IAEA
International Atomic Energy Agency

Nuclear Information Newsletter

www.iaea.org/inis ISSN 2410-4940 (online)

No. 17, October 2015

45th INIS Anniversary Newsletter

CONTENTS

To our readers

This year marks the 45th anniversary since the creation of INIS. INIS has come a long way since the IAEA Board of Governors approved the International Nuclear Information System in 1969. Officially, INIS started operations in January 1970, but it wasn't until May 1970 that its first product, the *INIS Atomindex*, was issued. This date is considered the 'birth' of INIS.

This special issue of the *Nuclear Information Newsletter* is devoted to the first forty-five years of INIS.

INIS was designed as an international cooperative venture, requiring the active participation of its members, who, over the years, compiled a remarkable collection consisting of more than 3.8 million bibliographic records, making it one of the world's largest collections of published information on the peaceful uses of nuclear science and technology. This spirit of international cooperation is reflected in this issue of the Newsletter. Articles written by many INIS Members, as well as former and current INIS Secretariat staff, bring to light some of the known, and hidden, moments in the history of INIS. Put together, these articles shed light on some of those treasured moments that made INIS what it is today.

Many centuries ago Confucius said – "Study the past if you would define the future". This year we celebrate the past 45 years of INIS, but we also need to think about the future. Reflecting on the past can hopefully provide guidance for the future, benefiting INIS and making it a more efficient and useful source of information for our users tomorrow.

I wish you an enjoyable and inspirational reading!

Dobrica Savić

Impressum
Nuclear Information Newsletter No. 17, October 2015
Prepared by The Nuclear Information Section (NIS)
Department of Nuclear Energy, International Atomic Energy Agency
Vienna International Centre, PO Box 100
1400 Vienna, Austria
Email: NIS - Section Head Office
Websites: INIS & IAEA Library

IAEA International Atomic Energy Agency

Nuclear Information Newsletter

www.iaea.org/inis ISSN 2410-4940 (online)

No. 17, October 2015

45th INIS Anniversary Newsletter

USA: OSTI Joins In Celebrating the Forty-Fifth Anniversary of INIS

Debbie Cutler is the International Program Manager, overseeing OSTI's multilateral energy information exchange agreements and the Alternate ILO USA.

Forty-five years ago, nations around the world saw their dream for a more efficient way to share nuclear-related information reach fruition through the creation of a formal international collaboration. This was accomplished without the Internet, email, or websites. It was the right thing to do for public safety, education, and the further advancement of science. It was also a necessary way forward as the volume of research and information about nuclear-related science, even back then, was skyrocketing and exceeded the capacity for any one country to go it alone. And the Department of Energy (DOE) Office of Scientific and Technical Information (OSTI) was part of the collaboration from its initial planning stages.

The International Nuclear Information System, or INIS, as it is commonly known, was approved by the Governing Board of the United Nations' International Atomic Energy Agency (IAEA) in 1969 and began operations in 1970. The primary purpose of INIS was, and still is, to collect and share information about the peaceful uses of nuclear science and technology, with participating nations sharing efforts to build a centralized resource.

OSTI grew out of the United States' post-World War II initiative to make the scientific research of the Manhattan Project as freely available to the public as possible. Thus, OSTI had been building the premier Nuclear Science Abstracts (NSA) publication since the late 1940s and was perfectly positioned to provide information gathering and organizing expertise to help the INIS concept coalesce into reality. OSTI was a key player in formative working group discussions at the IAEA in Vienna, Austria in the 1966-67 timeframe, and led many of the subsequent discussions and teams that finalized INIS policy guidance, common exchange formats, and more. To this day, OSTI has continued to represent the U.S. as the official INIS Liaison Officer (ILO) organization, contributing database content, helping disseminate INIS content more widely, and sharing information expertise as needed. OSTI joins representatives from over 140 countries and international entities to help the centralized Secretariat in Vienna build and manage INIS.

From its origins as a printed journal known as Atomindex, INIS evolved into the on-line world in 1978, and to CD-ROM in 1991, and finally to the Internet in 1998. It was only in 2009 that public access to the INIS database became a reality. The database (referred to as the INIS Collection) has grown to more than 3.6 million bibliographic citations to publications worldwide, 350 000 of which have full text directly available to users. A significant portion of this content was contributed by OSTI, on behalf of the United States. OSTI attends ILO and other technical/policy meetings, contributes new database content, participates in discussion forums on specific information issues, aids Secretariat and other ILOs when possible, and makes the historical NSA content freely accessible to the INIS community (which includes the U.S. public). OSTI also facilitates further dissemination of INIS-gathered information from around the world, just as INIS serves to further widen knowledge of U.S.-generated information.

The role of nuclear energy as a power source has ebbed and flowed in many nations over the years and research funding and public opinions have also fluctuated. But the need for information sharing has grown steadily, no matter the current environment in any one country. Nuclear and atomic science and physics have made great strides, as have safer engineering designs for reactors. Information in INIS includes environmental concerns such as waste management, site remediation, and radiation safety, non-proliferation and policy issues, medical isotopes and agricultural applications, and much more.

Nuclear accidents, although rare, do happen, and the INIS Collection is an important resource when they occur. Having INIS as an already established system of information available made quicker action possible to help address key issues related to the Fukushima event. Lessons learned from Three Mile Island and Chernobyl accidents were already available for Japan to access, as was research over the years on topics such as radiation monitoring and effects, containment, etc. For the U.S. nuclear community, the INIS database is also a valued resource, not only for accessing research results from historical research, but to find more recent research coming from countries that have not had a gap in their nuclear focus. The value is in saving countless hours, avoiding duplicative efforts, and learning from newer experiences.

Now that the Internet is our way of life and Google typically our first go-to resource for information about anything, INIS and OSTI continue to play vital roles in collecting and sharing information about the peaceful uses of nuclear science and technology. People sometimes forget that someone has to put the information on the Internet. Someone chooses what should go up. And then someone has to do things to make the information discoverable. Users should get back reliable and quality information on technical subjects without having to waste time looking at marketing or irrelevant information. It takes people to make this happen. It takes cooperation. INIS and OSTI both continue to collaborate in all these ways. It is not magic. It is committed people making a difference for an important international cause, every day.

IAEA International Atomic Energy Agency

Nuclear Information Newsletter

www.iaea.org/inis ISSN 2410-4940 (online)

No. 17, October 2015

45th INIS Anniversary Newsletter

Japan: 45 Years of INIS

Minoru Yonezawa is the INIS Liaison Officer for Japan, as well as the General Manager, Library, INIS and Archive Section, at the Japan Atomic Energy Agency.

I would like to congratulate INIS on its 45th anniversary. Japan is a founding member of this international cooperation program, and the Japan Atomic Energy Agency (formerly, Japan Atomic Energy Research Institute — JAERI) was appointed as the national center of INIS by the Japanese government. We have contributed to the collection, classification, indexing, abstracting and submission of nuclear literature published in our country, as well as promoted the INIS database within our country. I have been engaged in INIS activities for many years and have a lot of experience with INIS. On the occasion of INIS' 45th anniversary, I would like to look back on this experience.

I started my career at JAERI in 1984. The first regional training seminar for the Far East was held in Tokyo in October 1984. I was assigned to the Library Division of JAERI, but I worked as support staff for the regional training seminar. During the seminar, I had an opportunity to attend the technical tour with the seminar participants to the University of Library and Information Science, research laboratories, etc., in Tsukuba Science City. This was my first involvement with INIS. It was a very impressive and interesting experience.

My INIS career started in 1993. I was mainly engaged in the development of the INIS in-house on-line database on the main frame computer and INIS database promotional activities. We provided Selective Dissemination of Information (SDI) services, Retrospective Search (RS) services, INIS in-house on-line database services, and CD-ROMs, in addition to the INIS on-line database by STN International. Most of these services have been replaced by the INIS database on the Internet. At the beginning, the INIS database on the Internet was free of charge for university students and teachers, and we concentrated on universities for the promotion of INIS. Japan was among the top INIS members with the most university users, presumably due to our promotional activities. The Internet service has now been replaced with the INIS Collection Search (ICS) and it is available free of charge. ICS has become very useful and is still evolving. It is a necessary tool for researchers in the field of nuclear science and technology.

