of literature reported, meetings or other events being planned, dates by which specific actions were to be taken, etc.

1.3 INIS Launch and Early Years (1970-1976)

INIS started its operations officially in January 1970. By the end of 1969, of the 101 IAEA Member States at the time, 23 had agreed to join the system. Together with the two international organizations, FAO and IAEA, INIS therefore comprised 25 Members. By the end of 1976, the number had reached 62, including 50 Member States and 12 international organizations.

As requested by the Board, INIS started operations with a limited subject scope, with plans to reach full scope after two or three years. However, the initial few months revealed that starting the system, even with a limited scope, was far more difficult than anticipated. Difficulties in a number of Member States prevented them from sending regular input at the start of the system. As a result, the total production for the first year was much lower than anticipated. Not until 1975 would INIS be able to operate at full capacity and within the full scope initially identified.

Nevertheless, production of output tapes, the publication of the first issue of *"INIS Atomindex"* Vol.1, No.1, without a subject index, and the availability of abstracts and full text of NCL on microfiche, took place on schedule on 1 May 1970. One could surmise that this date should be considered the "date of birth" of INIS.

The first 5 years of operation was a period of rapid changes that were seen as necessary to improve parts of the system: the Thesaurus, acquired from EURATOM, required extensive improvements to be usable in the INIS context; inclusion of abstracts in electronic form was soon requested; formal agreement on a final scope was required and decisions on the indexes to be provided to the printed *"INIS Atomindex"* were required.

These years therefore saw meetings of various panels and working groups that, as had been the case in the years leading up to the establishment of INIS, provided advice and guidance for the further development of the system. There were also two meetings of the Advisory Committee for INIS, two international symposia on the handling of nuclear information and numerous training seminars organized by the INIS Secretariat of the Agency and held both in Vienna and as regional seminars hosted by some of the national centres.

The climax of this first 5 year period was the publication, starting in January 1976, of a true abstracting journal for the nuclear sciences when *"INIS Atomindex"* began appearing with an abstract of the document accompanying each bibliographic reference in the bulletin.

1.3.1 Symposium on the handling of Nuclear Information, Vienna, February 1970

The Agency's Division of Scientific and Technical Information had been very active in the 1960's, first in giving substance to the Agency's Statute in the area of the exchange of scientific and technical information on peaceful uses of atomic energy and secondly in the developments leading up to the establishment of INIS. These activities had made the Agency a prominent player on the international scene of information exchange and information retrieval systems.

As discussed in section 1.2.1 above, the *Panel on Scientific and Technical Information,* at its first meeting in July 1959, had recommended that the Agency continue and strengthen its policy of sponsoring Conferences and Symposia so as to provide additional opportunities for the exchange of information in the nuclear area. The Agency thus had established a policy of organizing between 10 and 15 conferences or symposia per year, these being held both in Vienna and at other locations hosted by Member States. It seemed appropriate therefore, for the Agency to sponsor for the first time a symposium on nuclear information. The *"Symposium on the handling of Nuclear Information"* was held at the Agency's Headquarters in Vienna on 16-20 February 1970.

The symposium was attended by 168 participants from 31 countries not only from the industrialized nations of East and West but also from participants from developing countries eager to draw benefit from the advances made in information processing and transfer. Participants from 12 international organizations, both governmental and non-governmental, also attended. Given the timing of the symposium, three months before INIS was due to distribute its first output products, and the fact that it was sponsored by the IAEA, it seemed appropriate that INIS be described at the symposium. A paper by Woolston, Issaev, Ivanov and Del Bigio[77] did so in detail. In its vision for the future of INIS, the paper ends on a very positive note:

> *"Participating centres in Member States have different problems, and ... these problems may be formidable. ... However, if we follow the concept of a step-by-step approach to the full realization of the system, and if we continue in the very real spirit of co-operation that has so far characterized the INIS project, then we believe that something really useful to the world's nuclear scientists will eventually emerge."*

We have seen that many of the discussions of the early panels and working groups called by the Agency made reference to *Nuclear Science Abstracts*, the abstracting journal published by the US AEC. The person responsible for NSA at the time of the symposium was Robert Shannon who

[77] J.E.Woolston, L.L.Issaev, M.V.Ivanov, G.P.Del Bigio, "The Design and implementation of an International Nuclear Information System", Symposium on the Handling of Nuclear Information, IAEA, Vienna, July 1970, STI/PUB/254, p.607-619

presented a paper[78] in which he described some of the achievements of NSA during its 21 year existence. Shannon concluded his presentation with a message from Glenn Seaborg[79], Chairman of the US AEC that reads in part:

> *"The interest of the International Atomic Energy Agency and its member nations in Nuclear Science Abstracts is most welcome. This latest exchange of views on how best to disseminate the voluminous technical literature of nuclear energy should lead to more effective, efficient, and economical methods for ensuring that every nuclear scientist has the latest research information at his disposal."*

This comment suggests the eventuality of improved and more economical methods for providing nuclear information services. A hint at a product that could replace *Nuclear Science Abstracts*?

Of the many other interesting papers presented at the symposium, reference will be made to the paper by Smith, Herr and Wakerling[80] because of the role these persons made in the development of INIS. Ray Wakerling from the USA was one of the two consultants invited in 1966 by the Director General of the IAEA to outline an information-handling system[81] and was a member of some of the early Panels while Gloria Smith and Jessie Herr were to play significant roles in future work on the INIS thesaurus terminology and the subject index that would later be developed for *"INIS Atomindex"*.

The symposium obviously offered countless opportunities for individual discussions among participants; among them were informal discussions between Shannon and Todeschini, the INIS staff member at that time posted in Luxembourg for the work on the adaptation of the EURATOM thesaurus as recounted in section 1.2.11 above. NSA was at the time receiving input from EURATOM on the basis of a bilateral agreement and shared some of the concerns held by INIS staff about some aspects of the thesaurus to be taken over by INIS.

1.3.2 Begin of INIS operations; January 1970

The Board had requested that INIS operate at limited scope for the first few years. However, the initial few months revealed that starting the system, even with a limited scope, was far more difficult than anticipated. Difficulties in a number of Member States prevented them from sending regular input at the start of the system. As a result, the total production for the first year was much lower than anticipated. Nevertheless a certain volume of input from Member States was processed between January and April and the first INIS output products appeared as planned on 1 May 1970. For the INIS staff in Vienna there was much preparation for the symposium referred to in section 1.3.1 above but in particular there was much preparation for the training seminars that were being planned for the second half of the year.

In June, as mentioned in section 1.2.11, the adapted EURATOM thesaurus was taken over and staff of the Subject Control Unit started experimental indexing of Agency publications with it. In September, at the invitation of Robert Shannon[82], the INIS staff member that had been stationed

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[78] R.L.Shannon, "Nuclear Science Abstracts: a 21-year Perspective", Symposium on the Handling of Nuclear Information, IAEA, Vienna, July 1970, STI/PUB/254, p.379-384

[79] See section 1.2.1 above.

[80] G.L.Smith, J.J.Herr, R.K.Wakerling, "An SDI System Based on NSA Magnetic Tapes", Symposium on the Handling of Nuclear Information, IAEA, Vienna, July 1970, STI/PUB/254, p.251-265

[81] See section 1.2.2 above.

[82] See section 1.3.1 above.

in Luxembourg for the duration of the EURATOM contract, visited the staff of the US AEC Technical Information Center in Oak Ridge, Tennessee (where NSA was produced) to discuss the improvements necessary to make the INIS thesaurus a more useful tool to produce consistent indexing when performed on a decentralized basis. These discussions were continued with Wakerling, Smith and Herr[83] at the University of California and concluded at the US AEC in Washington D.C. with Edward Brunenkant, Director of the US AEC's technical information program[84] and his assistant Thomas E. Hughes[85], where cooperation between INIS staff and staff of the US AEC on a revision of the INIS thesaurus was agreed upon.

In August the first three-week training seminar, a kind of "rehearsal" was held in Vienna and the second, at the invitation of the Government of India, was held at the Bhabha Atomic Research Centre (BARC) in Trombay not far from Bombay (now Mumbai) in November. Both seminars were conceived as "regional seminars"; while the Vienna one was aimed at participants from the incipient national INIS centres in Europe, the Bombay one was aimed at the South Asia and South East Asia regions. The primary purpose of the seminars was to provide training to staff from national INIS centres in the preparation of input of their national nuclear literature. There were many more applications than could be satisfied for both seminars and a strict selection had to be made; in the event, the Bombay seminar even had participants from as far away as Australia and Japan.

In August the document of the *INIS Reference Series* providing guidelines for indexing the literature *"INIS: Manual for Indexing"*[86], was published, while in October the INIS thesaurus in its two parts: *"INIS: Thesaurus"* and *"INIS: Terminology Charts"*[87] was published.

In the middle of 1970 there were also significant changes in the senior staff at INIS: Woolston returned to Canada and Charles Pelzer from the USA became the new Director of STI while Ivanov returned to the USSR and Zhan Turkov, also from the USSR, became the new head of the INIS Section.

1.3.3 Panel on Improvements or Alterations in the General Development Pattern of INIS; Vienna, November 1970

A variety of questions and/or points for discussion were laid before the Panel[88]; they included the fact that with reference to some aspects of data preparation for INIS input, no international standards existed at the time and INIS had to develop some standards for its own use (e.g. some two-letter country codes) which were then submitted to the International Standards Organization (ISO) who subsequently adopted them as international standards. Questions were raised about the relationship between INIS and nuclear data centres such as the Nuclear Data Computing Centre of the ENEA (European Nuclear Energy Agency) or the possibility of interchange of computer programmes.

Much discussion centred on the newly published first version of the INIS thesaurus taken over from EURATOM. While it was recognized that the thesaurus was a useful tool and its use should start at INIS centres without delay, much development work was needed to improve it,

[83] Staff of the Lawrence Radiation Laboratory, Univ. of California. See section 1.3.1 above.
[84] See section 1.2.1 above.
[85] Later to become Systems Analyst on the INIS Secretariat staff in Vienna.
[86] C.Todeschini, "INIS: Manual for Indexing", IAEA-INIS-12, Vienna, August 1970
[87] "INIS: Thesaurus", IAEA-INIS-13 and "INIS: Terminology Charts", IAEA-INIS-13A, Vienna, October 1970
[88] See document PL-423/7 for a summary of the discussions and recommendations.

particularly with regard to its structure. The Panel recommended that work on the revision of the thesaurus should start soon.

In the light of the difficulties that were being experienced at the national INIS centres in reporting to the system even only the literature falling within the limited subject scope as requested by the Board, the Panel had lengthy discussions about the desirability of rapidly moving towards operations with the full subject scope or not. The final recommendation was:

a) to retain the present limited scope till the end of 1971;
b) to plan a major expansion of the subject scope in January 1972;
c) to hold a meeting in mid-1971 to decide on the exact expansion for 1972.

The Panel also recommended that all INIS centres should plan to provide every record reported to the system with descriptors chosen from the INIS thesaurus by 1 March 1971.

1.3.4 Total revision of the INIS thesaurus; March - September 1971

In the light of the recommendation about the need for revision of the thesaurus made by the 1970 Panel as described in section 1.3.3 above plus the experiences that had been gained with the use of the first version of the thesaurus during the foregoing months and the discussions held by Claudio Todeschini of the INIS staff with the staff of the US AEC in Washington and Oak Ridge and at the Lawrence Radiation Laboratory[89], INIS management invited interested INIS Members to cooperate in a joint effort to revise the INIS thesaurus. Three national INIS centres plus the Lawrence Radiation Laboratory of the University of California agreed to participate in this work.

At the time it was felt that INIS, considered the first decentralized world-wide mission-oriented information system, should serve as an example for the feasibility of the UNISIST concept[90] and as such should be responsible, among other features, for the careful preparation and maintenance of its controlled vocabulary to enhance subject retrieval. A highly decentralized environment such as the one in which INIS was to operate, required a high degree of consistency and compatibility in the preparation of input.

Draft guidelines for the development and maintenance of the INIS Thesaurus were drawn up by Todeschini with assistance from other INIS Secretariat staff and with minor modifications were approved and used by the INIS Secretariat together with the INIS Centre of the Czechoslovak AEC; by the INIS Centre of France at Le Service Central de Documentation, CEA de France; by the INIS Centre of the USA at the Division of Technical Information Extension of the US AEC and the Information Research Group, Lawrence Berkeley Laboratory, University of California, in a systematic study of the INIS Thesaurus lasting from March to September 1971. The guidelines followed closely those developed by UNESCO[91] in 1970 and made reference to the conventions adopted jointly by the Engineers Joint Council (EJC) of New York and the US Department of Defense in their Project LEX[92] in 1967.

The parties participating in the study agreed to subdivide the terminology into four broad areas by subject on the basis of the special subject expertise that was available among the staff at each particular centre. The centres would then, on the basis of the guidelines for the development

[89] See section 1.3.2 above.
[90] See section 1.2.1 above.
[91] "Guidelines for the Establishment and Development of Monolingual Scientific and Technical Thesauri for Information Retrieval", Report No. SC/MD/20, UNESCO, Paris, July 1970
[92] "Thesaurus Rules and Conventions" for the "Thesaurus of Engineering and Scientific Terms", EJC, New York and US DoD, Report No.AD672000, 1967, p.673-679

and maintenance of the INIS Thesaurus mentioned above, review each term in the EURATOM thesaurus as adopted by INIS, remove errors and inconsistencies, ensure a univocal representation of every concept by one and only one descriptor in the thesaurus and above all link each term to other thesaurus terms that had a logical and/or semantic association with the term in question. The INIS Secretariat in Vienna assumed responsibility for the terminology relating to the names of all the world's nuclear reactors, fuel plants, accelerators and other machines used in nuclear activities; the INIS Centre of the Czechoslovak AEC for the terminology in the areas of Chemistry, Life Sciences and Medicine; the INIS Centre of France for the terminology in the areas of Metals and Materials Science; the Information Research Group, Lawrence Berkeley Laboratory, for the terminology in the area of High Energy Physics while the INIS Centre of the USA assumed responsibility for all the remaining terminology.

Questions had already been raised during the period of the contract with EURATOM about the usefulness of the "Terminology Charts"[93]. Experience gained at the two training seminars held in August and November 1970 showed that minimal use was being made of the charts by indexers. Furthermore it was abundantly clear that, while the continuous updating of the terminological files of the thesaurus could easily be carried out, the updating of the charts was a laborious manual task requiring the physical drawing of each chart by hand (in the absence, at that time, of adequate computer software for the purpose). After further discussions between the parties participating in the thesaurus revision study, it was agreed to eliminate the charts and ensure that the univocal nature of each thesaurus term and its links to other terms would be defined uniquely by the structure to be given to the terminology as defined in the guidelines for the development and maintenance of the INIS Thesaurus mentioned above.

During the seven month period of the study there was a flurry of exchanges of magnetic tapes between the centres in the five geographic locations where the work was taking place so as to merge the resulting terminology but also to eliminate duplicate entries, to agree on some minor extensions of the terminology and to harmonize the associated terms that went with each entry in the overall terminology. In particular this required the establishment of reciprocal relationships between any two terms that had been linked in one direction only (i.e. term A linked to term B only from the perspective of term A) that first required the subject specialists concerned to evaluate the validity of the link in both directions. Del Bigio of the Agency's Computer Section coordinated all the computer aspects of the study. The final version of the new INIS thesaurus was produced in Vienna and presented to the *Working Group on Thesaurus and Related Technical Questions* that met in Vienna in November 1971. The guidelines used by all participants in the study as the basis for the revision and restructuring of the terminology of the thesaurus were published by the Agency in December 1971[94].

1.3.5 Meetings of the Board of Governors of the IAEA in February 1971, of the Panel on Expansion of the Limited Subject Scope in July 1971 and the Working Group on Thesaurus in November 1971

At its meeting in February 1971, the Agency's Board of Governors reviewed the names of those persons nominated by the Director General to be members of the Advisory Committee for INIS, committee that the Board itself had recommended should review INIS operations at appropriate intervals[95]. The seven members were selected and plans for the first meeting of the committee in November 1971 were made.

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[93] See section 1.2.11 above.

[94] J.Heijnen, C.Todeschini, "INIS: Guidelines for the Development and Maintenance of the INIS Thesaurus", IAEA-142, Vienna, December 1971

[95] See para. d) in section 1.2.8 above.

The *Panel on Expansion of the Present Limited Subject Scope and Revision of Subject Descriptions* that met in July discussed various aspects of INIS operations as experienced during the first 15 months of existence of the system. Among other suggestions it recommended that the INIS Secretariat should check the indexing quality of at least 10% of the input and that training activities should be strengthened. But in particular it recommended that all INIS participating countries should expand the coverage of the literature reported to the system on 1 January 1972 to include categories that it defined and further recommended that expansion to the full scope should take place from 1 January 1973[96]. It also recommended that INIS should go to a semi-monthly pattern of publication of *INIS Atomindex* and distribution of magnetic tapes when the volume of literature reported to the system increased beyond 2000 items per month.

The *Working Group on Thesaurus and Related Technical Problems* that met in early November agreed that the *"INIS: Guidelines for the Development and Maintenance of the INIS Thesaurus"* would be the standard for management of the INIS thesaurus in the future. They recommended that the restructured INIS Thesaurus and the revised Manual for Indexing be used for INIS indexing and retrieval operations starting on 1 January 1972 to coincide with the expansion of the scope recommended by the panel referred to in the paragraph above[97].

In November/December 1971, at the invitation of the Government of Argentina, the second regional training seminar was held in Buenos Aires and attended by a very large contingent of trainees from many of the Latin American INIS centres. The seminar was instrumental in giving a very substantial push to nuclear information activities in the whole continent and signaled the beginning of the establishment of modern information management activities in a number of the South American countries.

1.3.6 First Meeting of the Advisory Committee for INIS, Vienna, November 1971

The Advisory Committee for INIS, who was to review INIS operations as decided by the Agency's Board of Governors at its meeting in February 1969, met for the first time on 18-19 November 1971 with a membership established by the Board as described in section 1.3.5 above. The main results of its discussions were as follows[98]:

The Committee expressed its interest in the Regional Centre concept and recommended that the Agency should take a more active and direct part in assisting the establishment of national or regional centres, a "Regional Centre" being defined as a multi-national centre which was to provide input, output and training activities.

In discussing coordination and communication between Member States and the Secretariat, the Committee recommended a more direct involvement of national liaison officers by providing more frequent opportunities for them to meet to discuss detailed operational questions and to exchange experiences that may lead to improved input and a more useful exploitation of the output products. These meetings could be held in Vienna or in other regions with the possible attendance of someone from INIS headquarters. The Committee felt that meetings of liaison officers would be of sufficient interest that a good attendance could be expected even if little financial assistance was forthcoming from the IAEA.

[96] See document PL-449/7/Rev.1, p.9
[97] See document PL-476/4
[98] See document PL-476/5, January 1972

The Committee stressed that training was one of the most important of the Agency's activities and consequently expressed the view that one training seminar per year did not seem sufficient.

The Committee reaffirmed that for the foreseeable future subject control for INIS should employ a thesaurus and coordinate indexing. In recognizing the high professional competence of the multinational team that worked on the production of the new thesaurus and on the critical evaluation which it was given by the members of the *Thesaurus Working Group*, the Committee accepted the recommendation of the Working Group and suggested that, upon the acceptance of this recommendation by the Director General, the new thesaurus should enter into use on the 1st of January 1972. It also recommended that a printed subject index of one type or another should be provided as soon as possible for *INIS Atomindex*.

The Committee discouraged the Secretariat from rendering retrieval services to individual requesters from Member States.

The Committee strongly recommended that INIS proceed to full-scope as quickly as possible without an intermediate scope restriction in 1972. Accordingly, the Secretariat should be prepared to receive full scope input from those Member States capable of providing it in 1972 while recognizing that achievement of full scope by the entire INIS membership may not occur until 1973.

A first INIS film entitled: *"International Nuclear Information System: A Co-operative Venture in World-Wide Nuclear Information Processing"* had been produced in 1971 by the INIS Secretariat, with the technical support of an enterprise from the Czechoslovak Republic. The film was given its first showing to the Advisory Committee that noted the value of the film both as a vehicle for promoting INIS and as a tool to further public understanding of modern methods of information dissemination.

1.3.7 Meeting of the Agency's Board of Governors, March 1972

At its four hundred and forty sixth meeting on 1 March 1972, the Agency's Board of Governors discussed the proposals made by the Director General[99] following the recommendations of the *Advisory Committee for INIS* as described in section 1.3.6 above.

The Governors discussed favourably the general trends in the initial period of INIS operations[100]. There were words of concern from some of the Governors, in particular the Governor of the UK with regard to expected budgetary requirements for INIS operations and the doubts expressed by some about the Agency's capacity of running a major information operation. However, the Governor of the USSR stated that:

> *... the Advisory Committee had been most positive about the work of INIS and that the system was regarded very highly by scientists, engineers and other users in many countries. His delegation therefore supported the recommendation that INIS begin operating with the full subject scope in 1972 as being in the interests of all participating States.*

The Governor of the USA stated that:

[99] See document GOV/1509
[100] See document GOV/OR.446, June 1972, paras.32-71

... the question had been raised as to why the INIS Atomindex was needed at all in view of the existence of Nuclear Science Abstracts; the answer was that it was unlikely that the United States would find it desirable or practical to continue producing Nuclear Science Abstracts indefinitely in its present form. There was a great need for a reliable, universal information system which would also be geared to the needs of the developing countries. The INIS programme represented the most promising effort to achieve those aims and its further development had the full backing of the United States Government. Consequently he was prepared to support an expansion of INIS operations as proposed by the Director General.

From this occasion onwards it was therefore clear that, even in the eyes of the US Government, there was an expectation that INIS would eventually assume the role of a universal information system in the nuclear sciences and that *Nuclear Science Abstracts* would then be discontinued. The Governors welcomed the publication of the revised thesaurus and the fact that a subject index was being prepared. In the light of the advice tendered by the *Advisory Committee for INIS* and from the general tenor of the discussion, the Chairman of the Board took it that the Board was prepared to take the action recommended[101], namely that the Board:

Accept the recommendation that INIS should begin as soon as possible in 1972 to operate with the full subject scope ....

However the Board also:

Further request the Director General to provide the Board during 1975 with a comprehensive report on the operation of INIS in the years 1972-74.

Thus in effect the Board decided that INIS was still in a "trial period" of operations and that a review of INIS would be made in 1975 to consider its future fate[102].

1.3.8 Developments during 1972

As recommended by the Agency's Board of Governors and described in section 1.3.7 above, INIS operations were expanded to cover all literature falling within the INIS subject scope as of the date of the Board's decision in March 1972. This expansion was on a voluntary basis, i.e. members expanded their subject coverage as soon as they were in a position to do so.

The volume of input received by the Secretariat during 1972 increased substantially by comparison with the first two years of operation. The averages were 494, 820 and 1728 items per month respectively in the three years 1970, 1971 and 1972. The Secretariat had responded to the need for exercising control on the quality of input with checks of the indexing of about 10% of the total input. Since, as was to be expected, the quality of the indexing during the initial years of such a decentralized operation was very uneven, the Secretariat soon found the amount of effort required for these quality checks to be unacceptably high. In addition to strengthening the training programme of the Secretariat, consideration was given to establishing "Indexing Consistency Tests" whereby copies of the full text of a specific set of documents were sent to all INIS Centres. These were required to index the documents; the indexing of each Centre was then checked by the Secretariat who communicated the results to the individual Centres. These tests proved useful in improving the overall quality of the indexing.

[101] See document GOV/1509, para.11
[102] See document GOV/OR.446, p.7, para.67

As part of this effort to improve indexing quality of the input, the *First Regional INIS Workshop for European Countries* was held, at the invitation of the Federal Republic of Germany, at the INIS Centre in Karlsruhe in September 1972. In March the first issue of the "*INIS Newsletter"*, to be produced quarterly, was distributed to all Liaison Officers, while during the year the INIS staff began providing retrieval services (Selective Dissemination of Information) based on the INIS database to IAEA staff in Vienna.

The other question of great relevance during the year was the study for a highly mechanized method to produce a subject index for the entries in *INIS Atomindex* that would require a minimum of additional effort during input preparation. The Secretariat was assisted in these efforts by Jessie Herr[103] of the Information Research Group, Lawrence Berkeley Laboratory, Univ. of California. A Working Group organized in May and attended by eight experts suggested that the one additional requirement necessitating the least added effort while providing the most useful input was the "flagging" on the part of the indexers at the time of indexing of the most important descriptors in each set. Each piece of literature would on average have about 3 or 4 such flagged descriptors. Alternatives to this proposal were then considered by the Secretariat, the one referred to as "Two Level Flagging" being the most promising. This would require the indexer to provide each of the "flagged" descriptors with an accompanying "qualifying" descriptor chosen from the already assigned descriptors in the set, which would indicate some characteristic, quality, property or other facet of the "flagged" descriptor. These two linked descriptors, the "Main Heading" and its accompanying "Qualifier" were in the future to be referred to as M/Q pairs to be used as entry points in the printed subject index of *INIS Atomindex*.

A significant change in senior staff responsible for INIS also occurred in about the middle of 1972. The Director of the Division of STI, Charles Pelzer, returned to the USA and was replaced by Edward J. Brunenkant, till then Director of the US AEC's technical information program. It seemed appropriate that Brunenkant[104], whose vision had led him to play such a key role in the establishment of INIS, had now taken over the helm at INIS Headquarters.

1.3.9 First Consultative Meeting of INIS Liaison Officers, Vienna, November 1972

As described in section 1.3.6 above, the Advisory Committee for INIS at its first meeting in November 1971 had recommended a more direct involvement of national liaison officers by providing more frequent opportunities for them to meet to discuss detailed operational questions and to exchange experiences that may lead to improved input and a more useful exploitation of the output products. The Agency invited the Members (countries or International Organizations) participating in INIS to send their Liaison Officers to the first such consultative meeting held in Vienna in November 1972. This was to be the first of a long line of such consultative meetings of Liaison Officers that were to take place usually at yearly intervals.

The Liaison Officers agreed to have *INIS Atomindex* and the accompanying magnetic tapes distributed at semi-monthly intervals starting with 1 January 1973; discussed at great length questions of the quality of input and agreed to participate in the "Indexing Consistency Tests" as described in section 1.3.8 above; discussed possible collaboration between services involved in indexing and abstracting scientific literature in the field of Physics following a presentation by D.H.Barlow, Director of INSPEC[105].

[103] See section 1.3.1 above.
[104] See section 1.2.1 above.
[105] D.H.Barlow, "World trends in physics information systems", Physics Bulletin, Vol.23, 1972, p.519-520

But on two matters the Liaison Officers broke new ground: the first, though it was only mentioned, was the possibility of making the abstracts to the literature available in machine readable form; the second was a strong recommendation in favour of "Two Level Flagging" for the subject index of *INIS Atomindex* as described in section 1.3.8 above. Large inputters supported the proposal for further experimentation with two-level flagging and indicated their willingness to participate in such experiments. The Secretariat would develop the necessary tools and procedures to allow the experiment to be conducted. As early as possible in 1973 the Agency would issue *INIS Atomindex* containing the subject index prepared with the aid of two-level flagging. During the following 6 months Member States would be able to assess the cost effectiveness of the index[106].

Consequently, the Secretariat issued in January 1973 the Circular Letter No.27[107] which contained detailed instructions on how to prepare input to the system with two-level flagging, so called M/Q pairs described in section 1.3.8 above, included with the subject analysis.

1.3.10 Developments during 1973

Expansion to full coverage of all literature falling within the INIS subject scope became mandatory as of 1 January 1973. Two-level flagging of descriptors for the subject index of *INIS Atomindex* was introduced on a voluntary basis following the issuance of Circular Letter No.27, and became mandatory in July 1973. There were 56.757 items of input processed during the year, about twice the sum total of all items processed during the previous three years.

GianPaolo Del Bigio, who had been a members of the INIS Study Team in 1968[108] and had led all INIS computing efforts at the Agency during the early INIS years, left the INIS staff to join the staff of UNESCO in Paris.

The largest training seminar yet held took place during the year. To further enhance the quality of indexing at input, all members were requested to participate in the first of a yearly series of indexing tests, the so called "Indexing Consistency Tests"[109]. Carried out under the label 73ICT, this exercise enabled individual national inputting centres to measure their quality of indexing and compare the descriptor sets selected by their indexers with the standard sets established at round table discussions by the INIS Secretariat.

The Secretariat began experiments in the processing of machine-readable abstracts and the optical scanning of input worksheets and abstracts. The possibility of introducing Optical Character Recognition (OCR) equipment such as the COMPUSCAN 170 would have enabled inputting centres to type their worksheets on standardized OCR sheets using once-through plastic ribbons with electric typewriters - necessitated by requirements for character legibility – and have the sheets read by the OCR equipment at the Secretariat without further keyboarding, except for the necessary corrections. Work had also begun on establishing an interactive retrieval system. In the expectation of a new operating system becoming available on the Agency's computer, it would become possible to bring on either IBM's STorage And Information Retrieval System (STAIRS) or the US AEC's RECON system. This could lead to the possibility of Members being able to access the Agency's computer – and the INIS database - via telephone linking.

The Secretariat had also begun cooperation with the UN's Food and Agriculture Organization (FAO) headquartered in Rome in the establishment of its information system for the agricultural

[106] See document PL-520/9 (Rev.1)
[107] See definition of "Circular Letter" in section 1.2.12 above.
[108] See section 1.2.6 above.
[109] See section 1.3.8 above.

sciences. In this regard it is interesting to read how this cooperation came about and here, again, it is through the words of John Woolston, who had left the Agency in 1970 and was then working at Canada's International Development Research Center (IDRC), that we see the role that INIS came to play in what became AGRIS, the system established by FAO[110]:

> *As chairman of the Implementation Advisory Group ... at its second meeting, which took place in Prague in September 1972 …… I asked my colleagues to allow me to make an informal approach to Brunenkant as director of the IAEA's STI division and find out whether he would be willing to process AGRIS input on IAEA facilities in Vienna, assuming the FAO and the IAEA could reach an appropriate agreement. Our last session was in the morning, and our flights out of Prague were to be around midday. At the last moment and quite grudgingly the Implementation Advisory Group gave its authorization. That night I was back in Ottawa, and the next morning I phoned Brunenkant. Having described what had happened in Prague, I put the question. What followed was the longest pause in any conversation I can remember. Finally Brunenkant broke the silence and said firmly, "Yes, John, I'll do it!"*

Thus the cooperation between the IAEA and the FAO in producing the latter's AGRIS database and *Agrindex* publication was to begin and continue for about a quarter century, with the computer processing of the records of the agricultural literature taking place, essentially, with the INIS software running on the IAEA's computers.

In November 1973 the *Second Consultative Meeting of INIS Liaison Officers* took place in Vienna. The Liaison Officers were informed of developments as outlined above and provided their comments. They confirmed their support for the use of two-level flagging to create the entry points for the printed subject index and expressed themselves in favour of introducing the traditional alphabetic subject index at the back of each issue with the citations arranged within categories as before. This was to be adopted from the beginning of 1974.

Many Liaison Officers spoke in favour of incorporating machine-readable abstracts into the system since they felt that having abstracts printed in *INIS Atomindex* would enhance the product. As a result, the Agency's staff would continue its investigations into problems involved in producing machine-readable abstracts for the system. The delegate from EURATOM informed the meeting that his organization would terminate input to the European Nuclear Documentation System (ENDS) at the end of the year[111].

1.3.11 Developments during 1974 and the International Symposium on Information Systems: Connection and Compatibility

In about the middle of the year Charles Gottschalk, who had participated in the work of the *INIS Study Team*[112] that had established the basic design of the system and who had, during the early years, guided the system in the adaptation of its design as operations showed the need, returned to the United States. He was replaced as Systems Analyst by Hans Groenewegen from Australia. Groenewegen, apart from having attended a number of meetings as Liaison Officer for Australia, had also participated in a number of the early Panels and Working Groups, advising the Agency on steps that led to the establishment of INIS.

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[110] Woolston, 2004, op. cit., p.380

[111] C.Vernimb, G.Steven, "ENDS: European Nuclear Documentation System", Nucl. Eng. Des., v.25, No.3, p.325-333, 1973. See also section 1.1.3 above.

[112] See section 1.2.6 above.

Based on an agreement to be signed by the IAEA and the FAO, plans were made for the establishment of an *AGRIS Input Unit*, manned by FAO staff but operating in Vienna, making full use of INIS software and all other facilities, to process the input for *Agrindex*.

The national INIS centre of France completed the translation of the INIS thesaurus into French and the Agency published it as one of the documents of the INIS Reference Series[113].

At the invitation of the Government of Bulgaria, the IAEA co-sponsored, together with FAO and UNESCO, an *International Symposium on Information Systems: Connection and Compatibility* that was held in Varna, Bulgaria in September/October 1974 and was followed immediately thereafter by a meeting of the INIS Liaison Officers. A number of papers presented at the symposium made direct reference to the questions of connection and compatibility between INIS and other current information systems. Staff from the FAO reported on how AGRIS had profited in its establishment phase from its interconnection with INIS[114]. The Nuclear Energy Agency of the OECD reported on its cooperation with INIS on the distribution of computer programs to users in non-OECD countries[115] and on its prospects for contribution to INIS of references to the literature in Nuclear Law[116]. The INIS Secretariat reported on the interconnections with other systems established during its development[117] and on its application of ISO standards[118].

At their consultative meeting in Varna in October, the Liaison Officers expressed their concern at the fact that the total volume of items that would be reported to the system during 1974 was well short of the projected figure. Continuing difficulties being experienced by some centres in establishing the required human and financial resources were recognized and a strengthened training and assistance programme was discussed. Delegates from the USSR and the Fed. Rep. of Germany informed the meeting that their centres had prepared the total translation into Russian and German respectively of the INIS Thesaurus. Members were also informed by the delegate from the Nuclear Energy Agency of the OECD that it would be possible for them to make arrangements with the NEA to prepare for input to INIS records of their national literature in the field of Nuclear Law[119]. The general opinion was that INIS should in principle follow international standards. It was suggested to establish a pattern of alternating the venue for future annual Liaison Officers Meetings between Vienna and a Member State, provided that an invitation from a Member States were forthcoming.

On one important matter there was strong consensus, namely in favour of including abstracts in machine-readable form into the system.

1.3.12 Second Meeting of the Advisory Committee for INIS, December 1974

[113] Document IAEA-INIS-13(Rev.7)(F)

[114] H.East, M.Martinelli, "Building on what exists: The development of AGRIS as an example of system interconnection", International Symposium on Information Systems: Connection and Compatibility, IAEA-SM-189/4

[115] L.Garcia de Viedma, "Nuclear Energy Agency, computer program activities", International Symposium on Information Systems: Connection and Compatibility, IAEA-SM-189/18

[116] P.Reyners, "Prospects for a contribution by the OECD Nuclear Energy Agency to the IAEA International Nuclear Information System in the field of nuclear law", International Symposium on Information Systems: Connection and Compatibility, IAEA-SM-189/37

[117] Zh.Turkov, A.Chepkasov, "Planning and development of INIS: its application of UNISIST principles and its interconnection with other international and national systems", International Symposium on Information Systems: Connection and Compatibility, IAEA-SM-189/3

[118] N.Gove, H.Schmid, A.Chepkasov, Zh.Turkov, V.Gadjokov, C.Todeschini, M-H.Binggeli, G.Schallaboeck, E.Ruckenbauer, D.Davis, G.Del Bigio, "Use of ISO standards in INIS", International Symposium on Information Systems: Connection and Compatibility, IAEA-SM-189/12

[119] See document MG-25/10

The one topic of major significance that occupied the time of the Committee was the question of providing each item of input to the system with an abstract in machine-readable form. The abstracts would then be included with each record on the output tapes and would be printed in *INIS Atomindex.*

Discussion of this topic moved in the direction of suggesting that abstracts in machine-readable form could be submitted by Members starting in the second half of 1975 and that publication of *INIS Atomindex* with abstracts could start in 1976, although it was realized that not all Members might be in a position to provide full input with abstracts to meet those dates. During the discussion the delegate from the USA made a statement that concluded as follows[120]:

> *….. If the proposed target date of 1 July 1975 for regular submission of machine-readable abstracts is accepted, a target date of January 1976 should provide ample time for the first printed issue of INIS Atomindex with abstracts. If this schedule is met and the product is satisfactory, the United States would consider discontinuing publication of NSA in July 1976.*

Thus for the first time, the Government of the USA who, through its Atomic Energy Commission had since 1948 published *Nuclear Science Abstracts* that had become the most widely used secondary service in the nuclear sciences, directly linked the possible discontinuation of NSA to developments with the INIS output products.

After further discussion, the following recommendations were made[121]:

> *6.1 The Committee recommended that machine-readable abstracts should be included in the system starting sometime in 1975 and that the Secretariat should plan for the production of a printed abstracting journal to commence publication in 1976.*

> *6.5 The Committee recommended that all abstracts submitted should be in the English language but that INIS members would have the option of also submitting a version of the abstract in a second language, ……*

> *6.6 The Committee decided to place on record its great appreciation to those members whose national language is not English for agreeing to support the recommendation regarding the use of English as a communication language also for abstracts.*

The Committee held an extensive discussion on the question of the subject scope to be covered by the system and came to the conclusion that the existing scope served the INIS Members well. Concluding the discussion[122],

> **The Committee expressed the view that the scope of INIS should be defined by the scope of the Agency's interests; whilst it could be somewhat narrower, it should not in any case be wider.**

This statement still defines the scope of INIS to this day.

[120] See document MG-37/3, p.4
[121] See document MG-37/3, p.4-5
[122] See document MG-37/3, p.6

The Committee also agreed that there was a continuing need for meetings of the INIS Liaison Officers and of the INIS Advisory Committee. It also carefully considered the document prepared by the Secretariat detailing INIS operations during the years 1972-74 which the Board of Governors of the IAEA had requested the Director General to provide during 1975.

1.3.13 Developments during 1975

The Board of Governors of the IAEA held its Four Hundred and Seventy-sixth meeting in February 1975 and considered the comprehensive report prepared by the Secretariat detailing INIS operations during the years 1972-74 which had been carefully reviewed by the Advisory Committee for INIS[123]. The Governors expressed pleasure at the progress that INIS had made during the past three years[124].

Very gratifying was the progress being made by the membership in upgrading their technical capabilities for providing input to the system. Thus the amount of input submitted in machine-readable form, as opposed to work-sheets, increased from 69% of the total input in 1972 to 73% in 1973, and reached more than 90% of the total in 1974.

Under the leadership of Groenewegen, the Secretariat conducted experiments[125] to establish the requirements, both human and technical, for the successful use of OCR techniques for the preparation of abstracts in machine-readable form[126]. This was essential, particularly for countries whose national language was not English. We have seen how the Advisory Committee for INIS had acknowledged great appreciation to those countries, in their agreement to supply abstracts in English[127]. The experiments were carried out in Vienna with staff whose mother tongue was not English. After conclusion of the experiments, the Secretariat purchased appropriate OCR equipment for the processing of worksheet input typed according to specifically set out OCR requirements.

During the summer of 1975 Turkov left the IAEA and was replaced as Head of the INIS Section by Alexander Beniaminov also from the USSR. Continuing their well established cooperation, the Agency and FAO held a combined INIS/AGRIS training seminar in Ankara, Turkey at the invitation of the Turkish Government. At their fourth Consultative Meeting, the Liaison Officers meeting in Vienna in October, discussed for the first time the possibility of "flagging" the records of those input documents that contained numerical data (this would in future be referred to as "data flagging"). There was continuing discussion on the quality of the input being processed and the results of the third Indexing Consistency Test. The Secretariat reported on the experiences with the processing of test magnetic tapes with machine-readable abstracts and experimental OCR input. There was some concern expressed at the fact that the volume of input for 1975 was about equal to that for the previous year and had still not reached the estimated figure of total world production.

1.3.14 Developments during 1976

Some INIS members had started providing input together with machine-readable abstracts during the second half of 1975. As the year progressed during 1976, more and more members

[123] Document GOV/INF/286, 11 February 1975
[124] See document GOV/OR.476, May 1975, paras.41-43, p.4-5
[125] The experiments were funded by the International Development Research Centre (IDRC) of Canada.
[126] H.W.Groenewegen, J.Marshall, "Optical character recognition: use of OCR techniques in decentralized data collection for bibliographic information systems", Report No. IDRC-TS3, IDRC, Ottawa, 1976.
[127] See section 1.3.12 above.

provided abstracts in this form and *INIS Atomindex* started establishing itself as the world-wide abstracting journal in the nuclear sciences and technology.

Since there was continuing discussion about the true volume of literature that fell into the INIS subject scope, and with it the concomitant discussion about the completeness of coverage of the nuclear literature by the INIS database, in April the Agency commissioned the Aslib Consultancy Service to conduct a study " ….. on an investigation of the size of the nuclear science literature"

In November the Fifth Consultative Meeting of INIS Liaison Officers took place. Besides the various operational questions discussed, there was a recommendation for the Secretariat to develop an implementation plan for a data flagging or tagging scheme to meet the needs of data centres. But the really notable recommendation of the meeting was the following[128]:

> *5. That the Secretariat should continue to negotiate with individual Member States and make preparations for the establishment early in 1977 of an experimental cooperative computer network which will provide INIS centres with a facility for searching the INIS data base at the Agency directly from remote locations.*

With this recommendation the first step was taken towards the "Direct Access Project" (DAP) that would eventually enable many members to access the full INIS database on the Agency's computer directly from their national centres or other national locations.

The year 1976, however, will go down in the annals of INIS as the year when its journal *INIS Atomindex* became recognized as the sole international abstracting journal for the nuclear sciences and technology. It had been announced by the US delegate[129] to the Second Meeting of the Advisory Committee for INIS in December 1974 that "…. *the United States would consider discontinuing publication of NSA in July 1976 if the (INIS) product is satisfactory"*. Again on this occasion which was so indicative of the role to be played by INIS in the future preservation of knowledge in the nuclear sciences, we make reference to the words of Woolston[130]:

> *In 1976, after the content of the printed output, INIS Atomindex, had become largely the same as that of NSA, the U.S. authorities discontinued their own publication. Thus a highly respected mission-oriented system under centralized national management was succeeded by a decentralized cooperative system under international management. For those involved, this was a momentous occasion, ……. There was particular justice in the fact that the same Edward Brunenkant who had so assiduously promoted the international option was serving as director of IAEA's STI division when the transfer was consummated.*

As a simple indication of the growth and consequently of the wide acceptance of INIS as the world's significant repository and record of the literature of nuclear science and technology, suffice it here to give the statistics of the volume of input from the INIS members for the years 1970 to 1976:

Year	**No. of Items**
1970	3.950
1971	9.839
1972	20.740
1973	56.369

[128] See the Director General's letter to Members of 24 January 1977.
[129] See section 1.3.12 above.
[130] Woolston, 2004, op. cit., p.377

1974	63.432
1975	63.118
1976	60.402

To conclude this section, entitled *"INIS Launch and Early Years (1970-1976)"*, there seems no better way than to quote the summing up made by the Second Advisory Committee for INIS when[131]:

> *4.4 The Committee unanimously resolved to congratulate the Agency on the very great achievements that INIS had made during the period from 1972 to 1974. The record showed that during this period INIS had proved:*
>
> *(a) that it is possible to collect input on a cooperative basis from countries all over the world;*
>
> *(b) that by this decentralized method it is possible to achieve something close to 100% coverage of the world's literature;*
>
> *(c) that it is possible to train people from many different countries, with many different language backgrounds to provide input on a consistent basis;*
>
> *(d) that it is possible to build a big system with a relatively small central cost; keeping both expenditures, expressed in constant money terms, and staff numbers approximately level throughout the development period;*
>
> *(e) that an international system can upgrade the quality of national systems that are cooperating with it;*
>
> *(f) that the service can be provided punctually.*
>
> *4.5 The Committee commented that in its opinion INIS was one of the major achievements of the UN family of organizations, not only because of what it was doing to meet the information needs of the nuclear community, but also because it was pointing a way to new methods of organizing the world's information systems, as evidenced by FAO's decision to proceed with the implementation of AGRIS along INIS lines, and the proposed establishment of DEVSIS and other information systems on the same lines.*

1.4 System's Maturity (1977-1991)

The fifteen year period to be reviewed in this section was one of solid growth in the overall size of the database but particularly of a continuous development in facilitating the access to nuclear information to all INIS users. The system adapted to technological developments and continued to provide substantial training opportunities for staff at the national centres in view of the inevitable turnover of staff responsible for preparing input to the system and providing information services to users. Soon after the personal computer made its appearance in the early 1980s, the Secretariat introduced its use that was soon to fundamentally change how the input arriving in Vienna was checked and processed to create the database.