One of my best memories concerning INIS was the 24th Consultative Meeting of INIS Liaison Officers, held in Kyoto in May 1996. It was quite a formidable task for us to host this meeting because there were many tasks involved, such as securing a budget and making arrangements with related organizations. We did not have much experience hosting a large international conference. However, the meeting was a success in part because of the cooperation with the INIS Secretariat, the INIS Liaison Officers, and the staff of the INIS national center of Japan and related organizations.

In March 2011, the Great East Earthquake occurred off the northeast coast of Japan. The Fukushima Daiichi Nuclear Power Station of the Tokyo Electric Power Company (TEPCO) Accident (Fukushima Accident) occurred. After the Fukushima Accident, the Japanese government, research institutes and TEPCO started releasing information on the accident through various types of media, such as books, articles, oral presentations, proceedings,

FIG. 1. 24th ILO meeting in Kyoto 1996.

technical reports and Internet information. We have been making efforts to collect, and classify this literature for input to INIS. In addition, we requested that the INIS Secretariat assign appropriate descriptors to all documents related to the Fukushima accident in order to make those records easily and comprehensively retrievable in the INIS Collection. Our request was kindly transmitted to the INIS Liaison Officers via Information Letter No. 321: Descriptors and Subject Category Codes for Records Relating to the Fukushima Accident.

We also started to collect Web-based literature from various public institutions including the Ministry of Economy, Trade and Industry, the Ministry of the Environment, and TEPCO, in addition to conventional literature such as journal articles, conference proceedings, technical reports, etc. This literature includes plant conditions, plant parameters, on-site and off-site monitoring data, reference documents and others. One of the issues with Internet information is that it is not permanent and it can suddenly be removed or replaced. To solve this issue, we have cooperated with the National Diet Library's Web archiving project to ensure permanent access to Internet information. The collection of this Internet information related to the Fukushima accident is available from our website: Fukushima Nuclear Accident Archive (FNAA). We will submit these records to the INIS database in the near future.

I believe that the past 45 years with INIS have been very successful. This is the result of unified cooperation between the INIS Secretariat and INIS Members. Toward and beyond the 50th anniversary, I hope that INIS continues as an important resource for the exchange of scientific and technical information on peaceful uses and applications of nuclear science and technology throughout the world.

FIG. 2. Fukushima Nuclear Accident Archive (FNAA).

FIG. 3. Photo

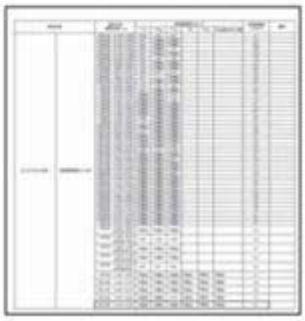


FIG. 4. Monitoring Data

IAEA International Atomic Energy Agency

Nuclear Information Newsletter

www.iaea.org/inis ISSN 2410-4940 (online)

No. 17, October 2015

45th INIS Anniversary Newsletter

France: National INIS Centre: New Directions and Main Achievements in an Evolving Context

Jérôme Surmont is the INIS Liaison Officer for France. He began working as a subject analyst for INIS in 1995 at the Information Valorisation Service (SVI) of the CEA-Saclay Research Centre.

In a letter dated October 8, 1969 and addressed to the Director General of the IAEA, the French Governor of the IAEA Board of Governors gave his official consent for France to participate in the newborn INIS. At the same time, it was decided to establish the France National INIS Centre at the premises of the Central Documentation Department, located at the Saclay Nuclear Research Centre (French Atomic Energy Commission - CEA), near Paris. Forty-five years later, the Central Documentation has become the "Information Valorization Service" (SVI in French) which incorporates INIS, the CEA-Saclay Scientific Library and several other scientific and technical information-related activities (archives, scientific watch, collaborative work, bibliometric surveys, etc.).

Odile Mouffron is the Alternate INIS Liaison Officer for France. She joined the CEA in 1995 as a subject analyst for INIS within the Information Valorisation Service (SVI) of the CEA-Saclay Research Centre.

INIS-France: workforce versus production

Until 2006, France was also a member of the Energy Technology Data Exchange (ETDE). During the pre-2000 era, the workforce dedicated to both INIS and ETDE input preparation was quite high (Fig. 1). The workflow process was organized so that all bibliographic inputs prepared for the INIS database were simultaneously submitted to ETDE's 'Energy' database. The 'pure' ETDE inputs (corresponding to non-INIS topics) represented about 30% of France's annual production of the period. In 2006, for both budgetary and workforce reduction reasons, France decided to withdraw from the ETDE and to focus its efforts on INIS. Additionally, France took this opportunity to cut down on subcontracting over the following years. However, the gradual decline of the workforce dedicated to this activity — which slowly began in the early 2000s — became more pronounced by 2008. Thus it became necessary for France to subcontract once again and to look for new means of production in order to maintain a good level of coverage and contributions to INIS, comparable to that of the preceding period.

Classical production versus voluntary inputting

A solution emerged during an informal discussion at the 11th INIS/ETDE Joint Technical Meeting (Vienna, November 2007). At that time, the INIS Secretariat was already making extensive use of its Computer-Assisted Indexing (CAI) system for the preparation of tens of thousands of journal article inputs (per year) to the database, using records purchased from big international editors. As indexing was no longer a problem for the Secretariat, their main concern was now access to specific documents, in

particular the conference proceedings, and their bibliographic description. For France, the situation was the other way around: we had many conference proceedings on hand waiting to be processed, with the capability to prepare the bibliographic description of hundreds of articles, but not enough workforce or time to analyze and index each of them. Common ground was immediately found and a new kind of cooperation was born: France would voluntarily submit complete inputs without indexing for some important missing documents and the INIS Secretariat would take over the indexing with the help of the CAI tool. France submitted its first voluntary inputs as early as December 2007, and since then has produced more than 17 730 voluntary inputs, mainly from international nuclear conference proceedings and foreign key-journals. Voluntary inputting has become a regular activity of the French National INIS Centre and now represents, on average, about 40-50% of France's annual production (Fig. 2).

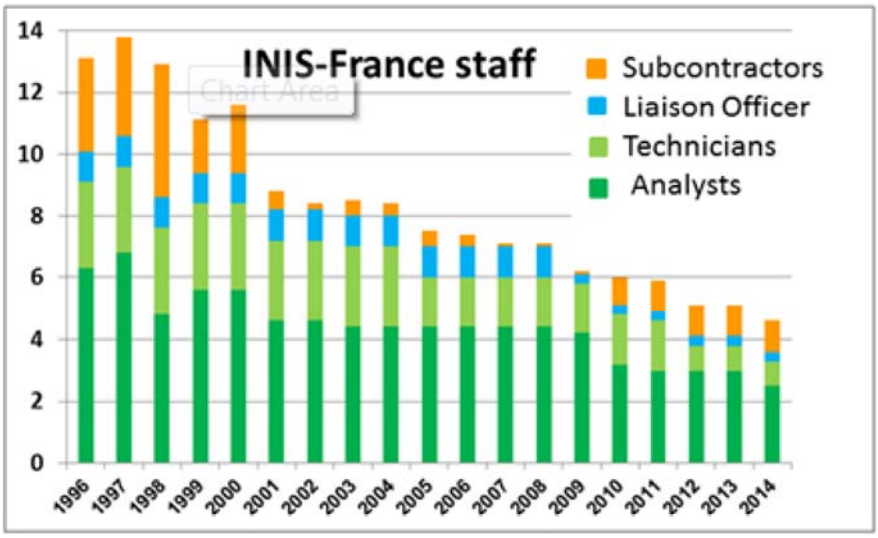


FIG. 1. INIS France:1996–2014 staff distribution per category

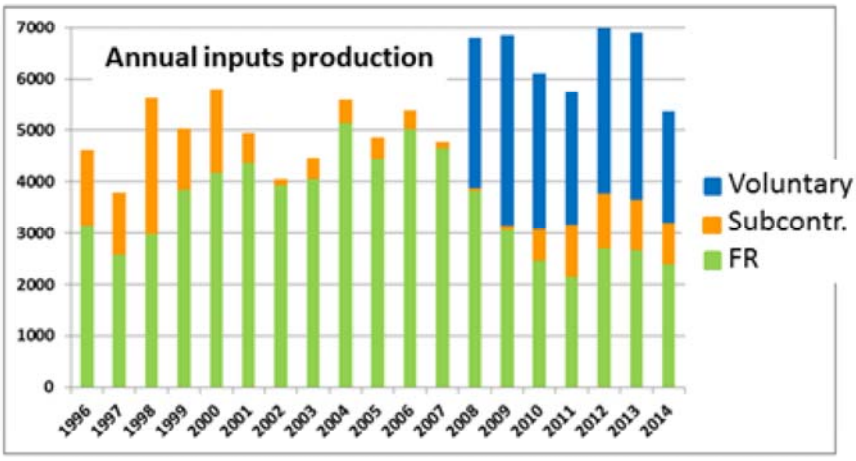


FIG. 2. INIS France: 1996–2014 input production, including all input prepared for ETDE (until 2006) and for OECD/NEA (all years).

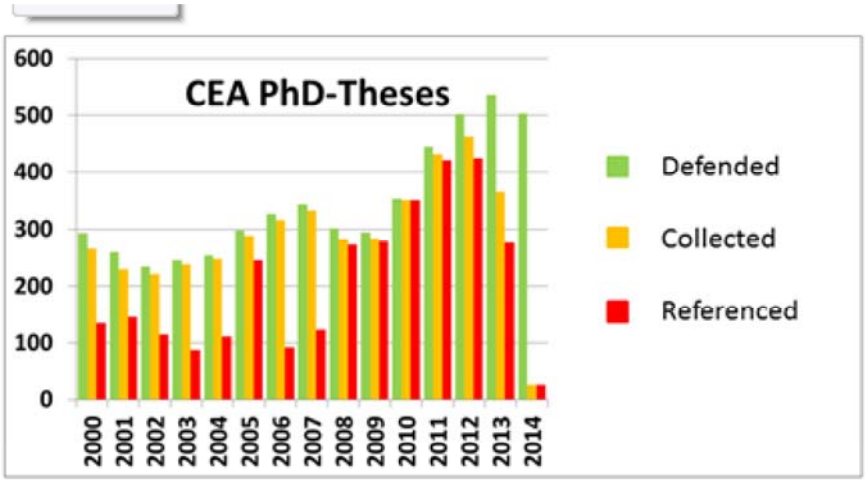


FIG. 3. Number of CEA PhD Theses defended since 2000 with respect to the number of manuscripts already collected and referenced in the CEA PhD Theses database.

Grey literature digitization and knowledge preservation

During the last ten years, the French INIS Centre has launched several digitization/preservation projects for historical grey literature documents which, in large part, come from the unique collection of reports of the CEA-Saclay Scientific Library. One project worth mentioning was carried out between 2004 and 2007 and involved the active participation of the INIS Secretariat to digitize more than 2760 CEA reports on microfiche (belonging to the 'CEA-R' collection) published between 1948 and 1969, thus covering the pre-INIS era. A second project, initiated last year, concerns the digitization of about 380 selected reports published between 1953 and 1994 in the discontinued

collection of CEA's technical notes (the 'CEA-N' collection). This second project will be completed before mid-2015 and all documents will be made available in full text through the INIS Collection. Last but not least, a third project concerns the collection, digitization and preservation of all historical and recent PhD theses prepared at the CEA. A 'CEA PhD Theses database' has been specifically created on the CEA-Saclay Intranet to make the full text of these PhD Theses accessible to all CEA researchers. Among all collected theses, about one third deal with nuclear topics and are consequently referenced in INIS in parallel. This project is bound to be developed since the number of PhD theses prepared at the CEA has dramatically increased in recent years with the number of thesis defenses exceeding 500 (Fig. 3). Such a project requires considerable time and effort, not only to process the documents, but also to retrieve the original manuscripts, since compulsory depositing of PhD Theses has never been implemented at the CEA. For this reason, even in recent years, manuscript collection is never 100% successful.

FIG. 4. Two INIS promotional flyers made available for library users.

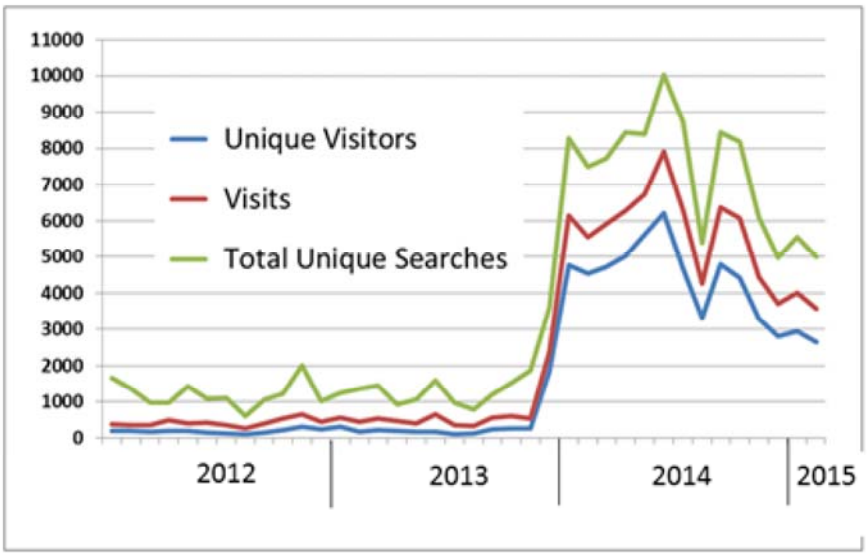


FIG. 5. France- INIS Collection Search Statistics (Jan. 2012–Feb. 2015).

PhD Theses and promotion of INIS

France participated in the Open Access Pilot Project launched in 2008 which led, the following year, to open access of the INIS database on the Internet. Since then, promoting INIS really started to make sense in order to inform the public at large about the richness of the database resources. Attracting new users is a task we have managed to carry out in two ways: internally, using flyers which, for instance, are made available to the users of the Scientific Library (Fig. 4), and externally, by targeting the university laboratories potentially interested in using INIS. These laboratories are identified thanks to the information recorded in the CEA PhD Theses database. In practice, for each recent CEA thesis referenced in INIS, we address a personalized E-mail to the PhD student and to both his university and CEA supervisors. The text of the message stresses the particular interest of the PhD work for the nuclear sciences and technologies, which is the reason for its referencing in INIS, and provides the direct link to the INIS record describing the document. In this way, for 145 CEA-theses published in 2012 and entered into INIS, more than 400 E-mails were prepared and sent to PhD students and laboratory researchers or managers, representing as many new potential INIS users.

Statistics of INIS usage in France

The indexing of the INIS Collection Search (ICS) by Google.com and Google Scholar search

engines at the end of 2013 led to an impressive increase in the number of unique visitors worldwide. A similar result has been observed in France (Fig. 5) with the monthly number of unique visitors oscillating between 2500 and 6000 since January 2014 (monthly average of 4250 visitors compared with the previous years' monthly average of 150–200 visitors). Among those users identified in 2014, CEA is leading with 3726 unique users, followed by Areva (1605 users), the National Nuclear and Particle Physics Institutes (IN2P3 – 1047 users), Electricite de France (EDF – 1036 users) and followed by a huge list of universities and research institutes that highlight the pertinence and efficiency of our promotional actions.

Conclusion

This brief look back over the last 20 years of the France National INIS Centre allows us to measure how far we have come and what choices we have had to make in a constantly evolving context. We have particularly stressed what, in our view, represents the most important mission of INIS, which is the preservation and dissemination of nuclear knowledge, in particular through the coverage and full text archiving of conferences and grey literature documents, with special attention paid to PhD Theses.

IAEA International Atomic Energy Agency

Nuclear Information Newsletter

www.iaea.org/inis ISSN 2410-4940 (online)

No. 17, October 2015

45th INIS Anniversary Newsletter

China: Review and Outlook of the Work of INIS

Mr Gong is Secretary of the party committee/Deputy Director, China Institute of Nuclear Information & Economics and INIS Liaison Officer for China.

In 1984, China joined the IAEA and, hence, INIS. China has carried out the work of INIS for 30 years. Throughout these years, the China INIS Centre has had many achievements and has promoted international communication and cooperation in the field of nuclear scientific and technical information, which has become an integral part of China's international cooperation on nuclear energy.