The 1980s also saw the first use at the Agency of algorithms using artificial intelligence in the implementation of an expert system to exercise quality control on the input data to the system. And finally it embraced with enthusiasm the opportunities offered as of the early 1990s by the use of the Internet. INIS implemented its use for all it was worth, namely as a means of providing input, as a channel for access to the database, as a means of communication between the Secretariat and the members and between the members themselves and to provide training by making available a product for "Distance Learning". Near the end of the period being reviewed the Secretariat created a

[131] See document MG-37/3, p.2

"Portal" that enabled users to have easy access to a variety of nuclear information sources over and above the INIS output products.

1.4.1 Developments during 1977, 1978 and 1979

As mentioned in section 1.3.14 above, the Fifth Consultative Meeting of INIS Liaison Officers meeting in November 1976 had recommended that the Secretariat continue to make preparations for the establishment of an experimental cooperative computer network which would enable the searching of the INIS database loaded on the Agency's computer in Vienna, directly from remote locations. Under the leadership of Groenewegen and of Vasil Dragulev of the Agency's Computer Section, the implementation of this "Direct Access Project" (DAP) was planned to have three phases. Since it was planned that the AGRIS database would also be available from the Agency's computer in Vienna, the AGRIS staff was also directly involved in the implementation of the DAP. In particular, Helga Schmid, who had been a member of the Agency's Computer Section and had worked in the INIS computer support group, had left the Agency's service to join the AGRIS Input Unit in Vienna in 1975 and participated in the development of the computer aspects of the DAP. During the period under review the first phase was executed:

DAP Phase I
The first phase of the experiment was confined to the provision of direct dial facilities for up to 10 Member States to the INIS and AGRIS databases located at the Agency. Online service started in 1978 with the first connection to the Agency made in January 1978 (Austria), followed by six others in 1978: Netherlands (March), UK (April), Norway (April), France (May), Czechoslovakia (June), Hungary (July).

As part of the basic design of INIS, the Clearinghouse at the Secretariat in Vienna had been collecting the full text of those documents defined as non-conventional literature (NCL)[132] received from the members either in the form of microfiche or as full text which was then photographed to produce microfiche in Vienna. These microfiche were then made available on request to any user requesting a copy of an NCL document. By 1977 over 100.000 such full text of NCL were available from the Clearinghouse. Patrick Lefebvre, over the years during which he was head of the Microfiche Clearinghouse until his retirement in the early 1990's, developed software that facilitated the processing, storage and retrieval of the large collection of master fiche stored at the Secretariat, from which copies were made according to the orders received from INIS members.

In May 1977 the IAEA organized the *"International Conference on Nuclear Power and Its Fuel Cycle"*[133] in Salzburg, Austria. This was a follow on conference to the four *"U.N. Conferences on the Peaceful Uses of Atomic Energy"* which had been held (in Geneva, Switzerland) in the 1950s and 1960s. As a special service to the many scientists attending the conference from all over the world, and of course to provide exposure to such a large captive audience of potential users of the INIS output products, the Secretariat, within the framework of the activities already taking place with the Direct Access Project, set up a number of remote work stations at the conference site linked to the Agency's computer in Vienna and INIS Secretariat staff provided retrieval services from the INIS database to any participant at the conference.

In 1977 the first INIS training seminar for North America was held, at the invitation of the Government of the USA, in Washington D.C. Gottschalk, who had been a participant in the work of the INIS Study Team in 1968 and had then served in the Secretariat as Systems Analyst, was by

[132] See section 1.2.6 above.
[133] "Nuclear Power and Its Fuel Cycle", (International Conference, May 1977), IAEA, Proceedings Series, STI/PUB/465, 1977, 6 Volumes

then back in Washington at the US ERDA[134] and it was due to his efforts and organizational skills that the logistics of this seminar were successful. This was particularly significant because a rather unique aspect of the seminar was the presence among the participants of trainees from Cuba, politically not an easy thing to arrange in those days for a meeting to be held precisely in Washington D.C. Once again, the particular aura carried by INIS as an international cooperative project, enabled some obstacles deemed almost insurmountable to be obviated.

The Nuclear Energy Agency (NEA) of the OECD, as has been mentioned in section 1.3.11 above, had invited those INIS members that were also OECD members to consider making use of their proposal to prepare for input to INIS references to nuclear laws or other legal literature published in their countries. A number of countries took advantage of the NEA offer, after adequate arrangements had been made between the IAEA and the NEA[135].

In November 1977 a consultation on the INIS/AGRIS network was held in Vienna. Of particular interest at the meeting was the presence of a representative of the International Institute for Applied Systems Analysis (IIASA) located in Laxenburg just outside Vienna, Austria and already using direct links to Bratislava (then in Czechoslovakia) and a representative of the ESA/IRS (European Space Agency/Information Retrieval System). The IIASA representative gave a presentation on the activities of his organization in the development of a computer network which would link facilities in Eastern European countries with facilities in Austria and France. The ESANET, operated by ESA/IRS was already a well established information service that offered its users access to a large number of scientific and technical databases from its Frascati location in Italy. With this background a proposal was discussed for the first time for the INIS/AGRIS network to work towards the possibility of entering into a form of cooperation with ESA/IRS and the IIASA. The one major aim of the network experiment was to provide a service that was accessible to both Eastern and Western countries and to both industrialized and developing countries. A partnership with ESA could perhaps provide a mechanism by which Eastern countries could access the ESANET databases. All of this at a time when both political and economic questions were not insignificant for transborder information flow between East and West. Once again INIS, with its unique status as an internationally created and operated database, was exerting a substantial influence on the level of cooperation between countries still wary of providing easy access to certain specific information sources to any and all comers.

The Liaison Officers met for their Sixth Consultative Meeting in May 1978. There was unanimous support for the introduction of "data flagging"[136]. With regard to the Direct Access Project:

> *A number of Liaison Officers present, including those representing the countries already connected to the network, expressed their great satisfaction with the way the experiment was being conducted and with the services provided. The Agency was encouraged to continue work on developing the project which was seen as a logical extension of the INIS system, offering one of the most effective ways of using the INIS products, and hence of interest to all countries.*[137]

Not long after the above mentioned meeting of the Liaison Officers, Beniaminov returned to the Soviet Union and was replaced as Head of the INIS Section by Arkady Romanenko (also from the Soviet Union) whose background, contrary to some of his predecessors, was indeed information

[134] See section 1.1.1 above.
[135] P.Reyners, "AEN,Droit nucleaire et informatique", in Nuclear Inter Jura '77, Florence, Italy, Oct.1977,16 p., INIS michrofiche, INIS-mf-4440
[136] See document TC-188/3, p.5
[137] See document TC-188/3, p.8

science. Maybe of greater significance, in the light of the role he had played in the creation of INIS and in guiding its way for six years, was the departure of Edward Brunenkant from the Agency at about the same time. Although many that have had working relations with INIS would share the opinion that Woolston merits the epithet "father of INIS", there is no disputing the fact that Brunenkant, through his fine appreciation of the politically and technically possible, his great sensitivity and diplomacy and his energy in pushing through realistic alternatives, was one of the outstanding players in making INIS a success story of international caliber. Brunenkant was replaced as Director of STI by Hal Pryor, also from the USA.

By the end of 1978 the INIS database had grown to 420,000 items. In addition, the number of publications of non-conventional literature whose full text was available on microfiche from the INIS Clearinghouse grew to 120.000 documents.

The Third Advisory Committee for INIS that met in February 1979 reviewed INIS operations since the last meeting of the committee and after discussing a number of operational questions placed on record its satisfaction with the balance which the Agency had achieved in managing the INIS system so that while the management was within the Secretariat, it continued to remain responsive to the views of the Member States, as expressed at Liaison Officers meetings and meetings of the Advisory Committee.

The main point of discussion of the committee however, was the Direct Access Project. The Committee agreed that the results of Phase I of the DAP were promising and justified further efforts to enable more countries to participate, subject to the condition that the Member States's national infrastructures be respected. It supported the proposal that the Agency should continue its discussions with ESA/IRS and IIASA to pursue the possibilities that would be opened by making use of the networks already established by those two organizations. However the Committee also expressed concern that in all future planning for the expansion of the INIS Direct Access Project, careful attention should continue to be given to the central role of the INIS Liaison Officers and to the need to safeguard their exclusive rights to the use of the INIS output products in their countries[138]. The committee made its recommendations to the Director General who then presented them to the Board of Governors of the IAEA at their meeting in May 1979[139].

Substantial efforts were therefore put by the Secretariat into the further development of the DAP. During the period under review the second phase was executed:

DAP Phase II

Since direct dial facilities to Vienna did not exist throughout the whole of Europe, full participation by some countries could only be attained via leased lines or an established telecommunication network. The second phase of the project evolved in co-operation with the two international organizations mentioned above that had vested interests in computer networking and in providing online access to bibliographic databases. The plan for Phase II involved an extension of the ESA/IRS network (ESANET) to Vienna from Frascati in Italy and the establishment of a leased telephone line between the IAEA and IIASA. In this way any user that already had access to the ESANET, could simply select among all the databases offered by ESA/IRS from Frascati the INIS database as the one to search, and it was transparent to the user that his search was taking place on the Agency's computer in Vienna and not on the ESA/IRS computers in Frascati. Similarly, users from Eastern Europe that had access to the IIASA computers in Laxenburg near Vienna, could, over the leased line, have direct access to the Agency's computer and search the INIS database.

[138] See document TC-269/4, p.5
[139] See document GOV/INF/357 of 17 May 1979.

At the invitation of the Government of the Federal Republic of Germany, the Liaison Officers held their seventh Consultative Meeting in Karlsruhe, F.R.G. in May 1979. A few points of note from among the wide ranging discussions:

In view of the information that the Russian version of the INIS thesaurus was due for publication later in the year, there was discussion of the publication of a *"Multilingual Dictionary"* carrying all the terminology in the four languages English, French, German and Russian.

During the lengthy discussion of the DAP, there was expression of satisfaction for the way the project had progressed so far, but there were repeated comments from delegates from developing countries that it was still proving difficult for many of them to take advantage of the project, also because of difficulties (mainly financial) these countries were experiencing in obtaining the equipment necessary for connecting to the network. Requests were made for assistance in this regard from the Secretariat who, in turn, suggested that developing countries approach the Agency's Technical Assistance Program that could provide help, since the INIS Secretariat was in no position to provide such assistance.

With regard to document back-up services, since the Secretariat, through the INIS Clearinghouse, could only provide the full text of Non-conventional Literature, there was general satisfaction with the arrangements that had been made with the British Library Lending Division (BLLD) and the Fachinformationszentrum Energie, Physik, Mathematik (FIZ4) in cooperation with the Technische Informations Bibliothek (TIB) of the Federal Republic of Germany for provision of the full text of documents of conventional literature.

In October 1979 the IAEA moved its Headquarters from the old *"Grand Hotel"* on the Kärntner Ring in the central district of Vienna to the new *"Vienna International Centre"* buildings which were built by the Republic of Austria and the City of Vienna on the other side of the Danube and put at the disposal of the United Nations and its specialized agencies located in Vienna, thus creating a "Third UN City" after New York and Geneva. The new facilities were spacious, well planned with an efficient infrastructure which, however, at the immediate time of occupation of the buildings by the Organizations, lacked a rapid public transport link to the centre of the city due to the recent collapse of the main Danube bridge in that section of the city[140]. A new bridge was then under construction. With all its obvious advantages, the *"UNO City"*, as it was usually referred to by the Viennese, lacked the charm of the old *"Grand Hotel"*; its glass outer walls were unmovable and unopenable and no smiling face could ever wave down to a casual passerby as used to be the case when on the Ringstrasse. Old-timers who had worked on the Ring asked themselves whether the ample parking facilities at the UNO City compensated for the fact that at lunch time you could not stroll down the Kärntnerstrasse and have a coffee on the Graben.

At about the same time as the Agency moved to the other side of the Danube, Groenewegen, its dynamic and creative Systems Analyst, returned to Australia. Apart from the DAP, the OCR capabilities and many other aspects of INIS operations, Groenewegen had also been very much involved in the planning of the move of INIS to the new facilities, particularly the clearinghouse, with its large cameras and chemical processing facilities for the preparation of microfiche.

1.4.2 The tenth anniversary year of INIS operations, 1980

During 1980 INIS commemorated the tenth anniversary of the start of its operations. The annual consultative meeting of INIS Liaison Officers was held for the first time in the new facilities

[140] The old steel structure "Reichsbrücke" built in 1937 that had survived the Second World War, collapsed into the river early Sunday morning 1 August 1976.

of the Vienna International Centre and this provided an appropriate backdrop to commemorate the anniversary. A special session of the meeting was devoted to the commemoration and the paper prepared by the Secretariat, "INIS Review and Outlook", touched on salient moments of the previous ten years but made a special point of stressing the cooperative nature of the system and did so in the following words:

> *C. Cooperation as the core philosophy*
> *In the INIS programme effort it is heartening to see how international cooperation has always produced a common solution for every situation. We may recall how after the INIS design had been developed and the project approved but before INIS actually became operational, the USA and the USSR each made a cost-free expert available for 6 months to assist in the establishment of some of the authorities such as the Corporate Author List. When a complete revision of the INIS Thesaurus was decided upon, specialists from three Member States collaborated with the Secretariat in a terminology analysis which saw magnetic tapes containing different or partly overlapping sections of the terminology being sent across borders and oceans and being merged, compared, corrected and completed to produce a "seamless" final product. At the time when a relatively high proportion of the input was still being sent to Vienna not in machine readable form but on worksheets to be keyboarded at Headquarters, a situation developed in 1974 in which the backlog of worksheets to be keyboarded was so large that the INIS Secretariat had to request for assistance. This request fell on fertile ground and the INIS centres of the Federal Republic of Germany and France keyboarded a large part of this material and returned it to Vienna on magnetic tape. When the central INIS processing programs were completely rewritten in 1978, the UK made a systems analyst/programmer available cost-free for six months to work at the Secretariat on this project. When South Africa wished to establish retrieval services but did not have retrieval software available, the INIS centre of the Federal Republic of Germany made its retrieval software package available to the South African INIS centre. These are but a sample of the many instances of cooperative effort by INIS Member States.*
>
> The size of the database passed the half-million mark during 1980.

The Direct Access Project and the possibility of on-line searching of the INIS database from other information service providers and even the possibility that INIS become part of another data base, had created an environment that raised new questions with regard to the exclusive rights of the national Liaison Officers to the INIS output products within their national boundaries. These included questions of revenue and cost sharing which were of a delicate nature. While national users could obtain approval for access to INIS from their own national Liaison Officer, a transborder networking environment could create a situation where a foreign service provider could theoretically offer access to the database to users outside his country against the wishes of the other country's national Liaison Officer. At their meeting the Liaison Officers reaffirmed the principle of exclusive rights of the national Liaison Officer to the INIS output products within his/her national boundaries and that consideration of international networks be handled within the framework of this principle. The exclusive rights included the right of the Liaison Officer to pass on these rights to another party. The recommendation of the meeting resulting from these discussions was as follows:

> *23. That careful thought and study be made of new factors that affect the relationships among the Liaison Officers and the Secretariat; and that in formulating the emerging relationships the Exclusive Rights principle be confirmed.*[141]

[141] See document TC 360/4, p.3

During 1980 the Secretariat continued its efforts to make the Direct Access Project more effective in reaching distant countries and hence the third phase of DAP was executed:

DAP Phase III

The objective of this Phase was to make direct access service available for developing countries who wanted and who were able to take advantage of this method of using INIS/AGRIS. Since 1977 Radio-Austria had hosted a node for TYMNET; since late 1979 the node allowed for a host computer interface. Following agreements with Radio-Austria, the Agency's computer was connected to TYMNET as a host in 1980. Since TYMNET did not have total global coverage, service through the telex network was arranged through Radio-Austria making the INIS on-line retrieval system available through any telex machine in the world that could connect to Vienna. Although the speed of this connection was limited to normal telex speed (5 characters per second), at the time this was deemed satisfactory for basic retrieval, training and demonstration. Within Europe, INIS also appeared on the EURONET where both Belgium and the Federal Rep. of Germany made it available to their users.

The Direct Access Project, because of the special mix of alternative channels offered to users in different geographical areas of the globe to access the database in Vienna on-line, was of special international interest and information on its development was presented in international fora[142].

1.4.3 Arrangements for membership and relations with the Secretariat; discussions in 1981 and beyond.

The INIS Study Team Report of 1968[143] had laid down the *modus operandi* of the system, describing the responsibilities of the members and those of the Secretariat from the technical point of view. As the years went by, and particularly as the Direct Access Project was developed, it became clear that it was necessary to formalize the exact arrangements whereby countries and International Organizations participated in the system[144]. Preparation of records of the national literature to report to the system was an onerous enterprise that required human and financial resources. These had to be provided by the national INIS centres who therefore had a stake in the output products produced by the system. Transborder access to these products needed careful regulation.

In implementing the recommendation made by the Liaison Officers the previous year and quoted in the section above, the Secretariat prepared a draft document entitled: *"Definition of Participatory Arrangements for INIS"* to be discussed at the 1981 meeting which, at the invitation of the Government of Brazil, was held in Rio de Janeiro, the first time a consultative meeting of the Liaison Officers was held outside of Europe.

Discussion of the draft document was heated and prolonged; members asked for more time to consider the matter and make their comments in due time in writing. The delicacy and importance of the questions raised is indicated by the fact that written comments were received over many months, that the draft document was repeatedly revised to incorporate as many of the comments as possible and that work on a new draft continued till it was presented at the next meeting in 1982 in Vienna. Further discussions followed and yet another draft was finally presented to the Fourth

[142] A.G.Romanenko, C.Todeschini, "The International Nuclear Information System Online Services", 4th International Online Information Meeting, Learned Information, London, December 1980, p.355-361

[143] See section 1.2.6 above.

[144] See recommendation from the 1980 meeting of Liaison Officers referred to in section 1.4.2 above.

Advisory Committee for INIS that met in January 1983. Reference to the discussions of the Advisory Committee will be made below.

At the Rio meeting the Secretariat also presented the Liaison Officers with its plans for the establishment in Vienna of a new Unit within the INIS Section to be called "Centre Services Unit". The Secretariat had in the past provided the national INIS centres with many services which included assistance in: input preparation, establishing input procedures, selecting and acquiring office or electronic equipment, obtaining access to INIS output products and primary documents, obtaining computer programs, providing training for INIS Centres' staff (including on-the-job training at the Secretariat), establishing training programmes, obtaining direct access to the INIS data base, and responding to requests for special information services. Taking into consideration the increased volume and scope of the Secretariat's services and assistance to INIS Centres, the decision had been taken to establish a Centre Services Unit in order to provide these more efficiently and effectively. The tasks of the Unit could be grouped into four broad areas of activity as follows:

a) Promotional activity
b) Provision of information services
c) Training
d) Development of national services

One of the first activities of the Centre Services Unit was to be the development of a basic training kit for input preparation, to be used as a self-teaching package or as an instructor's tool.

The Direct Access Project showed a slow but steadily increasing number of connect hours made to the INIS database with 1112 connect hours during 1980 compared with 808 connect hours during 1979.

At the Rio meeting, Liaison Officers also recommended that they should meet in Vienna every second year with meetings in alternate years alternating between Europe and outside Europe[145].

At about mid-year in 1981 Thomas E. Hughes[146] from the US Department of Energy, formerly assistant to Edward Brunenkant who had served as Director of STI at the Agency, became Systems Analyst in the INIS Section.

It may also be mentioned that in December 1981 Dr Sigvard Eklund, who had served as Director General of the IAEA for 20 years, retired and was appointed Director General Emeritus by the Board of Governors of the IAEA. It was during his tenure as Director General that INIS was established and Dr Eklund was a staunch supporter of the system. At the same time the Board appointed Dr Hans Blix, a former Foreign Minister of his country Sweden, as the new Director General of the Agency. Dr Blix was much interested in INIS and its further development and took the opportunity to address the Liaison Officers in May 1982 on the occasion of the first meeting they held after his appointment. He offered words of congratulation, encouragement and support[147].

1.4.4 Developments during 1982 and 1983

The two years under review in this section were years of consolidation of the system as a whole. The volume of input had reached a steady level between 70.000 and 80.000 items per year which was judged to be satisfactory but there was some question as to whether this represented a

[145] See document TC-441.9/4
[146] See section 1.3.2 above.
[147] See document TC-441.10/3, p.18

really complete coverage of the world's total production of literature in the peaceful applications of nuclear science and technology.

At their annual meeting in 1982 the Liaison Officers did suggest that the Secretariat, with the cooperation of Member States, monitor the extent to which INIS coverage of the literature of nuclear science and technology approached completeness. There was also discussion of the fact that preparing input using the Optical Character Recognition method was laborious both at the centres preparing the input and at the Secretariat for reading and processing the input. Alternative methods of input preparation for those centres using OCR were therefore sought so as to retire the OCR technique as soon as possible. Meanwhile a newly restructured INIS database format was introduced and made available online via the DAP. Also, based on a detailed proposal from the USA for a finer subdivision of the categories and after receiving comments from Members States, the Subject Category Scheme was revised.

In 1982 the German translation of the INIS Thesaurus was completed and in 1983 the first edition of the *"INIS: Multilingual Dictionary"*[148] (English/French/German/Russian) was completed and published. The Spanish translation, though much advanced, was not complete at the time when the other four language versions were merged for publication of the multilingual dictionary.

In order to implement the suggestion made by the Liaison Officers at their 1982 meeting with reference to the completeness of coverage of the database, an INIS Coverage Study was undertaken. Using in-house software and hardware and methodology developed by the International Centre for Scientific and Technical Information (ICSTI), Moscow, entries from INIS-related subject fields in three databases, INSPEC, COMPENDEX and MEDLINE, were compared with the INIS database.

During the first half of 1983 Hal Pryor, Director of STI, left the Agency at rather short notice to return to the USA and while recruitment action was proceeding, Romanenko, Head of INIS, was appointed Acting Director of STI until Pryor's successor assumed his duties in 1984. Pryor had brought much experience (from his years with NASA) and drive to his commitment to INIS. It might be said that he lacked his predecessor Brunenkant's delicate diplomatic touch, as a result of which some feathers were ruffled among some INIS Members, as transpired in the discussions described in the following section.

1.4.5 Fourth Advisory Committee and the "Definition of Membership Arrangements for INIS"

In January 1983 the Fourth Advisory Committee for INIS met in Vienna. Numerous technical, financial and policy questions were discussed by the Committee but by far the most substantial and lengthy discussions were on the subject of the document *"Definition of Membership Arrangements for INIS"* that had been referred to the Committee by the Liaison Officers after two inconclusive discussions on this topic which they had had at their 1981 and 1982 annual meetings.

The report of the discussions[149], in which one senses the tension at the meeting, reflects well the contrasting opinions of the committee members, which put them clearly into two groups.

Discussion was most heated in relation to the wording of a proposed paragraph on the need for Agency approval of arrangements between Members for commercial exploitation of the database across national boundaries. The draft of the paragraph in question read as follows:

"2.3 <u>Responsibilities</u>

[148] "INIS: Multilingual Dictionary", IAEA-INIS-20 (Rev.0)
[149] See document L2-AG-384.4/IV

The INIS Member is responsible for: ...

vii) obtaining prior approval from user Liaison Officers and from the Agency with regard to the commercial exploitation of the INIS database across national boundaries."

One group insisted that the paragraph be included in the document as it stood, while the other group was equally insistent that the paragraph should not be included, or if included, the words "obtaining prior approval from the Agency" should be replaced by the words "informing the Agency".

The first group felt that Agency approval was necessary because the Agency should represent the interests of the remaining INIS Members in any agreement among a few involving transborder commercial exploitation of the database. The second group felt that Agency approval was neither required nor appropriate. In their view, INIS Members owned the database collectively and individually with respect to their own boundaries or confines and were free to make any use they wished of the database within their own boundaries or within the territory of other Members with whom appropriate agreements had been made.

The Committee could not agree on a wording for paragraph 2.3 vii) of the document and therefore in its final recommendations to the Director General appears the text[150]:

The Committee:
1. Endorsed the text of a "Draft Definition of Membership Arrangements for INIS", but
2. Failed to agree on whether to include in the "Draft Definition" a paragraph on the need for Agency approval of arrangements between INIS Members involving commercial exploitation of the database across national boundaries. The matter was referred to the Director General for resolution.

The text of the draft document endorsed by the Committee and referred to the Director General does not contain a paragraph 2.3 vii) dealing with transborder commercial exploitation of the database.

It was also clear from the discussions of the *"Definition of Membership Arrangements"* that there was a link between that document and the Secretariat's Direct Access Project. Until that time the DAP was considered an "experiment". It was therefore not surprising that the Committee also[151]:

14. Recommended that a study be undertaken to provide additional information to be used in deciding whether the Direct Access Project should be endorsed by the INIS Members as an appropriate and needed long-term function of the Secretariat; and that on the basis of the results a final recommendation be made.

16. Agreed that it is most desirable to continue the Direct Access Project on an interim basis but recommended that a decision as to whether to institutionalize the project as a continuing service not be taken until completion of the study mentioned in Paragraph 14 above.

[150] See document L2-AG-384.4/IV, p.12
[151] See document L2-AG-384.4/IV, p.13

1.4.6 Developments during 1984 and 1985

In early 1984 Ivano Marchesi, who had enthusiastically set to work in the early 1970s to establish a very active INIS national centre for Brazil and had welcomed to Rio de Janeiro all the INIS Liaison Officers for their 1981 consultative meeting, assumed the duties of Director of STI at the Agency. At about the same time Romanenko returned to the Soviet Union and was succeeded as Head of the INIS Section by Alexander Filippov, also from the Soviet Union.

At their Twelfth Consultative Meeting in May 1984, there was consensus among the Liaison Officers that INIS operations were successful and the output products of the system were proving to be greatly useful to the world's nuclear community; they stressed especially the tremendous advantage that INIS had proved as the channel for nuclear information to the developing nations. Nevertheless, as INIS approached its 15th year of operations, there was a general feeling that it would do well to review and carefully evaluate all aspects of operations. Hence:

> *The Liaison Officers*
> *1. Recommended that planning begin promptly for a General Review of INIS Operations and Policies.*
> *2. Recommended that a thorough review of the Direct Access Project be completed, the results to be considered within the context of the General Review of INIS being planned to start soon.*

The recommended General Review of INIS Operations (GRINO) was undertaken by the Secretariat, in close cooperation with INIS Members during 1984-85. Five Working Groups (WGs) were organized to perform a review of all aspects of INIS operations:

WG on General Questions
WG on Scope, Coverage and Timeliness
WG on Bibliographic Control
WG on Subject Control
WG on INIS Services and Training

The Liaison Officers also discussed the value of the data-flagging of input records referring to documents that contained numerical data. While there was no denying the value of data-flagging *per se*, questions were raised about the effectiveness of the procedure as it was being currently applied in INIS. Since it was clear that many documents containing numerical data were not being data-flagged, results of retrieval using data flags only, showed excellent precision but poor recall; i.e. all items retrieved contained numerical data but only about a third of the relevant items were retrieved. It was therefore agreed that the data-flagging experiment be continued for another year or two with a special effort made to improve input quality.

At the invitation of the Government of Japan, the first regional training seminar for the Far East was held in Tokyo in October 1984. Trainees from the People's Republic of China that had just joined the IAEA and hence INIS, took part for the first time. As teaching staff of the Secretariat informally met Chinese trainees for the first time, they were impressed at the profound and detailed knowledge they already had of all the INIS rules, guidelines, formats and procedures as described in the documents of the INIS Reference Series. There is nothing like doing one's homework before meeting the teacher!

In May 1985 the Liaison Officers held their Thirteenth Consultative Meeting. As the meeting coincided with the 15th anniversary of the first INIS output products, there was something special about the meeting. The words of welcome at the opening were pronounced by the Director General of the IAEA, Dr Hans Blix and most of the following three days were devoted to discussing the

recommendations made by the GRINO Working Groups that had met during the three days preceding the Consultative Meeting[152]. The Liaison Officers adopted a draft "Action Plan on Implementing Recommendations of the GRINO Working Groups".

The Liaison Officers were informed that, after protracted negotiations, the members of the 4th Advisory Committee for INIS (that had originally met in 1983, see section 1.4.5 above) had finally approved by mail the draft text of the document *"Definition of Membership Arrangements for INIS"*[153]. On 26 February 1985 the Director General had also approved the document. That meant that INIS, for the first time in its history, had a written charter that set forth the principles on which INIS was based and comprehensive guidelines governing INIS operations. This would help preserve the framework of its successful cooperative effort. The Director General informed the Board of Governors of the IAEA of the successful approval of the document[154]. The text of the document is attached to the present document as Appendix I. During the fifteen years since the beginning of INIS operations, the Liaison Officers, other staff at the national centres, the staff of the Secretariat and other involved persons, had developed a *rapport* that led them to think of the group as "the INIS Family". As is true in most families, there is usually much cooperation and group solidarity, but this does not exclude differences of opinion. It may be indicative that INIS was no different from other "families" in that it took four years for its members to agree on the text of the document that governed the way in which they were to interact with each other!

The coverage study referred to in section 1.4.4 above had been extended to include comparisons with the coverage of the additional databases METADEX and VINITI. Final results of the study were presented to the Liaison Officers at the meeting, with the conclusion that coverage of the non-conventional literature by INIS was good, but that a 10-20% improvement should be possible in the coverage of conventional literature[155].

In the summer of 1985 Tom Hughes left the IAEA and returned to the Technical Information Center of the US DoE in Oak Ridge, Tennessee where he continued his close working and personal contacts with the INIS Secretariat in Vienna in his responsibilities at the national INIS Center of the USA. His intimate knowledge of INIS and the fact that his position as Systems Analyst of INIS had not yet been filled in Vienna was the reason for which the Director of STI, Marchesi, requested Hughes to return briefly to Vienna in November 1985 to serve as rapporteur for the meeting of the 5th Advisory Committee for INIS that met at that time.

As mentioned above, the 5th Advisory Committee for INIS met in November 1985. The Committee was presented with a detailed report on INIS operations for the period 1983-85[156]. It is interesting to see some of the statistical information presented to the Committee that gives a factual insight into the operation of the system:

	Years			
	1982	**1983**	**1984**	**1985**
Membership	81	86	88	88

INPUT FIGURES

[152] For a report of the discussions of the recommendations made by the 5 Working Groups of GRINO, see document L2-TC-441.13/3, p.3-29
[153] See document GOV/INF/476, para.4
[154] Document GOV/INF/476 of 23 May 1985
[155] See document L2-TC-441.13/3, p.2
[156] See document L2-AG-384.5/I

Number of items received (calendar year)	80527	82258	79351	83874
OUTPUT FIGURES				
Number of centres receiving INIS output tapes	40	40	42	43
Number of paid subscriptions to INIS Atomindex	1119	1170	1204	1027
Number of full subscriptions to documents on microfiche	33	34	37	36
Number of ad hoc orders for documents on microfiche	1900	1700	950	1320
Number of Member States and Organizations utilizing direct access to INIS/AGRIS databases at Vienna	31	31	32	44
Number of connect hours of direct access to the INIS database at Vienna	1243	1053	1188	1232

The Committee was also presented with the results of the GRINO Working Groups, their recommendations and the Secretariat's proposed further actions[157]. The Committee approved the Action Plans as presented in that document.

With respect to the Direct Access Project, the Committee made the following recommendation[158]:

> *4.2. ... ...*
> *(a) That the Project should be declared finished as an experiment,*
> *(b) That the Agency should continue to provide online service to those INIS Members wishing such access,*
> *(c) But that the Secretariat should foster cooperation among INIS Members in giving and receiving online access to the database,*
>
> - *through encouragement and the dissemination of information on the availability of online access throughout the INIS Family*
>
> - *without in any way abridging the freedom of choice of INIS Members,*
>
> - *the Agency being considered the source of last resort for such service*

As the statistics presented above show, the DAP was meeting with substantial success. The lengthy discussions by the Liaison Officers and the Advisory Committee, many of which hinged on the questions raised by the transborder commercial exploitation of the database, were finally set to rest by the above recommendation that sanctioned a continuation of the DAP "*to provide online*

[157] See document L2-AG-384.5/II
[158] See document L2-AG-384.5/VII, p.9

service to those INIS Members wishing such access" and established that the Agency was "*being considered the source of last resort for such service".*

1.4.7 Development of an Expert System for quality control of the subject analysis of input

Quality control of member's input, particularly the indexing and categorization of each item of literature, continued to be considered of primary importance because of the close correlation between correct indexing and high precision at the time of retrieval and *vice versa*. Since the checking of the indexing and categorization of members' input, performed by the Subject Specialists of the Subject Control Unit, represented a substantial work load for the Unit, Todeschini, by that time Head of the Subject Control Unit, sought ways of shifting some of this work load to the computer systems that were employed in the processing of Member's input. He suggested the possibility of developing an expert system, using techniques of artificial intelligence (AI), to assist the Subject Specialists in this task. He was granted a period of Sabbatical Leave between 1985 and 1986 which he spent at the Oak Ridge National Laboratory of the US Department of Energy in order to develop the expert system. During his time in Oak Ridge Todeschini had the possibility of working closely with the staff of the National INIS Center of the USA, whose function was carried out by the Technical Information Center of the US DoE, also located in Oak Ridge, Tennessee.

The Expert System based its algorithms on a Knowledge Base created from past portions of the INIS database that evaluated the co-occurrence of descriptors in specific subject categories. Descriptors and subject categorization of newly received input were checked against the Knowledge Base and the system identified those items of input with a high probability of containing either indexing or categorization errors. Only those items with high probability of containing errors were then checked manually by the Subject Specialists. This replaced the system used until then of randomly selecting items to be checked, with which most of the checked items were normally essentially correct. This was the first time that a computerized expert system was implemented at the IAEA[159].

After Todeschini's return to Vienna, the algorithms of the expert system he had developed were programmed for the INIS input processing system by Anatoli Tolstenkov[160], of the then Computer Section within the Division of STI. The expert system was tested during 1989 and the results presented at the *"International Symposium on the Future of Scientific, Technological and Industrial Information Services"* held in Leningrad, USSR, in May 1990[161].

1.4.8 Developments during 1986, 1987, 1988 and 1989

After ten years of operation, the Optical Character Recognition method of preparing input to the system which by the early 1980's was considered inefficient[162], was discontinued. More notable was the fact that in April of 1986 the INIS database reached its first millionth item.

At the invitation of the Government of the USA, the 14th Consultative Meeting of INIS Liaison Officers was held in Washington D.C. and opened on the 5th of May 1986, only nine days after the unfortunate explosion of Unit 4 of the Chernobyl nuclear power station in the Ukraine.

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[159] C.Todeschini, M.P.Farrell, "Expert System for Quality Control in Bibliographic Databases", Journal of the American Society for Information Science, v.40(1), p.1-11, January 1989

[160] Later to become Head of the INIS Unit within the INIS and Knowledge Management Section of the IAEA.

[161] See section 1.4.10 below.

[162] See section 1.4.4 above.

Little did the assembled Liaison Officers realize how much the future of nuclear power in the world (and indirectly INIS) would be affected in the coming years by the events of that fatidic 26th of April 1986. They used the occasion to stress the continuing importance of the free flow and exchange of information in the nuclear as in other areas and that, in the nuclear area, INIS should continue to be instrumental in furthering that aim.

The Liaison Officers were apprised of the work done to that date at the Secretariat in exploring the possibility of using Compact Disk (CD) technology for storing the INIS database and performing retrieval operations. For the first time a demonstration of document retrieval from the INIS database on CD-ROM was staged at the meeting. One of the recommendations of the meeting was that the Secretariat prepare a database users manual describing the INIS database from its beginning, detailing all record formats, character sets, fields, etc., and dates of changes to any of these. Robert McDermott from the Library of Congress of the US attended the meeting as the newly appointed Systems Analyst with INIS.

During 1987 access to the INIS database was made available on STN International (Scientific and Technical Information Network). The supplier of that network was Fachinformationszentrum Karlsruhe, the national INIS Centre for the Federal Republic of Germany.

Also in January of 1987, a number of member states of the IEA (International Energy Agency) of the OECD, signed an "Implementing Agreement" to operate a new system referred to as ETDE (Energy Technology Data Exchange). ETDE would create a database, very much in parallel with what INIS was doing, with the significant difference that it would not be limited to the peaceful applications of **nuclear** energy but would cover the world's literature on **all** types of energy sources. Interestingly, all member states of ETDE were already members of INIS. ETDE planned to take the full INIS input as the input to their database in the nuclear energy area. We will see in later sections how cooperation between INIS and ETDE grew and was advantageous to both systems.

At the 15th Consultative Meeting of INIS Liaison Officers held in Vienna in 1987, delegates were given a presentation of the pilot project of Automatic Indexing and Retrieval (AIR) then underway on the physics database at the INIS centre of the Fed. Rep. of Germany. For the automatic indexing of documents, the title and abstract of each document were transformed into words or phrases of the AIR dictionary and then descriptors were assigned according to a particular algorithm. While the interest of INIS in the possibilities of automatic indexing was very high, the results of the pilot project suggested that much still needed to be done to achieve a sufficiently satisfactory level of indexing. Developments at INIS would show that it would be almost 20 more years before a very effective Computer Aided Indexing (CAI) software package would be implemented in the preparation of INIS input.

The delegates were also informed of the status of COM (Computer Output on Microfiche) development. COM equipment had already been installed and the first programs were developed and tested. COM output (Atomindex, abstracts, cumulative indexes, documents of the Reference Series) would be available in the third quarter of 1987.

Prophetic was the view expressed by the delegate from France who questioned the fear of some of the Liaison Officers at the possible loss of the printed version of the INIS database (INIS Atomindex); he suggested that its loss was inevitable but that: *"…… something will replace it"*.

Perhaps the most notable of the many recommendations made by the Liaison Officers at the 1987 meeting, referred to the future use of CD-ROMs as a support for the database[163]:

The Liaison Officers:

12. Recommended that the Secretariat start immediately the implementation procedure for the INIS database on CD-ROM on the basis of the full INIS record starting from 1976. The most appropriate system available now should be chosen and first cost estimates based on a range of 50 to 250 subscriptions should be made available by the end of September 1987.

In December the 6th Advisory Committee for INIS met in Vienna. From its wide ranging discussions three topics emerged as being of most concern to the Committee: 1) the increased burden on the INIS budget caused by expanded and improved output services provided to Members; 2) the continued development of CD-ROM technology for the distribution of the database and other products; 3) the "spectre" of the possible abolition of INIS Atomindex in paper form.

With regard to the effect on the INIS budget of expanded output services, the Committee was informed that any fees collected from Members for expanded output services would end up in the Agency's Administrative Fund - as directed by the Agency's Board of Governors. For example: the INIS database on compact disc (CD-ROM service) would enable users in Member States to search the INIS database, with all the information retrieval functionality, on a microcomputer. INIS had the resources to develop the service. However, when it became a regular INIS output product, there would be additional annual expenses charged to the INIS budget varying anywhere from $30 000 to $100 000. INIS was projecting a fee structure for the service which would cover those costs. Yet those fees would not in any way offset the INIS budget because the fees, as mentioned above, would end up in the Administrative Fund. INIS would be $30 - $100,000 poorer every year by providing this useful service to Member States, while at the same time, users in Member States would be paying $30 - 100,000 to the Agency for that service. In this connection the Committee made the following recommendation[164]:

6. Recommended that the Secretariat pursue whatever measures are at its disposal to have user fees collected for its services to be applied to the costs of providing the services, while ensuring that such measures maintain the principle of the universality of INIS.

With regard to developments of CD-ROM technology the Committee:

13. Endorsed the continued development of CD-ROM as a new form of output product for the INIS database and encouraged its introduction ……..

15. Recommended…….. the production of the database on CD-ROM on a regular basis as soon as possible in 1989…….. with a view to the possible decision of full implementation of CD-ROM as a regular output product beginning in 1990.

The question of the possible abolition of the paper form of the INIS database brought to light an interesting aspect of life within the "INIS Family" namely that differences in planning of practical steps to be taken because of changing technologies were dictated not so much by the level of technological sophistication that a particular country possessed but more by the farsightedness possessed by the individuals involved. A case in point was the "modest proposal" offered by one of the Committee members. The purpose of the proposal was *"to re-establish the principle of*

[163] See document L2-TC-441.15/5
[164] See document L2-AG-384.6/10 or document GOV/INF/553 of 4 July 1988

universality by bringing all Members to the same level of capability of exploiting output products and resources, as they were at the start of INIS before the advent of online searching"[165]. The proposal was that by 1989 or 1990, CD-ROM be the standard form of delivery of Atomindex and the paper copy be abolished.

The response to this proposal was rather forceful. The general argument of several Advisors was that CD-ROM was too new to be entirely dependable; it was not transportable; it required maintenance; it could not be circulated; was not as up-to-date as the printed Atomindex and was not as accepted by the user as was paper. The general reaction was that CD-ROM was welcomed as a new and useful tool, but that INIS should proceed cautiously with any idea of dropping paper completely. Paper had served the Members very well in the past and was deemed to serve INIS well as one of a range of outputs in the future[166].

In the event, the Committee chose to make NO recommendation on this question!!

The Committee was also informed about the Agency's intention of introducing "Strategic Planning for Information Systems" (SISPlan). The reactor accident at Chernobyl in April 1986 had helped to crystallize the need for better coordination of information activities at the IAEA and SISPlan was intended to be the channel by which this would be achieved. It was suggested that some INIS staff would play a key role in developing SISPlan.