Review of the INIS work in China

The responsibilities of INIS are undertaken by CINIE:

The China INIS Centre is located at the China Institute of Nuclear Information & Economics (CINIE). As a research institute of nuclear industry soft science, CINIE is dedicated to the study, development and application of nuclear scientific and technical information, the study on strategic planning of nuclear industry development and management policies, on nuclear economics, on intellectual property rights and services, and on the editing and publishing of scientific and technical books, periodicals, and audio and video products, etc.

Since the first 53 items of input were submitted to the INIS Secretariat, the quantity of items submitted by China has steadily increased. Since 1995, the volume of input has kept steady at above 3000 items, increasing to more than 3500 items by 2010. At present, a total of 79 617 items of input have been submitted to the INIS Secretariat. The quality of input submitted by China has been doing quite well, and has been praised by experts from the INIS Secretariat many times on different occasions.

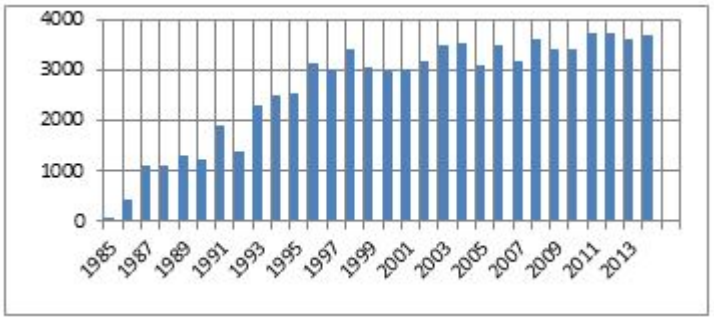


FIG. 1. Input volume.

Actively participating in communication and cooperation with the IAEA and INIS Member States:

Since joining INIS, China has actively participated in various INIS activities. Over the past 30 years, CINIE has attended approximately 90 INIS meetings and training courses. In turn, we have received 30 visiting officials and technical personnel, including Mr Yuri Sokolov, a former Deputy Director General, Department of NE, IAEA, other officials from the INIS Secretariat, and INIS Liaison Officers from other Member States. Mutual understanding and learning were promoted and talents of literature processing were developed through communication with the IAEA and INIS Member States. Most of the staff who participated in INIS training courses have become the backbone of INIS. Meanwhile, INIS activities also promoted the technical development of

domestic information institutions and libraries in the nuclear field.

Establishing the China INIS website to promote INIS:

The China INIS Center developed its first website in 2006 to better promote INIS. Having the website server located at the China INIS Centre made it convenient for domestic users to access the website. The Chinese interface and information, as well as the function of Chinese-English retrieval, also attracted domestic users. In addition to the INIS database on the Internet, other information resources, such as the China nuclear scientific and technical literature database, can also be searched.

At present, there are over 3700 users of the China INIS website from institutes and universities in the nuclear field, nuclear power plants and governmental bodies. Most of them find the website by searching information via the Internet. They learn about INIS and then become users of INIS.

Digging more deeply into INIS resources

Several new resources were developed using the INIS database and the China nuclear scientific and technical literature database in order to satisfy various user demands.

Data in different subjects and fields were selected from the INIS database to develop a special subject database, such as the database of radioactive waste management, reactor engineering and nuclear power, etc., which allows users quick access to precise information.

In addition, electronic journals were created by selecting certain NCL and then classifying and translating them into Chinese (title). For example, as the main reactor types in China are PWR and HWR, full text articles of NCL about the design, construction, operation experiences and safety of those reactor types were selected to make the electronic Journal of Nuclear Power.

Development and outlook of INIS

With the rapid development of the Internet, information resources are available in digital form. Some nuclear technology literature can be found via the Internet in addition to that found in INIS.

But the authoritative position of INIS cannot be replaced. The INIS Collection is made possible through cooperation between 154 INIS Members, in which data is processed and indexed on a regular basis according to INIS standards. The coverage of literature and quality of data cannot be matched by other databases in the nuclear field.

We firmly believe that INIS plays an active role in the promotion of peaceful uses of nuclear energy. INIS promotes processing and communication of scientific literature, keeping in mind its use as the final purpose. INIS members should carry out flexible promotional activities, highlight benefits for current and potential users, dig out valuable information from the INIS database and meet individual user demands. The overriding priority should be the peaceful use of nuclear energy and INIS resources should be utilized to the maximum.

We are sailing in the same boat and the China INIS Center would like to be powerful rowers in creating a stronger INIS.

FIG. 2. Homepage of China INIS website.

IAEA International Atomic Energy Agency

Nuclear Information Newsletter

www.iaea.org/inis ISSN 2410-4940 (online)

No. 17, October 2015

45th INIS Anniversary Newsletter

Germany: INIS — 45 years of Reliable Nuclear Energy Information

Silke Rehme *is currently the Vice President of Content & Services at FIZ, Karlsruhe. She has been the INIS Liaison Officer since 2006*

Sabrina Eck *is a librarian and is Head of Editorial Metadata and Patents. She has been the Alternate INIS Liaison Officer since 2012.*

Michael Mutschelknauss *is a Subject Analyst and Thesaurus Specialist. He has been involved*

First contributions

The Federal Republic of Germany has been an official INIS member since 1970. The first 78 citations from German publications can be found in Issue 2 of Volume 1 of the INIS Atomindex.

At that time, the Zentralstelle für Atomenergie-Dokumentation (ZAED) was the INIS center in Western Germany. To ensure that the documentation on nuclear energy was directly serving the interests of researchers working in this field, the ZAED had been recently moved from Frankfurt to the neighborhood of Kernforschungszentrum Karlsruhe, Germany's most important nuclear research institution. After 1977, the ZAED, together with other documentation centers, was merged into what is today FIZ Karlsruhe. At the same time, publications from Eastern Germany were analyzed by the Staatliches Amt für Atomsicherheit und Strahlenschutz in Berlin from 1974 to 1989. After the German reunification, FIZ Karlsruhe became responsible for this. The share of German contributions made to the INIS database amounts to 7% of the total number of contributions. Germany has regularly ranked among the top 5 contributing Member States in the annual statistics.

in INIS production since 1985.

FIG. 1. One of the first database citations from Germany.

International cooperation

Regarding cooperation in INIS, Germany — represented by FIZ Karlsruhe and its predecessors — has always been actively involved, not only in contributing publications, but also in strategic planning, organization, and technical and subject matters throughout the past five decades. Germany was part of the INIS Study Team during the planning stage of INIS. Germany also hosted two ILO meetings in Karlsruhe: one in 1979 and one on the occasion of the 30th anniversary in 2000. Staff from various INIS centers worldwide often visit FIZ Karlsruhe in order to gain insight into our INIS production or to participate in internships and training sessions on workflow management, application of rules, and FIBRE usage. FIZ Karlsruhe's many years of participation in the Voluntary Input Program, and the editing of input provided as a service to sometimes as many as 7 other European input centers, has contributed to the comprehensiveness of the INIS database.

The INIS Working Groups, dealing with topics related to the database and it's scientific, technical, and strategic enhancements, allow members the most direct influence on INIS developments. From the very start, Germany has been an active member of the Working Group establishing the *Guidelines for Standardized Entry of Corporate Bodies*, published under this title as Issue 21 of the *INIS Reference Series*. Among others, FIZ Karlsruhe was also a committed member of the Working Group responsible for merging the thesaurus and the classification of the two information systems, INIS and ETDE, and contributed to the realization of the Multilingual Thesaurus.

Development of the documentation of publications

The trends and developments that were decisive factors for the documentation of literature throughout the years were also essential for INIS production and the presentation of the INIS Collection. This directly affected the cataloging guidelines and thus the workflow of the INIS database production at FIZ Karlsruhe. One example is the development from a printed abstracting service to an on-line database. The printed service provided users with various indices for better access. To make them as uniform and unambiguous as possible, identifiers were introduced (e.g. affiliations and corporate publishers). Based on the INIS Reference Series, identifiers replaced the names of corporations found in literature being processed. Many database producers and information providers working with text mining techniques would be glad to have this kind of standardization today, but it, alas, was skipped during the technical advancement of search possibilities. As a side-effect, this method also saved space and storage capacity. For the same reason, the names of authors had to be abbreviated in the early years of

database production. With increasing storage capacity and the emergence of on-line searchable databases, these aspects lost their importance.

Database production at FIZ Karlsruhe

In parallel to the changes at INIS, database production at FIZ Karlsruhe has also undergone a vivid transformation during the past 45 years. In the early days, the citations of articles were recorded by hand on paper, a so-called ‘input sheet’, then transferred onto punched tape via ‘Flexowriter’ and finally sent to Vienna by mail. Errors and typos had to be corrected by cutting out the wrong sections of the punched tape and gluing in a section with the correct information. Later, magnetic tape, cassettes, and disks were used. It was not until the late 1990s that data could be transferred electronically by FTP, making it no longer necessary to send the information by mail.

FIG. 2. INIS Worksheet at FIZ Karlsruhe.

At FIZ Karlsruhe, the era of input sheets and punched tape was followed by a mainframe-supported input system, where data was entered into fixed entry masks via terminals, and with separate systems for journals, books, series, and articles. The introduction of an integrated system in the mid-1990s marked a milestone in FIZ Karlsruhe’s database production. Besides INIS, many other bibliographic and factual databases were produced with hundreds of thousands of entries per year. All of them used the same system, and many were produced according to the INIS cataloging guidelines, which had become the standard procedure at FIZ Karlsruhe.

Development of content produced in Germany

If we take a more detailed look at the subjects of German input, we should mention that this does not necessarily reflect German research activities but the German publication landscape. It comes, therefore, as no surprise that the content delivered to INIS by FIZ Karlsruhe has not really changed dramatically over the last 45 years. During all these years, German input has always focused on basic research such as nuclear physics, medical aspects, and material science.

On the other hand, Germany is a country with a highly developed nuclear reactor technology, many nuclear reactors, and a long-standing debate between supporters and critics of nuclear power. Looking at the political discussion in Germany about the use of nuclear power and the nuclear phase-out, it might be interesting to discover whether these developments are also reflected in the publications written by German authors.

In Germany, the first discussions on the safety of nuclear power plants, and, in consequence, also the phase-out, began very early. In the mid 70’s, criticism had already intensified, culminating with the Chernobyl accident in 1986.

In 2000, Germany decided not to build any new nuclear power plants and the run-time of any existing nuclear power plants should not exceed more than 32 years. The goal was a nuclear phase-out and the last nuclear power plant should be shut down around 2021. These dates had been vividly discussed and eventually prolonged due to technical and economic reasons until the accident in Fukushima. In 2011, as a direct consequence of this terrible accident, the German government decided to take consequent steps towards the phase-out, signaling a change in their energy policy. In the follow-up, eight nuclear power plants were immediately shut down in 2011, and a final plan for the nuclear phase-out was established.

One might expect that these political discussions and decisions would also affect research activities in Germany. In the beginning, nuclear power plant technology had been an important and successful area of research. This has changed over time and today one will hardly find research activities in this area in Germany. How does the INIS database reflect this?

If we look at publications from German authors in detail, we can see some effects which can be matched to the ongoing political discussion in Germany. For example, Fig. 3 shows that the number of articles on nuclear reactors (INIS classification codes S21 and S22) had remained stable for many years until 1986. Political discussions had been intense since the end of the 1970s, but we can see that the number of publications has continuously decreased since 1986, after the Chernobyl accident. If we look at publications worldwide, we can see that this decrease appears later, namely at the end of the 1990s. The early decrease of German research on nuclear reactors seems to be a result of the political situation in Germany.

Another hot topic in Germany has always been the storage of nuclear waste. How and where to store it has been a controversial subject for many years. So it is not really surprising that searches in INIS show that research results had been published at quite a high level for many years.

Topics like the nuclear phase-out, political issues, and environmental issues are a bit more difficult to search in the database. To search these topics comprehensively, one would have to search for quite a lot of search terms in different combinations of Boolean operators. To get a first impression of how these topics have evolved during the last decades, we have searched for the most important terms such as ‘nuclear phase-out’, ’dismantling’ and ’decommissioning’.

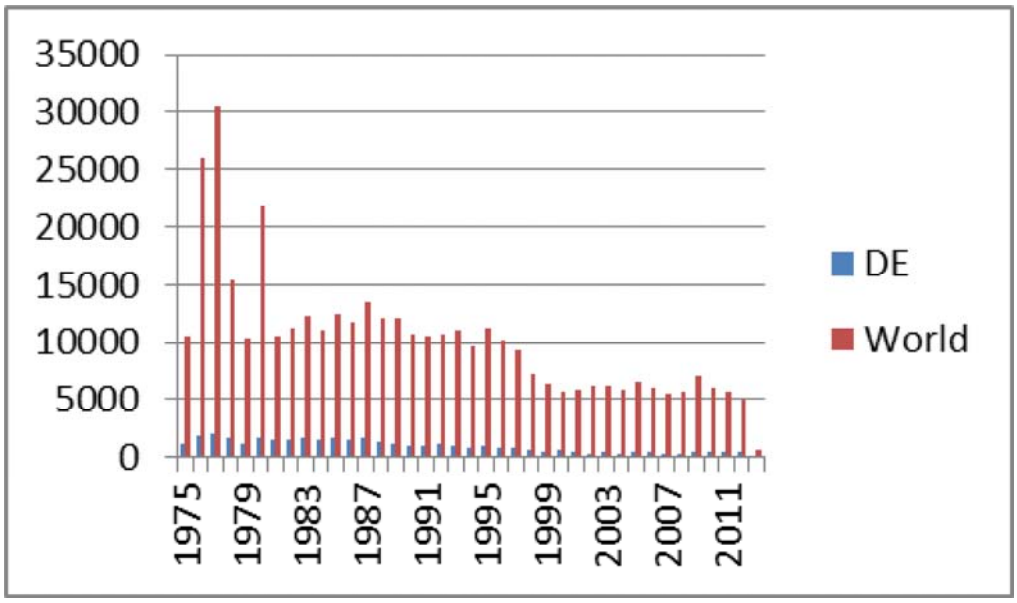


FIG. 3. Development of the number of publications on nuclear reactors during the years 1975-2013 in Germany and worldwide.

We see that this topic became important quite early (Fig. 4). Of course there was an increase of

articles after the Chernobyl accident, particularly worldwide. Concerning articles from German authors, the number has been, with very few exceptions, quite stable. What we can also see is that German authors delivered around 10% of all those articles, which is remarkably higher than the German portion of the entire INIS input (7 %). This probably gives a hint that this topic was and still is quite important in Germany.

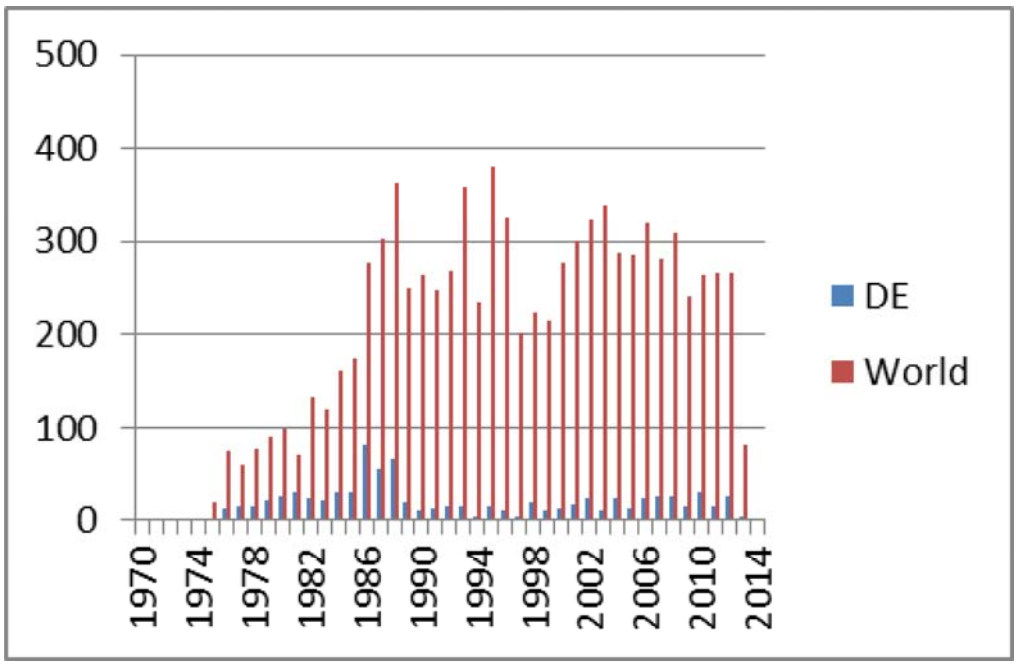


FIG. 4. Development of publications on the nuclear phase-out, dismantling and decommissioning during the years, 1975-2013 for Germany and worldwide.