At the invitation of the Government of the Republic of Turkey, the 16th Consultative Meeting of INIS Liaison Officers was held in Istanbul in May 1988. Apart from the views of the Bosporus and the Golden Horn from the Galata Tower, the meeting took note with gratitude (particularly that of the numerous Officers from Latin America) that the INIS Centre of Spain had completed the translation of the Thesaurus into Spanish, thus adding a fifth language version of that document.

A discussion on the precision and recall of one- and two-level flagging of descriptors for creating the entry points for the subject index led to the following recommendation[167]:

The Liaison Officers:

3. Supported the proposal for the continuation of two-level flagging for the creation of subject headings for the subject index ……..

Noting that the rapid production of CD-ROM was particularly advantageous to the developing countries in that it gave them automatic access, free of connect charges, to the database and gave them a technological leap in pursuing their work effectively, the Liaison Officers also:

17. Recommended that the Secretariat continue the development of CD-ROM aiming at full distribution as soon as possible in 1989 ……..

The meeting was also apprised of the participation of INIS Secretariat staff in the Agency's Technical Cooperation Programme, in particular the ARCAL X project[168]. The ARCAL X project, "Nuclear Information", had, as its general objective, the generation of the necessary and adequate conditions for all aspects of nuclear information in the countries of the Latin American region and the establishment of a regional system that would permit the efficient sharing of information resources between the participating countries. In particular it aimed to improve the physical facilities in each country via provision of appropriate equipment, i.e., video and film equipment,

[165] See document L2-AG-384.6/9, p.5
[166] See document L2-AG-384.6/9, p.6
[167] See document L2-TC-441.16/4
[168] See document L2-TC-441.16/3

computer hardware and software, etc. and to develop a standardized "Model Information Centre" package.

During the course of 1988, the States members of ETDE adopted the format used by INIS, with minor modifications, as the basis for their exchange of bibliographic records for the creation of the Energy Database. Implementation began in 1989. So, after AGRIS during the 1970s, it was now ETDE during the 1980s that took the INIS model for the creation of their database.

In October 1988, at the invitation of the China Nuclear Information Centre of the P.R. of China's Atomic Energy Authority, a large INIS Regional Training Seminar was held in Beijing, covering input preparation, provision of nuclear information services from the output products and other system-related aspects of INIS operations. A large number of trainees from the East-Asia and Southeast-Asia region participated.

During the course of 1989, increasingly detailed planning was progressing for an International Symposium that was to be co-sponsored by the IAEA together with three other organizations of the UN Family: FAO, UNESCO and UNIDO. As the main driving force behind the interest in holding the symposium, the IAEA had been assigned the role of lead organization and the Scientific Secretariat for the symposium was located in the INIS Section. The four sponsoring organizations chose the title: *"International Symposium on the Future of Scientific, Technological and Industrial Information Services"*[169] and indicated three areas of particular concern in the rapidly changing environment of information exchange: 1) information needs of users; 2) information retrieval & dissemination systems and 3) information management. The symposium was to be held in May 1990. The call for papers was issued in August 1989 and the selection of papers to be presented (based on synopses) was made in December 1989. Since the Soviet Union had already indicated its interest in hosting the 1990 consultative meeting of INIS Liaison Officers, it was planned to hold the symposium at the same venue in the Soviet Union, still to be defined.

As the 1980s progressed, the use of the PC for information processing became more and more widespread. At the Secretariat its use increased rapidly and it soon became apparent that before long every staff member would have one at his/her disposal. For the descriptive cataloguers of the Bibliographic Control Unit and the subject specialists of the Subject Control Unit, who prepared input by filling in worksheets that were then keyboarded by clerical staff at a work-station linked to the Agency's main computer, it became clear that work-flow would be greatly simplified and speeded up by abolishing paper worksheets, working directly on a PC and entering the input by means of a specific application software developed for that purpose. During the course of 1989 the first steps were taken to develop such software.

In May 1989 the 17th Consultative Meeting of INIS Liaison Officers was held in Vienna. A number of outside experts were invited to make presentations to the Liaison Officers, highlighting trends in Scientific Information Support, in Optical Storage Technologies, in Expert Systems and Information Retrieval Technologies.

There was much interest in the project for developing an integrated data preparation and checking software package for INIS input on IBM compatible PCs. The project, mentioned above, was being coordinated by the INIS Secretariat and Computer Section staff and involved programming staff of the national INIS centres of Brazil and the USSR. The software was to be known as "FIBRE" (Friendly Input of Bibliographic Records). Obviously PCs had come into common use at many national INIS centres too because the Liaison Officers[170]:

[169] See section 1.4.10 below.
[170] See document 631-L2-TC-441.17/3, p.7

3. Recommended that the Secretariat produce FIBRE and proceed with distribution with all deliberate speed.

Liaison Officers were also brought up to date on developments with the IAEA's Strategic Planning for Information Support (SISPlan), on which McDermott, the INIS Systems Analyst, was spending a great deal of his time. The plan was based on developing an understanding of what functions the Agency performed and the things, entities, about which it needed information in order to perform those functions. From interviews of top administrators and programme managers in the Agency, functional hierarchies, data flow diagrams and entity models of the various programmes were developed. An analysis of that information, together with an evaluation of systems used at the time, lead to an indication of unsupported information and the plan to adjust the support structure to provide more optimal support within the available resources. The status of planning for the International Symposium, mentioned above, was also presented, together with the information that it would be held in the Soviet Union in coordination with the annual meeting of Liaison Officers.

In conclusion of the 1989 Consultative Meeting, honour was paid to Elisabeth Ruckenbauer who was retiring at the end of that month after more than 30 years of service with the IAEA, more than 20 thereof with INIS. As Head of the Bibliographic Control Unit she had been not only the untiring defender of clear, concise and *internationally accepted* descriptive cataloguing rules to be applied in INIS input but had played an active role in international standardization bodies to ensure that such rules were established and internationally accepted. It was not per chance that the manual of the INIS Reference Series *"INIS: Descriptive Cataloguing Rules"*, whose principal author was Ruckenbauer, had been adopted by some organizations[171] with no link whatsoever to INIS, for their guideline on descriptive cataloguing.

In November 1989 the 7th Advisory Committee for INIS met in Vienna[172]. As was usual, the discussions of the Committee were wide ranging. Among the topics discussed was the interest in cooperation between INIS and other database producers whose subject scope overlapped with that of INIS. In particular there was interest in cooperation with ETDE[173] and ICSTI (Moscow). The discussions outlined possible technical cooperative ventures which could be undertaken by ETDE and INIS. These included joint development and maintenance of standards and authorities, compatibility of subject categories for both nuclear and non-nuclear disciplines, joint studies to improve indexing procedures, and joint training sessions[174].

There was much discussion about the status of the project for production of the database on CD-ROM. There had been delays due to difficulties with providing adequate retrieval software by the commercial firm that had been selected for the preparation of the product. The discussion highlighted again the delicate nature of the "exclusive right" of INIS Members to the distribution of the database within their jurisdiction. This was apparent from the relevant recommendation that read[175]:

The Committee:

6. Recommended that the option chosen for the INIS database on CD-ROM should ensure that the continued control of the distribution of the product remain firmly in INIS hands.

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[171] Such as NTIS (National Technical Information Service) of the USA.

[172] It is a quirk of INIS history that the members of the 7th Advisory Committee elected from among their number the Advisor from the German Democratic Republic to serve as Chariman of the Committee during the very month when events in his country sealed the demise and the soon to follow disappearance of that country from the family of nations.

[173] See comments about ETDE near the top of the present Section.

[174] See document L2-AG-384.7/M, recommendation No.11

[175] See document L2-AG-384.7/M or GOV/INF/580 of 23 April 1990

There were also some changes in the subject scope to be covered by the system. Of particular importance was the expansion of the scope to cover economic and environmental aspects of all energy sources, not only nuclear sources. The relevant recommendation read:

> *15. Taking note of the evaluation made by the Secretariat of proposals made by Member States with regard to changes in the INIS subject scope, recommended :*
> *a) to exclude Astrophysics and Cosmology,*
> *b) to continue to include High Energy Physics,*
> *c) to include the economic and environmental aspects of all energy sources, ……*
> *d) to include basic superconductivity and superconducting studies, ……*

It was also heartening to hear that the Committee:

> *19. Expressed confidence in the continued need for bibliographic databases such as INIS.*

To conclude this section it seems useful to recall the essential statistical information for the period under review:

	Years			
	1986	**1987**	**1988**	**1989**
Membership	88	89	93	94
INPUT FIGURES				
Number of items received (calendar year)	91301	101218	102097	92676
OUTPUT FIGURES				
Number of centres receiving INIS output tapes	43	42	40	35
Number of paid subscriptions to INIS Atomindex	873	828	739	664
Number of full subscriptions to documents on microfiche	37	37	37	37
Number of ad hoc orders for documents on microfiche	700	967	832	756
Number of Member States and Organizations utilizing direct access to INIS/AGRIS databases at Vienna	29	31	29	29
Number of connect hours of direct access to the INIS database at Vienna	1276	1099	754	773

It is interesting to note that over this period, while the number of Member States utilizing the direct access to the INIS/AGRIS databases at Vienna remained very steady, the number of connect hours was decreasing, while there were noticeable decreases in the number of centres receiving INIS output tapes and in the number of subscriptions to INIS Atomindex. The fact that the INIS database was being included in an increasing number of online services was being felt.

1.4.9 Twenty years of INIS operations. The events of 1990

The year 1990 was notable in the history of INIS for a number of reasons. Among them: the year marked the 20th anniversary of the distribution of the first output products; the INIS Secretariat led three other UN organizations in organizing and running the international symposium mentioned in Section 1.4.8 above and described in more detail in Section 1.4.10 below; a number of important changes among senior INIS staff took place during the year.

At the invitation of the Government of the USSR, both the international symposium and the 18th Consultative Meeting of INIS Liaison Officers were to be held in the Soviet Union. The two meetings were therefore held back-to-back in May, whereby the Liaison Officers met first in Obninsk. That seemed an appropriate venue to celebrate the 20th anniversary of INIS operations, since the world's first operating nuclear power station was located in that city[176] and the city is twinned with Oak Ridge, Tennessee, where the national INIS centre of the USA is located.

At the meeting the Liaison Officers were apprised of the status of the FIBRE software for input preparation and checking being developed by the Secretariat together with programmers from the INIS centres of the USSR and Brazil. There was great interest on the part of the membership in quickly having access to the FIBRE software. The Secretariat indicated that there was continuing development and checking of the software together with removal of "bugs" and it was hoped to make the software available to INIS centres before the end of the year.

There was also pressure from the Liaison Officers for a solution to the difficulties that were being experienced with the commercial firm that was to prepare and distribute the database on CD-ROM. Since the original firm that had been selected seemed unable to solve internal and software problems, a second firm, Silver Platter, had been requested to bid for the tasks to be performed. Indications were that Silver Platter was in a position to do so quickly. Various delegates did however caution that the INIS Secretariat should be very careful in moving toward the commercialization of INIS and insisted that Silver Platter be required to ask each Liaison Officer how the product could be distributed within each Member State. The Secretariat assured the members that in any dealings with Silver Platter the rights and privileges of the Liaison Officers would be upheld. Sensing overwhelming support of the delegates, the Secretariat indicated the contract with Silver Platter would be pursued with all deliberate speed.

Great interest was expressed in the cooperation between INIS and ETDE. This interest was in part fed by the desire of a number of non-ETDE Member States in the possibility of gaining access to EDB (the Energy DataBase created by ETDE). The delegate from ETDE explained that basic ETDE principles were similar to INIS except for the broader subject spectrum whereby all energy-related literature was covered. ETDE had no paper products and some members provided online access to EDB. Recent contacts between INIS and ETDE representatives had identified opportunities for cooperative ventures, for the enhancement and eventual compatibility of both systems. These efforts could include joint publication of authorities, joint subject analysis studies, and the IAEA would have access through the INIS Secretariat to ETDE database information for

[176] Calder Hall in the U.K. is recognized as the world's first commercially operating nuclear power station.

energy comparative analysis studies. By developing common standards, the two systems would evolve toward compatibility and thus facilitate any future interchangeability. ETDE membership was based on IEA membership which involves the assessment of membership fees to support overall IEA activities.

To commemorate the 20th Anniversary of INIS, the IAEA had had a medal forged for the occasion. Marchesi and Filippov were each presented with the medal; Marchesi for his 16 years as INIS Liaison Officer for Brazil followed by 6 years as Director of STI at the IAEA and Filippov for his 6 years as Head of the INIS Section. The assembled delegates gave Marchesi and Filippov a standing ovation in recognition of their contributions to the international nuclear science and technology community. The successors to Marchesi and Filippov had already been selected by the Agency, in the persons of Joyce Amenta as Director of STI and Alexander Sorokin as head of the INIS Section. Amenta came to the Agency from the US Nuclear Regulatory Commission while Sorokin, who had already served on the INIS staff in the period 1981-86 as Head of the Centre Services Unit, came from the All Union Library of Science and Technology of the USSR. Amenta was in attendance at the meeting of Liaison Officers in Obninsk, while both Amenta and Sorokin attended the international symposium in Leningrad.

But what was of very particular significance and surely a cause of satisfaction for many of the members of the fairer sex was the fact that Joyce Amenta was **the very first woman ever** to be appointed to the position of Director of a Division in the 33 year history of the International Atomic Energy Agency! Again a very special first for the Division of Scientific and Technical Information and for INIS!

The year 1990 was also the year when the Expert System for Quality Control, described in Section 1.4.7 above, was implemented in the routine checking of input to the system.

1.4.10 The International Symposium on Information Services

As mentioned in section 1.4.8 above, the IAEA, together with FAO, UNESCO and UNIDO, organized an *"International Symposium on the Future of Scientific, Technological and Industrial Information Services"* which was held in Leningrad (today St. Petersburg) on 28-31 May 1990[177]. Todeschini, the author of the present report, was appointed Scientific Secretary of the symposium. He was assisted by three coordinators, E.Samaha (FAO), J.Rose (UNESCO) and V.Podshibyakin (UNIDO).

The symposium was articulated into seven sessions, at each one of which the first paper was by an invited speaker. These speakers were: J.Woolston (Canada), T.C.Bearman (USA), E.Molino (Mexico), Ching-chih Chen (USA), K.Spark Jones (UK), P.V.Nesterov (USSR), and A.Neelameghan (India). One notes as the name of the first invited speaker that of John Woolston, the "Father of INIS". Twenty years after INIS issued its first output products, it was indeed a pleasure for all that had been in any way connected with the establishment and development of INIS to hear Woolston share with the attendees his experiences as presented in his paper: *"Scientific intelligence: the 'value added' in specialized information services"*. While it is not the intention here to pass judgment on the value of the individual papers that had been chosen by the selection committee consisting of members from the four Organizations, it should nonetheless be mentioned that papers were presented by some specialists in information science of global stature such as: Prof. F.W.Lancaster (Univ. of Illinois), Prof. K.Spark Jones (Cambridge University) and Mme

[177] For the programme of the symposium with the full list of papers presented see document IAEA-SM-317

N.Dusoulier (INIST, France). Papers directly related to INIS and AGRIS developments were presented by Todeschini & Tolstenkov (INIS)[178] and Samaha (AGRIS)[179].

While the IAEA had been assigned the role of lead organization and the Scientific Secretariat for the symposium, the responsibility for the publication of the proceedings had been assumed by UNIDO. It is regrettable that UNIDO never found the possibility of assigning appropriate staff to that task and the proceedings were never published. There exists a small IAEA publication listing the synopses of all the papers[180].

1.4.11 Developments during 1991

We conclude this section with the year 1991 as the year when a truly new form of output product began to be distributed on a regular basis in May. The INIS database on CD-ROM, which was first demonstrated to the Liaison Officers at their meeting in 1986[181], enabled users to have easy electronic access to the database without the burden of line costs for searching it on distant computers. As equipment for reading CD-ROMs became easily available at reduced costs also in developing countries, this offered an efficient alternative, while delays in access to the most recent data added to the database were kept small by updating the current disc at quarterly intervals. A set of archival discs covering the years 1976-1988 were produced while the current disc started with 1989 and would be regularly updated until filled.

Also of substantial significance for the process of input preparation at the national INIS centres was the distribution during that year of the first version of the FIBRE software. Much appreciation was expressed by the Liaison Officers at the receipt of FIBRE.

Following recommendation No.15 of the 7th Advisory Committee for INIS[182], the Secretariat had convened a Technical Committee on Subject Scope and an Ad Hoc Working Group on Subject Control who elaborated a new version of document IAEA-INIS-3 (Rev.7) *INIS: Subject Categories and Scope Descriptions* that, in particular, defined the additional new areas that were to be included into the INIS subject scope, namely the economic and environmental aspects of non-nuclear energy sources. This expansion of subject scope was to become effective with the new input for the year 1992.

From the late 1980s but all the more so during the 1990s, the INIS Secretariat became more and more involved in providing the technical know-how for development projects sponsored by the Agency's Department of Technical Cooperation. This referred of course to those projects dealing with information management and in particular projects established in order to improve the participation of developing members in INIS so as to enable them to better contribute their national literature to the system and provide nuclear information services to their national users. Secretariat participation was usually in the form of providing, from among the INIS staff, a person to act as "Technical Officer" for a project. Among other topics this was discussed at the Nineteenth Consultative Meeting of INIS Liaison Officers in Vienna in May 1991. It is clear from the recommendation they made[183] that the Liaison Officers were interested in an expansion of the support given by the Department of Technical Cooperation to such INIS related projects:

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[178] C.Todeschini, A.Tolstenkov, "Expert system for quality control in the INIS database", IAEA-SM-317/58
[179] E.K.Samaha, "Interaction between national and international information systems: the case of AGRIS and CARIS", IAEA-SM-317/57
[180] Document "Extended Synopses" IAEA-SM-317, May 1990
[181] See Section 1.4.8 above.
[182] See Section 1.4.8 above.
[183] See document 631-L2-TC-441.19/3, p.2

The Liaison Officers:

13. recognized the benefits to both ARCAL X[184] members and to the INIS System of the ARCAL X project, urged that funding for the AFRA-7 project be provided and that other INIS Members take steps to initiate similar projects for their regions including the possibility of projects being undertaken under the auspices of the IAEA's Regional Cooperative Agreement for Asia and the Pacific (RCA);

In December 1991 the 8th Advisory Committee for INIS met in Vienna. With reference to some downward trends in the use of some of the output products, the advisors held long discussions on the specific information needs of users and concluded by making a strong recommendation that a user study, coordinated through the INIS Secretariat, be carried out to enable INIS to base decisions on its future development on user needs.

The advisors recognized the value of the work of the INIS Clearinghouse in providing the full text of non-conventional literature (NCL) on microfiche and recommended that this service should continue as a priority for the foreseeable future. There was also mention, for the first time at an INIS meeting, that the INIS Secretariat should closely follow developments in the new technologies for storing full text of non-conventional literature, such as optical discs and CD-ROM, and should report on this to the Liaison Officers[185].

There was much discussion about expansion of the INIS subject scope to cover all energy sources and not only nuclear, but also recognition of the fact that it would be difficult to convince the Agency's Policy Making Organs (Board of Governors/General Conference) to expand into areas which were not within the IAEA's domain of interest. Hence there was renewed endorsement of the cooperation already underway between INIS and ETDE. The advisors made the following recommendations in this regard[186]:

34. Recognized that the technical co-operation between INIS and the Energy Technology Data Exchange (ETDE) for improving the compatibility between the two systems, establishing common standards and authorities and exploring more efficient and effective methodologies for information transfer has been successful and expressed appreciation to the INIS Secretariat and the ETDE Operating Agent and the Joint Working Groups held so far, for the good results.

35. Recommended that technical co-operation between INIS and ETDE should continue.

36. Recommended that INIS and ETDE agree on a statement that clarifies the areas and mode of co-operation between the two systems.

It will be noted that while the advisors strongly favoured continued INIS/ETDE cooperation, the above recommendation No.36 required that some kind of formal document be drawn up to clearly lay down how this cooperation should be channeled.

The essential statistical information for these last two years reviewed in this Section is given below:

	Years	
	1990	**1991**

[184] ARCAL X was the Technical Cooperation project RLA/0/009 "Nuclear Information" for the Latin American Region.

[185] See document L2-AG-384.8/2, p.3

[186] See document L2-AG-384.8/2, p.4

Membership	94	96
INPUT FIGURES		
Number of items received (calendar year)	95473	92670
OUTPUT FIGURES		
Number of centres receiving INIS output tapes	35	32
Number of paid subscriptions to INIS Atomindex	608	519
Number of full subscriptions to documents on microfiche	36	34
Number of ad hoc orders for documents on microfiche	743	862
Number of Member States and Organizations utilizing direct access to INIS/AGRIS databases at Vienna	32	32
Number of connect hours of direct access to the INIS database at Vienna	650	384

Although the Liaison Officers had[187]:

1. recognized that the usage figures in the Status Report for the online system and for microfiche represent only part of the real usage and proposed that INIS Members provide similar usage statistics for their countries or organizations as derived from all output services;

nevertheless the continued large decline in the usage of the INIS database on-line from the computer in Vienna was clearly visible and was at least in part the reason for the recommendation by the Advisory Committee for the "User Study" referred to above. The steady decline in the number of subscriptions to the printed *INIS: Atomindex* also continued.

Near the end of 1991 the Agency bestowed its highest honour, the *Distinguished Service Award*, on Claudio Todeschini, at that time Head of the Subject Control Unit at INIS. The award was presented by the Director General, Dr Hans Blix before the assembled members of the Agency's Board of Governors.

1.5 The Transition Years (1992-2000)

The promise of nuclear power led to the rapid growth of an international nuclear research and development environment during the late 1940s, the 1950s and 1960s. INIS was created at the end of the 1960s to serve the nuclear information needs of the scientists and engineers working in that

[187] See document 631-L2-TC-441.19/3, p.2

environment. By the 1990s, the political and technological environments that had led to the creation of INIS had radically altered. The INIS customer base had changed, due in part to a general disaffection in many highly developed Western countries with nuclear power, counterbalanced by a growing interest in this technology within developing countries. The emergence of a global telecommunication infrastructure had also changed the technological environment beyond recognition, leading to the emergence of a range of user needs and expectations that had not existed earlier.

From the time of its design and establishment in the late 1960s and through the 1970s and into the mid 1980s, recognition and support for INIS was unwavering. Because of a number of reasons, including financial and policy reasons (one could also say political reasons) there was a strong interest from major players in the nuclear arena as well as small users of INIS to further its aims and to ensure its continued operation and success. There are arguably two major reasons for the decrease in interest and support on the part of some of its members for INIS operations from the early 1990s:

1) the two accidents at nuclear power stations: Three Mile Island in 1979 and Chernobyl in 1986;
2) the collapse of the Soviet Union and the end of the cold war at the beginning of the 1990s.

As we know, the accident at Three Mile Island was very serious with regard to the working of the reactor since it led to a partial meltdown of the reactor core but it is equally true that there was an absolutely minimal release of radioactivity from the plant, essentially no contamination of the environment and no fatalities attributable to the accident. This proved the validity of the design and the containment of the reactor and demonstrated that, notwithstanding some serious operator errors, the plant was shut down with insignificant effects on the surrounding population. Nevertheless the accident sent shockwaves through the media and gave fuel to opponents of nuclear power in their arguments against further expansion of nuclear generated electricity.

Chernobyl was another story. The major environmental contamination by radioactive fission products of parts of the Ukraine but also of numerous other European countries due to fallout from the accident, led to serious reconsideration on the part of many nations that had a nuclear power programme about future developments for electricity generation. Many nations put the nuclear option on hold while some specifically adopted a policy of phasing out nuclear power.

The collapse of the Soviet Union, but more specifically the end of the cold war, removed one of the driving forces that had been instrumental in generating the consensus that had led to the establishment of INIS. There had been a specific interest in establishing a formal East-West collaboration embedded in an international infrastructure of which the UN and in the nuclear area the IAEA, was the prime example. The disappearance of this driving force weakened the support for INIS on the part of the main players in the East-West confrontation of the cold war. As a result there was a steep decline in the propensity for funding participation in INIS on the part of the Russian Federation, the USA and the UK. Furthermore there was a marked drop in interest (verging on a total disinterest) on the part of the Netherlands in INIS participation because of three reasons: the anti-nuclear policy adopted by the Netherlands for future power generation; the diminished interest in East-West collaboration as mentioned above but also the fact that, because of historical reasons going back practically to the late Middle Ages, the Netherlands had a highly developed and prolific publishing tradition, being the home of a large number of major international scientific publishers, producing some of the world's most authoritative scientific journals. Thus the country was, and is, the producer of a disproportionately large volume of nuclear literature (which it should process for input to INIS) while having a rather modest nuclear programme. It should be noted that

the four countries concerned, USSR, USA, UK and Netherlands together contributed during the late 1980s between 64 and 68% of the total INIS input. The policy changes and precipitous drop in funding at the four INIS centres mentioned led to the disappearance of a national INIS centre in the UK and a catastrophic drop in input from the other three countries in the late 1990s.

Concomitant with the decreasing commitment to INIS by the four countries described above, there was a marked rise in the number of members of the system. This was due to the entry as separate members of practically every one of the 15 former Soviet Republics. Interestingly, at about the same time there was an increased interest on the part of many smaller developing countries in participating in INIS because technological advances, also available in those countries, made the provision of nuclear information services using INIS data more readily possible; furthermore participation in INIS was a useful vehicle for obtaining support for improvements to their information infrastructures. Thus, while INIS membership in 1991 was 96, by 2001 it was 122.

The decreasing participation by the major contributors led, during the period under review in this section, to the rewriting of the rules by which the system operated (Definition of Membership Arrangements). More importantly it led to a fundamental change in the philosophy that had been at the basis of the initial design of the system, that of "decentralized input preparation". Led by the Secretariat in Vienna, in the late 1990s and early 2000s, INIS went through a substantial transition.

1.5.1 The early 1990s and the new INIS Mission Statement

Efforts at the Secretariat started early in 1992 to establish an effective methodology for carrying out the study of the needs for nuclear information of users and potential users of the INIS output products. This "User Needs Study" had been recommended by the 8th Advisory Committee for INIS as discussed in Section 1.4.11 above. While the first version of the FIBRE software had been distributed to all members the year before, further development of the software was taking place under Ivan Kurtev, leader of the INIS Computer programming group.

In April 1992 Robert McDermott, INIS Systems Analyst, who however had devoted a large part of his time at the IAEA to the development of the Agency's SISPlan, left the INIS staff to return to the USA and the position of Systems Analyst was taken over by Claudio Todeschini.

Both the User Needs Study and the latest version of FIBRE were discussed with the Liaison Officers at their meeting in Rio de Janeiro in May 1992, the second time that the Government of Brazil had invited INIS to hold its consultative meeting in that country. The Liaison Officers stressed the importance of the study and agreed to actively participate in its execution[188]. It is interesting to note that, although the number of subscriptions to the printed Atomindex was steadily decreasing, having fallen from over 1800 in 1977 to just over 500 in 1991 (not counting the free copies that all INIS centres received), the Liaison Officers still considered the printed product to have continued importance. They recommended that long-term plans for the replacement of printed products by microfiche or electronic media be made only after the results of the User Needs Study were available.

There was interest in the information that the IAEA had applied for associate membership in the Implementing Agreement for ETDE and what indirect benefits the INIS Members who were not members of the IEA could derive from the INIS Secretariat's associate membership in ETDE.

[188] See document 631-L2-TC-441.20/4, p.1

Discussions at a Technical Committee meeting held in November 1992 also raised questions about which elements that are selected at the time of input preparation for indicating the subject content of an item of literature, namely: subject category, descriptors, subject headings (M/Q pairs), are then used by searchers at the time of retrieval. Since content analysis was one of the most cost intensive aspects of input preparation, it was deemed important to know if all such content indicators were being used for retrieval or whether savings could be made by simplifying input procedures. It was suggested that a "Subject Search Study" be made to establish the validity of the subject indicators. At the same time the study could investigate the role that mother tongue played in the search query formulation, since the descriptors on the INIS file were in English, while not all searchers could formulate a query in that language. The Secretariat carried out the study with the collaboration of the INIS centres of Australia, France, Spain and Russia where native speakers of the four Agency official languages (English, French, Spanish and Russian) were to be found.

At their 21st Consultative Meeting in May 1993, the Liaison Officers discussed at great length the methodology of the User Needs Study and stressed that the study should provide information on what output products should be produced so that a decision on the future of these products, especially the printed Atomindex, could be taken[189]. There was also much discussion on the revision of the document *"Definition of Membership Arrangements for INIS"*. The Liaison Officers agreed that the aim of the revision was to encourage more active participation in INIS by all Members, and noted the distinction in the revised document between the rights that Members enjoy as a consequence of their membership of the IAEA and the privileges that are granted to them as a consequence of their active participation in INIS.

During 1993 the study for the selection of the most appropriate technology to store and make available to Members the INIS non-conventional literature on optical media was continued. From that year the Secretariat was also able to accept input via electronic mail. With regard to the expert system described in Section 1.4.7 above, which was now being applied to all input for quality control of subject analysis, results showed that for the input year 1992 the expert system selected 6.6% of the input as having a high probability of errors. These items were checked by the Subject Specialists of the Subject Control Unit and changes were made to 77% of the selected items or 5.1% of the total input. Also during the year, programming for FIBRE version 2.1 was completed; the program was tested and released by the end of the year. The software was also demonstrated at the 56th Annual Meeting of the American Society for Information Science (ASIS)[190].

The large complex of software programs that had been developed years earlier for the processing of INIS input and preparation of the output products were in dire need of replacement. Only completely new software would be able to exploit the possibilities offered by developments in computing technology. The decision was therefore taken to develop a completely new *INIS Data Processing System* (IDPS).

The year 1994 saw the continued work on the User Needs Study with distribution of the questionnaires and efforts on the part of both Secretariat and Members to reach as many users and potential users as possible. The INIS Clearinghouse Imaging Project for the optical storage of full text NCL was progressing in order to establish requirements for Clearinghouse imaging capability.

As mentioned in section 1.4.11 above, the Advisory Committee for INIS, meeting in 1991, had recommended that some kind of formal document be drawn up to clearly lay down how INIS/ETDE cooperation should be channeled. The Liaison Officers had concurred with the recommendation and therefore, over a period of time, the Secretariat and staff of the ETDE

[189] See document 631-L2-TC-441.21/3, p.1
[190] C.Todeschini, "Computer-Aided Input Preparation at the International Nuclear Information System (INIS)", Session No.52, 56th ASIS Annual Meeting, Columbus, Ohio; 24-28 October 1993.

Operating Agent, discussed the text of such a document and agreed to a final text in early 1994. The text for a Memorandum of Understanding on cooperation between the two organizations was then signed by Amenta, Director of STI on behalf of the IAEA and by Dora Moneyhun as representative of ETDE on behalf of the IEA. In the words of the Memorandum:

> *This Memorandum of Understanding is intended to formalize the relationship between ETDE and IAEA/INIS with regard to database development and the assurance of data integrity. An important element in the success of both databases is the continuing development of information technology to assist the participating countries and their respective data input centres in providing quality assurance of information*[191].

For their 22nd Consultative Meeting, the Liaison Officers met for the first time in Asia, in New Delhi at the invitation of the Government of India. There they reviewed the status of the User Needs Study, supported the idea of preparing a PC-based training package to provide training in INIS procedures, supported the Secretariat's proposals to establish an electronic bulletin board to promote more rapid and flexible information transfer between INIS centres and the Secretariat and discussed the electronic exchange of authority files by means of Internet's File Transfer Protocol (FTP)[192]. They also supported the idea of producing an annual *"Periodic INIS Report"* to promote the database and the services that can be provided from INIS.

In February 1994 the revised version of the *"Definition of Membership Arrangements for INIS"* was approved by the Director General. He transmitted the document to the Board of Governors of the IAEA with document GOV/INF/743 of 27 May 1994.

By the time the 9th Advisory Committee for INIS met in Vienna in November 1994 it was apparent that some Member States, in particular some of the largest contributors, were no longer able to ensure comprehensive coverage of the total INIS scope. However there was wide recognition that INIS was the only database covering the "core" nuclear areas such as reactor technology, radioactive waste management, radiation protection, reactor safety and environmental cleanup of nuclear facilities and that therefore there was a need for INIS to continue to provide a bibliographic database and full-text of NCL in these core areas.

Due to the budgetary constraints being experienced at many INIS centres, it was therefore clear that some novel ways for the continued compilation of the database were necessary. Consideration was given to the possibility of exploring partnerships with primary and secondary publishers so as to obtain bibliographic records more cost effectively and in a more timely fashion. The advisors also recognized that there was interest at the IAEA and in Member States in nuclear information beyond that in the INIS database (e.g., factual and numerical databases, catalogues and directories, power reactor operation statistics, press releases, calendars of meetings, names of experts with specific nuclear expertise, etc.). Electronic access to many such sources of information was increasing and it was felt that the INIS training program should be enriched and expanded to include methods of accessing sources of nuclear related information, including training in new technologies required to access electronic information.

Preliminary analyses of the responses to the User Needs Study (UNS) questionnaires also gave useful indications. It was clear that COM indexes on microfiche were not much used and could be discontinued. With regard to the printed *INIS: Atomindex* there was what appeared to be a contradiction: while the number of paid subscriptions to the product continued to fall (there continued of course to be one free copy distribution to each INIS Member), the UNS indicated

[191] The full text of the Memorandum of Understanding between the IAEA/INIS and the IEA/ETDE is attached as Appendix II to this document.
[192] See document 631-L2-TC-441.22/3

continued high usage of the printed product and a high level of satisfaction with it (83%). There was a very high level of satisfaction with the database on CD-ROM (over 85%), while there was much dissatisfaction with the database available online from the IAEA, since it was being searched using obsolete and non-supported software. The full text of NCL continued to be an essential product of INIS and by that time more than 540.000 items of NCL had been reported to the system and most of them were available on microfiche from the Clearinghouse.

Considerations on the above topics led the 9th Advisory Committee to make, among others, the following recommendations[193]:

> *8. recommended that INIS explore partnerships with publishers and with other database producers to enable bibliographic records to be obtained more cost-effectively, but acknowledged that there may be legal problems that would need to be addressed, and proposed that the Member States should take the initiative in arranging such partnerships with assistance from the INIS Secretariat when requested.*
>
> *12. recognizing that the printed Atomindex continues to be widely used but that the majority of its users express willingness to switch to an electronic product, proposed that production of the printed Atomindex could cease within three years provided that an inexpensive CD-ROM product is made available before that time.*
>
> *15. acknowledged the advantages of electronic methods of storing and disseminating non-conventional literature and recommended that INIS adopt this form of operation, but emphasized the importance of continuing to make non-conventional literature available on microfiche until interested INIS Members are able to make use of the new methods.*

But the 9th Advisory Committee also deliberated some of the fundamental questions that had led to the establishment of INIS in the late 1960s in the light of the substantially changed needs for nuclear information and the radically changed technology to provide access to that information. INIS had been planned and designed as a "Mission Oriented" system[194]. It is well to recall here what had been accepted as the "mission" of INIS from the original design of the system in 1968[195]:

> **To produce and disseminate in a decentralized manner a computer based bibliographic database containing records and abstracts of the literature produced throughout the world on all the peaceful applications of nuclear science and technology and to collect and make available the full text of those items not readily available through normal commercial channels.**

The changed information needs of the nuclear community, as also brought to light by the UNS, the greatly changed mechanisms by which nuclear information could be processed and accessed as well as the variety of types of nuclear information then available, were instrumental in leading the advisors to promulgate the new INIS Mission Statement that read as follows[196]:

> **INIS will respond to the information needs of the international nuclear community by providing in a decentralized manner a comprehensive information Service in the areas of interest and activities of the IAEA. This will be achieved by:**

[193] See document L2-AG-384.9/4
[194] See Section 1.2.6 above.
[195] See document L2-AG-384.9/3
[196] See document L2-AG-384.9/4

- **continuing to build a high quality bibliographic database for the nuclear literature;**
- **providing full text of the non-conventional part of the above literature;**
- **providing mechanisms to facilitate access to bibliographic information and full text of nuclear related literature available elsewhere;**
- **providing mechanisms to access other types of nuclear information.**

The 9th Advisory Committee also discussed proposals to improve cooperation between INIS and ETDE. For the first time the suggestion was made that the two systems hold joint technical meetings and establish joint subgroups to consider technical issues in more detail.

The year 1994 also saw the completion of the translation of the terminology of the INIS thesaurus into Spanish. This prepared the ground for the publication of the second edition of the INIS Multilingual Dictionary which would contain English-French-German-Russian-Spanish versions.

1.5.2 INIS at 25; the year 1995

In February 1995 the final report of the Subject Search Study was completed. The essential indications of the study, reached after analysis of the exact query formulations of 1002 searches performed by users at the Australian, French, Spanish and Russian INIS centres (plus the Secretariat at the IAEA), were that the most frequently used subject indicators were free text words or controlled terms from the thesaurus. Well over 80% of all searches in the study used at least some controlled term in the search profile and on an average query the controlled terms usually made up over 50% of the search points. Subject categories were rarely used in search formulations while subject headings (M/Q descriptor pairs) were practically never used. The study also indicated that while the Australian searchers and many of the French searchers formulated their queries in English from the start, a large proportion of the Spanish and Russian searchers formulated their queries in their native language and then used the thesaurus to formulate them in the English equivalent.

At the 23rd Consultative Meeting of INIS Liaison Officers held in Vienna in May, which coincided with the 25th anniversary of the production of the first INIS products in May 1970, a part of the time had been set aside for the celebration of that anniversary. Dr H. Blix, Director General of the IAEA, delivered the opening address. He stressed the current importance of INIS, noting the obligations on the signatories of the Nuclear Non-Proliferation Treaty, extended immediately before the present Meeting, to exchange information. He also mentioned that the IAEA's Technical Cooperation activities in this area are based to a very large extent on the INIS database[197].

Four keynote speakers had been invited to attend: Mr E. Brunenkant, former Director of the IAEA's Division of Scientific and Technical Information; Mr B. Mahon, Executive Director of EUSIDIC; Ms T. Rumsey, Director of the Office of Science, Education and Technical Information of the United States Department of Energy, and Mr V. Terent'ev, Director of Atominform in Moscow, Russian Federation. Also, posters describing INIS operations in their countries were presented by the Liaison Officers of Australia, Bangladesh, Canada, Germany, Guatemala, Malaysia, Pakistan, Paraguay, Poland, Turkey and the United States.

It was of special significance and a particular pleasure for all that had been involved in the early years of INIS developments that Edward Brunenkant was able to attend[198]. Brunenkant,

[197] See document 631-L2-TC-441.23/4
[198] See sections 1.2 and 1.3 above.

already marked by the illness that would take him away three years later, presented a personal look at some of the people and events in the late 1960s and early 1970s involved in the establishment of INIS. He described the rôle of the US AEC, of which he was at the time Director of Technical Information, in the exchange of scientific and technical information and its importance in the establishment and early stages of INIS. Mahon concentrated on future developments to INIS that would be required to ensure that it remained in the foreground of information systems. Rumsey stressed that the focus on customers is the key to ensuring that developments are to the benefit of information users. Based on its history, she mentioned, INIS was in a unique position to help the world realize the dream of a global information infrastructure. Terent'ev felt that the energy problems of the 21st century could only be resolved by an energy policy that included nuclear energy. For that to occur, the ready availability of scientific and technical information would be vital and the part to be played by INIS could be very significant.

The Liaison Officers were presented with the detailed analyses of the results of the User Needs Study. As one of the consequences of the UNS, the delegates agreed to cease COM production with effect from 1 January 1996[199]. There was also agreement that the Secretariat should seek a method of producing and making available the bibliographic database on CD-ROM less expensively than through the contractual arrangement then in force. Any new arrangement should enable its distribution and use to be determined by the INIS Liaison Officers. It had been agreed that the discontinuation of the printed product would be made dependant on the availability of the database on CD-ROM at a considerably lower price than through the arrangements earlier made with the commercial producer.

On the occasion of the 25th anniversary of INIS, the IAEA's *Bulletin* published two articles about the system[200].

During the year the Secretariat conducted successful negotiations for the exchange of literature and bibliographic records with the European Association for Grey Literature Exploitation (EAGLE), that continually updated a large collection of NCL from many European countries (not only in the nuclear area). In exchange for the records and the full text of the nuclear part of that literature from EAGLE, the Secretariat made available to EAGLE the FIBRE software that had been developed for preparation of input to INIS. In this way another database adopted *de facto* the INIS rules for bibliographic description. Also during the year, first tests were made of full text on electronic media and in October the second edition of the multilingual dictionary was published, for the first time including the Spanish version[201].

As had been suggested by the 9th Advisory Committee[202], in October INIS and ETDE held their first Joint Technical Committee (JTC) meeting in Vienna. The committee suggested that INIS and ETDE consider the possibility of joint printing of authorities, this being particularly interesting for the thesaurus. At the time a project was under way for the reconciliation of the INIS and ETDE thesauri. The committee reaffirmed the potential value of a common thesaurus to be used for input preparation for and subject retrieval from both the INIS and ETDE databases. The committee also remarked that the system of magnetic tapes then in use for information transfer was becoming obsolete, and suggested that alternatives should be investigated[203].

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[199] See document 631-L2-TC-441.23/3

[200] J.Amenta and A.Sorokin, *"INIS at 25: Pioneer of the Nuclear Information Highway"*, IAEA Bulletin, Vol.37, No.3, p.39, 1995, and C.Todeschini, *"International Nuclear Information System: New Directions and Partnerships"*, IAEA Bulletin, Vol.37, No.3, p.39, 1995.

[201] "INIS: Multilingual Dictionary", IAEA-INIS-20(Rev.1), October 1995. In 5 parts: English, French, German, Spanish, Russian.

[202] See section 1.5.1 above.

[203] See document 631-L2-TC-962/1

The essential statistical information for the four years reviewed in this Section is given below:

	Years			
	1992	**1993**	**1994**	**1995**
Membership	98	103	105	113
INPUT FIGURES				
Number of items received (calendar year)	88947	76540	77026	77060
OUTPUT FIGURES				
Number of centres receiving INIS output tapes	25	21	20	18
Number of paid subscriptions to INIS Atomindex	362	286	250	205
Number of full subscriptions to documents on microfiche	32	31	29	28
Number of ad hoc orders for documents on microfiche	1327	1092	1350	1503
Number of Member States and Organizations utilizing direct access to INIS/AGRIS databases at Vienna	25	24	23	19
Number of connect hours of direct access to the INIS database at Vienna	213	250	219	211
INIS on CD-ROM				
Paid subscriptions	54	89	89	92
Free subscriptions	75	82	84	89

In late 1995 Sorokin, Head of INIS Section since mid-1990 was selected for another post at the IAEA and vacated the post of Head of INIS Section.

1.5.3 The late 1990s

In early 1996 Todeschini, at that time INIS Systems Analyst, was appointed Head of INIS Section. Upon taking that position he was confronted with a situation, already clear before the change in responsibilities, of a rapidly decreasing volume of input from the main contributors as already described in the opening paragraphs of Section 1.5 and an exploding use of the Internet. The first was a serious challenge to the very existence of INIS; the second offered some welcome opportunities to work on solutions so as to cope with the challenge.