Outlook

Looking back on 45 years of cooperation in the INIS community, FIZ Karlsruhe is proud to have been an important member over the years. Throughout the last decade, traditional database producers and information providers involved in the documentation of literature as a whole have had to deal with strong competitors, such as Google, also in view of technical developments, new information channels, and an ever changing information environment. Only products and services with an excellent quality as to comprehensiveness, indexing depth and business models, and that were firmly anchored in the community, were able to hold their ground.

The INIS Collection has developed into a huge knowledge base of nuclear information. During the last couple of years, INIS has also become a user-friendly, modern Web database with really good functionality. It is offered for free worldwide so that the high-quality information does not get lost and will hopefully still be used during the next centuries. All Member States and member organizations can be proud to have built together such a huge and well maintained collection. If INIS succeeds in continuing the database under the aegis of the IAEA with strong partners, innovative ideas, a future-oriented strategy and a committed team in Vienna, Germany – and FIZ Karlsruhe acting on its behalf – will certainly keep walking a long way together with INIS.

FIZ Karlsruhe would like to thank the INIS team at the IAEA and congratulate them on the tremendously good job done throughout the years!

IAEA International Atomic Energy Agency

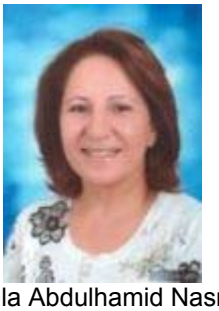
Nuclear Information Newsletter

www.iaea.org/inis ISSN 2410-4940 (online)

No. 17, October 2015

45th INIS Anniversary Newsletter

AAEA: My Experience with INIS on the Occasion of its 45th Anniversary



Nahla Abdulhamid Nasr is Head of the Scientific Documentation Department, as well as being in charge of the Director General's Office and the Secretariat of the Conferences of the Arab Atomic Energy Agency.

My name is Nahla Nasr and I am Head of the Scientific Documentation Department at the Arab Atomic Energy Agency (AAEA). I have been the AAEA INIS Liaison Officer since September 2009.

Since my tenure as ILO, I have prepared and submitted 131 records to the INIS Collection.

I received training on preparing input at the National Centre of Sciences & Nuclear Technologies in Tunisia (2009), the Syrian Atomic Energy Commission (2010), and the Egyptian Atomic Energy Authority (2012).

I participated in the 2010, 2012, and 2014 INIS Liaison Officer Meetings and the 2011 INIS Training Seminar. I prepare records using the Atom and Development bulletin which is issued periodically by the Arab Atomic Energy Agency four times a year. I have learned that journals are conventional literature (CL) that is commercially available through normal distribution channels, for example: booksellers, magazine trades, publishing houses. We are not requested to send copies of these publications to INIS. These are different from non-conventional literature (NCL) which is not readily available through normal or regular commercial channels (referred to as 'grey' literature), is difficult to locate and is available only from issuing organizations. Copies of the full text (in paper or electronic form) must be supplied to INIS with the bibliographic record. Books issued by the Arab Atomic Energy Agency are NCL. I have already submitted 12 NCLs as PDF files to the INIS Unit.

Usually NCL includes scientific and technical reports, conference papers, abstracts of conference proceedings, conference programs, theses, patents and technical brochures. For publications that contain several individual chapters, parts written by different authors or articles on different subjects, a monographic record (M level) has to be prepared for the complete publication. This is called the Lead Record. Analytical records then have to be prepared for the individual chapters of the publication. No Lead Record is needed for journal articles. If copies of NCL cannot be submitted to INIS, literary indicator x has to be assigned in the last sub-section of tag 008 to indicate that a copy has not been sent to INIS. Every record must be assigned at least one valid descriptor. Usually, every record contains between 5 and 10 descriptors from the INIS database. The record must contain an abstract as a summary of the information contained in the publication (maximum length 6000 characters). In addition to the English language abstract, one or more non-English abstracts may be provided. Each record has a Temporary Record Number (TRN), which is a unique number assigned to the record by the National Input Centre. TRN is changed to a permanent reference number (RN) after INIS processing.

Initially, we received the INIS database on CD-ROM monthly and searched the files on them with the appropriate program (winSPIRS 5.0). WebSPIRS (Silver platter's Information Retrieval System for the World Wide Web) lets us use a Web browser to search Silver Platter databases.

Since my participation in the 2011 INIS Training Seminar, I can now make searches on the INIS website. The Training Seminar concentrated on INIS input preparation, utilization of INIS products and services, and on promoting the system. After my participation in the Training Seminar, I learned more about input preparation and knew how to benefit from INIS products. When I returned to work, I created a link from the INIS website to the website of the Arab Atomic Energy Agency to promote INIS services directly from our organization.

To search for nuclear information from the INIS site, I search for those records in the INIS Collection using key words. Once the search is done, I expand some of the resulting records to verify where the terms and phrases are shown and then narrow my query by searching for specified phrases.

As for INIS electronic information exchange, it is possible to download files from INIS via the secure FTP server (example: latest updates of INIS Atomindex, electronic version of TRN/RN Cumulative Correspondence List, and software related to INIS activities). On the other hand I can put electronic versions of PDF files as an input corresponding to a Temporary Record Number (TRN) and store them under the name of my organization (AAEA) using the IAEA FTP server. We can also find compressed files of the INIS software, FIBRE+, on the INIS FTP server and can download it using the Web browser.

The INIS Unit also informed us about the FileZilla Project Tutorial for INIS users. The FileZilla FTP utility is a user-friendly file transfer protocol client that allows easy handling of file transfers between computers. With Filezilla it is possible to upload files to an FTP server, download files from an FTP server and perform on-line editing of server files. I have already used this application to upload FTP files of AAEA publications.

Between 2009 and 2014, the Arab Atomic Energy Agency organized activities in Arab Countries in which I organized some promotional activity for INIS. I distributed INIS promotional materials (printed and electronic materials) to the participants and presented them in the showrooms of the conferences and meetings.

The Arab Atomic Energy Agency is organizing the Twelfth Arab Conference on the Peaceful Uses of Atomic Energy in collaboration with the Egyptian Atomic Energy Authority (Sharm El-Sheikh, Arab Republic of Egypt: 16-20/5/2015) and INIS promotional materials will be distributed to the participants. In addition to that, I will do my best to submit a presentation about INIS, if it is accepted by the scientific committee of the conference.

IAEA International Atomic Energy Agency

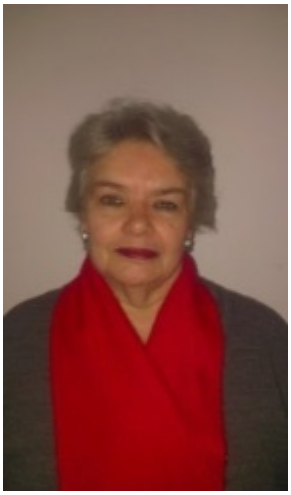
Nuclear Information Newsletter

www.iaea.org/inis ISSN 2410-4940 (online)

No. 17, October 2015

45th INIS Anniversary Newsletter

Argentina: Brief Overview of Argentina's INIS Activities



***Ms Bavio** has worked at the National Atomic Energy Commission (CNEA) as a technical librarian at the CAC (Constituyentes Atomic Center) Information Center since 1978. She has been chief of the Document Treatment Division from the Eduardo Savino Information Center (CIES) at CNEA and INIS Liaison Officer for Argentina since 2014*

Argentina works in close collaboration with the IAEA on its technical cooperation program, both on national projects within their national program plan, including its thematic areas, as well as on regional projects through the ARCAL agreement. In the field of horizontal cooperation, Argentina engages in technology transfer, training fellows and receiving scientific visits.

Argentina has been a member of the International Nuclear Information System (INIS) since 1970, and was among the first IAEA Member States to agree to participate in the system. As a member, we have been involved in the various activities carried out by the IAEA, disseminating the research and development of our researchers and scientists in nuclear and related subjects and promoting INIS activities.

The National Atomic Energy Commission (CNEA) is the INIS National Center. Contributions to the INIS database nationwide are made through the CNEA's Information Centers: Eduardo Savino Information Center (CIES, Constituyentes Atomic Center), Leo Falicov Library (Bariloche Atomic Center) and the Library of the Nuclear Regulatory Authority (ARN).

From 1970 up to 2014, Argentina provided more than 6000 documents to the INIS Collection (see Table 1).

Thanks to the close ties achieved throughout the years, we have been able to participate in the following networks (regional and international) in the nuclear field, which has enabled the exchange of information:

RRIAN (Regional Information Network in the Nuclear Area) is based on the RRIAN Network, RLA/0/017–ARCAL XLII (1999–2000) for Latin America and the Caribbean. This project was approved by the National Coordinators of ARCAL in Rio de Janeiro, Brazil (May 1998) and its first Project Coordinators Meeting was held in Buenos Aires, Argentina (April 1999). The main objective of this project was to promote regional cooperation of nuclear information with Latin-American and Caribbean INIS Centers and to expand the availability of nuclear information in the region by sharing resources electronically. Although it was designed for a biennium, it has continued to this day. Participating countries are: Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Ecuador, Mexico, Nicaragua, Paraguay, Peru, Uruguay and Venezuela; INLN–IAEA (International Nuclear Library Network) is a global nuclear knowledge management initiative aiming to strengthen international cooperation. (http://www.iaea.org/nuclearenergy/library-inln/);

LANENT's (Latin American Network for Education in Nuclear Technology) mission is to promote, preserve and disseminate education and nuclear training, and promote knowledge management

in the nuclear area in Latin America and the Caribbean. (http://www.lanentweb.org/es).

Countries	1996-2000	2001-2005	2006-2010	2011-2014
Argentina	209	1985	1137	1021
Brasil	11316	10695	18319	10958
Colombia	191	1794	895	542
Cuba	569	720	594	760
Chile	244	708	282	220
México	1023	2745	1432	721
Perú	242	316	202	102
Uruguay	111	427	669	741

Table 1 Comparative table of the inputs with the other countries of the region (1996-2014)

In relation to training, it should be noted that at the request of our government, the Second Regional Training Seminar of the Working Group on Thesaurus was held in Buenos Aires, November/December 1971 and attended by a large number of participants from the INIS centers in Latin America. This seminar promoted activities relating to nuclear information throughout the continent.

On numerous occasions, the staff of our INIS Centers have participated in the invaluable trainings sponsored by the IAEA, as well as by the ARCAL XLII Project, held in Austria, Cuba, India, Paraguay, and the former USSR, amongst others. These trainings have enabled the acquisition of knowledge needed to review national nuclear literature and to prepare input to the INIS database.

The training course, INIS Human Resources: Collective Training on the Work for Developing Member States Participating in INIS, organized by the IAEA and held in Moscow, USSR in 1989, was our first experience with the testing phase of the Friendly Input of Bibliographic Records (FIBRE) software, distributed in 1991.

Many technical developments could be highlighted but I will refer briefly to only some of them in relation to database input preparation, as well as to searching:

FIG.1. Eduardo Savino Information Center (CNEA, Buenos Aires.)

FIG. 2. Leo Falicov Library (CNEA, Bariloche).

FIG. 3. Nuclear Regulatory Authority Library (ARN, Ezeiza).

Bibliography:

Todeschini, Claudio: The International Nuclear Information System (INIS): The First forty years 1970-2010. IAEA, Oct. 2010.

IAEA International Atomic Energy Agency

Nuclear Information Newsletter

www.iaea.org/inis ISSN 2410-4940 (online)

No. 17, October 2015

45th INIS Anniversary Newsletter

Austria: The INIS Austria Centre 1970-2015

Marcus Rössner *has been a member of the Austrian INIS Centre at the Central Library for Physics and Chemistry Library of the University of Vienna since 2015. From 2011 to 2014, he worked as a librarian at the Library for Astrophysics at the same university.*

This article spotlights Austrian people and institutions that have influenced the fortunes of INIS and the INIS Centre in Austria.

The work of two Austrians had a lasting influence on INIS. The first person, Ms Elisabeth Ruckenbauer, was Head of the INIS Bibliographic Control Unit at the start of INIS. She was responsible for the development and implementation of the INIS bibliographic description rules (INIS Reference Series IAEA-INIS-01 and -02).

The second person having a lasting influence on INIS was Mr Alexander Nevyjel. He was Austrian INIS Liaison Officer from 1983 –2002, and Head of the INIS Subject Control Unit until 2011. During his second term of office, he developed, together with the Swiss company Convera, the Computer Assisted Indexing Software (CAI). The aim of the project was to optimize indexing. The implementation of CAI in 2004 resulted in an increase of input to the INIS database; from around 60 000 records per year to over 100 000 records per year.

We are proud that Mr Nevyjel is still an active member of the INIS Austria Center and that he continues to offer his experience and expertise. The Austrian INIS Centre has resided at two scientific institutions: Seibersdorf and the Austrian Central Library for Physics and Chemistry Library, each having a specific relationship with the IAEA and INIS.

The INIS Centre in Seibersdorf (1970–2011)

Within the framework of the “Atoms for Peace” program, the first Austrian research reactor was built in Seibersdorf in 1960 with international financial and technical support. Two years later, the IAEA Seibersdorf Laboratories were opened on these grounds. It was the beginning of close and long lasting scientific cooperation.

For decades, Seibersdorf was the Austrian Centre of excellence in nuclear research and it was for this reason, at the beginning of INIS, that the Austrian INIS Centre was located at Seibersdorf.

Austria is a founding member of INIS and the INIS Centre at Seibersdorf was one of the first to start work on INIS matters. The first INIS Center at Seibersdorf was operated out of the Library and consisted of two to three part-time employees. Many of them were students working on their diploma theses. The first Austrian INIS Liaison Officer was Ms Maria Tisljar, followed by Mr Alexander Nevyjel in 1983 and Mr Gert Sdouz in 2002. After a referendum in 1978 which led to a legal ban on the conventional use of nuclear energy in Austria, Seibersdorf became a multidisciplinary research centre and, today, is the Austrian Institute of Technology (AIT).

INIS at the Austrian Central Library for Physics and Chemistry Library

In 2011, the Austrian INIS Centre moved from Seibersdorf to the Austrian Central Library for Physics and Chemistry Library (ZBP), part of the Vienna University Library. A long-standing relationship was established between the IAEA and the ZBP. Due to the United Nations “Atoms for Peace” resolution, the ZBP became a depository library for nuclear sciences. In 1955, the installation of an “atomic library” was initiated. The cornerstone was a donation of scientific literature from the USA, among which were also reports from the United States Atomic Energy Commission (USAEC).

The ZBP played an important role when the location for the IAEA in Vienna was chosen. One of the requirements for the future location was the existence of a well-equipped physics library that could provide information to IAEA staff until their own library could be established. Before the establishment of the IAEA, an international commission was formed to determine the completeness and relevance of the ZBP’s inventory. Among the members of the commission were Mr Homi Jenhangir Babha (president of International Conference on the Peaceful Uses of Atomic Energy) and Mr Merril Eisenbud, who was the first Health and Safety Chief of the United States Atomic Energy Commission.

Fig. 1. From left to right: Alexander Nevyjel, Alexander Zartl, Brigitte Kromp, Lilian Nowak, Tobias Zarka, Marcus Rössner. (not pictured: Nohemi Sosa Nevyjel)

During the following years, close collaboration between the IAEA and the ZBP was established. In 1996, the IAEA donated a complete collection of INIS full text NCL on microfiche to the ZBP. In 2008, the handover of the NCL on CD-ROM and DVD followed. The ZBP Library serves as a depository for the INIS NCL Collection.

This sound relationship was important for the establishment of the Austrian INIS Centre at the ZBP in 2011.

INIS-Austria Today

With the relocation of the Austrian INIS Centre in 2011, Ms Brigitte Kromp, Head of ZBP, became the Austrian INIS Liaison Officer. Since then, searching and processing of NCL has intensified. The extensive archive of the ZBP makes it possible to provide users worldwide with access to the INIS NCL Collection. The main scope of INIS, however, has not changed during the last 45 years. Austrian national input is mostly comprised of conference papers and journals.

The work environment continues to grow more complex and the legal framework for providing material to the INIS database is a challenge in today's digital age. As shown in the following statistics, the annual national input ranges from 500 to 1000 records. The actual workload depends on the number of documents published nationally pertaining to INIS subject scope.