It was becoming clear that, notwithstanding all the exhortations made by the Secretariat, notwithstanding the agreed *"Definition of Membership Arrangements for INIS"*, and

notwithstanding the declared willingness of the INIS centres of the largest inputting Members, they would not be in a position to report all the nuclear literature published in their country because of substantially reduced funding. This was particularly true for journal literature. New approaches to the gathering of input data were called for. The electronic age was advancing and practically all publishers were preparing the articles to be entered into their journals in electronic form. Bibliographic descriptions and abstracts were already available in that form. Technically it should have been no great problem for the national INIS centre of the country where the journal was being published to obtain that data, add INIS Subject Categories and indexing terms to each record and forward all to the Secretariat in Vienna. Or better still: to have the data forwarded to the Secretariat directly by the Publisher? But in that case the records would lack INIS Subject Categories and indexing terms. Who would add those?

The Secretariat began earnestly to explore partnerships with publishers and with other database producers to enable bibliographic records to be obtained more cost-effectively as recommended by the 9th Advisory Committee and contained in the strategic plan described in the article published in the IAEA Bulletin referred to in Section 1.5.2 above. The first concrete agreement reached was that with EAGLE for European gray literature (NCL) described in the previous section. As was to be expected, negotiations with publishing houses were not easy. Hurdles were certainly not of a technical nature but rather on legal and copyright questions. One of the world's largest publishers of scientific journals, Elsevier Science from the Netherlands, was the first to be approached. By 1996 it appeared that an agreement had been reached. In the event, it was to be another five years before an agreement was actually signed and the first bibliographic records received directly from Elsevier were included in the database.

At the invitation of the Government of Japan, the 24th Consultative Meeting of INIS Liaison Officers was held in Kyoto in May 1996. That year marked the launch of the first version of an INIS website. The meeting was given presentations and demonstrations of the INIS Home Page as well as the INIS Computer-Based Training Package. The final report of the "Clearinghouse Imaging Pilot" (CHIP) was presented. CHIP had been conducted in late 1995 with the purpose of demonstrating the feasibility for electronic storage of NCL on CD-ROMs. At the meeting some of the Liaison Officers recounted that they were actively concerned about possibilities for obtaining bibliographic records directly from primary and/or secondary publishers and were faced with difficulties in reaching agreements because of issues relating to copyright, intellectual property and cost.

While the Liaison Officers agreed to place Barcodes for the first time on the full text of NCL documents, new questions were being raised in connection with the production and use of full text NCL in electronic form. This was clearly expressed in one of their recommendations made at the meeting[204]:

> *36. <u>requested</u> the INIS Secretariat to prepare a legal document describing as exactly as possible the distribution and usage of documents foreseen by and allowed to the INIS Secretariat and INIS users and to offer the document to INIS Members to authorize them to obtain the rights to use full text information on behalf of the IAEA.*

During the year the number of full text NCL available on microfiche passed the 500.000 mark. In October 1996 Joyce Amenta, Director of STI, left the Agency to assume a post at the United Nations in New York. Her years as Director of the Division that included the INIS Section had been years of innovation. Amenta was a person with a wide open smile and a listening ear but

[204] See document 631-L2-TC-441.24/3

also a person of firm decision making, ready to direct changes that questioned the way things were done to that day. Particularly in the area of computing, where her expertise chiefly lay, she introduced changes whose benefits were not immediately appreciated by all her staff. By the time she left the Agency her valuable contributions were well recognized. Her transfer to the U.N. was fairly rapid and recruitment at the Agency for posts at the Director level had to follow procedures which included approval from the Board of Governors. Hence the post remained vacant until about mid-1997.

A notable INIS milestone was passed during the course of 1997: the two millionth bibliographic record was entered in the database. During the year the new technology studied during the CHIP project mentioned above for the electronic document delivery service of NCL full text on CD-ROM was implemented. Also, the new computer based training package on CD-ROM was released, thereby making self-training at national INIS centres a reality.

During the course of 1997 the INIS Secretariat, in consultation with the Agency's Legal Division, prepared a statement which defined the Agency's distribution policy for the full text of the INIS non-conventional literature (NCL) to clarify in particular its non-commercial character. The policy statement was presented to the Liaison Officers at their 25th Consultative Meeting held in Vienna in May 1997[205]. The statement was to be used in discussions between national INIS centres and producers of NCL in each country so as to clarify the responsibility of the INIS Member for providing the full text of such NCL to the INIS System and to agree with the producer of the literature on the distribution policy of such full text NCL by INIS. There was satisfaction with the new agreement reached between the Secretariat and the commercial firm responsible for the manufacture, distribution and sale of the INIS database on CD-ROM which resulted in a significantly lower price for the product and transferred responsibility for its marketing and distribution from the firm to the INIS Liaison Officers. Arrangements were also made to use the firm's technology to cover the "gap" between successive updates of the database on CD-ROM[206].

The meeting was also informed that Ms Denise Loehner, INIS Liaison Officer of France, would assume the position of Director of the Division of STI from July 1997.

In late 1996 the IAEA offered[207] to the *Zentralbibliothek für Physik* (Central Library of Physics) of the University of Vienna, through the Austrian Federal Ministry of Science and Transport, a complete collection of the full text of INIS non-conventional literature on microfiche. The collection, in addition to providing services to the patrons of the *Zentralbibliothek für Physik,* would serve as a depository library for INIS non-conventional literature and hence act as a secure "off site" storage and as such would also be available to provide contingency support to the master collection at the IAEA. As an index to the collection, a copy of the INIS bibliographic database on CD-ROM was also provided to the Library and, in view of the fact that the full text of the non-conventional literature would in the future be stored electronically on CD-ROMs, one full set of those was also made available to the Library. An appropriate ceremony took place in December 1997 in the Austrian Foreign Ministry in Vienna for the official handover of the collection, in the presence of the Austrian Authorities and IAEA staff, among them Emil Levine, at that time Head of the INIS Clearinghouse, who had driven the effort at digitization of the collection and the donation of a copy thereof to the *Zentralbibliothek für Physik.*

During the course of the year 1997 the Secretariat began to consider the actions necessary to establish a "Nuclear information gateway" as it was initially called. Such a gateway would aim to be a one-stop-shop for the nuclear community, a tool for INIS Members and other users that would

[205] See document 631-L2-TC-441.25/2, Attachment 4.
[206] See document 631-L2-TC-441.25/3
[207] See letter of the IAEA to the Permanent Mission of the Republic of Austria to the IAEA dated 29 November 1996.

provide a single, reliable access point from which all information in the gateway's scope would be collected and kept up-to-date. The INIS Home Page on the Web already provided the starting blocks of such a gateway. However, its structure would need to be vastly expanded to ensure a systematic coverage of INIS scope.

Near the end of 1997, for the second and until now last time, the Agency bestowed its highest honour, the *Distinguished Service Award*, on a member of the INIS staff, Seyda Rieder, for her contributions to the work in the Clearinghouse and subsequently in the Bibliographic Control Unit at INIS. Again the award was presented by the Director General, Dr Hans Blix before the assembled members of the Agency's Board of Governors.

In view of the forthcoming discontinuation of the printed *INIS: Atomindex*, the Joint INIS/ETDE Technical Committee, meeting in Vienna in October, recommended that INIS input no longer require the assignment of the "M" label to some subject descriptors, labels that had been used to create the search entry points in the subject index of the printed product[208].

In November 1997 the Secretariat obtained the license for the acquisition of the BASIS software so as to be able to offer the INIS database online via the Internet. Meanwhile, under the direct responsibility of Anatoli Tolstenkov, Head of the INIS Computer Support Group, work continued on the development of the *INIS Data Processing System* (IDPS), the totally new software for the processing of input and production of the output products of the system.

After the first major INIS milestone passed during 1997, namely the two millionth bibliographic record entered in the database as mentioned above, a second, very notable, milestone was passed in 1997: the printed *INIS: Atomindex*, was published for the last time with Vol.28, Issue 24 at the end of the year.

The position of INIS Systems Analyst, that had been vacant since mid-1996, was finally filled by Yves Turgeon from the National Library of Australia in May 1998. As a native born Canadian, he was in time to assist at the 26th Consultative Meeting of Liaison Officers held in Ottawa, Canada, in June of that year. At the meeting the Liaison Officers were witnesses to demonstrations of the retrieval of the full text NCL from optical storage on CD-ROM and its delivery by e-mail and of retrieval of bibliographic references from the database online via Internet using the BASIS software.

The INIS Data Processing System (IDPS) project, initiated in 1993, reached a milestone in 1998 with the completion of the INIS Record Processing Sub-system (IRPS). IRPS enabled the INIS Secretariat to move all records processing done at the Secretariat from a paper-based system to an online environment. IRPS entered production in July 1998 and from then was used exclusively for record processing at the Secretariat. The IRPS architecture as well as the IRPS interface had been substantially redesigned and the new version of IRPS was based on the Client/Middle-Tier/Server architecture. The interface was based on five INIS specialist roles, namely non-conventional literature specialist role, bibliographic specialist role, journal specialist role, subject specialist role and production specialist role.

Due to continuing budgetary limitations both at the Secretariat but particularly at some of the larger INIS centres, there was pressure to simplify input procedures so as to reduce costs. The Liaison Officers discussed the possibility of a joint project between INIS and ETDE to study the database record format and identify ways for its simplification[209]. There was also discussion on

[208] See document 631-L2-TC-962.3/2, p.3
[209] See document 631-L2-TC-441.26/3

revitalizing the idea of regional centers as apart of the INIS Program, in particular with regard to the Latin America Region.

Much of the discussions at the Joint INIS/ETDE Technical Committee meeting in Oak Ridge, Tennessee, in October 1998 were centred on the redesign of the bibliographic record format. Various options, including that of the *"Dublin Core"* were reviewed but no consensus could be reached as experimentation was still proceeding. Note was taken of the strides made in the reconciliation of the INIS and ETDE thesauri. The driving force behind the need for a reconciled thesaurus was the desire of many of the centres of those countries that were contributing input both to INIS and ETDE to work with one thesaurus only at the time of input preparation. It is interesting to note that by that time, with the exception of two or three large centres, all other centres preparing input both for INIS and ETDE were using the FIBRE software developed by INIS for preparing input to the two systems.

In November/December 1998 the 10th Advisory Committee for INIS met in Vienna. That meeting is, to date, the last time the Secretariat convened an advisory committee for INIS[210]. The dramatic changes affecting INIS outlined in the first part of section 1.5 of the present document, required the Committee to address three important aspects of INIS operations: 1) alternatives to the national INIS centres for the acquisition of input records; 2) the thereby resulting necessity to review the *INIS Mission Statement* and *Definition of Membership Arrangements for INIS*; 3) the desirability or indeed necessity for INIS to develop into a "Nuclear Internet Portal" (or "Nuclear Information Gateway" as it was first called) to access a variety of nuclear related information.

With regard to the possibility of entering into the database records of the nuclear literature obtained through channels other than from the national INIS centre of the country where the literature was published, for the first time in the history of INIS there were concrete discussions in that direction at the 10th Advisory Committee, including the possibility of purchasing such records. The resulting recommendations read[211]:

7. ***recommends*** *that INIS should continue to cover both conventional and non-conventional nuclear literature as at present.*
8. *strongly* ***urges*** *the Secretariat to investigate in more detail, in co-operation with the INIS Centres, options for the acquisition of bibliographic records to supplement the INIS database.*
9. ***supports*** *in principle the option of purchasing bibliographic records in electronic form and* ***urges*** *the Secretariat to investigate possible funding arrangements for this purpose, including funding from the regular budget of the IAEA to which all members contribute.*

The discussions on the need to review the texts of the *INIS Mission Statement* and *Definition of Membership Arrangements for INIS* were far reaching but did not lead the Committee to make proposals for specific word changes in those documents. The sense of the discussions was that the principles under which INIS operated were still valid but had to be viewed from the perspective of the changed technical and economic conditions under which INIS Members were then operating. The resulting recommendations read:

3. ***recognises*** *that INIS was the first model and example of an international cooperative system with decentralised collection of data and distribution of services designed to meet the information needs of its members on a free and equitable basis.*

[210] A very detailed document of background information on INIS operations was prepared for the Committee as document No. L2-AG-384.10/1
[211] See document L2-AG-384.10/3

4. *further* ***recognises*** *that the principles under which the system operates are being challenged because of technical and economic conditions which have emerged and that the INIS community needs to secure the continuation of the principles of the model under new conditions.*
5. ***recommends*** *that this fundamental objective be kept in mind in considering any of the specific actions that are being recommended by the Committee, so as to avoid a piecemeal and ad-hoc approach to problem solving which might put at risk the basic principles referred to above.*

With regard to the "Nuclear Internet Portal", work on which had started in 1997 as mentioned above, the Committee took a favourable view while stressing that the INIS Members should take an active part in contributing material for the Portal and made the following recommendations:

18. ***encourages*** *the Secretariat to establish a pilot project as a first step towards evaluating the feasibility and usefulness of an INIS Internet Portal involving initially some of the information resources created by or made available through the IAEA.*
19. ***suggests*** *that the Secretariat explore with the Member States the inclusion in the INIS Internet Portal of resources and compatible systems already existing in Member States simultaneously with the development of the pilot project.*

On 31 December 1998, after more than 20 years of operation, the INIS database under STAIRS on the IAEA mainframe ceased to be available. That service was replaced by the INIS database on the Internet, fully operational since October 1998.

The involvement of INIS Secretariat staff in IAEA Technical Cooperation projects related to nuclear information and in particular to INIS participation continued at an increased pace. Particularly energetic in furthering this activity was Taghrid Atieh, Head of the INIS Centre Services Unit. A listing of projects active in 1998/99 gives an indication of this activity:

National Projects	**Project No.**	**Activity**
Kazakstan	KAZ/0/002	Establishing an INIS Centre
Uzbekistan	UZB/0/002	Establishing an INIS Centre
Moldova	MOL/0/002	Establishing an INIS Centre
Slovakia	SLR/0/00	Upgrading Slovak INIS Centre
Latvia	LAT/0/002	Establishing an INIS Centre

Regional Projects	**Project No.**	**Activity**
East Asia/Pacific	RAS/0/029	Radiation Protection and Networking (RCA)
Latin America	RLA/0/017	(ARCAL XLII) Information Network in the Nuclear Field
Europe	RER/0/011	Establishing INIS Capabilities in the Newly Independent States

Other training related activities included the distribution of the French and Spanish voice versions of the PC-Based Training package, whereby the French and Spanish INIS centres provided the translated texts. Furthermore, plans were underway for updating and converting the PC-Based Training Package to HTML format and making it the first INIS Distance Learning course available on the Web during 1999.

Developments in the initial months of 1999 confirmed the negative trend in the volume of input to the database. The Secretariat continued its efforts to reach a legal agreement with Elsevier Science from the Netherlands for the inclusion of electronic records of their publications into INIS

and initial contacts with other publishing houses were considered. The seriousness of this development was discussed at the 27th Consultative Meeting of INIS Liaison Officers in May 1999 at which the Liaison Officers again considered ways for lowering the costs of input preparation but interestingly welcomed the interest expressed for the first time by some Members to play a role in the preparation for input of literature not published within their national boundaries and recommended that the INIS Secretariat be instrumental in assisting the establishment of such arrangements.

Since it was well understood that the difficulties being experienced at INIS inputting centres were basically due to the reduced funding of the centres by the respective national Authorities, the Liaison Officers again raised the possibility that the Policy Making Organs of the IAEA be appraised of the situation. Possible new approaches to input preparation might also necessitate changes in the Membership Arrangements. These opinions were expressed in the following recommendations[212]:

19. *agreed to sensitise their respective Government Authorities on the importance of the INIS System and its continued operation*
20. *recommended that the INIS Secretariat establish a Working Group to investigate the input problems currently experienced, possible changes to the Membership Arrangements and alternative methods of financing the creation of input*
21. *urged the INIS Secretariat to bring before the Board of Governors of the IAEA the issues raised by the drop in input and the options for possible solutions that could affect the Membership Arrangements, so as to take into account the new realities for the continued update of the INIS Database.*

The implementation of the INIS Record Processing Subsystem (IRPS), the most important part of the INIS Data Processing System (IDPS), was completed successfully in June 1998 as mentioned above. By 1999 the system was fully operational and the INIS Section produced in 1998 more than 40.000 records using that system. The implementation of IRPS as well as the implementation of the new Clearinghouse NCL Ordering System and the development of the new INIS online service completed the migration of all INIS applications from the mainframe to the modern Client/Server platform.

As recommended by the 10th Advisory Committee for INIS, work continued on the model for the "INIS Web Services", as the "Nuclear Internet Portal" was then being called. It was planned for the "INIS Web Services" site to target researchers, engineers, journalists and members of the public who needed to access a variety of resources in the nuclear field. It would be linked to both the INIS Home Page and the Portal of the IAEA, but would also function as a separate service.

The core of the service would consist of a hierarchical set of web pages with commented links. It would also be fully searchable and provide, where possible and appropriate, direct access to the data. If resources could not be accessed directly, the service would provide contact information. The INIS bibliographic database would be central to the bibliographic part of the new system. An option that was being explored was to provide direct access to the full text of the conventional literature when possible, in addition to the non-conventional literature. That would be an extension of the then existing system. In addition to the INIS Database and other Agency resources, the pilot would provide access to other types of information such as: 1) Bibliographic databases, online journals, reports and preprints; 2) Scientific data; 3) Technical data, patents and product information; 4) Commercial data (products from vendors and service providers); 5) Nuclear institutions, installations, sites and research institutes (including power plants, experimental

[212] See document 631-L2-TC-441.27/3, p.2

reactors, fuel plants and waste treatment and re-processing plants); 6) Universities and other academic institutes with a strong nuclear program; 7) National and International administrative and regulatory bodies, with contact information; 8) Commercial and environmental aspects of nuclear and non-nuclear energy generation; 9) Other nuclear-related information.

A pilot project of the "INIS Web Services" had been prepared and each resource included in the project had been reviewed by a subject specialist at the Secretariat. Information provided to add value to the references included familiar INIS fields—title, subject category; descriptors, etc.—and comments to assist users in making an informed decision as to the relevance of the link. The pilot project was demonstrated to the meeting of Liaison Officers. The INIS Web Service was made available to INIS Members in August 1999 and, after enhancements, made available to the public as of January 2000.

At the end of August 1999, Claudio Todeschini, then Head of the INIS Section, retired after more than 30 years of service with INIS at the IAEA. In referring to his contributions to the system during those many years, one of the Liaison Officers suggested at the last meeting of the Liaison Officers held during his tenure as INIS Head in May of that year, that he should be renamed Mr TodeschINIS.

Since recruitment action had not been completed, arrangements were made for an Acting Head to provide continuity to the service. In the meantime, Turgeon, the Systems Analyst, essentially carried out all the tasks normally performed by the Section Head.

The discussions at the 5th ETDE/INIS Joint Technical Committee Meeting held in October 1999 in Tennessee centred on the redesign of the INIS/ETDE record structure and the concomitant redesign of the FIBRE software. The Committee agreed with the INIS Secretariat's summary that the main goal was to develop simpler rules for inputting and to adopt a minimal format/set of data elements for the record. It also agreed that if ETDE decided to adopt the expanded Dublin Core as their format, the INIS Secretariat would join the ETDE discussions to ensure that the minimum record format that INIS would consider, would accommodate a common ETDE/INIS solution. There were several objectives for the new FIBRE design, including extended use of wizards to guide users through the creation of new records and more flexible options to import and export records.

The essential statistical information for the four years reviewed in this Section is given below:

	Years			
	1996	**1997**	**1998**	**1999**
Membership	116	118	122	122
INPUT FIGURES				
Number of items received (calendar year)	80502	80547	67848	61200
OUTPUT FIGURES				
Number of centres receiving INIS output tapes	14	1	-	-
Number of centres receiving INIS Output on CD-ROM	-	10	21	20

Number of paid subscriptions to INIS Atomindex	161	130	-	-
Number of full subscriptions to documents on microfiche (free)	21	21	1	1
Number of full subscriptions to documents on CD-ROM (free)	-	7	31	44
Number of ad hoc orders for documents on microfiche	1468	882	-	-
Number of Member States and Organizations utilizing direct access to INIS/AGRIS databases at Vienna	17	13	-	-
Number of connect hours of direct access to the INIS database at Vienna	199	126	-	-
Number of Member States and Organizations with free access to the INIS database on Internet	-	-	89	95
Paid subscriptions to INIS database on Internet	-	-	22	27
Paying registered users of the INIS database on Internet	-	-	606	835
INIS on CD-ROM				
Paid subscriptions	101	145	201	178
Free subscriptions	96	99	88	90

It is remarkable how much the change in information technology affected INIS operations during the four years reviewed in this Section and in particular how significant were the changes in the distribution of output products. Changes between the years 1997 and 1998 indicate the disappearance of output on magnetic tapes, the disappearance of the printed *Atomindex*, the practical disappearance of full text NCL on microfiche, the disappearance of direct access to the database on the Agency's computer, combined with the rapid growth of the use of the database on CD-ROM and then the rise of access to the database on the Internet and the full text NCL on CD-ROM. Also of significance was the decline in the volume of input to the system during the two latter years of the period. This fact raised important considerations that were the subject of various actions described in Sections here below.

1.5.4 The year 2000 and the new arrangements for Membership

The year 2000 brought the 30th anniversary of the establishment of INIS. That was cause for a commemoration at a special session held in conjunction with that year's Consultative Meeting of Liaison Officers described below.

The simplified common INIS/ETDE subject categories were introduced in January 2000 and the expert system for quality control re-introduced in July 2000 with a recalculated knowledge base for the new categories.

The INIS Data Processing System (IDPS) was successfully completed in January 2000 with the implementation of two new subsystems: the INIS Output Products Subsystem (OPS) and the Input Registration Subsystem (IRS). The implementation of the Input Registration Subsystem created a real link between IDPS and the INIS Imaging System (INISIS). In order to process electronic records acquired directly from electronic publishers, a new module was added to IRPS. The module was designed to convert records into INIS format from those of publishers such as Elsevier and the British Library. A new, 32-bit release of a Windows version of FIBRE, WinFIBRE 3.0, was developed, being much more reliable and stable by comparison with the previous version.

In the light of the discussions at the 10th meeting of the Advisory Committee for INIS in 1998 and recommendations 20 and 21 (presented in Section 1.5.3 above) made by the Liaison Officers at their 1999 meeting, referring to possible changes to the *"Definition of Membership Arrangements"* required by the new realities for the continued preparation of input to the INIS database, including possible alternative methods of financing the creation of input, the Secretariat undertook a review of the document. Following extensive consultations with INIS Members a revised text was drawn up and agreed to by the Members at the 28th Consultative Meeting of INIS Liaison Officers held in June 2000.

The revised text[213] contains significant changes over the previous version in Sections 2.3.2, 2.3.3, 2.3.4, 5.1 and 5.2. In the original Membership Arrangements, each INIS Member was fully responsible for the preparation of input for all items of literature published within its national boundaries (or organizational confines), irrespective of quantity. In order to ensure a more equitable distribution of the burden of input preparation amongst Members, the revised text envisioned that a minimum contribution by every Member in the building of the database was now required. That was established in Section 5.2., which also outlined the process to be used to establish this minimum level of input for each Member. That Section, which introduced a significant new aspect to the whole philosophy on which INIS had been founded 30 years before, read as follows:

> *5.2 In order to achieve an equitable distribution of the burden of input preparation among INIS Members, each Member will be required to prepare a minimum number of pieces of literature per year for input to the Database. The minimum number will be established by the Liaison Officers at their Consultative Meetings. To attain the minimum number, Members will cover the literature published within their national boundaries and complement it with literature published in countries having a disproportionately large volume of nuclear literature.*

The new *"Definition of Membership Arrangements for INIS"* was presented to the Agency's Board of Governors with document GOV/INF/2000/21 of 5 September 2000.

Germany was the second INIS member (after Brazil) to invite the Agency for a second time to hold a meeting of the Liaison Officers at its national INIS centre (the first time had been in 1979). Thus the 28th Consultative Meeting was held in Karlsruhe in June 2000.

As mentioned at the opening of this Section, the year 2000 brought the 30th anniversary of the establishment of INIS. At a special session of the Consultative Meeting, Dr. Georg Schultheiss, at

[213] Included as Appendix III to the present document.

that time Liaison Officer of Germany, the host country for the meeting, linked his remarks to the special INIS anniversary emphasizing[214]:

> *the high importance of the INIS Database, pointing out that the Internet is a source of information, but also has a varied quality of information, whereas INIS has a consistent focus and high quality. The timeliness, complete content, and quality are the distinguishing characteristics of INIS. …… He pointed out that information systems like INIS are losing support because of assumptions that are made about the Internet.*

Dr. Schultheiss's remarks about the Internet refer to the misguided opinion frequently expressed by those who have not tried to obtain very specific scientific information from the Internet when they state: *"You can find it all on the Internet!"* Those that have tried to find needed scientific information may guess that it is on the Internet but also know that while it is easy to find that information in the nuclear area by searching the INIS database, it is an immeasurably more arduous task to search for it and find it on the Internet.

The keynote address was given by Dr. Werner Rittberger, former Director of FIZ Karlsruhe, and long time Liaison Officer for the Federal Rep. of Germany. Dr. Rittberger recalled early personalities in the INIS family and shared some anecdotes about the early years of INIS.

During the meeting the Liaison Officers agreed on the principle of sharing the input preparation among all INIS Members as described in the new *"Definition of Membership Arrangements for INIS"* and recommended a pilot program to determine the minimum number of records to be input by each Member[215].

Following much work on the part of both the INIS and ETDE staff on the reconciliation of the INIS and the ETDE thesauri, the first draft of the reconciled INIS-ETDE Thesaurus in electronic format was distributed at the Liaison Officers' Meeting in Karlsruhe.

During the second half of the year 2000, Ms Denise Loehner, (by then called Ms Denise Pawlik), left the services of the Agency. The post of Director of the Division of Scientific and Technical Information was left vacant, pending reassessments of the administrative arrangements for the Agency's nuclear information management activities.

In October 2000, the 6th INIS-ETDE Joint Technical Committee met in Vienna. The main topics of discussion were the redesign of the INIS/ETDE record structure and the acquisition and processing of electronic records. Although progress had been made toward a common new record structure, no final agreement was reached and the Committee recommended the establishment of a new subgroup on INIS/ETDE Input and Output Formats Redefinition, with a mandate to elaborate detailed requirements for a common minimum INIS/ETDE record, including standards and input rules to be applied and input and output formats, ensuring that compatibility be maintained for current products.

The *Computer Based Training Package* that had been made available on CD-ROM in 1997 was complemented in 2000 by a *Distance Learning Programme* available via the INIS Web site.

The acquisition and processing of electronic records or documents was recognised as an integral part of input procedures for the system.

[214] See document 661-L2-TC-441.28/4, p.7
[215] See document 631-L2-TC-441.28/3, p.2

1.6 Changes in the "decentralized" nature of INIS and its management (2001-2006)

The adoption of the revised *"Definition of Membership Arrangements for INIS"* as described in Section 1.5.4 above was driven by the fact that while some member countries were responsible for the input preparation of very large volumes of input, others had little or no input to prepare but could draw full benefit from the use of the system's output products. To redress this imbalance and to require all Members to help shoulder the onerous task of input preparation, the new arrangements foresaw for the first time in INIS history the preparation by some centres of input for literature not published in that country. This did indeed begin to take place in 2000 but it soon became clear that the additional input obtained in this way did not compensate for the very substantial drop in input preparation by a small number of Members whose countries produced a large volume of nuclear literature, who were no longer in a position to fulfill their responsibilities as required by the membership arrangements.

Realization of the changed circumstances under which the system had to operate as well as concomitant changes in the perceptions of information and knowledge management, led to some specific actions and to some changes in the way the Agency's technical information activities were managed. Primarily these were: 1) a substantial change from the original philosophy of "decentralized" preparation of input for INIS by the country originating the literature; 2) a thorough evaluation of the current INIS programme and 3) a rearrangement of the lines of administrative responsibilities for the various groups of Agency staff performing information management activities. These actions are reviewed in the three following Sections.

1.6.1 First contract to acquire INIS records – change in input preparation philosophy

As mentioned in Section 1.5.3 above, discussions had started in 1994/5 with Elsevier Science from the Netherlands, one of the world's largest publishers of scientific journals, to explore the possibility of obtaining bibliographic records in electronic form directly from them for input to the INIS database. Although it appeared by 1996 that an agreement had been reached, legal and copyright questions drew out the negotiations for another five years and it was only in 2001 that a contract was finally signed with Elsevier and the first bibliographic records received directly from that publisher were included in the database. During the year 2000 agreements enabling a similar transfer of bibliographic records for the journal publications of the Institute of Physics Publishing, Nuclear Technology Publishing and British Nuclear Society (all from the UK) as well as the British Library were reached with the respective institutions. Besides Elsevier as mentioned above, a contract was signed in 2001 with the American Institute of Physics for similar transfer of appropriate bibliographic records.

It is appropriate at this point to dwell briefly on the significance of the above mentioned contracts for the future of the database and for the substantial break with the philosophy that had guided INIS from its founding. As has been mentioned repeatedly, one of the cornerstones of the INIS philosophy was the decentralized nature of the system, on the basis of which responsibility for the preparation of input to the database lay with the INIS centre of the country where the literature was published. And this took place with no financial exchanges of any nature between the national centres and the Secretariat at the IAEA. Clearly, obtaining bibliographic records for the literature directly from the publishers and thereby completely bypassing the national INIS centres was a complete break with the original philosophy. But what was maybe more significant was the fact that the INIS inputting rules required the inputting centres to prepare not only a bibliographic description of each item of literature but also to perform the subject analysis of the scientific content of the publication. Thus each record, besides the title and abstract, also required that a set of descriptors (keywords), manually selected from the INIS thesaurus, be assign to it as well as one of

the subject categories into which the total subject scope of INIS was divided. It should also be noted that INIS inputting rules required that the indexing process be performed on the basis of the **full** text of the document, not just the abstract! For the thirty years 1970-2000, this requirement was faithfully followed by most INIS inputting centres.

The bibliographic records obtained electronically from the publishers, although accompanied by a title and abstract, clearly are not supplemented by INIS descriptors or by subject categories. Thus each record must be reviewed by a Subject Specialist who then has to assign descriptors and a subject category to each item on the basis of title and abstract only! Indexing tests have suggested that, over a large volume of items, indications for about three quarters of the relevant descriptors will usually be found in the title and abstract. What about the remaining quarter? What about category assignment without the detailed information contained in the full text?

A totally new aspect that accompanied the changes described above for obtaining input to the database was the financial one. As mentioned above, input as it had been prepared since the inception of INIS by the Members envisaged no financial exchanges of any nature between the national centres and the Secretariat at the IAEA. Electronic records of the literature obtained directly from the publishers had to be purchased. Clearly publishing houses operate on different financial premises than INIS national centres. Discussions with the INIS centres of those Members who could not prepare all their large volume of input, who were therefore the obvious candidates for the application of the new modus operandi of purchase from the publishers, led to understandings whereby those national centres made financial contributions directly to the budget of the INIS Secretariat at the IAEA specifically earmarked for the purchase of electronic records from the publishing houses. It was a recognition, on the part of the national centres involved, of their responsibilities vis-à-vis the INIS system. This certainly facilitated the justification of the new expenditures for INIS within the financial establishment of the IAEA.

During 2001 microfiche production ceased at INIS. Thus from that time on, the full text of NCL was only made available on CD-ROM, to be complemented later by direct access over the Internet.

In September 2001 the Agency's Division of Scientific and Technical Information (STI) was dissolved. STI had been the "home" of INIS since the system's inception; now the INIS Section remained attached to the Department of Nuclear Energy and reported directly to the Deputy Director General, head of the Department. Thus a uniquely anomalous situation was created in which INIS had neither a Section Head nor a Director of a Division in the chain of command.

1.6.2 INIS Programme Evaluation

There had been no comprehensive review of the INIS programme since the General Review of INIS Operations (GRINO)[216] in 1984/5. The Agency had an internal policy to re-evaluate its activities as the need arose. At the time it was felt that there was a need to know how INIS customers had changed, as indicated by a shift in the pattern of utilization, and to ascertain whether the assumptions that had led to the creation of INIS were still valid in the information environment of 2001.

Discussions in 2001 during the preparation of the budget for the 2002-2003 biennium indicated a strong interest at the IAEA and within Member States in maintaining continuity of knowledge and expertise in the nuclear field, particularly through the collection and dissemination

[216] See Section 1.4.6 above

of scientific and technical information and through technology transfer. The mechanism of "Programme Evaluation" within the Agency offered the opportunity to re-evaluate INIS within the context of the overall Agency reform process and, in consultation with Members States, to define its future direction so that it remained relevant and responsive to the needs of its users while reflecting the changed realities at the Secretariat and at the cooperating national centres.

Agency policy required the evaluation to be conducted by an External Evaluation Panel, which would base its analysis on material prepared in advance of its meetings, on briefings, on information provided by the INIS Secretariat staff during the evaluation meetings and on visits by most members of the panel to the national INIS centre of their country. The twelve members of the Panel where chosen with a balanced geographical distribution and a balance between industrialised and developing countries/regions and also chosen to bring different types of expertise and experience in information management principles and practice (including some direct experience with INIS) as well as academic and industrial experience in nuclear and other disciplines[217]. Panel members also reflected a balance between information providers and users, including major potential beneficiaries of the System and specialists without previous association with the Agency.

The INIS Secretariat prepared a comprehensive *Background Synthesis Document* for the Panel[218]. Ten of the twelve Panel members prepared a country survey report on the basis of information gathered within their own countries about INIS activities, use of the database, comments and suggestions and possible future role of INIS. One member of the Panel, accompanied by two Agency staff, made a field visit to the AGRIS/CARIS offices of the FAO in Rome. The Panel then met for two one-week meetings in Vienna, the first on 11-15 February 2002 and the second on 18-22 March 2002.

The full evaluation report became available in July 2002[219]. In the section "OVERALL APPRAISAL" the Panel stated:

> *A number of Member States have expressed their concern about the ageing of the human workforce in the nuclear sector and the sharp decline in the number of new entrants to training in nuclear science and engineering. To respond to this concern the Agency launched a new programme D.4 (Maintenance of Knowledge in Nuclear Science and Technology) which has been welcomed by the Standing Advisory Group for Nuclear Energy (SAGNE) at its January 2001 meeting. The Evaluation Panel believes that the function of INIS is an important component of knowledge maintenance and preservation and should be viewed as such.*

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[217] Members of the Panel were: Professor Alexander Kouzmin (Chairperson), Cranfield School of Management, Sydney, Australia; Dr. Ravi Bhushan Grover (Rapporteur), Department of Atomic Energy, Mumbai, India; Mr Robert Workman (Rapporteur), British Nuclear Fuels plc (BNFL), Warrington, U.K.; Professor Raymond P. Abratt, Groote Schuur Hospital and University of Cape Town, Cape Town, South Africa; Ms. Annette E. Bourgeois, Natural Resources Canada, Ottawa, Canada; Ms. Christa Brulet, Commisariat à l'Energie Atomique, Saclay, France; Dr. Fawzy H. Hammad, Atomic Energy Authority of Egypt, Cairo, Egypt; Mr. Michael J. Lawrence, Pacific Northwest National Laboratory, Richland, WA., U.S.A.; Mr. Shangeng Luo, China Institute of Atomic Energy, Beijing, China; Dr. Alexander N. Rumyantsev, Kurchatov Institute, Russian Research Centre, Moscow, Russia; Professor Dr.-Ing. Georg Friedrich Schultheiss, Fachinformationszentrum Karlsruhe, Germany; Professor. Dr. Dimitar Todorovski, University of Sofia, Sofia, Bulgaria.

[218] "Consultancy Services for Preparation of Documentation on INIS Program Evaluation", Final Report, ENCONET Consulting, Report No. ENCO-FR-(02)-01, January 2002. This report was prepared under contract by Claudio Todeschini, former Head of the INIS Section.

[219] "Evaluation Report of the International Nuclear Information System", IAEA Evaluation Series:02-1:MP7.R.1, July 2002. The report was presented to the Board of Governors of the IAEA as: "The International Nuclear Information System", document GOV/INF2003/12 Annex 3.

The above opinion of the Panel may have been taken into consideration in the decision, discussed in Section 1.6.3 below, to formalize Nuclear Knowledge Management activities at the Agency while maintaining INIS as the repository of information on the published nuclear literature.

It is not intended to list here all the recommendations made by the Panel. In the "Executive Summary" of the evaluation report, the Panel listed its major recommendations[220], some of which are highlighted here:

> Recommendation 3: *Given the global capabilities of information and communication technology, the Agency should significantly increase INIS's capability to provide both Member States and Agency users with information from a qualified database, plus link users to a broad variety of other information sources relative to nuclear science and technology from open internal and external systems.*
>
> In terms of INIS specific recommendations, the Panel recommends that:
>
> Recommendation 5: *Since people are the most important resource in an information management environment, the Agency should select as soon as possible a Head of the current INIS Section. That person should be an experienced leader in information management.*
>
> Other INIS-specific recommendations are that the Agency should:
>
> - *establish an overall information management strategy for INIS to enhance the role of Nuclear Information Management in sustainable development;*
> - *establish standards for digital, electronic collection and distribution of information;*
> - *make the INIS Database collection requirements simpler, more flexible and compatible with national systems without unduly compromising quality;*
> - *keep INIS current with the latest IT capabilities being deployed in Member States, particularly those with large amounts of documentation to provide to INIS;*
> - *enhance INIS to become a portal for a variety of information products – of which the INIS Database is one – that provide benefit to users of nuclear scientific and technical data and information world-wide;*
> - *harness the information and the value from hitherto unclassified and declassified, non-sensitive information; and*
> - *enhance the role of INIS in information and knowledge maintenance and preservation with access possibilities for search, mining and archiving.*

In Recommendation 5 reproduced above, the Panel voices its concern, frequently mentioned in the Report, about the staffing of senior positions at INIS and its chain of command. In the full Report, under the heading "INIS Management and Leadership", the Panel concludes:

[220] "Evaluation Report of the International Nuclear Information System", IAEA Evaluation Series:02-1:MP7.R.1, July 2002, p. iii

It is clear that INIS requires leadership. The absence of dynamic leadership, the lack of a strategic business plan and the failure to implement proven business processes has been a fundamental weakness[221].

The concern expressed by the Panel was due, at least in part, to the anomalous situation described at the end of Section 1.6.1 above.

1.6.3 Rearrangement of the lines of administrative responsibilities for INIS

Budgetary pressure was nothing new at the IAEA. The Agency had been operating essentially with a "zero growth" budget for numerous years, and actual budgetary increases were rare and limited to specific high priority areas. Indeed, priorities had changed significantly at the Agency since the birth of INIS and in the late 1990s – early 2000s, INIS had suffered reductions both in staff and in its budget, both resources being moved to other areas of Agency activities.

Two other developments during those years namely: the growth of the Internet with its capability of offering quick and ready access to much information not necessarily "packaged" in a formal database as well as developments in more structured approaches to Information Management, led decision makers at the Agency and in Member States to justify a certain shift in priority away from INIS towards a more Agency-wide effort in information activities. This was in part supported by some of the recommendations made by the Evaluation Panel described in Section 1.6.2 above. While the efficiency of information retrieval directly from the Internet in specific scientific disciplines has already been placed in doubt earlier in this report, the wonders claimed for the Internet may nevertheless have influenced certain administrative decisions with regard to the INIS programme and the resources to be devoted to it by the Agency. The decisions may also have been influenced by the contrasting personalities of the main players concerned.

In 2003 the "INIS Section" disappeared and its responsibilities were incorporated into the newly formed "INIS and Nuclear Knowledge Management Section". The new Section was to report directly to the Agency's Deputy Director General that was head of the Department of Nuclear Power. The Division of Scientific and Technical Information, of which INIS had been a part since its inception, had already been dissolved in September 2001 as mentioned in Section 1.6.1 above. INIS activities and Knowledge Management activities were to be carried out by two Units, each with a Unit Head, reporting to the Head of the INIS and Nuclear Knowledge Management Section. As it turned out, it was not till May 2005 that an appointment was made for the position of Section Head of the "INIS and Nuclear Knowledge Management Section". This means that in effect, the INIS Section was without a Section Head from September 1999 till May 2005!

1.6.4 Developments during the years 2001-2003 – Disappearance of the "INIS Section"

The INIS Distance Learning Program (INIS DLP) was officially launched to the Member States in December 2000. It contained two courses: "Bibliographic Description" and "Subject Analysis", which give comprehensive instructions about input preparation for INIS. By early 2002 54 users from 31 countries were registered.

By this time the FIBRE software had essentially become the standard software for input preparation; during 2001, 87 INIS Members used FIBRE. Also in 2001, the new subject categories

[221] "Evaluation Report of the International Nuclear Information System", IAEA Evaluation Series:02-1:MP7.R.1, July 2002, p. 21

were used in the INIS Expert System to identify records to be checked. A total of 36,790 items of input were checked for quality of subject analysis and, if necessary, corrected by the Secretariat Subject Specialists.

The implementation of the new *"Definition of Membership Arrangements"* described in Section 1.5.4 above resulted in 38 Member States contributing 1,988 records of voluntary input (Subject Analysis) of electronic records during 2001. In the same period the INIS Secretariat contributed 4182 records of non-IAEA input.

In line with a recommendation of the Liaison Officers, in January 2002 the Secretariat proposed to provide complimentary access to the INIS database on Internet to those universities and academic institutions that had potential need for the information contained in the database. The Secretariat received requests from 100 Universities and contacted all of them to finalize the license formality and the registration process. By early 2002 the total number of authorized users of the database on Internet, including Universities and Permanent Missions, was 130,301; by the end of 2002 the number had increased to 270,062 authorized users. During the year, links to the full text of some IAEA technical documents (TECDOCS, in PDF format) became available from the INIS Database on the Internet.

During 2002 the Secretariat, with participation of some Members, initiated the evaluation of candidate software for computer aided indexing (CAI). There was also progress on the digital imaging of the microfiche collection. For cost reasons, it was more economical to carry out the project in-house. With a total microfiche collection of over 500,000, the project would take some time. The intent was to make the whole collection electronic; in practice, the project proceeded in phases chronologically, with ad-hoc requests and special collection requests also being satisfied. A new e-learning module, an additional component of the INIS Distance Learning Program (DLP), entitled "How to search the INIS Bibliographic Database on the Internet" was launched.

The 30th Annual Consultative Meeting of INIS Liaison Officers was hosted by the Bulgarian Committee on the Use of Atomic Energy for Peaceful Purposes in Sofia in May 2002. Bulgaria thus became the third INIS Member to host the Liaison Officers for a second time (the first time having been in 1974). The Liaison Officers supported the active involvement of INIS in knowledge preservation activities in the IAEA and in Member States; they also supported the proposal of the INIS Secretariat to change the frequency of the Consultative Meeting of the INIS Liaison Officers to a biennial format.

During 2002 electronic records were made available free of charge by the Institute of Physics Publishing and the British Library. This initiative resulted in 15,267 bibliographic records indexed either as a voluntary contribution by INIS Member States (3 839 records) or by subject specialists from the INIS Section (11 428 records). An agreement with the American Institute of Physics was signed. Electronic data conversion programs were written for each new source of electronic input.

In 2003, as described in Section 1.6.3 above, the IAEA changed the "INIS Section" into the "INIS and Nuclear Knowledge Management Section" with extended responsibilities. Mr Yves Turgeon (Australia), the former Systems Analyst of the INIS Section was appointed Head of the INIS Unit while Mr Yanko Yanev (Bulgaria) was appointed Head of the Nuclear Knowledge Management Unit. The new Section still remained without a Section Head.

Also in 2003, while digitisation of the microfiche of full text NCL continued, the INIS Clearinghouse, working in co-operation with the relevant Agency divisions, completed the digitisation of documents of the IAEA Board of Governors for the period 1957-1996. Also, all documents related to the ARCAL project were digitised for the Department of Technical Co-

operation. Older IAEA publications such as documents from the *Technical Reports Series*, the *Nuclear Safety Series* and the *Accident Response Series*, *IAEA Conference Proceedings* and a number of issues of the *IAEA Bulletin* were also digitised.

At the 31st Consultative Meeting of the INIS Liaison Officers held in Vienna in March 2003, the Liaison Officer of the Rep. of Korea informed the meeting of work done at his INIS centre to load the INIS database on their computers and make it available as a mirror of the Vienna database or as a separate host. After analysing the advantages and disadvantages of both options, the decision to create a host instead of a mirror had been made. A domain name was registered and the database was fully populated in January 2003 (2,347,302 records). Services were launched in test mode in March. The database is updated with data supplied by the INIS Secretariat on the Agency's FTP site. Official launch was planned for August 2003.

Although the latest version of the *"Definition of Membership Arrangements for INIS"* had been approved and implemented recently (2000), the Liaison Officers again entered into a discussion of those arrangements because it was felt that the information environment was fast changing and there was a need for INIS to evaluate whether the arrangements corresponded to current needs and requirements[222]. The Liaison Officers recommended that there be a "modernization" of the document. Work on such a "modernization" started in 2003.

The essential statistical information for the four years reviewed in this Section is given below:

	Years			
	2000	**2001**	**2002**	**2003**
Membership	122	122	127	129
INPUT FIGURES				
Number of items received (calendar year)	65715	69113	71163	87822
Thereof				
Voluntary contributions	2202	1988	3839	4907
Voluntary contributions by the INIS Secretariat	8136	4182	11428	26322
OUTPUT FIGURES				
Number of centres receiving INIS output on CD-ROM	19	19	17	16
Number of full subscriptions to documents on microfiche (free)	1	-	-	-
Number of full subscriptions to documents on CD-ROM (free)	48	50	53	56
Number of ad hoc orders for documents on CD-ROM	492	513	568	874

[222] See document L2-TM-25969-31/4, p.20

Number of Member States and Organizations with free access to the INIS database on Internet	97	100	102	107
Free registered users of the INIS database on Internet	15851	31553	75777	78519
Paid subscriptions to INIS database on Internet	26	28	30	27
Paying registered users of the INIS database on Internet	36763	38515	13539	17484
Users of the INIS database under complementary access for Universities	-	-	189746	490477
INIS on CD-ROM				
Paid subscriptions	178	178	147	133
Free subscriptions	88	100	106	102

1.6.5 International Conference on Nuclear Knowledge Management

In 2002, the General Conference of the IAEA adopted a resolution on *"Nuclear Knowledge"*, reiterated in 2003, emphasizing the importance of preserving scientific and technical competence in the nuclear area, calling for increased awareness and inviting both the Agency and Member States to strengthen their activities and efforts.

At the forty-seventh regular session of the IAEA General Conference in 2003, Dr. Mohamed ElBaradei, the Director General of the IAEA stated:

> *"Whether or not nuclear power witnesses an expansion in the coming decades, it is essential that we preserve nuclear scientific and technical competence for the safe operation of existing facilities and applications. Effective management of nuclear knowledge should include succession planning for the nuclear work force, the maintenance of the 'nuclear safety case' for operational reactors, and retention of the nuclear knowledge accumulated over the past six decades. …… A substantial area of Agency activity involves assisting Member States with capacity building and human resources development - through education programmes, hands on training, and knowledge transfer - in ways best suited to their desired uses of nuclear technology."*

In 2002, at their 30th Consultative Meeting, the INIS Liaison Officers had already approved to hold their 2004 meeting in the form of a conference dedicated to nuclear knowledge and information management. That recommendation, strengthened by the resolution of the IAEA General Conference and the statement of the Director General mentioned above, led to the holding in September 2004 of an *"International Conference on Nuclear Knowledge Management: Strategies, Information Management and Human Resource Development"*. The conference was organized by the IAEA and co-organized and hosted by the Government of France through the Commissariat de l'Energie Atomique, and held in Saclay, France. The objective of the conference

was to reach a clear and common understanding of issues related to nuclear knowledge management for sustaining knowledge and expertise in nuclear science and technology.

The conference comprised the following topical sessions:

- Nuclear knowledge management – policies and strategies
- Managing nuclear information – policies and strategies
- Managing nuclear information – case studies
- Human resources for the nuclear sector
- Networking nuclear education and training
- Special session on the International Nuclear Information System

1.6.6 Developments during the years 2004 and 2005

The first test version of the Computer-assisted Indexing (CAI) system was installed on the servers of the INIS Secretariat in May 2004. After extensive tests the beta-version was installed in June 2004 and was used for production indexing from then on. The input was submitted to the CAI system in batches, analysed and the index entries generated were verified and/or approved by the subject specialists at the INIS Secretariat. The final acceptance of the CAI system Version 1.0 was in August 2004. During the period June – December 2004 a total of 27,465 records were processed (indexed) with the Computer-assisted Indexing System. The implementation of the CAI system owes much to the efforts of Alexander Nevyjel[223] who had joined the Secretariat in 2002 as head of the Subject Analysis Group.

The introduction of the CAI system mentioned above was one of the key aspects that enabled the Secretariat to move swiftly to regain the completeness of coverage that had been strongly undermined by the inability of countries with large volumes of nuclear literature to report their literature to the system. Thus the statistics for the year 2004 clearly indicate this turnaround, driven of course by the agreements with publishers for the direct input of electronic records of their publications as mentioned in Section 1.6.1

Thus in the year 2004, a total of 106,886 records were added to the INIS database. That was the best annual result ever achieved by INIS during its entire history. Such a successful outcome was possible because of the continued cooperation of Member States in preparing their own national input, the voluntary contributions of many Member States, and the efforts of the INIS Secretariat in covering a backlog of scientific journals. Voluntary contributions included 6,564 bibliographic records prepared by INIS Member States and 43,041 records prepared by the INIS Secretariat. The gap in the coverage of many core journals, identified for the period starting with 1999, was almost filled, while the acquisition and processing of records for current issues of those journals was becoming routine.

By the end of 2004 there were 2,541,950 records in the INIS database.

In October 2003, INIS started a project to refresh the NCL collection on CD-ROM. By the end of 2004, all NCL documents produced with the original imaging system had been OCRed, converted to PDF (image + text) and optimised for Web access. The Knowledge Preservation Group (KPG) continued digitising the NCL microfiche archive according to the schedule of the project started in 2002.

[223] Alexander Nevyjel had been Liaison Officer for Austria from 1983 to 2002.

In 2005 the Secretariat acquired a thesaurus management system that supports Unicode. The system was enhanced to fully support all INIS languages. The Russian (Cyrillic), Chinese and Arabic versions of the Thesaurus make use of Unicode. By 2006 an electronic version of the INIS Multilingual Dictionary was released that included versions in the 6 official IAEA languages: Arabic, Chinese, English, French, Russian and Spanish plus the German version.

The 32nd Consultative Meeting of Liaison Officers was held in Vienna in April 2005. At the meeting they reviewed changes to the definition of membership arrangements and approved the new text of the document to be then entitled: *"Arrangements for the International Nuclear Information System"*. The full text of the document is appended to this document as Appendix IV.

In April 2005, after the position of Head of the INIS Section had remained vacant for 5 years and 7 months (though there had been Acting Heads), Robert Workman (UK) was appointed Head of the INIS and Nuclear Knowledge Management Section[224].

1.6.7 The year 2006 and once again a new INIS Mission Statement

It had been the wish of the Board of Governors of the IAEA, at the time when they approved the establishment of INIS at their meeting in February 1969[225], that the operations of INIS should be reviewed **annually** by an advisory committee. At that time the Board had requested that[226]:

d) The operation of INIS would be reviewed annually by an advisory committee, the members of which would be appointed by the Board after receipt of nominations by the Director General;

An advisory committee for INIS had met repeatedly, usually at about three or four year intervals, between 1971 and 1998. The changes in the nature of INIS and its management as described in Section 1.6 above caused an extended pause in this established pattern to set in. However, by 2006 it appeared necessary that INIS operations should be reviewed by the Secretariat and representatives of the participating Member States. Administrative patterns within the IAEA had in the meantime changed so that an "advisory committee" was no longer the desired approach. Hence it was decided that the Secretariat would call a Consultancy Meeting bringing together representatives from a number of the larger participants in the system. The objective of the consultancy was to discuss and recommend strategies that would meet the needs of Members over the next three- to five-years period by identifying and analysing various issues related to INIS operations, as well as significant changes and trends in the field of information transfer and information technology which could have an impact on INIS. The focus was to be on common difficulties and problems related to the main INIS activities, possible solutions and recommendations that would be applicable to both INIS National Centres and the Secretariat.

This Consultancy Meeting on "Strategic Input to INIS" was conducted in Vienna in April 2006. The report of the meeting provided a statement of an "INIS Vision" which states:

Recognizing that knowledge powers the future, the vision is for INIS:

- to be the world's most **authoritative** and **comprehensive** source of **reliable** information and knowledge on the peaceful uses of nuclear science and technology;

[224] Mr Workman had been a member of the panel for the INIS Programme Evaluation carried out in 2002. See Section 1.6.2
[225] See Section 1.2.8 above.
[226] See document GOV/OR.408, para.40(d)

- to see INIS products and services at the core of a Web of nuclear information and knowledge bases.

The meeting also defined a new *INIS Mission Statement* to read as follows:

The Mission of INIS is:

1. **To provide quality nuclear information and knowledge management services to Member States;**
2. **To create a reservoir of nuclear information and knowledge for future generations;**
3. **To assist with the development of a culture of knowledge sharing within the Agency and among Member States;**
4. **To maintain and develop INIS in cooperation with Member States and active partners to preserve scientific and technical nuclear information.**

The above Mission Statement was approved by the INIS Liaison Officers at their 33rd Consultative Meeting in October/November 2006[227]. The new slant towards information and knowledge management is clear in the above mission statement, compared to the emphasis on building a high quality bibliographic database and providing full text of the non-conventional literature in the earlier statement described in Section 1.5.1 above.

In May 2006 Yves Turgeon returned to Australia and Anatoli Tolstenkov was appointed Head of the INIS Unit.

During the year 2006 a new version of the INIS database on the Internet was launched. New additions included a multi-lingual interface (English, German, Japanese and Spanish), direct on-line access to full-text documents, full-text search and other enhanced features. Also, the full text of the NCL became available online.

The Secretariat acquired a thesaurus management system that supports Unicode and all official UN languages. As part of the development of the thesaurus management system, a new XML exchange format for the thesaurus was developed. This format was used to upload the Thesauri in all official UN languages, plus German, into the new thesaurus management system. It can be used for distributing and exchanging any version of the thesaurus.

Also during 2006 a new newsletter entitled *"Nuclear Information and Knowledge"* was launched. The newsletter is intended to provide information on all activities of both the INIS Unit and the Nuclear Knowledge Management Unit of the INIS and Nuclear Knowledge Management Section. The first issue appeared in April 2006.

With regard to partnerships, the Agency continued its co-operative arrangement with the OECD/NEA Data Bank. Furthermore, following a recommendation made by the Liaison Officers[228] on the need to facilitate access to nuclear information published prior to the establishment of INIS, the Secretariat worked with the national INIS Centre of the USA at OSTI for the development and maintenance of a search Interface/Viewer for *Nuclear Science Abstracts (NSA)* of the Energy Citations Database (ECD). In this way search access was provided to over 829.000 items from the NSA printed volumes for the years 1948-1976. A link to this Viewer was made available through the INIS database on Internet.

[227] See document "Actions and Recommendations", 33rd Consultative Meeting of INIS Liaison Officers, Vienna, Austria, 30 October-1 November 2006, recommendation 4.
[228] See document L2-TM-25969-31/4, recommendation 27, p.19

The year saw a significant increase in the support provided to INIS Member States through the IAEA Technical Co-operation Department. Four new national INIS related projects were approved, while three ongoing national projects continued to be implemented. One regional training course took place in Syria, while national seminars were conducted in Mali and in Niger.

The 33rd Consultative Meeting of INIS Liaison Officers was held in Vienna in October/November 2006. The Liaison Officers approved the new INIS Mission Statement as mentioned above and discussed the possibilities for implementing the three areas of direction as discussed at the Consultancy Meeting in April:

- continuing to maintain the bibliographic database and developing full text search capabilities, while developing capabilities for integrating other types of information such as multimedia, videos, etc., and incorporating access to non-INIS sources;
- redefining the relationship between the INIS Secretariat and INIS National Centres, incorporating the development of active partnerships and sharing the workload of voluntary input preparations with INIS National Centres in order to maintain comprehensiveness and strengthen partnerships;
- improving access to nuclear information resources by providing intelligent access to nuclear information available from various information resources both inside and outside the Agency, providing access to full text documents referenced in the INIS Database, not only NCL, and developing multilingual retrieval capabilities, including cross language searches and Digital Object Identifiers (DOIs).

By the end of 2006, with the successful completion of volume 37 of the INIS Bibliographic Database, the total number of records in the INIS database had reached 2.778.427.

The essential statistical information for the three years reviewed in this and the previous Section is given below:

Years	**2004**	**2005**	**2006**
Membership	130	136	140
INPUT FIGURES			
Number of items received (calendar year)	106939	116636	122412
Thereof			
Voluntary contributions	6564	29	0
Voluntary contributions by the INIS Secretariat	43041	53645	63592
OUTPUT FIGURES			
Number of centres receiving INIS output on CD-ROM	16	16	15
Number of full subscriptions to documents on CD-ROM (free)	7	7	7
Number of ad hoc orders for documents on CD-ROM	669	420	508

Number of Member States and Organizations with free access to the INIS database on Internet	110	114	120
Free registered users of the INIS database on Internet	80569	81274	88625
Paid subscriptions to INIS database on Internet	18	19	14
Paying registered users of the INIS database on Internet	10951	5660	2167
Users of the INIS database under complementary access for Universities	882932	1175771	1415159
INIS on CD-ROM			
Paid subscriptions	108	104	86
Free subscriptions	102	107	114

Notable in the above statistics is the continuing increase in the number of Members, the substantial yearly increase in the total volume of items input to the system, the disappearance of voluntary contributions to the input by Member States according to the revised membership arrangements approved in 2000 accompanied by a surge in the voluntary contributions made by the Secretariat. A continued steady use of the output products was accompanied by a marked decrease in the number of paying registered users of the database on Internet and a phenomenal rise of the number of users of the database under complementary access for Universities.

1.7 The recent years (2007 – 2009)

1.7.1 Developments during 2007

The creation of the INIS database continued to require substantial efforts and resources in order to put together the two fundamental components for each piece of literature: the bibliographic description and the indexing of its subject content. The creation of the bibliographic records was still a completely manual process. To facilitate data capture, development of a new tool was begun at this time. Such a "Metadata Extraction Tool" (MET) would produce an improvement of input quality and performance by avoiding the manual re-typing of data already available in digital form. With regard to subject indexing, continuing improvements of the Computer Assisted Indexing system (CAI) during 2007 significantly increased the performance of the subject analysis process in the INIS Secretariat. For Member States an automatic "batch processing" mode was implemented, which allowed to pre-process files and assign "suggested descriptors", which are then reviewed (approved-rejected-amended) by subject specialists in Member States, improving their performance and speed of input preparation.

In response to the recommendations of the INIS Liaison Officers at their 33rd Consultative Meeting in 2006, a remote access feature to CAI was set up and implemented in June 2007. During 2007-2008 the remote access to CAI was used by about twelve Members. Subsequently it became a regular service of the INIS Secretariat to Member States. Input files are sent to the INIS Secretariat in FIBRE format with full bibliographic description, but without indexing. The Secretariat loads the

files to CAI online and the subject specialists in the Member States can index these files online from their remote location using CAI. After completion the file is exported directly to the production system, or if requested, sent back to the Member State for further reviewing.

Over the years since the inception of INIS, much effort had gone into the development and maintenance of the INIS Thesaurus, first in English only, later in additional languages as the INIS national centres of countries with national languages other than English undertook the translation of the terminology. The first multilingual INIS Thesaurus was published in 1995 in English, French, German, Russian and Spanish as *INIS Reference Series IAEA-INIS-20 (Rev. 1)*. In 2005, versions in Chinese and Arabic were completed by the INIS centres of China and Syria respectively. In 2006 monolingual and multilingual versions of the Thesaurus were published in electronic form in PDF format and the interactive multilingual thesaurus with navigation capabilities, including the full thesaurus hierarchy in HTML, was published on CD-ROM in 2007[229].

Following a decision at the 33rd Consultative Meeting of INIS Liaison Officers in 2006, a survey of the Liaison Officers was conducted during June to September 2007. All aspects of the role of the ILOs were reviewed, with the objective of:

- gaining a better understanding of the situation in INIS Member States,
- identifying any issues that may be preventing ILOs from fulfilling their INIS mandate,
- determining whether there is a need for additional support from the INIS Secretariat.

The survey tools were a questionnaire as well as some personal or telephone interviews. The response rate was 65%. Many ILOs are employed as government officials, working mainly in information management and managerial jobs. The time they are able to spend on INIS matters is thus limited and varies widely (between 2% and 100%). Only a few ILOs and Alternate ILOs are able to work full-time for INIS. In 60% of the Member States there is relevant literature that is not captured for the INIS database, primarily due to limited financial and human resources. Furthermore, theses and conference papers are difficult to obtain. The ILOs' vision of the future of INIS was varied. Many expressed a vision of INIS in line with the current mission statement; the INIS database would be part of a portal or web of nuclear information resources; INIS would continue to play a role in nuclear knowledge management and preservation; a substantial increase in (and access to) full-text literature would occur; the INIS database would be freely accessible to all users worldwide; the content of the database would be adapted more to users' needs and priority areas of nuclear research; the database would offer multilingual features; and finally, the Internet and Internet browsers would continue to have an impact on the successful development of INIS.

The Syrian INIS centre completed the preparation of the Arabic version of the user interface for the database on the Internet, thereby simplifying the retrieval of information from the INIS database in the Arabic world. The Arabic interface was added to the existing five interfaces (English, German, Japanese, Portuguese and Spanish).

The digital preservation of the full text of literature continued in cooperation with Member States. The most significant project of the previous four years in this connection had been the conversion of the INIS collection of non-conventional literature (NCL) from microfiche to digital media. By the end of 2007 about 40% of the microfiche collection had been digitized, and searchable full-text documents in PDF format were uploaded to the INIS online database. Between January 2007 and April 2008, the INIS Secretariat digitized the collections of full-text literature from Argentina, Brazil, Bulgaria, Canada, China, Chile, Colombia, Cuba, Czech Republic, Denmark, Egypt, Germany (partly), India, Mexico, Poland, Russian Federation (partly), Sweden,

[229] See "INIS: Multilingual Thesaurus Arabic-Chinese-English-French-German-Russian-Spanish" and "INIS Reference Series, IAEA-INIS-26/CD", ISBN 92-0-102307-3, May 2007

Switzerland, Ukraine and United States (partly) and provided the electronic documents (PDF) to INIS Liaison Officers of the respective countries.

The 11th INIS-ETDE Joint Technical Committee Meeting was conducted in Vienna in November 2007.

The committee reviewed the changes made in recent years in the information available on the Web. These changes required that serious consideration be given to the kind of information that INIS gathers: how it is gathered, how it is made available and how user requirements for nuclear information are satisfied. Financial constraints in many INIS National Centers, including the INIS Secretariat, had impacted the volume and quality of input preparation, as well as the comprehensiveness of the INIS database. Notwithstanding these difficulties, notable accomplishments had been achieved through increased efficiency of document indexing (CAI) and the purchase of electronic documents directly from publishers. The INIS Secretariat had started a project to eliminate the backlog of conference proceedings. At that point in time, the INIS database contained over 2.8 million records. References to Journal articles represented about 58% and to NCL about 31% of the total. These two types of information therefore corresponded to about 90% of the total number of records in the database.

As discussed in Section 1.6.1 above, starting in 2001, as a result of a number of contractual agreements with large scientific publishing houses, a very significant volume of records referring to Journal articles obtained in electronic form directly from the publishers, were being entered in the database. The collection of records referring to NCL however, continued to depend entirely on the efforts being made by the national INIS centres, many of which, as mentioned above, were experiencing substantial budgetary difficulties.

Hence there was a visible trend for the database to become a Journal oriented database, even though the majority of Journal articles were already available on the Internet directly from primary and secondary publishers, or through special search systems. However, by concentrating on NCL, INIS would be heading in the direction of an archival database due to the time lag in obtaining NCL records. The Joint Technical Committee was therefore being faced with a number of strategic questions. Was it prudent for INIS to continue the compilation of both conventional and non-conventional literature for a comprehensive nuclear bibliographic database? What would happen if the INIS Secretariat no longer received the necessary funds to support the purchase of Journal article records from the publishers in the future?

In the event, the Joint Technical Committee made the following recommendations[230]:

2. ***stressed*** *that selection criteria for input preparation should continue to take into account important parameters such as subject, content, relevance, and value as well as the type of literature;*
3. ***recommended*** *establishing a special working group which will elaborate guidelines for prioritising input preparation, taking into account the results of usage studies and considering possible financial constraints;*
4. ***recommended*** *in parallel to continue development of cross-database search interfaces to complement current INIS resources.*

Furthermore, and in particular with reference to Conference literature, the Committee made the following recommendation[231]:

[230] See document 605-L2-TM-32483, recommendations 2-4, p.1
[231] See document 605-L2-TM-32483, recommendation 5, p.1

5. ***recognised*** *the importance of coverage of the gap in Conference literature, stressed the importance of the allocation of necessary funds to finance the development of tools to identify missing conferences and workflow management, and encouraged the INIS Secretariat to resume the voluntary contribution activities when the necessary tools are in place;*

One of the Committee's most significant discussions, a discussion with far reaching consequences, was that devoted to the possibility of providing free access to the INIS bibliographic database. Distribution of the database was currently based on the INIS Membership Arrangements which include the concept of the exclusive right of each Liaison Officer to the distribution of the database within his/her national boundaries. However, most bibliographic databases had become free to users and the majority of digital library publishers provided free access to bibliographic information. The Committee discussed the possibility of opening access to the INIS bibliographic database and suggested the start of a pilot project in which 3-5 countries would volunteer to open access to users with registration, in order to track usage, but without permission being necessary on an individual basis. After a period of 6 months, organisational and technical implications would be evaluated and presented at the 2008 ILO Meeting. Open access would be provided on a country by country basis with permission from the respective Liaison Officer. Access to the full text of NCL was a much more complicated issue which would need special attention. In the event the Committee made the following recommendation[232]:

19. ***recommended*** *opening free access to the INIS Database on the Internet as a pilot project for selected countries from various regions, recognizing the possible technical and organisational implications, and to present the results at the 2008 ILO Meeting. Latin American countries, Canada, France, and the USA volunteered to participate. After the pilot, and depending on capacity, other countries may request free access be added based on each members' rights in the INIS Membership Arrangements;*

By the end of 2007, with the successful completion of volume 38 of the INIS Bibliographic Database, the total number of records in the INIS database had reached 2,895,867.

1.7.2 Developments during 2008 and a momentous decision

During 2008 substantial work was carried out on the development of the "Metadata Extraction Tool" (MET) first mentioned in Section 1.7.1 above. The objective of this project was the development and acquisition of a software tool that would facilitate the data capture and production of bibliographic records in INIS format and thus further improve the productivity of INIS staff. The new tool would produce an improvement of input quality and performance by avoiding the manual re-typing of data already available in digital form by making extensive use of selection lists based on central authority files and local personalized lists for recurring entry text. From electronic documents in PDF format, the tool would:

- capture text from original full text;
- reformat content according to INIS input rules;
- verify against INIS authorities;
- produce and export bibliographic files.

The Metadata Extraction Tool (version 2.0 developed during 2008) has been in use since August of that year.

[232] See document 605-L2-TM-32483, recommendation 19, p.3

In early 2008 there was a follow-up to the initial handover of INIS materials on microfiche in 1997 referred to in Section 1.5.3 above. That part of the full collection of non-conventional literature on microfiche that had by then been digitized by INIS and that took up more than 250 gigabytes of data in portable document format (PDF) was written over to an external hard disc. At an appropriate ceremony in January 2008 the disc was handed over by Seyda Rieder, by then Leader of the INIS Database Production and Imaging Group, to the Head of the *Zentralbibliothek für Physik* in Vienna[233].

In April 2008, Robert Workman left the services of the Agency. Once again the IAEA did not move to an immediate replacement of the Head of the INIS and Knowledge Management Section but appointed Ruth Hahn-Weinert, Head of the IAEA Library, as acting Head of the INIS and Knowledge Management Section.

The exchange format used to distribute INIS Atomindex, ISO 2709 (1973), had been developed in the late 1960s. The format adequately addressed the technological needs of its time, but it no longer met the requirements of modern technology. The Secretariat therefore decided to distribute INIS Atomindex with a new XML based output format. Benefits from this change in format include unlimited record length, increased readability, support of hierarchical relations and full integration with the web. To ensure a smooth transition to the new XML based output format, tests were carried out in conjunction with previously identified National INIS Centres and appropriate improvements were made accordingly. By the end of August 2008 all Volumes/Issue of the INIS Atomindex were converted into the new XML based output format and data cleaning was completed. Full implementation of the XML output format took place on the 1st of January 2009, starting with Vol. 40/01. The old ISO 2709 format continued to be made available until the end of 2009. In parallel, the entire Atomindex (back volumes) will be converted to the new XML format and will be made available to INIS Members upon request.

Substantial efforts were invested in digital preservation services during 2007 and 2008. These services were in two parts: digitization of the Non-Conventional Literature (NCL) received with regular INIS input for the production of the INIS electronic full text database, and the digital preservation activities, which included various digitization projects, in particular the conversion of the NCL collection of microfiche to digital medium. With respect to this latter project, of the over 600 000 records available on microfiche for the period 1970–1997, about 40% had, by that time, been fully digitized, the full text converted into searchable PDF and uploaded to the INIS database, while respecting online access agreements with INIS Member States.

The objectives of digital preservation were to provide consistent, high level image quality, interoperability and accessibility of digitized resources, and to ensure long-term preservation of the digital resources. In order to achieve this goal, INIS adopted general principles based on Cornell University, a leading institution in the field of digital preservation. A document entitled *Digital Preservation at INIS*[234] provided information about the practices carried out at INIS, as well as technical processes, standards used, hardware, software, and processes related to digitization.

In the course of processing the backlog of journal literature - that had not been reported to INIS - published by the large publishing houses with whom INIS had developed contractual arrangements for purchasing electronic records of their publications, it became apparent that many conference papers were also not being reported to the system. This experience clearly showed the need for a conference authority that would provide unique identification of each conference, harmonization of data gathered from different sources, identification of missing conferences and

[233] See "Nuclear Information and Knowledge" newsletter, No.5, March 2008, ISSN 1819-9186, p.7

[234] See "Digital Preservation at INIS", Rev.1, September 2008; attached to "INIS Information Letter No.253" of 3 October 2008

collection of materials from forthcoming meetings. Although discussions on ways to improve the coverage of conference literature had already taken place as of 2005/2006, a specific project with the purpose of developing a "Conference Authority Tool" was initiated in 2008. This software tool would merge the *"Meetings on Atomic Energy"* database (an IAEA publication), the IAEA Library catalogue and the conference data extracted from the INIS database with the aim of identifying and verifying duplicates entries; specifying and adjusting the master entry for each conference; identifying missing conferences in the INIS database and monitoring input preparation of conferences by national INIS centres.

In October 2008, after about 25 years of service to INIS, Anatoli Tolstenkov retired from the IAEA. Tolstenkov had brought great computer skills to his work for the system, combined with strategic vision in identifying developments in IT that bore promise if implemented for INIS. He employed these qualities first as a member of the Agency's Computer Section in that Section's computer support role for the INIS system; then, when administrative arrangements were altered and INIS had its own computer support group, as a member and later as leader of that group. Subsequently he had become Head of the INIS Clearinghouse and finally he had been appointed Head of the INIS Unit within the INIS and Knowledge Management Section. Apart from his many contributions to the system, his personal and human qualities had made him a valued member of the INIS team. In November 2008, Dobrica Savić (Canada) took up his duties as the new Head of the INIS Unit.

The 34th Consultative Meeting of INIS Liaison Officers was held in Vienna on 3-5 November 2008. The tone of the meeting was one of expectation since it was clear to all that INIS would have to meet the challenges presented by the rising interest in many IAEA Member States for nuclear power and the realization that an appropriate nuclear information infrastructure is an important element of any national nuclear power programme. In this context, the meeting, while recognizing that INIS has over its many years of existence striven with a great measure of success to exploit technological advances in information management, it was also necessary for all stakeholders, that is both the Secretariat and INIS Members, to actively promote and market INIS as a product that can fulfil the expectations mentioned above. There was therefore much discussion on ways for the Members to share their individual experiences in promotion and marketing and in developing a joint marketing plan.

The meeting was presented with information on a study which was commissioned by the IAEA's Department of Nuclear Energy in 2007 on the operations model for a modern nuclear information system. The mission statement states:

> *The future information system is the world's leading authoritative, trusted and reliable international nuclear information system devoted to all aspects of the peaceful uses of nuclear science and technology for all users from all Member States and all over the IAEA.*

The study identified three key drivers for a modern information system: access, content, and web technology. INIS was positioned to be a key player in such a modern nuclear information system.

The meeting took note with satisfaction of the forty years of cooperation and partnership between the IAEA and the Nuclear Energy Agency (NEA) of the OECD. As a result of this cooperative arrangement, the NEA Computer Programme Data Bank has distributed to authorised centres in non-OECD countries, on behalf of the IAEA, about 11 350 computer program packages. On the other hand, non-OECD countries contributed 600 new or revised versions of computer codes to the Data Bank who then went on to distribute through its service 6000 copies of these packages

originating from non-OECD countries. Throughout these 40 years, INIS has provided the Data Bank with one staff member to support this service.

The Liaison Officers reviewed in detail many of the topics referred to it by the Joint INIS/ETDE Technical Committee that had met in November 2007, as described in Section 1.7.1 above. Among them was the question of the documents of the INIS/ETDE Joint Reference Series which at that time included three joint formal publications: the *Joint INIS-ETDE Thesaurus*, *Subject Categories and Scope Descriptions*, and the *Manual for Subject Analysis*. The meeting discussed the possibility of extending the series by adding a revised *Joint INIS/ETDE Guide to Bibliographic description*.

But the most momentous discussion of the meeting was that concerning the pricing policy of the INIS database. As mentioned in Section 1.7.1 above, this had already been an item of discussion at the Joint INIS/ETDE Technical Committee Meeting of November 2007. The pricing policy of the INIS database had essentially been based for almost 40 years on the initial philosophy of INIS as a "decentralized" system. On that basis, the database, after having been compiled by the Secretariat with the data sent to it as input by the Members, was returned to each single Member who could then exercise full control over its distribution (with or without financial considerations) within its national boundaries. On-line database providers and subsequently the Internet had made simple world-wide access to a database a simple technicality. Financial requirements and possibility of access were controlled on the basis of policy considerations as described in the documents *"Definition of Membership Arrangements for INIS"* in their various versions[235].

Availability of information on the World Wide Web had changed dramatically in the preceding several years. Many publishers and information providers offered free access to bibliographic information and charged users only for providing the full texts of documents. With the exception that university students could access the INIS Database on the Internet free as of 1 January 2002, in accordance with the 29th INIS Liaison Officers Meeting recommendation[236], pricing policy of the INIS Database had remained essentially unchanged. As mentioned in Section 1.7.1 above, the Joint INIS/ETDE Technical Committee discussed the possibility of opening access to the INIS bibliographic database and suggested the start of a pilot project, the results of which were to be referred to the Liaison Officers at their 2008 meeting.

It was clear during the discussion of this question that the Liaison Officers felt the time had come to remove all obstacles from making the full INIS bibliographic database free to be accessed by anyone world-wide. It is therefore fair to say that a truly momentous decision was taken by the 34th Consultative Meeting of INIS Liaison Officers in Vienna in November 2008 when they agreed to make the following recommendations[237]:

28. ***appreciated*** *the work of the INIS Secretariat on the Pilot Access Project, and* ***supported*** *the proposal to open the access gradually to all INIS members in alphabetical order of country names, as presented by the INIS Secretariat;*
29. ***recommended*** *starting actual implementation of the project in 2009 and* ***stressed*** *that it should be done on a country by country basis and in accordance with the INIS Membership Arrangements;*

With a total of 123,536 records added in 2008, the INIS Database surpassed the number of three million references and reached 3,018,476.

[235] See Appendices I, III, IV
[236] See document 631-L2-TC-441.29/3, recommendation 37, p.3
[237] See document 605-L2-TM-34654, p.34

1.7.3 2009 – the 40th year of INIS operations – worldwide, free, open, unrestricted access to the INIS Database

The "Conference Authority Tool" (CAT) discussed in Section 1.7.2 above, was implemented and became operational in April 2009.

The provision of training at formal training seminars together with other forms of capacity building had always been an integral part of the INIS programme, based on close cooperation between the Secretariat and the various INIS Centres. As the INIS Centres of those member countries responsible for the publication of large portions of the nuclear literature decreased their direct contribution of input to the system, so did their need for training new personnel. At the same time, technological advances made it easier for countries in the less developed world to be able to have direct access to the nuclear information contained in the INIS Database. This fact, together with the desire of these countries to draw larger benefits from a wide range of peaceful applications of nuclear technologies, raised their interest in INIS and hence their need to have trained staff to help them achieve these benefits. The divergence of interest of these groups of countries can be seen by analyzing the geographical distribution of areas where INIS efforts at training and capacity building have been heavily requested. Thus it is apparent that areas like Africa showed a high profile in this activity. In close co-operation with the IAEA Technical Co-operation Department, increasing support was provided by the Secretariat to INIS Member States in establishing and/or reactivating national INIS Centres, many of these Member States being in Africa. An INIS component was introduced within the AFRA regional project - *"Human Resources Development and Nuclear Knowledge Management 2009-2013"*.

The full text collection of NCL documents, originally stored as microfiche, then digitized, should clearly be stored in the most appropriate archival format. The Adobe Acrobat Portable Document Format (PDF) had been selected for this task. The archival standard of PDF (PDF/A) was tested and evaluated for possible adoption. By the end of 2009 about 60% of the NCL microfiche collection had been digitized for a total of over 180 000 documents or more than 9.6 million pages.

As a direct consequence of the recommendations made by the Liaison Officers at their 34th Consultative Meeting of November 2008, as described in Section 1.7.2 above, a major milestone in INIS history was reached on 3 April 2009 when the INIS Database was opened to all Internet users around the world. Free, open and unrestricted web-based access was provided to all users interested in the peaceful applications of nuclear science and technology. This open access also included access to 200,000 full-text NCL documents consisting of scientific and technical reports and other non copyrighted publications.

It would have been difficult, at the time when INIS was being established in the 1960s, to foresee such a development. As described in the early sections of the present document, there were some politically inspired directions given to the design and the "philosophy" under which the system was intended to operate. This was due at least in part to the desire of many of the Governments of the Member States to keep a measure of control over what entered the Database, how it was distributed to the participating Member States and who would have access to its contents. The subject scope of the Database was, after all, the nuclear sciences which, politically, were still considered a fairly delicate field of activity. The 40 years since the beginning of INIS operations had seen fundamental changes in the view that many Member States took of the Database but to this had been added the totally changed technological environment of information management and the totally new computer literacy and expectations of free access to information on

the part of millions of persons world-wide that have interest in the peaceful applications of nuclear science and technology. To this must be added the fact that at its inception INIS input was provided to an overwhelming proportion by just a few Members who were the largest producers of nuclear literature. Their substantial efforts and investment in human and financial resources in the preparation of that input had led them to take a somewhat more restrictive view as to who should be provided with free access to the data. The fact that it is precisely these same large producers of nuclear literature (in particular Journal literature) that no longer prepare this input for INIS, is largely the reason why these Members no longer have objections to the free access provided worldwide. Thus the milestone reached by INIS on 3 April 2009 would certainly have sounded improbable to many of its founders and, had it been aired as a distant aim of its operation at the time when INIS was being proposed, might even have led some of the Member States to oppose the establishment of such a system.

At the end of July 2009, after more than 32 years of service, Seyda Rieder retired from the IAEA. Ms Rieder's contributions to INIS were substantial; her skills and energetic drive were devoted first to the INIS Clearinghouse, the collection of full text NCL documents, subsequently to all aspects of bibliographic control, during the course of which she became supervisor of all bibliographic control activities and during her last years at INIS, and subsequent to the reorganization of INIS activities into the INIS and Knowledge Management Section as described in Section 1.6.3 above, she served as Group Leader, Database Production & Imaging Group.

In October 2009 the 12th INIS/ETDE Joint Technical Committee met in Vienna. The Committee reviewed the activities of the two systems during the two years since its 11th meeting and the technical improvements made in the methods for data collection, processing and distribution. The Committee for the first time expressed concern about the "balance" between the Secretariat and the Members in the respective volumes of input contribution. A further increase in the already disproportionately large share of input prepared by the Secretariat would continue to undermine the principle of "decentralized operation" that had been the hallmark of INIS. It also raised the question of the sustainability of the purchase of bibliographic records. In the event of further budget cuts at the Secretariat there was the risk that some parts of the nuclear literature, currently prepared by the Secretariat, would not be covered. Indeed at the Secretariat – as well as at some national INIS centres – the possibility of processing only records from "core" journals was already being seriously considered.

The Committee agreed that as of 1 July 2010 the sole standard format for INIS output would be in XML. It also agreed that the Metadata Extraction Tool (MET) would eventually replace the FIBRE software for input preparation, but that only when MET carried in full all checking procedures as FIBRE now does, would the use of FIBRE be discontinued. This would probably not take place before about 2012.

With the introduction of free, open and unrestricted web-based access to the INIS Database as mentioned earlier in this Section, statistics on the usage of the database would be of particular interest. The Committee was informed of some attempts at quantifying such use but also of the enormous difficulties of obtaining meaningful statistics. The Committee recommended that a special working group study ways of gathering useful figures on the use of the database.

Over and above the substantial efforts for capacity building, particularly in co-operation with the IAEA Technical Co-operation Department as mentioned earlier in this section, the Secretariat

held a full training seminar in Vienna in November. Attendees were drawn widely across the world, predominantly from developing countries but also a few from more highly developed countries.

The essential statistical information for the three years reviewed in this and the previous Sections is given below:

Years	**2007**	**2008**	**2009**
Membership	141	143	146
INPUT FIGURES			
Number of items received (calendar year)	117447	123536	109523
Thereof			
Voluntary contributions	118	1841	1091
Voluntary contributions by the INIS Secretariat	54814	62988	50187
OUTPUT FIGURES			
Number of centres receiving INIS Atomindex on CD-ROM	15	15	15
Number of subscriptions to the INIS NCL on CD-ROM (free)	70	72	75
Number of subscriptions to the INIS NCL on CD-ROM (paid)	7	7	7
Number of ad hoc orders for NCL documents	501	356	422
Number of Member States and Organizations with free access to the INIS database on Internet	121	122	all
Free registered users of the INIS database on Internet	89630	91360	n/a
Paid subscriptions to INIS database on Internet	13	15	n/a
Paying registered users of the INIS database on Internet	2436	2886	n/a
Universities using complementary access of the INIS database	356	387	n/a
INIS on CD-ROM			
Paid subscriptions	68	53	47

Free subscriptions	114	111	83

In this last table of statistics for the three years leading up to the 40th anniversary of the distribution of the first INIS output products in early 1970, it is gratifying to see that there is a continuously increasing interest, particularly from developing countries, in participating in this activity that brings to users in the Member States easy access to scientific and technical information in all peaceful applications of nuclear energy. INIS membership reached 146 with the end of 2009, compared with 25 at the end of 1969.

The volume of the full INIS Database at the end of 2009 stood at 3.127.660.

1.8 Current Status – Closing the Circle

The period 1998 to 2009 was a turbulent one for the INIS system. The considerable drop in input to the system in the early years of this period, due to the reasons discussed in the first few paragraphs of Section 1.5 above, brought a dangerous level of instability to the system. Changes in the administrative arrangements for the IAEA's activities in scientific and technical information in the nuclear area coupled with the inordinate delays in filling senior staff positions – discussed in Sections 1.6.3, 1.6.6, 1.6.8 and 1.7.2 above – brought additional instability.

Remedial action brought a return to stability. The remedy had two basic aspects: the changes in the philosophy with which INIS had been established, namely the acceptance of the fact that not all the input would be prepared by the country in which the literature was published and the concomitant willingness of some Member States (and the Secretariat) to voluntarily prepare for input part of the literature published by other Members and secondly the revolutionary technological changes in information processing that saw the publishing industry produce their publications in an electronic form that permitted easy capture by INIS of the records of the literature directly from the publishers. In this way INIS has achieved in recent years an annual volume of input to the database that substantially surpasses that of any one of the previous 30 odd years.

There has been yet another very recent change in the arrangements for voluntary contributions described above. The voluntary contributions of some Members that prepared for input literature published elsewhere were made possible by a system set up by the Secretariat that channeled such records to the participating INIS centres who indexed them and returned them to Vienna. The surprisingly high efficiency of the CAI system put in place by the Secretariat, both in terms of speed of processing and of the high quality of the resulting indexing, resulted in a situation where it was quicker and more efficient for the records to be all processed by the Secretariat. Thus, as indicated in the last table of statistics included in Section 1.7.3 above, the voluntary contributions of Members have been greatly reduced while those of the Secretariat have soared. It is also disappointing to recognize that the financial arrangements described in Section 1.6.1 above, whereby those INIS Members on whose behalf the Secretariat purchases electronic records, make contributions to the INIS budget, those arrangements are not being consistently fulfilled, thereby further burdening the INIS budget.

It is this particular situation of the voluntary contributions, that is, the very large voluntary contribution made by the Secretariat, which led the Joint INIS/ETDE Technical Committee at its last meeting to express its concern about the "balance" between the Secretariat and the Members in their respective volumes of input contributions as mentioned in Section 1.7.3 above.

Nevertheless it can be said that today the system is solidly operational and produces a database, a digitized collection of full-text documents and other output products of great value to the Member States of the IAEA. The human and financial resources at the Secretariat have, however, been cut down to the bone and a similar situation has developed at a good number of the national INIS centres. The Member States of the IAEA, who are also the Member States that cooperate on the continued creation of the INIS database and contribute to the budget of the IAEA from which the Secretariat operations are financed, should consider the value of INIS to the users in their own countries when considering the distribution of their budgetary contributions to the various activities of the IAEA.

There is active participation in INIS operations by many of its Members. It is interesting that the greatest growth in participation has been among Developing Countries and this is the fastest growing part of INIS; while the contribution from smaller developing Member States is not significant, it extends the reach and overall usefulness of INIS. More clearly than ever before, it serves the objectives of the IAEA. Most remarkable is the stability of the participation of many of the middle sized members.

There is much talk at this point in time, in the media but also in many countries at Governmental and energy policy making level, of a renaissance in the nuclear power industry. Whatever the future may bring for nuclear power generated electricity, there is no questioning the enormous dependence of so many aspects of mankind's daily lives on the application of nuclear techniques in medicine and health care, agriculture, industry, environmental protection and other areas. It is more important than ever to maintain a mission-oriented information system in nuclear science and technology, despite ubiquitous availability of information through the Internet. There is no doubt that the intrinsic value of INIS is vindicated by its providing a single point of access to qualified, relevant and refereed information on the subject. One can envision a time when most bibliographic references in INIS will be linked to the full text of the original document, leading scientists, researchers, engineers, managers, policy makers and any other user of nuclear information directly to the information itself via a few clicks on the INIS database.

1.8.1 Closing the Circle

There is a certain symmetry in the history of INIS over its 40 years of existence. Section 1.2 above describes the Genesis of the system but even before that, in Section 1.1, references are made to nuclear information systems that existed before the establishment of INIS. In particular it is mentioned that by the late 1960s the abstracting journal *Nuclear Science Abstracts (NSA),* produced by the US AEC, was on the shelves of practically every library of academic or research institutions or industrial concerns dealing with any aspect of nuclear science and technology. NSA was produced centrally by a branch of the US AEC located in Oak Ridge, Tennessee, USA. Mountains of paper publications in nuclear science and technology, scientific journals, books, reports, patents, conference preprints, manuals, monographs and other types of publications were physically received in Oak Ridge and were manually processed by descriptive cataloguers, subject indexers and reproduction specialists that catalogued and indexed each piece of literature to create entries in NSA and reprographed some of the material to permit distribution of the full text. This was an outstanding example of a "centralized" system. As the volume of nuclear literature grew, such a centralized operation could not be financed indefinitely.

The developments that grew out of the situation described above are the subject of the present document. It is in fact the history of INIS.

Now, about 40 years later, there is a certain irony in the fact that, due to budgetary restrictions at the Secretariat and in Member States but in particular because of spectacular developments in information technology, the "fully decentralized" INIS system that was created to resolve the difficulties inherent with a centralized system, has had to rethink itself in order to survive. The solution? An accelerating return to a quasi centralized operation, where the majority of the input (in 2009 it is expected to be about 55% of the total) is prepared by the Secretariat.

The closing of the circle is almost complete ……

2 SYSTEM DESCRIPTION OF INIS

As mentioned in the Foreword to the present report, the establishment of INIS was a response in fulfillment of Article III, paragraph A.3 and Article VIII, paragraph C, of the Agency's Statute that requires the IAEA to foster the exchange of scientific and technical information on peaceful uses of atomic energy and also requires that the Agency take positive steps to encourage that exchange among its members and serve as an intermediary among its members for that purpose.

The 1960s was the decade when computers began to be used extensively for the first time in the area of documentation. It was then that electronic databases with references to items of published literature were first conceived. It seemed appropriate that the IAEA, in considering its possible role in facilitating the exchange among its members of information on the peaceful applications of atomic energy, should have envisaged an electronic equivalent of the well established pattern of creating "bibliographies" of published literature, these items of literature being books, journal articles, technical reports, conference papers, patents or whatever.

Such an "electronic bibliography" could appear at regular intervals providing references to the literature published since the previous issue. Ideally it would cover relevant literature published anywhere in the world. With regard to its subject coverage, that could be restricted or expanded at will and would obviously be dependant on the wishes of the participating members. In the event, as will be discussed in Section 2.3 below, it tended to be defined by the scope of the Agency's interests.

In establishing such an electronic bibliography or database, it was clear that the IAEA would rely on and apply whenever possible the relevant international standards that were being developed (and would indeed play a role in the establishment of some such standards where necessary) and would also rely heavily on international cooperation both with its members and with other organizations or institutions.

A further significant factor of such an international endeavour was that of language. Nuclear literature was and is published in many languages, although some predominate. The system that was finally implemented which, as described in Section 2.1.1 below, is of a decentralized nature, required each member to scan and process its own national literature. By and large this meant that each country would be processing literature in its own national language, a great advantage for a system that was to accept records of literature from all over the world. At the same time, however, participants soon agreed that the "carrier language" of the system, which is the language to be used in the computerized part of the input to the database, would be English. Although this did put an unequal burden on members whose native language was not English, this was facilitated by providing a very well structured authority for the controlled terminology, namely the INIS Thesaurus. Furthermore, with exemplary contributions of translations of the thesaurus from relevant national centres, translations of the thesaurus into all six official IAEA languages plus German were made available over the years.

2.1 Introduction – Mode of Operation

When the establishment of the INIS system was approved by the Board of Governors of the IAEA in February 1969[238], the method by which it was foreseen that the system would operate had

[238] See document GOV/OR.408, paras 40 and 51.

basically been defined by the "INIS Study Team" as the Team laid down in its final report[239]. The INIS Secretariat, essentially the INIS Section within the Division of Scientific and Technical Information of the IAEA, in consultation with the Members of INIS (both Member States and Member International Organizations), then developed the rules, formats, guidelines and Authorities that were applied in the creation of the INIS database and its output products.

The various aspects of the operation of the system are laid out in the following sections.

2.1.1 Principles

The system was to be a *"Mission Oriented System"* whereby the "mission" was the peaceful applications of nuclear science and technology. The system was to be computer based, though a printed output product was foreseen. Its operational philosophy was to be based on a decentralized mode of operation whereby the collection and scanning of the literature falling within the subject scope of INIS and the preparation of an input record for each such "piece of literature" was to be the responsibility of the country (or international organization) where the literature was published. The responsibility of the INIS Secretariat was to prepare input records for all the nuclear literature published by the IAEA and some other organizations of the UN Family, to merge the input received in Vienna, to perform checks and corrections as necessary and to prepare the output products. These products would then be sent back to the participating countries who were then responsible for providing information services based on these products to users within their national boundaries (or organizational confines if an international organization). Thus the "decentralized nature" of the system could be defined as having been the **basic principle** on which the system was based.

It may be appropriate to underline here the substantial advantage that such a decentralized operation of this mission oriented system had for all participating members. Effectively it enabled participation for large countries with a very substantial nuclear programme, medium sized countries and also small and developing countries with essentially no nuclear programmes except for the use of certain nuclear techniques, primarily in health care and possibly agricultural applications. Since the burdensome responsibility of each member, as mentioned above, was the preparation of an input record for each "piece of literature" published in the country, this burden was spread, one could say "justly", by requiring the large countries that produced much nuclear literature to prepare many input records, while the small countries had to prepare much less input. This was further accentuated by the fact that even the pieces of literature produced by scientists or other authors from small countries were, more often than not, published in journals that were produced in larger countries that therefore were responsible for the preparation of that input. Hence small countries required small resources to participate while large ones, who could better afford it, had to devote more substantial resources to their INIS participation. On the other hand, **all** participants have access to the **full** range of output products and can therefore draw benefit for their users working in the nuclear area.

2.1.2 Participation in INIS

At the time when the Board of Governors of the IAEA approved the establishment of INIS as mentioned in Section 2.1 above, the Board also requested the Director General of the IAEA to invite all interested Member States of the IAEA to participate in the system. Dr Sigvard Eklund, then Director General of the Agency, did so with his letter of 8 July 1969. Membership in INIS was

[239] "Report of the INIS Study Team", Vienna, July 1968, PL-308

(and is) restricted to States who are Members of the Agency, to UN organizations and to certain international or intergovernmental organizations.

To participate in INIS, an official request to this effect was to be made by the appropriate national or organizational authority to the Director General of the Agency. Those States or organizations that do so are referred to as INIS Members. Every INIS Member is represented in INIS by a Liaison Officer officially appointed by his/her Government, or Executive Head if an international organization. An Alternate Liaison Officer may also be appointed.

Participation in INIS entails certain rights, privileges and obligations for all Members.

Withdrawal from participation in INIS is at the discretion of the INIS Member. The rights extended to a Member cease upon the date of the INIS Secretariat's formal recognition of the INIS Member's withdrawal.

2.1.3 Rights and privileges of Members

Members have the right to carry out within their national boundaries (or organizational confines, if an international body) dissemination of information contained in and derived from all output products and services furnished by the INIS Secretariat. This is an exclusive right which remains with the Liaison Officer but may be delegated to the Secretariat. Members also have the right to cooperate with other INIS Members in the provision of input and in using the output products and services furnished by the INIS Secretariat. They may also attend and vote at Consultative Meetings of INIS Liaison Officers.

The first version of the *"Definition of Membership Arrangements for INIS"*[240], approved by the 4th Advisory Committee for INIS in 1985, then approved by the Director General of the IAEA and transmitted to the Board of Governors of the Agency in document GOV/INF/476 of 23 May 1985, also recognizes, in addition to any privileges deriving from the rights enumerated above, the following privileges for INIS Members:

i) - to receive limited free subscriptions to INIS Atomindex and its cumulative indices;

ii) - to receive one copy of the regular INIS output on magnetic tape at no cost.

iii) - to arrange access for INIS Members to any INIS database services made available by INIS Members, informing the Agency within one month of any arrangements involving access across national boundaries and subject to conditions laid out in para. 4(a). The services to national centres of developing countries shall be provided on a non-profit basis.

iv) - to receive assistance from the Secretariat, in a form jointly determined, in connection with the provision of input to INIS and the use of INIS output products and services. This assistance will usually be limited to agreed periods during which the INIS Member is establishing its own operations or experiencing particular difficulties.

It is clear from the above that the privileges granted to Members reflected the status of information technology at the time, with its use of printed products and magnetic tapes and no

[240] See Appendix I

mention of direct electronic access to any bibliographic references or full text. It is therefore not surprising that the currently valid document *"Arrangements for the International Nuclear Information System"*[241] that replaced in 2005 the earlier *"Definition of Membership Arrangements for INIS"*, mentions as one of the rights of INIS Members the right to "receive free of charge a copy of all INIS products and obtain access to INIS services."

2.1.4 Obligations of Members

The very principle on which INIS was founded brought a fundamental obligation to every INIS Member, worded in the first version of the *"Definition of Membership Arrangements for INIS"* as follows:

i) - the collection, selection, description, categorization, indexing, abstracting and related preparation, of items of literature published within its national boundaries (or organizational confines if an international body) and submission to the INIS Secretariat in Vienna in accordance with the definitions, rules, procedures, formats, and guidelines set forth in the "IAEA/INIS Reference Series" and associated INIS Circular Letters;

ii) - providing the Agency with the full text of each item of non-conventional literature, either as originally published or in the form of microfiche prepared to a standard specification, provided there is no legal prohibition or limitation;

Members' obligations as defined by the currently valid document *"Arrangements for the International Nuclear Information System"* are more detailed[242] and include making provisions to secure adequate financial and human resources to fulfill its obligations; ensuring comprehensive and timely coverage of the literature published within their national boundaries by submitting to the Secretariat complete references to the literature as specified by the INIS rules; by ensuring access to references to literature published within their national boundaries; by providing the Agency with **access** to the full text of each item of NCL, provided there is no legal prohibition or limitation.

The Member's obligations also require them to provide access to INIS information, maintaining contact with the users of INIS information products and services, and carrying out promotional activities as well as contributing advice and recommendations on matters relating to the maintenance, improvement and further development of INIS and evaluating INIS user needs for new products, services and collections.

2.1.5 Role of the INIS Secretariat

As mentioned in Section 2.1.1 above, the basic role of the INIS Secretariat has always been to prepare input records for all the nuclear literature published by the IAEA and some other organizations of the UN Family, to merge the input received in Vienna, to perform checks and corrections as necessary and to prepare and distribute the output products. The Secretariat was and is responsible, in consultation with INIS Members, for the development, updating and maintenance of all the authorities, standards, formats, definitions, rules, procedures and guidelines to be used for the preparation and processing of input and for the creation and utilization of output.

[241] See Appendix IV
[242] See Appendix IV, Section 3.3

The role of the Secretariat has changed over the years and is outlined in the documents *"Definition of Membership Arrangements for INIS"*[243] for the earlier years. The present role of the Secretariat is defined in the document *"Arrangements for the International Nuclear Information System"*[244]. The Secretariat carries the responsibility for managing and operating INIS, taking into account recommendations from the Board of Governors of the Agency, INIS Members and INIS advisory bodies. The Secretariat must also integrate literature citations from all INIS Members, including those from the Agency and other international organizations, into the database and ensure the availability of all INIS products and services; it must provide, maintain and develop the specific infrastructure required to support INIS operations; maintain and develop, in consultation with INIS Members, the appropriate authorities, standards, formats, definitions, rules, procedures and guidelines to be used for quality control.

Linked to the IAEA's role for knowledge preservation, the INIS Secretariat must ensure the long term preservation and access to all materials contributed to INIS; it must create and promote information products and services for use by INIS Members and provide training materials and coordinate INIS training activities.

The Secretariat is also responsible for organizing and conducting various INIS meetings such as the ILOs Assembly, technical committees and other meetings needed for the operation and development of INIS while at the same time maintaining provisions to support attendance of ILOs at INIS meetings. It also negotiates or determines the cost and price of INIS products and services.

2.1.6 INIS Guidance and Oversight

Oversight of INIS operations is carried out through normal IAEA management. However, right from the start, when the Board of Governors of the IAEA authorized the establishment of INIS in February 1969, it requested that:

> *The operation of INIS would be reviewed annually by an advisory committee, the members of which would be appointed by the Board after receipt of nominations from the Director General*[245].

As it subsequently evolved, the Advisory Committee for INIS described below, which reviewed INIS operations, met at irregular intervals, usually of about four years.

Furthermore, as described in Section 1.3.7 above, the Board of Governors of the IAEA requested at its meeting in March 1972, that the Secretariat prepare a comprehensive report on the operation of INIS during the years 1972-74. That report was presented to the Board at its meeting in February 1975 and the Governors expressed pleasure at the progress that INIS had made during those three years.

2.1.6.1 Advisory Bodies

Apart from the oversight mentioned above, a regular pattern of meetings of diverse bodies was established to ensure that INIS was operating to the benefit of its Members and within the best interests of the IAEA. These bodies were as follows:

[243] See Appendixes I and III, section 3.1
[244] See Appendix IV, section 4.1
[245] See document GOV/OR.408, 9 April 1969, p.12

Consultative Meeting of INIS Liaison Officers

For many years this body met annually and participation was open to the Liaison Officer of every INIS Member. After 1979 a pattern was established as a result of which the yearly meetings alternated in their location between Vienna and a location other than Vienna. Recently it was decided that, subsequent to the meeting in 2006, the frequency of the meetings would be bi-annual.

INIS Liaison Officers consider technical and operational matters concerning INIS activities and development, and make recommendations thereon. These matters include but are not limited to system development and innovation, access policy, distribution, marketing and promotion.

Although communication between the Secretariat and the Liaison Officers is continuous, both within a formal framework such as the issuing of *INIS Technical Notes, INIS Circular Letters* and *INIS Information Letters* described in Section 2.7 below and of course by e-mail or telephone as required, nevertheless it has always been important for the Liaison Officers and the staff of the Secretariat to meet periodically. This has engendered a feeling of belonging to "the INIS family" that has been responsible over the years for an exceptionally and highly motivated enthusiasm on the part of most of the Liaison Officers to cooperate on all INIS matters for the benefit of all concerned. There can be no doubt that the achievements of the system over a span of 40 years are owed to a large extent to contributions made in the name of the "INIS family".

INIS Advisory Committee

As mentioned above, in order to review INIS operations as recommended by the Board of Governors, an INIS Advisory Committee was established. The Committee, however, met at about four year intervals instead of the yearly frequency suggested by the Board. The operation of INIS was reviewed at times of major change in the System and the members of the Committee were experts serving in their personal capacities at the invitation of the IAEA.

The Advisory Committee considered economic and scientific policy matters and reported to the Director General of the Agency. The Advisory Committee, after having met ten times, last met in November 1998.

A decision by the Director General of the IAEA to eliminate most advisory bodies reporting directly to him rather than through the Deputy Directors General led to the abolition of the INIS Advisory Committee after 1998. The role of the Committee has been adapted by using other more flexible mechanisms such as consultancy meetings or other ad-hoc meetings on specific subjects.

INIS Technical Committee/Joint Technical Committee (Joint INIS/ETDE Tech. Comm.)

A Technical Committee normally meets every year. Participants, at the invitation of the IAEA, are technical experts nominated by INIS Members with a strong understanding of the INIS technical issues under consideration. Sometimes joint meetings are held with ETDE, when matters relevant to both systems are to be discussed and in particular when it concerns data exchange between the two systems.

The Committee discusses and makes decisions on technical issues that have an impact on INIS operations and makes recommendations to the INIS Secretariat and to the Liaison Officers. Technical issues include but are not limited to standards and formats, tools, services, products, workflows, etc.

Special Committees

A large number of special meetings of committees or panels were convened in the years immediately prior and subsequent to the establishment of INIS as described in Section 1 of this Report. These committees drew up initial technical specifications for the system and in subsequent years discussed a great number of specific technical questions connected with the further development of the system.

Currently special committees may be convened on an ad hoc basis at the request of the Secretariat or Members as the need arises. Such a committee would normally be convened to consider a specific topic.

2.1.6.2 Evaluations

There have been two full evaluations of INIS since the establishment of the system.

As described in Section 1.4.6 above, the *General Review of INIS Operations* (GRINO) took place during 1984-85[246]. Performing GRINO was an INIS initiative.

As described in Section 1.6.2 above, the IAEA carried out a *Programme Evaluation* of INIS during 2002[247]. The mechanism of "Programme Evaluation" is a normal IAEA process and not an INIS initiative.

2.2 Relations with other Systems or Organizations

As mentioned in the Foreword to this report, INIS was designed as an international cooperative venture, requiring the active participation of its members that would therefore need to invest human and financial resources in order to make it function. Because of certain pragmatic – one might almost say 'political' – reasons governing at the time of its establishment during the years of the Cold War, its founders found it appropriate that it should be established within the aegis of one of the specialized agencies of the United Nations, namely the IAEA. The work of the IAEA, founded as it is on its Statute, relies *de facto* on cooperation among its Member States. This of course applies fully to all its programmes, and INIS is no exception.

The basis for INIS operations is therefore cooperation between those Member States (and International Organizations) that have agreed to participate in its work, as is inherent in the nature of its home organization the IAEA. Particularly because of its decentralized nature and the reasons mentioned above, the *condicio sine qua non* for INIS operations was and is that there should be very close cooperative working relations between the national INIS centres themselves as well as between the INIS Secretariat at the IAEA and the national centres. But this is not all.

INIS was established and has operated successfully for 40 years because of the political will of its participating Member States but significantly also because of its capacity to provide easy access to scientific and technical information on all peaceful applications of nuclear science and technology to a body of users ranging from students and other academics, to research scientist,

[246] See documents L2-TC-441.13/3, p.3-29 and L2-AG-384.5/II

[247] "Evaluation Report of the International Nuclear Information System", IAEA Evaluation Series:02-1:MP7.R.1, July 2002. The report was presented to the Board of Governors of the IAEA as: "The International Nuclear Information System", document GOV/INF2003/12 Annex 3.

engineers, members of the power, medical, agricultural, chemical, mining, metallurgical and other industries and even to such disparate disciplines as archeology. This necessitated INIS to employ cutting-edge information technology in both the gathering and the distribution of its collected information. To do this INIS required partnerships with other systems and organizations but also with other players in the information industry that were driving the great strides being made in information technology.

We wish now to review the relations or partnerships developed between INIS as a whole and other information systems, organizations or independent entities.

2.2.1 Relations with FAO

It was during 1973 that the UN's Food and Agriculture Organization (FAO) headquartered in Rome, began considering the establishment of an information system for the agricultural sciences. As described in Section 1.3.10 above, cooperation between INIS and the FAO began immediately since it was clear to both organizations that any bibliographic information system that would be established by FAO would only gain by fully using the INIS experience. Hence the system that was started up, namely AGRIS, was but a mirror of INIS, the difference being that it referenced the world's literature in the agricultural sciences (Agriculture, Forestry and Fisheries) as opposed to the nuclear sciences.

Thus the cooperation between the IAEA and the FAO in producing the latter's AGRIS database and the printed *Agrindex* publication began at that time and continued for about a quarter century. FAO established a small "AGRIS Input Unit" at the IAEA in Vienna manned by FAO staff. All computer processing of the records of the agricultural literature and preparation of the output products (except the actual printing of *Agrindex*) took place with the INIS software running on the Agency's computers.

As described in Section 1.4.1 above, during 1976 the INIS Secretariat was making preparations for the establishment of an experimental cooperative computer network which would enable the searching of the INIS database loaded on the Agency's computer in Vienna, directly from remote locations. It was planned that with this "Direct Access Project" (DAP) the AGRIS database would also be available. Direct dial facilities and online service started in 1978 and continued till 1997.

2.2.2 Relations with ESA and IIASA

During the 1970s the European Space Agency (ESA) had established the ESA/IRS network (ESANET) that provided online access to many databases stored on ESA's computers in Frascati, Italy. Furthermore, the International Institute for Applied Systems Analysis (IIASA) located in Laxenburg just outside Vienna, Austria, had established access to its computers from a number of East European countries, as mentioned in Section 1.4.1. A second phase of the Direct Access Project evolved in co-operation with these two international organizations. As a result, any user that already had access to the ESANET or had access from Eastern Europe to the IIASA computers in Laxenburg, could have direct access to the Agency's computer and search the INIS and/or AGRIS databases online. When direct access to the two databases was discontinued in 1997 this cooperation with ESA and IIASA terminated.

2.2.3 Relations with the OECD

Starting in the late 1960s, the IAEA has had an agreement with the Nuclear Energy Agency (NEA) of the OECD for the distribution of computer codes (software) from the NEA Data Bank. On the basis of this agreement users in countries that are members of INIS but are not member countries of the OECD can obtain computer codes from the Data Bank thanks to an INIS staff member funded by the IAEA and permanently seconded to the NEA in Paris, France. This service is currently still active.

Also, as has been mentioned in section 1.3.11 above, the NEA had invited those INIS members that were also OECD members, to take advantage of its proposal to prepare for input to INIS references to nuclear laws or other legal literature published in their countries. A number of countries indeed took advantage of the NEA offer, after adequate arrangements had been made between the IAEA and the NEA. In recent years, due to lack of human resources at the NEA, this cooperative effort has been discontinued.

2.2.4 Relations with UNESCO and the ISO

As mentioned in Section 1.2.1 above, during the 1960s UNESCO was in the process of establishing the UNISIST programme, defined as an "Intergovernmental Programme for Co-operation in the Field of Scientific and Technological Information". During the period of the establishment of INIS and its early years of operation, the IAEA actively pursued cooperation with UNESCO in its efforts in the area of scientific information and, whenever possible, INIS rules, formats, guidelines etc. were established by following UNISIST guidelines.

The International Standards Organization (ISO) has established a great number of standards in the area of information exchange. Cooperation between INIS and the ISO has been frequent and mutually beneficial. Members of the INIS staff have frequently served on ISO committees that have developed and approved international standards in areas relevant to INIS. There have even been at least two occasions (two and three letter country codes and rules for the structure of monolingual thesauri) when INIS had to develop and adopt "standards" of its own because of the inexistence of international standards. These INIS "standards" were then incorporated in later ISO international standards.

2.2.5 Relations with ICSTI (Moscow)

The International Centre for Scientific and Technical Information (ICSTI) of Moscow has long been one of the international organizations member of INIS. During the years it has hosted a number of INIS training events but has also performed certain studies such as the comparison of coverage between the INIS database and a number of other databases performed in 1982 as described in Section 1.4.4 above and initiated together with the Secretariat the development of the software FIBRE in 1989 as described in Section 1.4.8 above.

2.2.6 Relations with the Energy Technology Data Exchange (ETDE)

As described in Section 1.4.8 above, in January 1987 a number of member states of the IEA (International Energy Agency) of the OECD, signed an "Implementing Agreement" to operate a new information system referred to as ETDE (Energy Technology Data Exchange). The ETDE database would not be limited to the peaceful applications of **nuclear** energy but would cover the

world's literature on **all** types of energy sources. All member states of ETDE were already members of INIS. The format and most other characteristics of the ETDE database are very similar to INIS. ETDE takes the full INIS input as the input to their database in the nuclear energy area.

Early in 1994 a formal document was signed that clearly lays down how INIS/ETDE cooperation should be channeled. The text of that *"Memorandum of Understanding"* is found in Appendix II of the present document. There has been a great deal of cooperation between INIS and ETDE. Cooperative ventures have included joint development and maintenance of standards and authorities, compatibility of subject categories for both nuclear and non-nuclear disciplines, joint studies to improve indexing procedures, and joint training sessions.

A clear and continuing example of INIS/ETDE cooperation has been the holding of meetings of the Joint INIS/ETDE Technical Committee that usually meets at yearly intervals, the location of the meeting usually being alternatively Vienna and Oak Ridge, Tennessee, USA, where the Operating Agent of ETDE is located[248].

2.3 Subject Scope and Coverage of INIS

2.3.1 Subject Scope

When INIS was designed in the late 1960s an initial subject scope was defined by the INIS Study Team[249]. Subsequently the subject scope was defined by a document in the INIS Reference Series, IAEA-INIS-3 (Rev…..), *"INIS: Subject Categories and Scope Descriptions"*. The document has undergone a number of revisions, the latest being Revision 8 of October 1997.

As cooperation with ETDE became closer, the two organizations decided to publish a Joint Reference Series of documents. In that joint series the subject scopes of the two systems are defined by the joint document: ETDE/INIS-02, "*Subject Categories and Scope Descriptions"* of July 2002.

The total subject scope is divided into a hierarchical set of categories whose total scope constitutes all peaceful applications of nuclear science and technology. The hierarchy of categories has changed over time from three levels to five levels to the current one level.

Section 1.3 above describes how INIS started operations with a limited subject scope, as had been requested by the Board of Governors of the IAEA, with plans to reach full scope after two or three years. Difficulties in a number of Member States prevented them from sending regular input at the start of the system. As a result it was not until 1975 that INIS was able to operate at full capacity and within the full subject scope initially identified.

In December 1974 the Advisory Committee for INIS stated that:

> ***The Committee expressed the view that the scope of INIS should be defined by the scope of the Agency's interests; whilst it could be somewhat narrower, it should not in any case be wider.***

In November 1989 the Advisory Committee for INIS recommended some changes in the subject scope to be covered by the system. Of particular importance was the expansion of the scope

[248] See section 2.1.6.1 above.
[249] Report of the INIS Study Team, document PL-308, July 1968, Appendix C, p.59

to cover economic and environmental aspects of all energy sources, not only nuclear sources. This expansion of subject scope became effective in 1992.

2.3.2 Document Types

The total volume of literature to be reported to INIS was divided into two broad classes: 1) conventional literature and 2) non-conventional literature (NCL).

Conventional literature is defined as literature usually easily available through normal commercial channels. The following document types are recognized as being conventional literature: journal articles; books; computer medium (machine-readable information recorded on floppy or compact disk, magnetic tape or other memory device).

NCL is defined as literature not easily available through normal commercial channels and is generally more difficult to locate. Such publications are normally referred to as "grey literature". The following document types are recognized as being NCL: scientific and technical reports; patents, pre-conference papers.

Each specific type of document is identified in the database by a unique "Literary Indicator".

2.3.3 Geographic Coverage

The geographic coverage of the database is intended to be that of all the IAEA Member States that are Members of INIS plus certain international organizations as defined in Section 2.1.2 above. Since INIS membership now stands at 146, geographic coverage is practically worldwide.

2.3.4 Time Coverage

When INIS was established and became operational in 1970, it was decided not to report to the system literature published before 1970. Nevertheless a small number of items of literature published before 1970 have entered the database. In recent years there have been discussions about the possibility of a retrospective enlargement of the INIS database. This possibility can realistically be entertained inasmuch as a very large part of the nuclear literature published between 1948 and the start of INIS operations in 1970 was captured by *Nuclear Science Abstracts* published by the USAEC. Following discussion between INIS and the Office of Scientific and Technical Information (OSTI) of the US DoE, the current INIS national centre of the USA, it is now possible for users of the INIS database on the Internet to gain access to the NSA files. This "NSA Viewer"[250] allows searching of the NSA database which currently contains over 829 000 items from the printed NSA.

2.4 Data Capture and Submission

2.4.1 Bibliographic Data

Each "piece of literature", as each item to be reported to INIS is referred to, has to have a bibliographic description obtained by following the INIS descriptive cataloguing rules as laid out by

[250] Available at http://www.osti.gov/inisnsaview/

the document of the INIS Reference Series: IAEA-INIS-1, *INIS: Guide to Bibliographic Description.* The work of preparing the bibliographic description was assisted by the document: IAEA-INIS-2, *INIS: Descriptive Cataloguing Samples*.

The record format adopted at the time of the initial INIS design was essentially that of the US Library of Congress "MARC" format[251]. The format went through many minor changes over the years as described in detail in the document of the INIS Reference Series: IAEA-INIS-22, *INIS: Database Manual*. Recently the format has been changed to an XML format and its development has been the substance of very detailed and lengthy discussions with the Operating Agent of the ETDE system[252]. The XML format will eventually be used for the output products of the INIS database. The currently valid revisions of the required documents are: IAEA-INIS-1 (Rev.8), *INIS: Guide to Bibliographic Description* of March 2007 and IAEA-INIS-2, *INIS: Samples of Bibliographic Description* of January 2000.

A number of other documents of the INIS Reference Series provided guidelines or Authorities to be used in the preparation of input to the system. These included codes for countries and international organizations, authority lists for corporate entries and report number prefixes, authority lists for journal titles, etc. The full list of documents of the INIS Reference Series and of the ETDE/INIS Joint Reference Series is given in Appendix V.

2.4.2 Subject Data

Each "piece of literature" reported to INIS, apart from its title, is to be accompanied by three indicators of its subject content namely: 1) an English language abstract, 2) a subject category and 3) a set of "descriptors" selected from the INIS Thesaurus. An abstract in the original language, if not English, may optionally be included in the record.

1) Abstract
The English language abstract is to be prepared following the guidelines provided by IAEA-INIS-4, *INIS: Instruction for Submitting Abstracts*. In practice practically all abstracts are author abstracts.

2) Subject Category
The Subject Category assigned to the piece of literature has to be chosen from among those defined in the document IAEA-INIS-3, *INIS: Subject Categories and Scope Descriptions*. This has recently been replaced by the joint document ETDE/INIS-02, *Subject Categories and Scope Descriptions* of July 2002.

3) Descriptors
According to the original rules, the descriptors (or "Keywords" as they are sometimes called) assigned by the subject specialist indexer to the piece of literature, were to be selected from the document IAEA-INIS-13, *INIS: Thesaurus* on the basis of the analysis of the **full text** of the piece of literature. Guidance for the indexing process was provided by the document IAEA-INIS-12, *INIS: Manual for Subject Analysis*. This has recently been replaced by the joint document ETDE/INIS-03, *Manual for Subject Analysis* of October 2002, while the thesaurus has been replaced by ETDE/INIS-01 (Rev.2.2), *Joint Thesaurus* of April 2009. Currently, very few INIS centres can afford the luxury of having indexers with professional subject knowledge of all the scientific areas that make up the INIS subject scope. Thus the indexing is performed by the available staff, be they subject specialist, librarians or whatever.

[251] MARC – MAchine Readable Cataloguing
[252] See discussions referring to this subject starting with Section 1.5.3 above.

Furthermore, currently the majority of items of input are indexed by CAI software (on the basis of title and abstract only), and the resulting set of descriptors are then reviewed and changed as needed by the subject specialists at the INIS Secretariat.

2.4.3 Integrated Data Preparation and Checking Software

As described in Section 1.4.11 above, during 1991 the Secretariat distributed to national INIS centres the first version of the FIBRE software that permitted direct keyboarding of input data on a PC. Since the software also performs many direct checks of the correctness of the input as it is being prepared, the overall quality of the input received in Vienna is vastly improved. It is also a much more efficient and speedy process of input preparation.

Subsequent versions of FIBRE have many additional features, such as direct consultation of Authorities such as the Thesaurus with the possibility of selecting appropriate descriptors by a simple mouse click.

More recently, as described in Sections 1.7.1 and 1.7.2 above, the Secretariat started development of a new tool, a "Metadata Extraction Tool" (MET) that would produce improved input quality and performance. From electronic documents in PDF format, the tool can capture text from the original full text, can reformat the contents according to INIS input rules, can verify the data against INIS authorities and produce and export bibliographic files. When fully developed MET will be able to perform all data checks as had been done by the FIBRE software and will therefore produce "clean" input to be entered into the database. MET will eventually replace the FIBRE software entirely. The availability of such MET software to fully replace FIBRE at National INIS Centres is foreseen for the year 2012.

2.4.4 Full Text of NCL

For each item of NCL, the full text of the piece of literature should be sent to the Secretariat for inclusion in the collection of the INIS Clearinghouse. If this is not possible because of legal, copyright or other distribution issues, an availability note is to be included with the record indicating how or where the user may obtain the full text.

2.4.5 Data Submission

Methods for data submission have of course changed radically over the years of INIS operations. They will be briefly outlined here.

Initially bibliographic and indexing data and abstracts were submitted on one of the following supports which were physically mailed to Vienna:

a) typed Worksheets or
b) punched paper tape or
c) 7 or 9 track magnetic tape.

These three supports were later supplemented by:

d) typed OCR sheets.

Eventually the punched paper tapes, then the OCR sheets and finally the magnetic tapes became obsolete. They were replaced by electronic transfer via FTP upload to the IAEA's

computer, later supplemented by sending the data as attachments to electronic messages and then by data transfer via Internet to the INIS input site at the Secretariat.

Two methods were used for transfer to the Secretariat of the full text of NCL by mailing to Vienna either:

a) a physical copy of the actual document or
b) a microfiche copy of the document.

This has now been supplemented by the possibility of sending an electronic copy of the document via Internet preferably in Acrobat PDF format though TIFF (Group IV), MS Word or HTML formats are also accepted.

2.5 Data Processing and Merging

2.5.1 Bibliographic and Subject Data

Software for the processing of input and preparation of output products was all developed in-house. The first set of programs was used to process the data as of early 1970 when the first INIS input was received in Vienna. A fairly thorough review and rewriting of the software took place in the late 1970s. By the beginning of the 1990s it was decided to undertake a completed migration of all INIS applications from the mainframe to the modern Client/Server platform. A completely new set of programs was developed. As mentioned in Sections 1.5.1 and 1.5.3, this new *INIS Data Processing System* (IDPS) consisting of the *Input Registration Subsystem* (IRS), the *INIS Record Processing Sub-system* (IRPS) and the *Output Products Subsystem* (OPS) entered production in July 1998.

Processing of the data received as input to the system, which of course included the data prepared by the Secretariat referring to literature published by the IAEA, required close cooperation between the staff of the INIS Section proper and the computer support staff.

During the early INIS years, when a substantial proportion of the input was received on typed worksheets, that data was keyboarded by INIS Secretariat staff. This input was merged with paper tape and magnetic tape input and processed in "Runs", where normally each "Run" consisted of the input from a particular INIS input centre (country). The "data stream" of the input being processed was subdivided into two parts: the descriptive cataloguing part and the subject analysis part of each record. The two parts were subjected to extensive computer checking by the processing software. Where possible some automatic correction of errors was carried out by the programs; all errors that could not be corrected by machine were printed out for manual correction. The descriptive cataloguing part of the data stream carried the items containing errors to the staff of the Bibliographic Control Unit while the subject analysis part of the stream carried the items containing errors to the staff of the Subject Control Unit for correction. Manual corrections on paper were then keyboarded to update the input files. Inordinate amounts of printer paper were used.

Currently input is in the so-called FIBRE format, which is an ASCII representation of the INIS format. In addition, electronic input received from various publishers is converted into this format then processed as regular input. Since the introduction of the IDPS all checking and correction of input items is done on-line. The system enables the user to consult all Authorities (such as the Thesaurus) on-line while performing the corrections.

2.5.2 Full Text of NCL

Parallel to the processing of the input stream of records, the Clearinghouse processed the full text of the NCL. Those items of NCL for which the full text was received as a physical copy of the document had to be prepared for photographing by the cameras that produced the microfiche. After photographing the pages of text, chemically processing the resulting microfiche and enveloping the fiche, they were merged with the full text NCL received in microfiche form. Completeness checks were performed to ensure that every item of NCL for which there was an input record was linked to the correct full text of the document. The master copy of each microfiche was added to the collection of the Clearinghouse.

Currently the full text of NCL may still be submitted as a physical copy of the actual document or in electronic form as mentioned in Section 2.4.5 above. The physical documents received are then scanned at the Secretariat.

2.5.3 "Production" of the Output

Quality control was exercised inasmuch as up to 5% of input items were randomly selected by the software and printed out for detailed checking of the quality of the descriptive cataloguing and subject analysis. Comments from the Secretariat on the quality and correctness of the input were returned to the relevant inputting centre.

Twice per month the system went into "production". All input items that had been checked during the previous two weeks and corrected if necessary and were therefore "clean" (and the Clearinghouse had a full text if NCL) could go into "production". All the items that went into production were written to output magnetic tapes and were printed in the next issue of the printed *Atomindex*.

Currently the system goes into "production", that is, the database is updated with the new input that has been checked and corrected as needed, at weekly intervals, with a total number of 50 "productions" per year. The output bibliographic files are now all in XML format, while output in the old ISO 2709 format is being continued for some Members requesting it until 30 June 2010.

2.6 Output Products, Distribution and Access

As mentioned in Section 2.1.3 above, every INIS Member shall have the right to "*Receive free of charge a copy of all INIS products and obtain access to INIS services".*

2.6.1 Bibliographic and Subject Data

In the early INIS years those Members that wanted them received 24 times per year the updates to the database on magnetic tape plus one copy of the printed *INIS Atomindex*. Further copies of *Atomindex* were available at cost.

As of 1978, the INIS database was available via the DAP[253] for searching directly on the IAEA's computer.

[253] See Section 1.4.1 above.

Starting with 1991, the INIS database became available on CD-ROM[254] and this support quickly gained much favour among INIS users. The product is currently still made available by the Secretariat[255].

Production and distribution of the printed *INIS Atomindex* was discontinued with the end of 1997. Direct access to the INIS database via the DAP from the computer at the IAEA was also discontinued with the end of 1997.

Access to the database maintained at the IAEA has been available via the Internet starting in 1998[256]. Free access to the INIS database online is offered to Universities and academic institutions in INIS Member States, furthermore free access is offered to participants at conferences or training courses in the area of nuclear science and technology.

As pointed out in the document *"Arrangements for the International Nuclear Information System"*[257], the Liaison Officers have the right to:

> *Disseminate within their national boundaries or organizational confines all products developed by INIS, provided there is no legal prohibition or limitation. This exclusive right shall remain with the ILOs, but may be delegated to the INIS Secretariat or to another INIS Member.*

As a result, INIS services for end-users may vary from country to country, though the Secretariat remains the centre of last resort to access INIS information. Some Members have made arrangements with information providers with international distribution. Among them are:

In the USA:

The ETDE Energy Database, into which is merged the full INIS database, is available to users in all ETDE member countries and, since 2004, to many developing countries. It is also available via ETDE's own Internet product, ETDEWEB[258].

The ETDE Energy Database is also provided by the United States to the commercial provider "Dialog", which merges it with other sources of information to form its *Energy Science and Technology Database* (file 103) available through Dialog[259]. The database is also available in CD-ROM format.

In Germany, USA and Japan:

INIS online through STN International[260].
The INIS Database is maintained at the Fachinfonnationszentrum (FIZ) Karlsruhe, Germany, and is accessible through STN International, the *Scientific and Technical Information Network*, operated cooperatively by FIZ Karlsruhe, Chemical Abstracts Service (CAS) of the American Chemical Society (ACS), Columbus, Ohio and the Japan Science and Technology Corporation, Information Center for Science and Technology (JICST), Tokyo.

INIS Database as part of ENERGY Database through STN International.

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[254] See section 1.4.11 above.
[255] See site http://www.iaea.org/inisnkm/inis/products/availability.htm
[256] See site http://www.iaea.org/inisnkm/inis/products/availability.htm
[257] See Appendix IV.
[258] See site https://www.etde.org/etdeweb/
[259] See site http://www.dialog.com
[260] See site http://www.stn-international.de/

All member countries of the Energy Technology Data Exchange (ETDE) can have access to INIS information in the *Energy Science and Technology Database* in which the full INIS data is included. The database covers worldwide energy-related information on energy sources, use and conservation, regulatory considerations, as well as basic scientific studies. It covers the period from 1974 to the present and contains more than 3.8 million records.

Member country online services
Many INIS Members also provide online access through national or in-house systems[261].

As described in Section 1.7.3 above, as of 3 April 2009 the INIS Database was opened to all Internet users around the world. Free, open and unrestricted web-based access was provided to all users interested in the peaceful applications of nuclear science and technology.

2.6.2 Full Text of NCL

The full text of NCL, so called "grey literature", has always been available from INIS. The INIS Clearinghouse has a complete collection of microfiche, in part photographed and produced in-house, in part obtained directly from the country of origin via the national INIS centre. Microfiche in the collection are linked to the respective record in the INIS database. For many years quite a number of INIS Members had full subscriptions to the full text of NCL documents on microfiche. Most of these subscriptions terminated around 1997. Requests for the full text of single documents by individuals in INIS Member countries were satisfied either by the national INIS centre that subscribed to the full collection of microfiche or by the INIS Clearinghouse at the Secretariat.

Electronic imaging of full text NCL started in 1997. From that date the full text NCL has been made available on CD-ROM. Documents processed earlier in microfiche are currently being imaged in a retrospective process that will ultimately see the whole collection digitized. Single documents are being imaged as required on request. The CD-ROMs are distributed free to those Members who accept the responsibility of redistributing the full text NCL as needed within their jurisdiction.

2.6.3 Full Text via the Internet

All full text, either NCL or conventional literature, that has been authorized for free distribution, is available on the Internet via a link from the relevant record in the INIS Database.

2.6.4 Online Ordering of Documents

Full text documents can be ordered online from selected Document Delivery Services. At present, INIS has arrangements with 61 national INIS centres to provide document delivery services to users within their jurisdiction. Requests for individual pieces of literature produced since 1997 are referred to these Centres if they exist in the country of the requester. Orders for pieces of literature published prior to 1997 can be addressed to the INIS Secretariat.

2.7 Communication with Members

[261] See site http://www.iaea.org/inisnkm/inis/products/avail_othhosts.htm

Over the years, the decentralized nature of INIS always necessitated close cooperation between the Secretariat and the Members. Personal communication has always been the most effective form of communication; this has been furthered and fostered in a variety of ways, not the least being the annual consultative meetings of all the INIS Liaison Officers that took place alternatively in Vienna and at national INIS centres at the invitation of the respective Government of the Member. Not without cause this large group of persons frequently referred to themselves as "the INIS Family".

The meetings of the Liaison Officers, of the various Technical Committees, of the Training Seminars and other Capacity Building exercises as well as personal visits of Member staff to Vienna or INIS Secretariat staff at the national INIS centres, strengthened interpersonal relations and ensured that INIS responded fully to the needs and requirements of its Members.

All rules, guidelines, formats, Authorities, samples of input, description of output products, training tools etc. were and are fully described in the documents of the *INIS Reference Series*, now complemented by the documents of the *Joint ETDE/INIS Reference Series*. Copies of these documents are always available for Members. In addition, three systematic methods for communication with Members have always existed; these are: *INIS Technical Notes, INIS Circular Letters* and *INIS Information Letters*.

INIS Technical Notes

Whether with respect to input preparation or with one of the output products, if there is discussion about a possible change or improvement or a completely new aspect that could influence any rule, guideline, Authority, format or whatever of the system, there is need for consultation within the Members and with the Secretariat. Between meetings of the Liaison Officers such consultations are preceded by the issuance of a Technical Note that describes the precise change or novelty that is being considered and offers a choice of possible approaches or solutions.

Such Technical Notes sent by the Secretariat to the full membership require a response from the Members. Usually most Members respond and the Secretariat then takes such actions as are recommended by the majority of Members. If the matter proves difficult to resolve or entails lengthy implementation periods, it is then inevitably taken up at the next consultative meeting of the Liaison Officers.

To date the Secretariat has issued 185 Technical Notes.

INIS Circular Letters

Whenever a change or improvement or new aspect that could influence any rule, guideline, Authority, format or whatever of the system, is introduced after agreement among the Members, it is "officially" announced to the membership via a Circular Letter. These Circular Letters essentially are a form of update to the documents of the Reference Series and their contents are included in the next revision of such documents.

To date the Secretariat has issued 161 Circular Letters.

INIS Information Letters

Information letters are employed to inform Members of statistical data concerning input/output, forthcoming INIS meetings, INIS staff vacancies, dates or deadlines for the implementation of a specific action or any other matters relevant to the general operation of the system.

To date the Secretariat has issued 247 Information Letters.

Needless to say, the Secretariat communicates with individual Members by postal or electronic mail whenever such action seems warranted.

For the last few years a "Members Area" has been available on the INIS Website[262]. This password protected web site provides a rich selection of information for Members in many aspects of their relationship with the system.

2.8 INIS Publications, Marketing and "Online Presence"

2.8.1 Publications

2.8.1.1 INIS Newsletter

Starting with March 1972 the Secretariat began publishing the *"INIS Newsletter"*, intended to be a quarterly sheet that provided all Members with non-technical news about events, people, major and minor milestones, new products and new services. It provided news both from the Secretariat and from the national INIS centres. It was intended primarily for the "INIS Family", so to speak. Though the intention was to publish quarterly, the needs of resources required directly for the processing of input, creation of the output products and training took priority. The appearance of the Newsletter was therefore irregular. It was published 55 times. Starting with 2006 it was replaced with the newsletter *"Nuclear Information and Knowledge"* described below.

2.8.1.2 Nuclear Information and Knowledge

With the administrative reorganization of INIS activities from an *"INIS Section"* to an INIS Unit within the *"INIS and Nuclear Knowledge Management Section"* as described in Section 1.6.3 above, a new newsletter was brought to life. The new publication known as *"Nuclear Information and Knowledge"* first appeared in April 2006 and is planned to have a semi-annual frequency. It provides general news about both INIS and the Knowledge Management Unit. As was the case with the earlier newsletter, it provides news about events, people, new products and new services, meetings, workshops, Internet presence, etc.

2.8.1.3 INIS Periodic Report

With the year 1995 the Secretariat started publishing an *INIS Periodic Report* in the form of a glossy, colourful and attractive publication intended for the general public. Its contents provided general information on INIS events, training activities and developments over the past year, at the Secretariat but more particularly in the member countries and organizations. It also presented statistics on the growth of the INIS database, the contributions made by the Members and the volume of new literature in the different subject areas. It specifically highlighted the benefits that

[262] See site http://www.iaea.org/inisnkm/marea/member1.htm

users could draw from the INIS output products and provided information on how best to gain access to those various products. Starting from 1996 the name was changed to *INIS Annual Report.*

Financial constraints required the *INIS Annual Report* to take on a more modest mantle and starting from 1999 it was published in a simpler black-and-white version. Further budgetary restrictions led to the discontinuation of the publication after 2002.

2.8.1.4 "Presenting INIS"

This little booklet, in a handy format and glossy, attractive appearance, is published, as the name implies, to provide to the general public information about INIS, its mission, the general characteristics of the data it includes in its database, its subject coverage, its mode of operation, its membership, its output products and the manner in which access can be gained to those products.

The booklet has gone through a number of editions, a new one usually being produced when some substantial changes have occurred in INIS operations. This has been particularly the case when new output products have been made available to users of the database or full text NCL.

The booklet is made available in Arabic, Chinese, English, French, Russian and Spanish.

2.8.2 Marketing and "Online Presence"

Promotion of INIS is undertaken jointly by the Secretariat in Vienna and the Liaison Officers in Member States. Its aim is to increase awareness of the INIS system, its products and services and to highlight benefits for current and potential users. Members are responsible for organizing promotional activities in their countries while the INIS Secretariat assists by providing information material.

Activities include promotion and marketing at IAEA and other nuclear conferences, meetings, symposia and exhibitions with online and/or CD-ROM demonstrations. The Secretariat has "stands" that can be borrowed and set up at such meetings or conferences with posters to attract attention to INIS services and to enable marketing staff to distribute brochures and provide information and/or sample searches of the database. Other activities include publishing articles and advertising in professional journals; provision of promotional materials to hosts; preparation and distribution of brochures, information sheets, demo CDs, and other promotional tools. INIS entries are published in directories world-wide.

INIS has been present "Online" ever since the Direct Access Project (DAP) became operational in 1978 as described in Section 1.4.1 above. As of that date the INIS database could be searched online at the computer of the IAEA in Vienna from a number of European countries and, as the worldwide networking of computers increased, from an ever larger number of countries throughout the world.

The first appearance of an INIS website was in 1996 when the Secretariat launched the first version of the INIS Home Page[263]. The website has undergone fundamental changes, being first known as the "INIS Portal" and later as the "INIS Web Service". The INIS Web Service was made available to INIS Members in August 1999 and, after enhancements, made available to the public as

[263] See Section 1.5.3 above.

of January 2000. Meanwhile, the INIS database on the Internet had become fully operational in October 1998.

Extensive information about INIS, its operation, its Members and importantly, how to gain access to its database, the full text of nuclear documents and other nuclear related information sources, were made available at the INIS website within the site of the IAEA at the following URL: http://www.iaea.org/inisnkm/inis/aboutinis/overview.htm From here the user has links to the password protected "Members' Area" or directly to the database.

With the opening of the INIS Database for free, open and unrestricted web-based access to all users starting in April 2009[264], the on-line presence of INIS acquired a fully new dimension[265]. Vigorous cooperative marketing efforts between the Secretariat and Member States are afoot to enhance the visibility and encourage the use of the on-line Database.

2.9 Capacity Building

Under the general heading of "Capacity Building" is understood a wide variety of activities and efforts carried out by the Secretariat and directly or indirectly involving members of its staff. Its primary purpose is to familiarize staff at the national INIS centres with all aspects of INIS operations, be they related to input preparation or use of the output products[266]. But such familiarization efforts are also instrumental in transferring experience and knowledge about information systems, bibliographic databases, access to full text of documents, use of the Internet and other documentation activities independent of direct INIS applications. INIS capacity building efforts are both classroom-based and e-learning and take a variety of forms briefly described below.

2.9.1 Training

The INIS training programme is designed to meet a number of objectives:

- Establishment and improvement of a national information infrastructure in Member States
- Transfer of modern information technology
- Gaining expertise in preparation of input to the INIS database
- Maintenance of high quality and coverage of the INIS database
- Maximum utilization of INIS output products
- Improved responsiveness to needs of users in Member States
- Fostering exchange of scientific and technical information

[264] See Section 1.7.3 above.
[265] See http://inisdb2.iaea.org
[266] T.Atieh, R.Workman., "Thirty-five years of successful international cooperation in nuclear knowledge preservation: the International Nuclear Information System (INIS)", Int. J. Nuclear Knowledge Management, Vol.2, No.1, 2006, p.76

INIS training seminars are funded and staffed by the Secretariat and emphasize INIS input skills and use of output products. All aspects of INIS operations are addressed in the training events organized by the IAEA for Members, including selection criteria for the literature to be reported to the system, abstracting, descriptive cataloguing, indexing, retrieval, marketing and promotion. The training events are aimed at assisting INIS Members in training personnel newly involved in input preparation and utilization of output products.

Training events have been held from the very beginning of INIS operations. The first such seminar was a regional seminar for South and East Asia and the Pacific held in November/December 1970 at the Bhabha Atomic Research Centre (BARC) near Mumbai at the invitation of the Government of India[267]. Training seminars have been held, over the whole history of INIS, usually once per year. Vienna was the frequent location of such seminars but they have also been held at some of the national INIS centres. To date INIS has held 76 training events, involving over 1800 trainees.

Frequently, if the seminar is held at one of the national INIS centres, it is declared to be a "Regional Seminar" and special efforts (and financing) are made to facilitate attendance by staff of INIS centres in that region.

2.9.2 Technical Cooperation Projects

The IAEA's Department of Technical Cooperation organizes, coordinates and finances projects in IAEA Member States, primarily in developing countries. Proposals for projects are made by individual countries or groups of countries, in the latter case resulting projects are usually referred to as regional projects. If a proposed project is approved and funded by the Department, a "Technical Officer" is appointed for the project. The Technical Officer is usually not a staff member of the Department of Technical Cooperation but rather of an Agency Division that is directly concerned with the specific field of activity relevant to the project. Hence the Department of Technical Cooperation has turned many times to the INIS Secretariat to designate a Technical Officer for projects dealing with nuclear information exchange. A designated Technical Officer usually devotes 5–10% of his/her time to work on that project.

Many of the IAEA's Technical Cooperation projects relating to nuclear information exchange have aimed at improving information infrastructures in developing countries and establishing nuclear information services usually based on INIS output products. Establishment and improvement of national INIS centres has been a part of this so as to ensure the reporting to the system of the nuclear literature published in the country and provision of nuclear information to local users.

INIS has participated with the Department of Technical Cooperation in over 50 national and regional projects. Many of these projects have resulted in what may be considered "success stories" for INIS and the Department of Technical Cooperation. To give just one example: the ARCAL[268] regional projects in Latin America. These projects, some starting as early as 1985, and ending in 2000, led to the establishment or strengthening of many of the national INIS Centres in the region and finally to the establishment by the Members in the region of the RRIAN (Red Regional de Informacion en el Area Nuclear)[269]. This network facilitates the sharing of services for access to

[267] See Section 1.3.2 above.
[268] Acuerdo Regional de Cooperacion para la Promocion de la Ciencia y la Tecnologia Nucleares en America Latina y el Caribe
[269] See http://rrian.cnen.gov.br/

nuclear information by users in Latin America and the Caribbean and in particular for the availability of the full text of documents in the nuclear area.

2.9.3 Fellowships and Scientific Visits

Fellowships and scientific visits are also sponsored by the IAEA Technical Co-operation Department in conjunction with INIS. A "Fellowship" is designed for junior staff members in Member States, generally has a duration of two to three months in a single geographic area, and constitutes on-the-job training. Over 130 fellowships have been granted to date. A "Scientific Visit" is designed for senior staff in a Member State and has a duration of one to three weeks usually in more than one location. Over 100 scientific visits have been arranged by INIS.

2.9.4 Distance Learning Programme

The INIS Distance Learning Programme was developed during the late 1990s and became operational in the year 2000[270]. It provides comprehensive instructions about input preparation in two courses: Bibliographic Description and Subject Analysis. The program is available free, both on-line and off-line on CD-ROM, for individualized, self-paced study addressed to the staff of the INIS Centres.

[270] See Sections 1.5.3 and 1.5.4 above.

3 EXTERNAL CONTRIBUTIONS

Contributions from Persons that played a significant role in the establishment and development of INIS

Many persons played a substantive and critical role in the establishment and development of INIS. Some of them were involved only for a few years, others for longer periods. While the present report attempts to provide the full history of INIS, it was felt that some personal and direct contributions from some of those very players would provide a lively perspective of the events, through the eyes of someone that was actually at the pulse of negotiations, proposals and developments.

A number of persons were contacted and invited to make such written contributions. A good number agreed and their statements follow here below. These are personal statements and reflect the author's perceptions with regard to the establishment of INIS and its further development. Some of the statements are from persons who had associations with INIS both as members of the Secretariat and as staff of the INIS centre of their country, in which cases the comments reflect the perspective from both locations.

Alas, we must recognize that it is already too late to have contributions from a number of persons that played a very important role in the establishment and development of INIS.

3.1 INIS at 40

John E. Woolston
Director, Division of Scientific and Technical Information, 1967-1970

In the 1960s, our world was seen as divided into three clusters: the 'capitalist' countries, the 'socialist' countries, and the 'Third World', or developing countries. The first two clusters were engaged in an intense and dangerous rivalry, the 'Cold War'. They competed with each other for influence in the developing countries, many of which were just emerging from colonial subjugation and had little more than their poverty to bring to international policy-making.

Despite all this, there was an underlying assumption that some highly desirable goals could be achieved more effectively by cooperation rather than by competition. For example, some 'capitalist' countries, as well as 'socialist' countries, had built national health-care and social-security systems. Regional and international organizations had been established with statutes empowering them to foster cooperative programmes involving all their members.

In 1966, the Soviet Union gave a cautious but serious response to an initiative from the United States to establish a global system for sharing information produced in nuclear research and the peaceful applications of nuclear technology. Their bilateral discussions in the summer of that year were seen by the rest of the world as offering promise for a modest break in the 'Cold War', and a wave of universal political support carried the concept of INIS over the several hurdles – financial as well as technical - that had to be crossed to bring it into operation.

Many might think it quite remarkable that the basic system designed 40 years ago is still in operation. Beginning in the 1980s, there has been a global shift of opinion away from organised cooperation – often characterized as 'bureaucratic' - and towards a trust in competition, a reliance on market forces to achieve desired outputs with maximum efficiency. Nevertheless INIS has survived, and I am encouraged to believe that it is headed for a second burst of recognition and achievement.

While the 'Cold War' is history, we have a new nightmare to prod us into action. 'Climate Change' replaces the nuclear holocaust as the greatest threat to our survival. The decades of fear-mongering about nuclear power must soon give way to a realisation that this is the best option we have to cut the production of greenhouse gases. The 'renewables' – solar, wind, biofuels – may make modest contributions to the effort, but nuclear energy is the only alternative to fossil fuels for powering our great cities and industries.

Unfortunately, this realisation is coming dangerously late. Once it is accepted, we will need to act with great speed to apply the necessary resources of money, materials and talent. And to do so with safety and efficiency, we must be ready to share what we know, to abandon the constraints imposed by competition, and to cooperate to a degree that we have not seen since the Second World War.

INIS already holds a great store of relevant information. It has the means to make it available at the speed of the Internet. The IAEA must invite its members to share their experiences and their technologies quickly and effectively. INIS is only one of several mechanisms for achieving this result, but the spirit of international cooperation that made INIS possible in the face of "Cold War" suspicions is exactly what we need to halt our descent into global catastrophe.

Texcoco, Mexico, March 2008

3.2 INIS Reminiscence

Ivano Marchesi
Director, Division of Scientific and Technical Information, 1983-1990

In 1969, when John Woolston (then director of Scientific and Technical Information- IAEA) introduced me to INIS in Vienna, I could never imagine that, 15 years later, I would be sitting in his chair. What I did imagine was the positive impact that a membership could have for Brazil. Upon my return to Rio de Janeiro, therefore, I established the Brazilian Nuclear Information Center (CIN), which went operational less than a year later.

In the few years following, the work at CIN was both hectic and exciting. More than 2000 professionals received monthly relevant information from all over the world, and could access the continuously growing database of the system. The Brazilian literature, collected from research centers and universities, and sent regularly to INIS Headquarters, was certainly used by other countries at similar levels of development, confirming the initial idealistic conception of a true international tool for the benefit of all.

At the national level, CIN became the source of several other initiatives in S & T Information, all of which based their development on CIN expertise. The same happened at the regional level, strengthening cooperation and partnership.

At present, CIN is a mature structure using modern technological tools, and active in servicing its broad community of users.

Moving to Vienna in 1984 was both a challenge and a pleasure for me. The pleasure consisted in seeing so many friendly faces, belonging to both INIS staff and Liaison Officers with whom a bond had been created throughout those years. The challenge consisted of keeping the interest of all members, as well as the balance between different opinions and interests. The INIS files should confirm the positive results of that period.

It was very clear, however, that in a changing world, INIS would also have to evolve, and meet new demands while keeping abreast with new technologies. By the time I left Vienna, several experts' meetings on this subject had already taken place, and new products were ready. It is comforting to see that this process never stopped, and that INIS is still one of the leading Information Systems today. It is my belief that its importance will increase in a world where global exchange of information is essential for both local and international development. In that case, it will be highly rewarding to have been part of such an important venture.

3.3 INIS Reminiscence

Hans W. Groenewegen

INIS Liaison Officer for Australia, 1970-1974

Systems Analyst, INIS Secretariat, 1974-1979

Not long after I was recruited to the position of Chief Librarian of what was then called the Australian Atomic Energy Commission, the Research Director invited me into his office to tell me that the International Atomic Energy Agency would soon be convening a meeting in Vienna to discuss plans for a new information system and that he would like me to attend on behalf of Australia. That was in October 1968 and the subject of the meeting was the Report of the Panel on the Final Proposal for INIS.

That was my introduction to INIS and to the exciting world of international cooperative information systems. Subsequently the AAEC Library became the National INIS Centre for Australia, and I became the first INIS Liaison Officer for my country. I attended further INIS meetings in Vienna and in due course we started preparing input – not a large amount because at that time Australian nuclear scientists published most of their research results in international journals. But as an INIS Centre we were also early subscribers to the INIS magnetic tape service and we used those tapes to produce a printed catalogue of conference papers and a primitive current awareness service. My involvement with INIS created in me a strong desire to be employed for some time at the centre of the operation and it was my incredible good fortune that some years later that desire was realised and I was offered the position of Systems Analyst in the INIS Section of the IAEA.

To have been a member of the INIS staff during the early years of the system (in my case from 1974 to 1979) was an exceptional experience.

We were a relatively small team and although recruited from a diverse range of countries, which included the United States, the Soviet Union (as it was then), France, Germany, the United Kingdom, Bulgaria, the then CSSR, Italy, Austria, India and Australia, we actually had quite a lot in common. This included:

Our belief in the project; our excitement at the revolutionary approach that had been chosen for its development; our desire to make it work; our complementary professional skills and technical knowledge, and our respect for each other as individuals and as professionals.

Surprisingly, perhaps, we worked within a very informal framework, although within very clear guidelines. The policies, priorities and systems boundaries were set primarily by the INIS Advisory Committee – on a triennial basis – and by the INIS Liaison Officers at their annual meetings. Once the developmental guidelines were set, each staff member was assigned his or her responsibilities, and then we got on with the work. Compared to other organisations I have worked in, there were very few formal staff meetings but there was a lot of interaction, frequent consultation and discussion on an informal basis. We all had open door policies and we spent quite a bit of time in

each other's offices, discussing our ideas or arguing alternative approaches. We circulated amongst ourselves drafts of discussion papers, reference manuals and circular letters to the Liaison Officers, and in the drafting and reviewing of them, we clarified our own ideas, identified potential problems or solutions and tightened up our procedures.

This productive environment flourished because of the light touch of management and because of the exceptional recruits from the Member States that the IAEA attracted generally and in particular for the Division of Scientific and Technical Information. This highly successful recruiting record was in no small measure due to the support of the INIS Liaison Officers in the Member States, many of whom were only too happy to nominate some of their brightest and most innovative staff members for a period of service in the INIS Section or the Computer Section. Another major factor was the excellent support received from the local staff, in particular those in the Publications Division and in the Conference Division.

More than to anyone else, the credit for creating this outstanding working environment belongs to Ed Brunenkant who was Director of the Division of Scientific and Technical Information from 1972 to 1978. His vision, his drive, his authority, his extensive contacts in the information industry, his management style and his remarkable personality created the working environment and secured the resources that made possible the development of INIS into one of the leading scientific and technical information systems of its time. Working with him was a rare privilege and an unforgettable experience.

27 March 2008

3.4 20 Years Working with INIS

Elisabeth Ruckenbauer

Head, Bibliographic Control Unit, 1969 – 1989
INIS Secretariat

When the concept for the introduction of an International Nuclear Information System - on the basis of international cooperation and the use of computerized data processing methods - was conceived and the preparatory work on a high level was going on I was a staff member of the then called Documentation Section within the Division of Scientific and Technical Information. A very dynamic Russian Section Head, an eminent scientist, had had the Agency purchase a computer which was used for the production of specific bibliographies, based mostly on information lifted from Nuclear Science Abstracts. In those days punch cards was the medium for data entry. The designers of INIS had decided on upper and lower case letters which rules out the use of punch cards. I remember that for many years the choice of equipment for data entry used to cause technical problems until the introduction of the PC.

Parallel to the completion of the outlines for cooperation between the Agency and its member States, work on the design of the processing and checking system of input data, their merging and distribution began: Bibliographic authority files were set up – on the basis of data received from TIC, Oak Ridge, Tenn. and the help of 6 months of Margaret Pflueger's time on loan from the same institute - rules for the description of bibliographic data, suitable for electronic data processing, had to be formulated, various connected international standards, such as country codes or transliteration rules had to be selected and prepared for distribution to INIS partners.

While working closely with the Systems Analyst Chuck Gottschalk and the brilliant Program Designer Gianpaolo Del Bigio, I grew with the required tasks together with my colleagues. After all, the setting-up of INIS was completely new and depended very much not only on our own efforts, but even more on the cooperation of the Member States.

When the date for publishing the first trial issue of INIS Atomindex was chosen – 1 May 1970 (rather than 1 April) - just three Member States had submitted some input (I believe these were F.R. Germany, Czechoslovakia and Sweden), the processing and checking system of input data and their output was just ready to go into operation. I remember, the timing was so tight, that on a Sunday until midnight I went through the printouts to look for errors and problems. The next day, our second Systems Programmer Helga Schmidt took care of the necessary computer processing and lo and behold on the planned date a slim issue of 147 bibliographic entries (without descriptors) appeared in printed form!

A great impetus made itself felt when Edward J. Brunenkant was Director of the Division of Scientific and Technical Information. He was a man visions and had the gift to charge his staff with impossible assignments but the challenge usually worked and brought good results.

Thanks to the excellent cooperation with the programming staff and my closest colleagues, problems were solved as they arose and eventually I was officially charged with the responsibility for the bibliogaphic side of the system until my retirement 19 years later. We even helped AGRIS in its beginning to an effective start. Most important for the success of the entire endeavour, however, was the close cooperation with INIS centers in the member States and the – frequently - personal support I received from them. I'd like to mention the responsible staff of the ZAED, Karlsruhe, and TIC, Oak Ridge, where I spent a couple of times some days to work with their staff in order to

profit from their experience and to iron out common problems. Getting to know the staff of the different centers proved to be extremely useful. This was achieved during our annual seminars and/or on the spot-training.

After my retirement I lost touch with the further developments of the System. The present document, however, has brought me up-to-date again and I am pleased to note that two essential projects I had been pursuing with little success had after all developed as hoped by me. One was the administrative transfer of the responsible computer staff (analysts and programmers) from the Computer to the INIS Section. As a result of this positive organizational change – the programming staff reporting directly to the head of the INIS Section – the repeatedly requested design of a user-friendly data entry and checking system for the PC to become available in-house and to interested input centers has become the most used input tool within the system all over the world. It had begun as a decentralized programming effort between the staff of Atominform, Moscow and the Brazilian INIS partner in Rio de Janeiro, and was finally brought to completion by the programming staff of the INIS Section.

The close cooperation between INIS and ETDE, resulting in common standards I consider a great success for INIS!

Looking back at 20 years of working with and for the International Nuclear Information System I can confirm that these were extremely challenging and interesting times that I would not like to have missed in my life. In addition it provided me with opportunities to meet and get to know on a working basis different people from many parts of the world.

3.5 Reminiscences on the Formation of INIS

William M. Vaden
Deputy Manager, Office of Scientific and Technical Information
U.S. Department of Energy (1965-1985)

When I was invited to provide some recollections about the formation and early operations of the International Nuclear Information System (INIS) in observance of the publication of its history, my first thoughts centered on the days when I was a member of the First Reference Design Team which met in Vienna in the spring of 1968. Not to be forgotten, of course, are the memories of the friendly periodic gatherings of the INIS Liaison Officers. And, in the intervening years, I also assisted in resolving issues or problems relating to INIS/U.S. matters that occasionally arose at the Technical Information Center (TIC) in Oak Ridge. Although all INIS meetings and personal contacts had their significance, two experiences were especially important in their overall effect on our local programs in Oak Ridge and in their long-term duration. The following paragraphs represent a personal effort to summarize facts and understand the tenor of the times in which these events occurred. The first relates to activities of the design team and its work in laying the foundation for a structure that would be productive, efficient, and long-lasting. The second occurred in 1972 when I represented the U.S. as INIS Liaison Officer for a meeting wherein the major objective was to decide on a plan for creating a subject index to *INIS Atomindex.* Many valuable memories remain in connection with INIS and its achievements. Most relate to individuals who provided time and talent in so many remarkable ways to make INIS world-renowned. With the passing decades, many of these great friends now reside in our memories.

* * * *

As the U.S. representative assigned to assist in the March 4 - June 28, 1968 reference design study for INIS, I was already aware of the highly regarded status of the information organization at the International Atomic Energy Agency, in particular, its library and publications groups. And many of the points in the paper forwarded to the invited team members to consider were issues that the Technical Information Center (TIC) in Oak Ridge, Tennessee, had wrestled with, but in a smaller international context. Some of the issues we had settled to our satisfaction; some were still in the resolution stage.

The introduction to the IAEA document, "Terms of Reference for Team Undertaking First Reference Design" (for INIS), begins with the following statement: "Since 1965, the Agency has had under consideration a proposal that it should play a leading role in establishing a computer-based information system to meet the needs of its Member States in the processing and retrieval of information dealing with nuclear science and technology…"

Aiming for a world leadership role in the information technology field was a brave act for an agency that was barely 10 years old and whose experience in procuring, creating, and disseminating information products and services to a world-wide customer base was meager. To enter a sophisticated information technology field that was coupled to computers, barely tested for this purpose, was daring. In 1956, more than 70 nations signed a statute to establish the IAEA. Of this group, the number of members desiring to receive computer output products other than print, at the time of the design team's first meeting, would surely have been quite small. When the IAEA Library was established, the U.S. shipped more than 8,000 full-size and microcarded reports, along with 55,000 printed index cards for library catalog filing -- an event duplicated in libraries of other countries selected under the U. S. Atoms for Peace program. Also included were 11 volumes of *Nuclear Science Abstracts (NSA)* (24 issues per volume) with cumulated indexes, and

complementary literature relating to the shipment and its maintenance. A reasonable bet for the reference design team would be that the world would still be committed to print products for many decades to come and that much of the world was still comfortable with library catalogs and browsing in indexes to large literature collections.

It was not irrational for persons to be cautious in fully accepting the computer to replace the age-old familiar hands-on means of finding answers from printed texts. What came from the computer was strange. The process was impersonal, and the products were unwieldy and were presented in print styles that were large and ugly. Much of the push toward computerization had originated from a few countries where information organization leaders had installed large systems that were regarded as symbols of status. An air of hubris was obvious among those in this elect community when their arguments often centered on whose computer was the largest and fastest. Our Technical Information Center (TIC) in Oak Ridge never found computer output data, processed with its all-capital print, acceptable for *NSA*. TIC, by contract arrangement, used the large computers installed at Oak Ridge sites to process data from punched paper-tape created for *NSA* indexes, store the data, and perform indexing studies as requested by TIC. Working with programmers and assisting in systems design provided TIC staff with a good level of knowledge of the computer's promise as an emerging new tool for mankind. Our experience had convinced us that the computer, properly used, could be a boon to major processors of information, as evinced by the success we were experiencing in processing our own scientific research materials, while simultaneously incorporating magnetic tape products from other information sources into a common data file.

One assignment for the study team revolved around the recommended action to be taken and procedures to be followed "to…co-ordinate the operation of INIS with the production of *Nuclear Science Abstracts* and other abstracting journals in the nuclear field." Here, in the Terms of Reference document was a hint of cooperation, to be explored, that might be arranged between two major bibliographic services and possibly others. I immediately sensed that this would very likely not be a point of agreement with our people. It was also clear to me that only one journal with scope and coverage as outlined by *NSA,* and supported as it was through cooperation with other countries, could be successfully produced on a long-term basis. If a second such journal were undertaken and issued in parallel, years would be required for it to connect to the important information trails and resources sufficiently for it to become creditable, not counting the expense outlaid for equipment and systems design. The U.S. had already established relationships with certain countries, to the extent that a feeling of partnership had developed over the years. Earliest exchange partners were Canada and the United Kingdom, beginning in 1947. Through the years, exchanges were also arranged with Australia, Sweden, Finland, France, Japan, and Norway. Foreign depository libraries, under membership agreements, forwarded in-scope materials from their countries as well. A special exchange agreement with the Euratom countries is discussed further in this brief outline. *NSA* therefore was expected to continue to live up to its responsibilities until, should it ever come to pass, these connections could be severed honorably with all partners in agreement.

Yet, things never remain stable forever. As early as 1950, our Bureau of the Budget questioned the need for *NSA*, and periodically questions would arise about why the U.S. was subsidizing an international abstracting service. Indeed, at the Second General Conference of the IAEA held in Vienna in 1958, it was proposed that a major center be developed within the IAEA for exchange of information. Was this a portent as regards possibly modifying portions of the U.S. nuclear technical information program at home?

Overshadowing these imbedded doubts was the further realization that in the U.S., political winds were already shifting toward research in energy areas beyond nuclear. How to intelligently interpret this trend and integrate it with current international nuclear science information planning should

also require the attention of management very soon. Until the future became clearer, however, the primary focus for me, as the U.S. member of the INIS design study team, should be to aid in the development of an information system as generally outlined, but for us back home I also carried the responsibility to avert damage to the system under development for *NSA*. Such were some of the ideas, facts, questions, and possible opportunities that permeated my private musings during the months' long deliberations of the study team.

When computerization became a topic in our discussions, it became apparent that additional assistance would be required by the study team. We needed expert advice that related to the computer itself (equipment optimized for the designed system including special software and storage needs to handle inputs and outputs); defining jobs and acquiring personnel; office needs and space allocation; and cost estimates for the total system. To support some of its information program activities, the Agency had made plans to install in 1965 an IBM 1401 computer, a machine that schools and small companies found useful to demonstrate computer basics and to accomplish office tasks. Very soon it was announced that a computer subgroup was being organized and would assist the team for a period ranging between two and four weeks. Represented in the subgroup from the Agency was Gianpaolo Del Bigio, manager of the computer section, who represented both teams. Well versed in the large computer systems at Oak Ridge (which included the processing of *NSA* data tapes) was James A. Gillcrist from the U.S.

During the first week of our meetings I was asked by the chairman to brief the team on details of the system that was being used in Oak Ridge to publish *NSA* . Since workloads and many of the tasks being considered for INIS were already routinely handled by *NSA,* a clearer understanding of the team's task could more easily be understood through comparisons. Procedures and processes that were then in use at TIC are briefly touched on to better understand the issues that the study team was confronting in ultimately recommending a system that was practical, realistic, and yet forward looking. The computer was still maturing in its technology, and, to avoid frequent glitches, exacting standards for data inputs and outputs were required. Because of the size of the very large workload being anticipated, the efficient absorption of members' inputs directly into the data processing system was imperative in the overall design. The INIS system designers could not ignore the fact that more than a third of the total processing workload would be fully processed for direct entry via magnetic tape from TIC. Other countries cooperating with *NSA* could also provide their country inputs in similar fashion. Establishing cataloging, indexing, and data processing standards by INIS for the various computer systems involved was therefore essential. *NSA* was being successfully processed through the use of its own standards and programming guidelines; it would therefore seem prudent that such authorities should be explored for possible INIS use. An annual work load of 60,000 – 70,000 indexed items was initially estimated for INIS; later estimates increased this number. Thus, to simplify processing, workable standards, codes and authorities were encouraged in the preparation and transmittal of items for the planned decentralized system. In 1967, Abraham Lebowitz of the AEC Washington staff, who assisted in drafting TIC's cataloging guide, was invited to Vienna to assist in drafting the cataloging manual that was ultimately adopted by INIS. For one month, Charles Gottschalk, AEC Washington, aided the team in simplification of rules for inputting data. Cataloging authorities that had their origins at TIC were the List of Serials, Corporate Authors, and Report Number Prefixes.

For the year 1967, *NSA* was arranged into scientific categories with all abstracts being sequentially numbered. Four indexes (subject, report number, personal author, and corporate author) supplemented the abstracts for each published semimonthly issue. The top portion of the abstract contained the essentials that identified each research item. Many index points or "tracings" were obtained from the descriptive cataloging process. The new TIC system, installed at the beginning of the year (*NSA* Volume 21, Number 1) required less keyboarding, and the processing flow was enhanced. A new descriptive cataloging manual had been prepared which specified that

all processed items be categorized by type, such as reports, journal articles, patents, theses, plus others. Some items required few descriptive tags; many tags were required for other types. New stations had been arranged to allow newly procured "Flexowriters" to create the "header" in the same typeface as would be done later in the processing sequence for the abstract. Both would be placed together in final page makeup. (A more complete description of the process, later to be adopted for INIS' use, is available elsewhere.)

These processing innovations formed the essential improvements for the enhanced system (1970 design) which later allowed the removal of Flexowriters in favor of "cathode ray tubes." These CRT keyboarding stations (video terminals) allowed information to be edited and corrected prior to incorporation into the data base. Simplification of input was increased further as a result of a greatly increased availability of characters and symbols which could be keyboarded directly to a newly installed computer processor. An IBM 360/20 machine, finally approved for data transmission to the larger on-site computers, allowed final tape corrections to be made in-house prior to transmittal. Stored "authorities" such as abbreviated journal titles, corporate authors, subject headings and Euratom keywords allowed cross-checking of cataloged items and provided word and title consistency. A newly installed IBM print train provided 120 characters in upper- and lower-case letters, along with subscript and superscript numerals for all printed indexes.

One of the more difficult issues to be resolved by the study team was in choosing a plan to index the literature. Because "keyword indexing from an agreed thesaurus" was the team's ultimate decision, the following comments are provided to explain the U.S./Euratom relationship that was still in effect at the time of the study team's deliberations. Membership of the European Atomic Energy Community included Belgium, France, the Federal Republic of Germany, Italy, Luxembourg, and The Netherlands. Almost from its beginning, TIC provided, in 1958, a depository library collection, arranged literature exchanges, and supplied Euratom with other bibliographic tools. In early 1962, a meeting at TIC in Oak Ridge with Euratom representatives resulted in a cooperative indexing agreement. A significant point was to assist Euratom in plans for control and retrieval of scientific literature by means of a machine-based system using key terms (descriptors) patterned after *NSA* subject headings. The agreement required a training program and an understanding of "keyword" creation and usage and the ultimate usefulness of keywords in formulating questions directed at computer interrogation of established data files. A thesaurus was therefore compiled and maintained at Euratom. Keyword indexing was done in parallel with all other *NSA* subject indexing, and keywords corresponding to *NSA* issues were shipped to Euratom on a regularly scheduled basis. This arrangement was in force for approximately 10 years. When INIS was formally established, by means of U.S. help in computerizing the thesaurus to allow additional "see" and "see also" references, the reformatted Euratom list was eventually adopted by INIS and thereafter was referenced as the INIS Thesaurus.

At the Board of Governors meeting in 1969, the study team's recommendations were accepted. The first output products, issued as a printed bibliographic publication listing, along with associated computer tapes, appeared in April 1970.

The finally accepted INIS scope was reasonably well synchronized with *NSA*. The final recommendation for INIS's computer and overall operational start-up system permitted interfacing installed equipment at Oak Ridge which was used for processing *NSA*, including the IBM 120-character print train that was especially designed for printed indexes. However, *NSA* was created as a published abstracting service that contained abstracts and indexes in each printed issue, whereas it had been recommended that, for the new INIS program (because it was a completely computerized start-up system), an *INIS List of References* for each issue would be printed, along with magnetic tape copies for subscribers.

In 1973, technical information specialists both in Washington and Oak Ridge had provided assistance to the newly installed Nixon administration in outlining fields of energy research in the development of a new energy plan that would in the future include both nuclear and non-nuclear energy areas of interest. Future planning for the new Offices of Information Services programs and activities would proceed accordingly in this new direction.

Meanwhile at TIC, editors of *NSA* had been working to produce a subject index that would incorporate the newly accepted INIS Thesaurus as the resource for index terminology and yet allow the continuation of a pattern to which users, for decades, had become accustomed, i.e., alphabetically arranged subject terms followed by modifying lines. A change was announced regarding a modified printed method of index page presentation, beginning in 1973 with *NSA* Volume 28. Some apprehension existed regarding possible adverse user acceptance of the newer computer involved version versus the familiar decades-old index page presentation. Termed "two-level flagging" in describing the new plan, the primary entry was a subject term selected from the INIS thesaurus connected to a "qualifier" or subheading (chosen from the thesaurus), both being connected by a slant mark. The abstract title, supplied by the computer, was printed below the heading arrangement, along with abstract number and volume number. Page appearance of the newer style of indexing was very similar to the older. The newer version received scarcely any negative reaction from index users, and no change was detected by magnetic tape subscribers. All issues of Volume 28 were published uneventfully.

A major problem remained, however. To obtain the greatest economies both at TIC and at INIS, data files should be mergeable at both sites. Effective January 1972*, INIS Atomindex* had begun full-scope operations. At the November 1972 Consultative Meeting of Liaison Officers, members were invited to make their own recommendations for the creation of a printed subject index to appear with each *Atomindex* issue. Acting as Liaison Officer for the U.S. at that meeting, I presented our recommendation for the index, which was for INIS to consider adopting the concept of two-level flagging. I explained that it was not complicated to construct, the INIS Thesaurus was the subject source, it allowed the conventional main heading/subheading relationship for users, it was economical in use of print for the index page, and it would not limit or inhibit (for retrieval) the assignment of descriptors considered necessary in the creation of a database. Should INIS adopt this method, it would allow INIS to construct a system compatible with *NSA*, by far the largest producer of information for INIS, and would thus allow an efficient merging and processing of information exchanged by the two systems.

On the latter point, it was further explained to the Liaison Officers that *NSA* would likely cease publication in favor of *Atomindex,* but only if countries dependent on *NSA* could be assured that *Atomindex* could satisfactorily supplant *NSA*. Having essentially the same indexing patterns that would allow easy and economical interchange of products between the two systems would enhance the assurance of an acceptable *NSA* exit. The principal idea for two-level flagging was favorably received by the attendees, with the understanding that the concept would be developed further by the Secretariat. After an initial experimental period, INIS formally initiated the recommended indexing concept for *Atomindex* subject indexes.

At the December 1974, INIS Advisory meeting in Vienna, the U.S. representative, Edwin E. Stokely, expressed his hope that an abstracting substitute could be developed quickly by the IAEA that would supplant *NSA*, thus allowing the U.S. to move forward with the new administration's broader energy plan. In its summary actions, the committee responded, "taking into account the intentions of the U.S. government regarding the future of NSA… the Committee recommended that machine-readable abstracts should be included in the system and that the Secretariat should plan for the production of a printed abstracting journal." Subsequently, in a letter directing the Manager, TIC, to act on this recommendation, Stokely stated, "Although it is not mandatory that we input our

abstracts in machine-readable form beginning July 1 (an option in the recommendation) I feel that it is essential that the U.S. exercise leadership by being among the first to begin providing abstracts (in this) form." It was thus apparent that a plan for the AEC's publishing program involving *NSA* would be terminated upon assurance that an orderly replacement for it could be accommodated in Vienna.

During the Fall of 1975, Edward J. Brunenkant, Director of Scientific and Technical Information, IAEA, visited Washington and announced that *INIS Atomindex* had become fully capable of supplying subscribers with an abstracting/indexing service of essentially the same quality as was attributed to *NSA* (a requirement that the IAEA was expected to meet to allow *NSA* to expire). On May 17, 1976, Robert L. Shannon, Manager, TIC, Oak Ridge, announced that, after almost 30 years without interruption, publication of *NSA* would cease, effective June 30, 1976.

Author's Note. The initials for the Technical Information Center (TIC) have been used as the author's preference throughout this paper to identify an organization now known as the Office of Scientific and Technical Information (OSTI), U. S. Department of Energy, Oak Ridge, Tennessee. From the time of the emergence of the Atomic Energy Commission's Technical Information Division (TID), through the Energy Research and Development Administration, to its current DOE name, several other organizational names (and initials) have also been used to identify *NSA's* organizational components, some of which would appear in IAEA/U.S. correspondence and action papers.

22 May 2008

3.6 INIS and the Czech Republic

Zsolt Staník

INIS Liaison Officer for the Czechoslovak/Czech Republic in 1984-1994

Creation of INIS falls into the period of time when the so called East Bloc countries had been in a strong political isolation and had very limited access to information including nuclear from the developed Western countries. Our researchers, scientists, students and the staff of the Nuclear Information Centre (NIC) in Prague had appreciated very much the opportunity to become, practically since the very beginning of INIS operation, its member and contribute to its development.

The Czechoslovak National INIS Centre (since 1993 the Czech National INIS Centre) had been the first information organization in the former Czechoslovak Republic, who successfully introduced commercial provision of information services. Part of the income together with the financial support from the government had been used for the improvement and modernization of information services. Thanks to INIS, the NIC had become the leading information institution in the Republic.

Since the very beginning of INIS, the NIC has been taking part in its development and improvement. An example is the participation of the NIC team with Mr. Hýbner, Mr. Helbich and me in reviewing terms in the EURATOM Thesaurus (base for the INIS Thesaurus). The team assumed the responsibility for the terminology in the area of Chemistry, Life Sciences and Medicine.

Our experts regularly participated at work in various INIS technical, consultative and advisory groups in Vienna, sometimes under difficult conditions.

One of the most challenging times for us, the INIS staff of NIC at all, was our participation in the Phase I of an INIS experiment, called Direct Access Project (DAP). DAP represented a cooperative computer network enabling the searching of the INIS Database loaded in the computer in Vienna.

For a smooth accomplishment of the Project tasks, it was at that time politically desirable to involve from the very beginning also the East Bloc countries. In 1978 Mr. Brunenkant, Director of the Division of the Scientific and Technical Information, contacted our Centre with a request to accomplish the first East connection to the computer in Vienna.

That was more than a challenging offer and should not be refused. With an archaic Czech Tesla modem and Hungarian Orion monitor and after a series of technical changes, modifications and consultations with the INIS staff in Vienna, one sunny day in June 1978, we exploded into happiness seeing on the screen the first incoming characters (with a speed of 300 bauds) of one of the INIS abstracts from Vienna. It was the first online connection of a Czech organization to an information source stored in a computer in any Western country.

My enthusiasm and joy as a national Project manager was short-lived when I received a message from the secret police service stating that I was fully responsible for the data and information

transferred with a strong personal impact in case sensitive information flowed out through this communication channel.

With the set of equipment mentioned we had visited the former German Democratic Republic and USSR in order to assists them with the access.

As a curiosity, let me present a situation that had happened in ICSTI, Moscow during an attempt to access the computer in Vienna. There had been a high level representation in the Centre including the top management of ICSTI, Mr. Brunenkant and Mr. Dragulev from the IAEA, etc. As usually happens in such important events, the poor quality of the telephone line did not enable the online communication.

There was a strong need to find a solution. Without informing the distinguished guests, we had asked the staff in NIC, Prague, to realize a back-to-back telephone connection. With my Russian colleague we called the NIC number in Prague. The NIC staff was holding the line and from the other telephone they called the Vienna computer. After a beep signal from the modem the two lines had been connected physically, and on the ICSTI monitor the first abstract had been displayed. The trial had been so successfully accomplished.

Literature referred from the INIS Database helped hundreds of students to successfully finish their university studies. The INIS Database had been at that time the key information source for our scientists and researchers in the core fields covered by the INIS subject scope. An important role had been played by the full text of NCL on microfiche and later on CD-ROM, through other channels practically unavailable. INIS had served various organizations as an example of an efficient and successful cooperation in creating and distributing information at the national level.

Internet, free information exchange of information between the East and West has been calling for a change in the structure and operation of INIS particularly in the area of the role of the INIS national liaison officers, in the way of compiling information, in providing information services, in designing tools for completing information sources not yet covered by INIS through Internet, etc.

The INIS in its original form is slowly passing away. Long live the new one! With all thanks and gratitude to hundreds of those who devoted their effort, skill and enthusiasm in creating and developing an information product so much loved for many, many years by nuclear community in the world.

Wishing INIS a happy new birth and all the best in the future.

3.7 40 Years of INIS

Prof.Dr.-Ing. Georg F. Schultheiss
INIS Liaison Officer for Germany, 1992-2003.
Former Scientific-Technical Director and CEO of FIZ, Karlsruhe.

My personal data bases reach back only to the late 90's – but include some of the main expert and consultancy reports for the future INIS development and its member states situation, where I partly had the opportunity to participate. Information technology develops very fast and so INIS has to follow, although decision processes in international organizations like IAEA are meanwhile partly slower than technical progress.

From our historical experience of the last 70 years – uranium fission was discovered in 1938 by Otto Hahn and I was born in 1938 – we know that, like a hammer, atomic energy might be a tool or a weapon. We also know about the threat of radiation to those human beings working with and exposed to radioactive material and the respective radiation – all the dead scientists from Marie Curie to those men and women examining Tschernobyl after the man-made accident. Practically all nuclear and radiation accidents including the misuse of x-ray application by medical people are failures in the man-material-interface and caused by the human side even if there might have worked experts. The constant attendance and accurate information of the well known but not well followed consequences strongly need adequate and reliable information resources and training activities.

Qualified information is important for research and development in nuclear medicine, nuclear chemistry and physics, in nuclear engineering and safety as well as in the huge number of isotope applications. Therefore the International Nuclear Information System was created within the IAEA and constantly expanded to assist worldwide all the R&D activities and the technological applications to prevent further danger and accidents and to avoid duplication wherever necessary and possible. Working for more than 10 years as German INIS Liaison Officer together with highly qualified assistants like Irmgard Lankenau, Dagmar Marek and Eike Hellmann within the INIS community and all the active colleagues and friends from more than 100 counties and organizations is unforgettable for the rest of my life and formed my own global understanding in a significant way.

The mission of IAEA and the steadily growing importance of information and knowledge management make INIS to one of the centre points of the future resources for the exchange of scientific and technical information on peaceful use and applications of nuclear science and technology throughout the world. This has been confirmed by the 2004 International Conference at Saclay, France and implies the necessity to include sociological and political aspects to keep the efforts on the peaceful side and to enable the scientists and engineers to decide on and organize their work in an adequate way. Climate change and the upcoming activities in nuclear energy usage in different countries with limited experience so far show that consistent and qualified information sources are the prerequisites to reach effective and economic results.

But those facts require that the scientists and engineers have to be convinced, encouraged and enabled to use the existing information resources for their purposes. A worldwide training task like this including information literacy was and will be a must for future success of all the resources invested in INIS, WNU and other systems. It is clear that this cannot be solved by the few people working in the INIS Secretariat or in the IAEA in total. This needs a constant and strong assistance through all member states and their educational, scientific and industrial institutions and networks. To bind those institutions and regional networks into a stable and globally effective system is one of the main tasks of the future. This includes the necessity to reduce also barriers like language

problems, cultural differences and political difficulties – all not really “nuclear issues” but certainly with some “radiation effects”.

The respective overall information management strategy based on existing elements can be further developed and enhanced to use the nuclear technology heritage in a proactive, flexible way for knowledge preservation and information resources according to existing customer needs. Certainly there is still a lot of work to be done to improve and protect the global situation but as long as mankind may exist, INIS will be one piece for constantly flowing drops of useful information to keep the earth as a place worth to live in.

Lueneburg, Germany, 25.May 2008

ABBREVIATIONS

AEC	Atomic Energy Commission (USA)
AGRIS	Agriculture Information System
AIP	American Institute of Physics
ARCAL	Acuerdo Regional de Cooperacion en America Latina
BARC	Bhabha Atomic Research Centre
BCU	Bibliographic Control Unit
BLLD	British Library Lending Division
CAI	Computer Assisted Indexing
CD-ROM	Compact Disk – Read Only Memory
CEA	Commissariat à l'Énergie Atomique
CHIP	Clearinghouse Imaging Pilot
CNRS	Centre National de la Recherche Scientifique
COM	Computer Output on Microfiche
DAP	Direct Access Project
DOE	Department of Energy (USA)
DTIC	US Defense Technical Information Center
EAGLE	European Association for Grey Literature Exploitation
ECD	Energy Citations Database
ECSC	European Coal and Steel Community
EDB	Energy Science and Technology Database
EEC	European Economic Community
EJC	Engineers Joint Council
ENDS	European Nuclear Documentation System
ENEA	European Nuclear Energy Agency
ERDA	Energy Research and Development Administration (USA)
ESA/IRS	European Space Agency/Information Retrieval System
ETDE	Energy Technology Data Exchange
EURATOM	European Atomic Energy Community
FAO	Food and Agriculture Organization
FIBRE	Friendly Input of Bibliographic Records (software)
FIZ4	Fachinformationszentrum Energie, Physik, Mathematik
GRINO	General Review of INIS Operations
IAEA	International Atomic Energy Agency
ICSTI (Moscow)	International Centre for Scientific and Technical Information
ICSTI (Paris)	International Council for Scientific and Technical Information
ICSU	International Council of Scientific Unions
IDPS	INIS Data Processing System
IDRC	International Development Research Center (of Canada)
IEA	International Energy Agency
IEE	Institution of Electrical Engineers
IIASA	International Institute for Applied Systems Analysis
INIS	International Nuclear Information System
INISIS	INIS Imaging System
INSPEC	Information Service in Physics, Electrotechnology and Control
IOPP	Institute of Physics Publishing
IRPS	INIS Record Processing Sub-system
IRS	Input Registration Sub-system
ISO	International Standards Organization

IT	Information Technology
JTC	Joint Technical Committee
MARC	MAchine Readable Cataloguing
MET	Metadata Extraction Tool
M/Q pairs	Main Heading/Qualifier descriptor pairs
NCL	non-conventional literature
NEA	Nuclear Energy Agency
NSA	Nuclear Science Abstracts
OCR	Optical Character Recognition
OECD	Organization for Economic Co-operation and Development
OPS	Output Products Subsystem
OSTI	Office of Scientific and Technical Information (USA)
PDF	Adobe Acrobat Portable Document Format
PDF/A	Adobe Acrobat Portable Document Format/Archival
RRIAN	Red Regional de Informacion en el Area Nuclear
SCU	Subject Control Unit
SISPlan	Strategic Planning for Information Systems
STAIRS	STorage And Information Retrieval System (of IBM)
STI	Division of Scientific and Technical Information
STN International	Scientific and Technical Information Network
TIB	Technische Informations Bibliothek
TIC	Technical Information Center (USA)
UDC	Universal Decimal Classification
UK AEA	UK Atomic Energy Authority
UNESCO	United Nations Educational Scientific and Cultural Organization
UNIDO	United Nations Industrial Development Organization
UNISIST	Intergovernmental Programme for Co-operation in the Field of Scientific and Technological Information
UNS	User Needs Study
US AEC	United States Atomic Energy Commission
US DoE	United States Department of Energy
US ERDA	US Energy Research and Development Administration
VINITI	Vserossiisky Institut Nauchnoi i Tekhnicheskoi Informatsii
ZAED	Zentralstelle für Atomenergie Dokumentation

APPENDIX I

Following is the text of the first version of the *"Definition of Membership Arrangements for INIS"* as approved by the 4th Advisory Committee for INIS, then approved by the Director General of the IAEA and transmitted to the Board of Governors of the Agency in document GOV/INF/476 of 23 May 1985.

DEFINITION OF MEMBERSHIP ARRANGEMENTS FOR INIS

1. General Considerations and Membership

A. In pursuit of Article III, paragraph A.3, of its Statute, the International Atomic Energy Agency (hereinafter referred to as the Agency) has established the International Nuclear Information System (INIS) in collaboration with interested Agency Member States and co-operating international organizations.

B. IAEA Documents GOV 1319 and PL-308 as well as standards, rules, and amendments adopted by or emanating from INIS Liaison Officers' and Advisory Committee actions provide guidance for managing and operating INIS.

C. Membership in INIS is restricted to States who are Members of the Agency, to UN organizations and to certain international or intergovernmental organizations.

D. To participate in INIS, an official request to this effect is to be made by the appropriate national or organizational authority to the Director General of the Agency. Those States or organizations who do so are hereinafter referred to as INIS Members.

E. Every INIS Member is represented in INIS by a Liaison Officer officially appointed by his/her Government, or Executive Head if an international organization.

2. INIS Members

The following is set down as a statement of the rights, privileges and responsibilities of INIS Members.

2.1 Rights

INIS Members will have the following rights:

i) - to carry out within their national boundaries (or organizational confines, if an international body) dissemination of information contained in and derived from all output products and services furnished by the INIS Secretariat. This is an exclusive right which remains with the Liaison Officer but may be delegated to the Secretariat.

ii) - to cooperate with other INIS Members in the provision of input.

iii) - to cooperate with other INIS Members in using the output products and services furnished by the INIS Secretariat.

iv) - to attend and vote at Consultative Meetings of INIS Liaison Officers.

2.2 Privileges

In addition to any privileges deriving from the rights enumerated in Section 2.1 above, INIS Members also have the following privileges:

i) - to receive limited free subscriptions to INIS Atomindex and its cumulative indices;

ii) - to receive one copy of the regular INIS output on magnetic tape at no cost.

iii) - to arrange access for INIS Members to any INIS database services made available by INIS Members, informing the Agency within one month of any arrangements involving access across national boundaries and subject to conditions laid out in para. 4(a). The services to national centres of developing countries shall be provided on a non-profit basis.

iv) - to receive assistance from the Secretariat, in a form jointly determined, in connection with the provision of input to INIS and the use of INIS output products and services. This assistance will usually be limited to agreed periods during which the INIS Member is establishing its own operations or experiencing particular difficulties.

2.3 Responsibilities

The INIS Member is responsible for:

i) - the collection, selection, description, categorization, indexing, abstracting and related preparation, of items of literature published within its national boundaries (or organizational confines if an international body) and submission to the INIS Secretariat in Vienna in accordance with the definitions, rules, procedures, formats, and guidelines set forth in the "IAEA/INIS Reference Series" and associated INIS Circular Letters;

ii) - providing the Agency with the full text of each item of non-conventional literature, either as originally published or in the form of microfiche prepared to a standard specification, provided there is no legal prohibition or limitation;

iii) - contributing advice and recommendations on matters relating to the maintenance, improvement and further development of INIS;

iv) - maintaining contact, to the extent practicable, with the users of INIS information products and services within the applicable boundaries/confines and for representing user views at INIS meetings.

v) - establishing and carrying out promotional activities throughout the applicable boundaries/confines so that all persons who can derive benefit from INIS are made aware of its potential and of the information services that can be derived from it.

vi) - obtaining clearance from the Agency before providing information services derived from INIS output products to States or organizations which are not INIS Members.

3. Management of INIS

3.1 Role of INIS Secretariat

A. The Secretariat function is vested in the INIS Section, Division of Scientific and Technical Information, of the Agency. The Secretariat function is, therefore, carried out within Agency policies, procedures, channels of authority, and financial limitations.

B. Independent of its Secretariat role, the INIS Section of the Agency bears the rights, privileges and responsibilities of the Agency as an INIS Member.

C. The Secretariat's principal responsibilities are:

i) - the management of INIS to ensure that its rules and procedures are correctly and efficiently implemented and to take the necessary actions for the efficient operation and continued improvement of INIS. The Secretariat will consider the interests of all Members in managing the operation of INIS.

ii) - the integration of input from INIS Members into the INIS file (database), including identification and correction of errors;

iii) - the distribution of INIS Atomindex and of regular INIS output on magnetic tape to INIS Members according to the provisions of Section 2.2 above;

iv) - the distribution of INIS Atomindex and of microfiche copies of non-conventional literature at the prices established by the Agency subject to the provisions of Paragraph 2.1(i);

v) - the creation and promotion of information products and services derived from the INIS file for use by the INIS Members;

vi) - the development, in consultation with the INIS Members, and the subsequent updating and maintenance of all the authorities, standards, formats, definitions, rules, procedures and guidelines to be used for the preparation and processing of input and for the creation and utilization of output.

vii) - the training, upon request, of INIS national centre personnel in the preparation of input and in the utilization of output;

viii) - the preparation of input with respect to literature published by the Agency and other UN organizations.

D. In carrying out the activities associated with meeting its principal responsibilities, the Secretariat shall give emphasis to maintenance and improvement of the quality of the INIS file generated for Members and to the usefulness of the INIS system in general.

E. Fiscal Responsibility for INIS Operations

i) - Costs of INIS Operations

Discrete costs of operations will be reported on the basis of major operating activities. Such costs will be those which can be directly attributable to INIS and reports thereof will be provided to Members on a regular basis.

ii) - Fiscal Planning

The INIS Secretariat will prepare estimates of the costs of INIS operations in the context of activities in the paragraph immediately above and provide such planning estimates to Members for their internal utilization and for provision of relevant comments to the INIS Secretariat.

iii) - Cost Recovery

The prices of INIS products and services shall be set to strive for full recovery of direct output production costs.

iv) - Cost and Price of Products

Full recovery of the entire INIS budget through the sale of products and services to Member States cannot be expected, because these Member States already contribute to the Agency budget (and hence to INIS), and additionally incur expenses themselves in providing input to the system. Full recovery of the direct output production costs associated with distribution beyond the limited free quantities provided by Members should, however, be attempted.

F. The Secretariat will have the right to make recommendations to the appropriate Agency Authorities with regard to INIS Members not adequately fulfilling their responsibilities as laid out under Section 2.3 above.

3.2 INIS Advisory Bodies

3.2.1 INIS Advisory Committee

A. The operation of INIS is reviewed at times of major change in the System or at intervals of not more than four years by an Advisory Committee, the members of which are experts serving in their personal capacities at the invitation of the Agency.

B. The Advisory Committee considers economic and scientific policy matters and reports to the Director General of the Agency.

3.2.2 Consultative Meeting of INIS Liaison Officers

A. This body will normally meet annually and participation is open to the Liaison Officer of every INIS Member. Voting rights are retained as long as a state or international organization remains a Member.

B. INIS Liaison Officers consider technical and operational matters concerning INIS activities and development, and make recommendations thereon.

4. Change of Status

A. An INIS Member not adequately fulfilling its responsibilities as laid out under Section 2.3 above, may forfeit its rights and privileges as given in Section 2.1 and 2.2 above, except those due to it by virtue of its membership in the Agency. If the Secretariat decides that an INIS Participant is not meeting the requirements of Section 2.3, discussions will be initiated and a concerted effort made for a period of up to two years to bring the INIS Member into compliance. During this time the INIS Member will retain full rights and privileges. If by the end of the two-year period the situation has not been resolved, it will be recommended that those rights and privileges be forfeited.

B. Withdrawal from participation from INIS is at the discretion of the INIS Member. The rights and privileges extended to a Member cease upon the date of the Secretariat's formal recognition of the Member's withdrawal.

5. Supplemental Arrangements

This document may be supplemented upon appropriate agreement of the Members and of the Agency to reflect provisions and activities as may be agreed.

APPENDIX II

Following is the text of the Memorandum of Understanding drawn up between the IAEA/INIS and the ETDE (Energy Technology Data Exchange) of the IEA (International Energy Agency) in April/May 1994.

MEMORANDUM OF UNDERSTANDING
between
THE INTERNATIONAL ATOMIC ENERGY AGENCY (represented by the International Nuclear Information System (INIS)
and
IEA ENERGY TECHNOLOGY DATA EXCHANGE (ETDE)
concerning
relationship between ETDE and IAEA/INIS database development and the assurance of data integrity.

Memorandum of Understanding between IAEA/INIS and ETDE

This document outlines the framework for technical cooperation and its operating arrangements between the International Atomic Energy Agency (IAEA), represented by the International Nuclear Information System (INIS) Secretariat, and the IEA Energy Technology Data Exchange (ETDE) represented by its operating Agent.

1. Background

ETDE and INIS are both international information systems established to facilitate the sharing of data among their respective member countries. INIS was established in 1970 to provide a mechanism for the member countries of the International Atomic Energy Agency to share their collective information on the peaceful uses of nuclear energy. IAEA currently has 86 countries participating in the sharing of data through a common database. ETDE, established in 1987, has 16 member nations that pool information on all aspects of energy, including nuclear.

All ETDE member countries are also members of INIS; because of this, INIS standards were adopted with minor modifications to accommodate the wider subject scope of ETDE.

Due to the close connection between the two information systems, technical cooperation between ETDE and INIS commenced and has grown significantly, thus enabling some member countries to take advantage of a common direction for both systems. In this close working relationship, the joint development of standards and procedures has been important to the success of both databases. Efforts have been ongoing to consolidate authority files and provide data input centers with joint rules and guidelines on data preparation. The INIS Secretariat has been an observer at ETDE Executive Committee and Technical Working Group meetings since 1989. Operating Agent representatives likewise have been observers in INIS meetings.

2. Objectives of Cooperation

This Memorandum of Understanding is intended to formalize the relationship between ETDE and IAEA/INIS with regard to database development and the assurance of data integrity. An important element in the success of both databases is the continuing development of information technology

to assist the participating countries and their respective data input centers in providing quality assurance of information.

3. Benefits of Cooperation

3.1 Increased efficiency and cost effectiveness of database production and provision of services for both ETDE and INIS members, the IAEA/INIS Secretariat, and the ETDE Operating Agent.
3.2 Provision of a compatible set of authorities and guidelines for member countries who contribute data to both systems.
3.3 A balanced and equitable sharing of work.
3.4 Saving of resources in the development of mutually beneficial new information technologies.

4. Areas of Cooperation

Specific cooperation between ETDE and INIS is foreseen in the following areas:

4.1 Analysis of current systems to develop and implement less costly and more effective methodologies for processing and exchanging information and to take advantage of advances in information technology.
4.2 Development and enhancement of information handling techniques and information processing technology; encouraging their implementation by member countries of both systems.
4.3 Development of compatible rules, guidelines, and authorities used for input preparation and joint procedures where possible.
4.4 Development of improved output products and co-ordination of promotional activities for such products.
4.5 Developing and maintaining contacts with the user community to enable the systems to better respond to the community's needs.

5. Types of Cooperation

In order to ensure the continued good working relationship between IAEA/INIS and ETDE, both organizations agree to:

- coordinate activities, particularly development activities, of both information systems;
- exchange information on the results of development projects conducted by the systems; and
- encourage representatives of both organizations to attend each other's meetings as observers on a case-by-case basis, as decided by the organization holding such meetings. Where appropriate, the views of the observers should be actively sought on issues affecting both organizations.

In addition, ETDE agrees to provide the INIS Secretariat access to the ETDE database for IAEA internal purposes only, such as for the provision of information services for IAEA meetings and to INIS Secretariat staff. IAEA shall not have the right to reproduce or redistribute the information to the governments of IAEA member countries or other third parties, unless otherwise agreed by ETDE in writing.

6. Termination of Memorandum of Understanding

This Memorandum of Understanding may be terminated by either party at any time upon one month's written notice prior to the date of termination.

For the International Atomic Energy Agency:	For the IEA Energy Technology Data Exchange (ETDE):
Joyce Amenta Director, Scientific and Technical Information	Dora H Moneyhun ETDE Operating Agent Representative
Vienna, 14 April 1994	Paris, 19 May 1994

APPENDIX III

Following is the text of the revised version of the *"Definition of Membership Arrangements for INIS"* as approved by the 28th Consultative Meeting of INIS Liaison Officers in June 2000, then approved by the Director General of the IAEA and transmitted to the Board of Governors of the Agency in document GOV/INF/2000/21 of 5 September 2000.

DEFINITION OF MEMBERSHIP ARRANGEMENTS FOR INIS

1. GENERAL CONSIDERATIONS AND MEMBERSHIP

1.1 In pursuit of Article III, paragraph A.3, of its Statute, the International Atomic Energy Agency (hereinafter referred to as the Agency) has established the International Nuclear Information System (INIS) in collaboration with interested Agency Member States and co-operating international organizations.

1.2 IAEA Documents GOV/1319 and PL-308 as well as standards, rules, and amendments adopted by or emanating from INIS Liaison Officers' and Advisory Committee actions provide guidance for managing and operating INIS.

1.3 Membership in INIS is restricted to States who are Members of the Agency, to UN organizations and to certain international or intergovernmental organizations.

1.4 To participate in INIS, an official request to this effect is to be made by the appropriate national or organizational authority to the Director General of the Agency. This request shall include the commitment to fulfill the responsibilities as laid out under Section 2.3 below. Those States or organizations who are accepted by the Agency are hereinafter referred to as INIS Members.

1.5 Every INIS Member is represented in INIS by a Liaison Officer officially appointed by his/her Government, or Executive Head if an international organization. An Alternate Liaison Officer may also be appointed.

1.6 Each INIS Member fulfilling its responsibilities as laid down in Section 2.3 below shall have the same rights and privileges in the INIS database.

2. INIS MEMBERS

The following is set down as a statement of the rights, privileges and responsibilities of INIS Members.

2.1 Rights

INIS Members will have the following rights:

2.1.1 - to carry out within their national boundaries (or organizational confines, if an international body) dissemination of information contained in and derived from all output products and services furnished by the INIS Secretariat. This is an exclusive

right which remains with the Liaison Officer but may be delegated to the Secretariat or to another INIS Member that has not forfeited its privileges as foreseen in Section 4.1 below and which shall be exercised in conformity with Sections 2.3.10 and 2.3.11 below.

2.1.2 - to co-operate with other INIS Members in fulfilling their responsibilities as laid out in Section 2.3 below.

2.1.3 - to co-operate in using the output products and services furnished by the INIS Secretariat with those INIS Members that have not forfeited their privileges as foreseen in Section 4.1 below.

2.1.4 - to participate at Consultative Meetings of INIS Liaison Officers.

2.2 Privileges

In addition to the rights enumerated in Section 2.1 above, INIS Members also have the following privileges:

2.2.1 - to receive one copy of the regular INIS bibliographic output in each of the available forms at no cost.

2.2.2 - to arrange access for INIS Members to any INIS database services made available by INIS Members, subject to conditions laid out in Sections 2.3.10 and 2.3.11 and Section 4.1 below.

2.2.3 - to receive assistance from the Secretariat, in a form jointly determined, in particular in connection with the provision of input to INIS and the use of INIS output products and services. This assistance will usually be limited to agreed periods during which the INIS Member is establishing its own operations or experiencing particular difficulties.

2.2.4 - to vote at Consultative Meetings of INIS Liaison Officers.

2.2.5 - for developing INIS Members that specifically request it, to receive financial assistance from the Secretariat in exceptional cases to participate at Consultative Meetings of INIS Liaison Officers provided that sufficient funds are available in the allotment for the meeting. The travel standards which will be applied are indicated in the Provisional Travel Rules of the Agency.

2.3 Responsibilities

The INIS Member is responsible for:

2.3.1 - the collection, selection, description, categorization, indexing, abstracting and related preparation, of items of literature published within its national boundaries (or organizational confines if an international body) and submission to the INIS Secretariat in Vienna in accordance with the definitions, rules, procedures, formats, and guidelines set forth in the 'IAEA/INIS Reference Series' and associated *INIS Circular Letters.*

2.3.2 - establishing, if needed, Supplemental Arrangements to secure access to bibliographic references to literature published within its national boundaries (or organisational confines) as defined in Section 5.1 below.

2.3.3 - preparing for input a minimum number of items of literature per year, including those published within its national boundaries and if necessary others as established on the basis of the Supplemental Arrangements defined in Section 5.2 below.

2.3.4 - informing the INIS Secretariat of those portions of its literature that should be distributed to other Members for input preparation on the basis of the Supplemental Arrangements defined in Section 5.2 below, if the Member has a disproportionately large volume of literature published within its national boundaries.

2.3.5 - providing the Agency with the full text of each item of non-conventional literature, either as originally published or in a form jointly determined prepared to a standard specification, provided there is no legal prohibition or limitation.

2.3.6 - contributing advice and recommendations on matters relating to the maintenance, improvement and further development of INIS.

2.3.7 - providing information services to and maintaining contact with, to the extent practicable, the users of INIS information products and services within the applicable boundaries/confines and for representing user views at INIS meetings.

2.3.8 - establishing and carrying out promotional activities throughout the applicable boundaries/confines so that all persons who can derive benefit from INIS are made aware of its potential and of the information services that can be derived from it.

2.3.9 - obtaining clearance from the Agency before providing information services derived from INIS output products to users in States or organizations which are not INIS Members.

2.3.10 - informing the Agency within one month of any arrangements involving access across national boundaries.

2.3.11 - identifying INIS as the source of information when disseminating or repackaging such information.

2.3.12 - participating in studies and evaluations as agreed by the Consultative Meetings of INIS Liaison Officers.

3. MANAGEMENT OF INIS

3.1 Role of INIS Secretariat

3.1.1 The Secretariat function is vested in the Agency with most Secretariat functions being carried out by the INIS Section, Division of Scientific and Technical Information. The Secretariat function is, therefore, carried out within Agency policies, procedures, channels of authority, and financial limitations.

3.1.2 Independent of its Secretariat role, the INIS Section of the Agency bears the rights, privileges and responsibilities of the Agency as an INIS Member.

3.1.3 The Secretariat's principal responsibilities are:

3.1.3.1 - the management of INIS to ensure that its rules and procedures are correctly and efficiently implemented and to take the necessary actions for the efficient operation and continued improvement of INIS. The Secretariat will consider the interests of all Members in managing the operation of INIS.

3.1.3.2 - the integration of input from INIS Members into the INIS file (database), including identification and correction of errors.

3.1.3.3 - the redistribution among Members of some of the literature published by Members having a disproportionately large publishing activity for input preparation by other Members according to the Supplemental Arrangements as defined in Section 5.2 below and the subsequent integration into the INIS file of such bibliographic references.

3.1.3.4 - the distribution of regular INIS output in electronic form to INIS Members according to the provisions of Section 2.2 above.

3.1.3.5 - the distribution of INIS output products including full text of non-conventional literature at the prices established by the Agency subject to the provisions of Section 2.1.1.

3.1.3.6 - the creation and promotion of information products and services derived from the INIS file for use by the INIS Members.

3.1.3.7 - the development, in consultation with the INIS Members, and the subsequent updating and maintenance of all the authorities, standards, formats, definitions, rules, procedures and guidelines to be used for the preparation and processing of input and for the creation and utilization of output.

3.1.3.8 - the training, upon request, of INIS national centre personnel in the preparation of input and in the utilization of output.

3.1.3.9 - the preparation of input with respect to literature published by the Agency and other UN organizations.

3.1.4 In carrying out the activities associated with meeting its principal responsibilities, the Secretariat shall give emphasis to maintenance and improvement of the quality of the INIS file generated for Members and to the usefulness of the INIS system in general.

3.1.5 Fiscal Responsibility for INIS Operations

INIS financial operations are subject to the financial rules and regulations of the Agency.

3.1.5.1 - Cost and Price of Products

Full recovery of the entire INIS budget through the sale of products and services to Member States cannot be expected, because these Member States already contribute to the Agency budget (and hence to INIS), and additionally incur expenses themselves in providing input to the system. Full recovery of the direct output

production costs associated with distribution beyond the limited free quantities provided to Members should, however, be attempted.

3. INIS Advisory Bodies

3.2.1 INIS Advisory Committee

3.2.1.1 - The operation of INIS is reviewed at times of major change in the System or at intervals of not more than four years by an Advisory Committee, the members of which are experts serving in their personal capacities at the invitation of the Agency.

3.2.1.2 - The Advisory Committee reports to the Director General of the Agency.

3.2.2 Consultative Meeting of INIS Liaison Officers

3.2.2.1 - This body will normally meet annually and participation is open to the Liaison Officer of every INIS Member.

3.2.2.2 - INIS Liaison Officers consider all matters concerning INIS activities and development, and make recommendations thereon.

4. CHANGE OF STATUS

4.1 If the INIS Members, represented by their Liaison Officers, together with the INIS Secretariat decide that one of their Members is not adequately fulfilling its responsibilities as laid out in Section 2.3 above, discussions will be initiated and a concerted effort made to bring the INIS Member into compliance. An INIS Member that has not adequately fulfilled its responsibilities as laid out in Section 2.3 above for two years, shall forfeit its privileges as given in Section 2.2 above, except in cases where the INIS Members, following a report by the INIS Secretariat, are satisfied that the failure is due to conditions beyond the control of the INIS Member. The INIS Member which has forfeited its privileges will still retain its rights as laid out in Section 2.1 above until a decision to the contrary is taken by the appropriate organs of the Agency upon recommendation of the collective INIS membership.

4.2 Withdrawal from participation from INIS is at the discretion of the INIS Member. The rights and privileges extended to a Member cease upon the date of the Secretariat's formal recognition of the Member's withdrawal.

5. SUPPLEMENTAL ARRANGEMENTS

This document may be supplemented upon appropriate agreement of the Members and of the Agency to reflect provisions and activities as may be agreed.

5.1 INIS Members may endeavour, with the cooperation of the INIS Secretariat as needed, to secure access to bibliographic references to literature published within their national boundaries (or organizational confines) either from the primary publishers or from other sources and/or negotiating with publishers or other sources the transfer to INIS, either via the national centre or directly to the INIS Secretariat, of bibliographic data for literature not dealt with according to Section 2.3.1 above.

5.2 In order to achieve an equitable distribution of the burden of input preparation among INIS Members, each Member will be required to prepare a minimum number of pieces of literature per year for input to the Database. The minimum number will be established by the Liaison Officers at

their Consultative Meetings. To attain the minimum number, Members will cover the literature published within their national boundaries and complement it with literature published in countries having a disproportionately large volume of nuclear literature.

APPENDIX IV

Following is the text of the revised version of the *"Arrangements for the International Nuclear Information System",* developed in the light of recommendations made by the INIS Programme Evaluation Panel in 2002 and further developed by a team of INIS Members. The changes were approved by the INIS Liaison Officers (hereinafter referred to as ILOs) at the 32nd Consultative Meeting of the ILOs, 25-28 April 2005. Here follows the final draft revised on 10 May 2005.

ARRANGEMENTS FOR THE INTERNATIONAL NUCLEAR INFORMATION SYSTEM

1. PREAMBLE

1.1. In 1969, in pursuit of Article III, paragraph A.3 of its Statute, the International Atomic Energy Agency (hereinafter referred to as the Agency) established, in collaboration with interested Agency Member States and co-operating international organizations, the International Nuclear Information System (hereinafter referred to as INIS), as a multilateral co-operative mechanism to exchange and preserve scientific and technical information on the peaceful use of nuclear energy.

1.2. The Agency Documents GOV/1319 and PL-308 have established the foundation and guiding principles to develop and maintain INIS.

1.3. The IAEA Board of Governors document *Membership Arrangements for INIS*, first published in 1985 (GOV/INF/476, Appendix II) and subsequently revised in 1994 (GOV/INF/743) and, in 2000, as *Definition of Membership Arrangements for INIS* (GOV/INF/2000/21), clarified the mechanisms and rules for co-operation within INIS.

1.4. This decision to revise the *Definition of Membership Arrangements for INIS* is based on the recommendations of the 2002 INIS Programme Evaluation, as contained in document *The International Nuclear Information System (GOV/INF2003/12 Annex 3).* The IAEA Board of Governors took note of this document at the Programme and Budget Committee meeting of 5 May 2003.

1.5. The present revised *Arrangements for the International Nuclear Information System* reflect a number of changes to the mechanism used to operate INIS, as proposed by the Evaluation Panel and further developed by a team of INIS Members. The changes were approved by the INIS Liaison Officers (hereinafter referred to as ILOs) at the 32nd Consultative Meeting of the ILOs, 25-28 April 2005.

2. INIS STRUCTURE

2.1. INIS consists of a network of Members contributing scientific and technical information on the peaceful use of nuclear energy through an INIS Secretariat. The INIS Secretariat function is vested in the Agency and located at the Agency's Headquarters in Vienna.

2.2. INIS activities are implemented through a regular programme of the Agency and by work done in Member States.

2.3 As INIS Secretariat, the Agency is responsible for the management and co-ordination of INIS, including, among other things, the processing of input and distribution of products to Members, the organization and conduct of INIS meetings, and the preparation of budgets and reports.
The Agency also contributes scientific nuclear information to INIS, and is responsible for the contributions from other international organizations.

2.4. In carrying out its functions INIS shall be assisted by: (a) an Advisory Committee, reporting directly to the Director General of the Agency; (b) the INIS Liaison Officers (hereinafter referred to as ILOs) Assembly; (c) the INIS Technical Committee, ad hoc advisory and technical committees and other Agency mechanisms.

3. INIS MEMBERSHIP

3.1. INIS Eligibility

3.1.1. Membership in INIS is restricted to States who are Members of the Agency, to UN organizations and to certain international or intergovernmental organizations.

3.1.2. To apply for INIS membership, an official request is to be made by the appropriate national authority or international organization to the Director General of the Agency. This request shall include the commitment to fulfill all responsibilities and obligations as laid out under Section 3.3.

3.1.3. Requests for membership are approved by the Director General of the Agency. Those States or organizations that are accepted by the Agency are hereinafter referred to as INIS Members.

3.2. The Rights of INIS Members

Each INIS Member shall have the right to:

3.2.1. Receive free of charge a copy of all INIS products and obtain access to INIS services.

3.2.2. Disseminate within their national boundaries or organizational confines all products developed by INIS, provided there is no legal prohibition or limitation. This exclusive right shall remain with the ILOs, but may be delegated to the INIS Secretariat or to another INIS Member.

3.2.3. Actively participate and vote at the meetings of the ILOs Assembly (see 5.2).

3.2.4. Receive assistance from the INIS Secretariat, in a form jointly determined under Section 4.1.10.

3.3. The Obligations of INIS Members

Fulfillment of membership responsibilities and obligations is subject to a review every four years by the INIS Secretariat in consultation with INIS Members. Each INIS Member shall:

3.3.1. Make the necessary provisions to secure adequate financial and human resources as well as the appropriate infrastructure to fulfill its responsibilities and obligations as determined hereafter.

3.3.2. Officially appoint an ILO and notify the INIS Secretariat. The ILO shall serve as contact point for all INIS related matters with the Agency and within his/her country or organisation, and shall represent the country/organisation, give recommendations and have the right to vote at the meetings of the ILOs Assembly.
Each INIS Member may designate an alternate to act in the INIS Liaison Officer's place on matters within his/her competence. The INIS Member shall notify the INIS Secretariat accordingly.

3.3.3. Assume the responsibility to ensure comprehensive and timely coverage of the literature published within their national boundary or organisational confines. Each Member's obligations will include:

a. Participating in the INIS Database production by submitting to the INIS Secretariat complete references to literature as specified by the INIS rules.

b. Ensuring, with the co-operation of the INIS Secretariat and/or other INIS Members, as appropriate, access to references to literature published within their national boundaries or organizational confines, either from the primary publishers or from other sources.

c. Providing the Agency with access to the full text of each item of NCL, either as originally published or in a form jointly determined, provided there is no legal prohibition or limitation.

d. Providing access to INIS information, maintaining contact with the users of INIS information products and services, and carrying out promotional activities within their national boundaries and organizational confines.

e. Participating in studies and evaluations as agreed by the ILOs Assembly.

f. Contributing with advice and recommendations on matters relating to the maintenance, improvement and further development of INIS, including:

- Identifying other information resources to enhance the System.

- Evaluating INIS user needs for new products, services and collections.

3.3.4 Provide the Agency with an annual report on their activities.

3.3.5. Report on all issues that may affect the comprehensiveness and timeliness of their contributions, and work with the INIS Secretariat and other Members on finding solutions within the cooperative environment of INIS.

3.4. Withdrawal from INIS Membership

Withdrawal from participation in INIS is at the discretion of the INIS Member. The rights extended to a Member cease upon the date of the INIS Secretariat's formal recognition of the INIS Member's withdrawal.

4. MANAGEMENT OF INIS

4.1. The INIS Secretariat Functions

4.1.1. Manage and operate INIS by developing an effective and efficient Agency INIS Programme, taking into account recommendations from the Board of Governors of the Agency, INIS Members and INIS advisory bodies.

4.1.2. Integrate contributions from all INIS Members, including those from the Agency and other international organizations, and ensure the availability of all INIS products and services.

4.1.3. Provide, maintain and develop the specific infrastructure required to support INIS operations.

4.1.4. Maintain and develop, in consultation with INIS Members, the appropriate authorities, standards, formats, definitions, rules, procedures and guidelines to be used for quality control.

4.1.5. Ensure the long term preservation and access to all materials contributed to INIS.

4.1.6. Create and promote information products and services for use by INIS Members.

4.1.7. Provide training materials on the operations of INIS and coordinate 1NIS training activities as jointly determined and agreed with INIS Members.

4.1.8. Regularly inform INIS Members on INIS activities, on developments in INIS and on the status of implementation of the suggestions and recommendations of the INIS advisory bodies.

4.1.9. Organise and conduct the meetings of the INIS Advisory Committee, the ILOs Assembly, the INIS Technical Committee and other meetings needed for the operation and development of INIS.

4.1.10. Maintain provisions to support attendance of ILOs at INIS meetings, according to the travel rules of the Agency.

4.1.11. Negotiate or determine the cost and price of INIS products and services. Cost recovery of the direct output production costs associated with distribution beyond the limited free quantities provided to Members should be attempted.

4.1.12. Negotiate, in consultation with INIS Members, information interchange and access to INIS products and services by requesting entities.

4.1.13. Report, as appropriate, to the Board of Governors of the Agency on the operations of INIS.

5. THE ADVISORY BODIES OF INIS

5.1. INIS Advisory Committee

5.1.1. Every four years, the operation of INIS will be reviewed by an Advisory Committee, the members of which are experts serving in their personal capacities at the invitation of the Agency.

5.1.2. The Advisory Committee shall report to the Director General of the Agency.

5.2. ILOs Assembly

5.2.1. A meeting of the Assembly will normally be held every second year and participation is open to the Liaison Officer of every INIS Member.

5.2.2. ILOs consider all policy and operational matters concerning INIS activities and development, and make recommendations thereon. These matters will include but not be limited to system development and innovation, access policy, distribution, marketing and promotion.

5.3. INIS Technical Committee

5.3.1. A meeting of the Committee will normally be held every year.

5.3.2. Participants, at the invitation of the Agency, shall be technical experts nominated by INIS Members with a strong understanding of the INIS technical issues under consideration.

5.3.3. The Committee will discuss and make decisions on technical issues that have an impact on INIS operations and make recommendations to the INIS Secretariat and to the ILOs. Technical issues will include but not be limited to standards and formats, tools, services, products, workflows, etc.

APPENDIX V

DOCUMENTS OF THE INIS REFERENCE SERIES

IAEA-INIS-1, INIS: Guide to Bibliographic Description
IAEA-INIS-2, INIS: Samples for Bibliographic Description
IAEA-INIS-3, INIS: Subject Categories and Scope Descriptions
IAEA-INIS-4, INIS: Instructions for Submitting Abstracts
IAEA-INIS-5, INIS: Terminology and Codes for Countries and International Organizations
IAEA-INIS-6, INIS: Authority List for Corporate Entries and Report Number Prefixes
IAEA-INIS-7, INIS: Specifications for Machine Readable Data Exchange
IAEA-INIS-8, INIS: Paper Tape Specifications and Record Format
IAEA-INIS-9, INIS: Magnetic Tape Specifications and Record Format
IAEA-INIS-10, INIS: Transliteration Rules for Selected non-Roman Characters
IAEA-INIS-11, INIS: Authority List for Journal Titles
IAEA-INIS-12, INIS: Manual for Subject Analysis
IAEA-INIS-13, INIS: Thesaurus
IAEA-INIS-13A, INIS: Terminology Charts
IAEA-INIS-14, INIS: Description of Computer Programs
IAEA-INIS-15, INIS: Self-teaching Manual for Descriptive Cataloguers
IAEA-INIS-16, INIS: Samples of Indexed Documents
IAEA-INIS-17, INIS: First Steps on STAIRS
IAEA-INIS-18, INIS: Orientation manual for INIS and AGRIS (OMINAS)
IAEA-INIS-19, INIS: Instructions for the Submission of OCR Input
IAEA-INIS-20, INIS: Multilingual Dictionary
IAEA-INIS-21, INIS: Guidelines for Standardized Entry of Corporate Bodies
IAEA-INIS-22, INIS: Database Manual
IAEA-INIS-23, INIS: FIBRE User's Manual
IAEA-INIS-24, INIS: Manual for Online Retrieval from the INIS Database on the Internet
IAEA-INIS-26, INIS: Multilingual Thesaurus (Electronic Version)

DOCUMENTS OF THE ETDE/INIS Joint Reference Series

ETDE/INIS-0l (Rev. 2.2) (April 2009), Joint Thesaurus - Part I + Part II
ETDE/INIS-02 (July 2002), Subject Categories and Scope Descriptions
ETDE/INIS-03 (October 2002), Manual for Subject Analysis