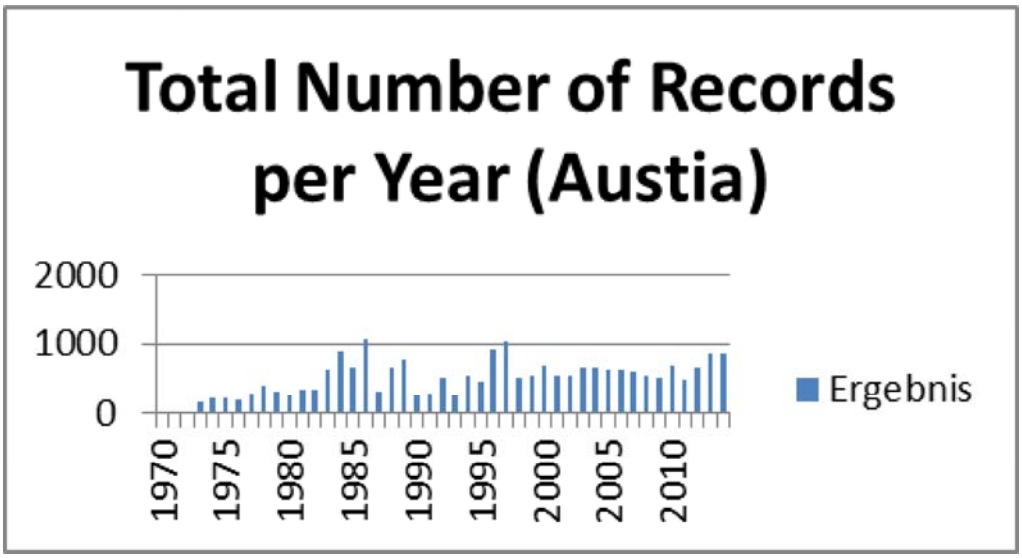


FIG.2. Number of Records per Year.

IAEA International Atomic Energy Agency

Nuclear Information Newsletter

www.iaea.org/inis ISSN 2410-4940 (online)

No. 17, October 2015

45th INIS Anniversary Newsletter

Belarus: Moving Forward Together

Uladzimir Ivaniukovich has been the INIS Liaison Officer for Belarus since 1992. He is head of the Chair of Ecological Information Systems at the International A. Sakharov Environmental University in Minsk.

The 45th anniversary of INIS provides an opportunity for Member States to look back on significant events. Belarus was among the founding members of the system and the 45th anniversary of INIS also marks 45 years of this country's participation. In 1992, Belarus began to work independently after a change in the political situation. As a result, the activity of the Belarus INIS Centre increased significantly. Within this time frame, about 6000 inputs were contributed and more than 100 copies of NCL were provided.

Currently, Belarus submits about 300 inputs per year to INIS. This quantity reflects the activity of our scientists in the fields corresponding to the scope of INIS.

In our country, interest in nuclear technologies is defined by two main factors – the severe consequences of the Chernobyl accident and the acute shortage of energy resources. Therefore, the main focuses of nuclear research are the behavior of ecosystems in conditions of radioactive contamination, and the impact of low dose radiation on living organisms, nuclear medicine, nuclear energy, radiation protection and radiation safety.

The severe consequences of the Chernobyl accident is the most important area of interest to Belarus because it affects the health of thousands of people. After the Chernobyl accident, about 23% of Belarusian territories were contaminated by cesium 137, with levels reaching more than 37 kBq/m2 (1 Ci/km2). Zones of evacuation and resettlement encompass an area of 6.7 km2 (data from http://www.chernobyl.gov.by). Currently about 1142 million people live within these territories.

At the time of the Chernobyl accident, Belarusian specialists did not have the knowledge and experience necessary to ensure the safety of the population in conditions of acute or chronic irradiation. To study the problems of radioactive contamination on the environment and its impact on living organisms, a number of research centers were established: the Institute of Radiobiology of the National Academy of Sciences of Belarus, the Research Institute of Radiology at the Ministry for Emergency Situations, the Republican Research Center for Radiation Medicine and Human Ecology, and the Palesse State Radioecological Reserve. In most cases, INIS has been, and remains, the only source of bibliographic information for these fields of research.

The national INIS Centre was established during the era of the printed editions of the 'Atomindex', which were later replaced by a CD-ROM version as a more convenient form for information dissemination. The Belarus INIS Centre is situated at the Environmental University in Minsk. The Centre is open to all in need of nuclear information. One branch of the Centre is located in Gomel, the administrative center located in the contaminated zone. In 2008, when the Belarusian Nuclear Power Engineering Program started, four state universities began training specialists in nuclear power. These universities use INIS output products. We attach great importance to the use of INIS in the preparation of specialists. Opportunities to use INIS are

regularly demonstrated to students in extension courses in different fields – radiation safety, medicine, agriculture, etc. Classes demonstrating the use of the INIS database are included in the curriculum of the Regional Post-graduate Courses on Radiation Protection and Providing of Safety of Sources of Ionizing Radiation, which are organized by the IAEA and held in Belarus every two years. More than 180 experts from 13 countries in Eastern Europe and Asia have gained experience in INIS output products.

The INIS Secretariat has always set high standards. One of its principles is that INIS always uses the most advanced information technologies and software products to ensure functionality and maintenance of the system, as well as offering information support to nuclear specialists. This is the basis for survival in an environment of rapidly changing technology. At the same time, because of this, we have an opportunity to show students how to work with modern information sources.

Another important principle is the support offered by the Secretariat to new national INIS centers. We remember the support provided by the Agency's Department of Technical Cooperation in the first years of our national INIS Centre's operation. An essential role of the Secretariat is to train the personnel working in the INIS centers. Many national information specialists are trained in a short time.

In conclusion, on this 45th anniversary of INIS, I would like to especially thank the members of the INIS Secretariat, with whom I started to work more than 20 years ago and who created a friendly and businesslike atmosphere, which has been preserved and maintained today. They are Alexander Sorokin, Claudio Todeschini, Anatoli Tolstenkov, Alexander Nevyjel, Seyda Rieder, Lubomir Iliev, Lidia Goschinski, Graham Tebb, Taghrid Atieh, Bekele Negeri Duresa, Kristina Epperson, Zsolt Stanic and many others. In addition, I would like to say warm words to my colleagues – INIS Liaison Officers from different countries with whom I worked closely over the years.

IAEA International Atomic Energy Agency

Nuclear Information Newsletter

www.iaea.org/inis ISSN 2410-4940 (online)

No. 17, October 2015

45th INIS Anniversary Newsletter

Uruguay: Milestones in the Regional Evolution of INIS

Ana Elda Rebellato *has been working at the Library of the Ministry of Industry, Energy and Mining DINAMIGE in Montevideo URUGUAY since 1980. She has been the INIS Liaison Officer for Uruguay since 1995.*

My first contact with the IAEA was in 1989 in Moscow, at ATOMINFORM while attending the International Centre for Scientific and Technical Information (ICSTI) training: *INIS Human Resources: On the Job Group Training for Developing INIS Member States*.

Lectures were given about FIBRE data entry software and searches on INIS CD-ROM.

Through the Regional Cooperation Agreement for the Promotion of Nuclear Science and Technology in Latin America and the Caribbean, specifically by the ARCAL X project, modern technologies for access to information were introduced and the creation of INIS Centres was supported. During its execution, from 1985–1992, many countries in the region became members of INIS, including our country, Uruguay.

Our involvement in the RLA/0/017 ARCAL XLII Regional Network for Nuclear Information increased after our application for INIS Liaison Officer was submitted by government authorities in Uruguay. This enabled better conditions for the formation of a nuclear Regional Information Network with 15 countries in Latin America.

The Regional Network for Nuclear Information (RRIAN) proposed an expansion of the availability of nuclear literature in the countries of the region and the international dissemination of scientific and technical reports published in participating countries.

The acquisition of hardware and software, and human resources training in information technology allowed inclusion in the cooperative system (http://cin.cnen.gov.br/rrian).

Through the concept of re-packing information, two publications were produced: *Accidents and Incidents in the Nuclear Area in Latin America and the Caribbean. Bibliographic Collection*, which was published in hard copy and, *Bibliographic Collection of Nuclear Legislation in Force in Latin America and the Caribbean: Organic Laws and Nuclear Safety*.

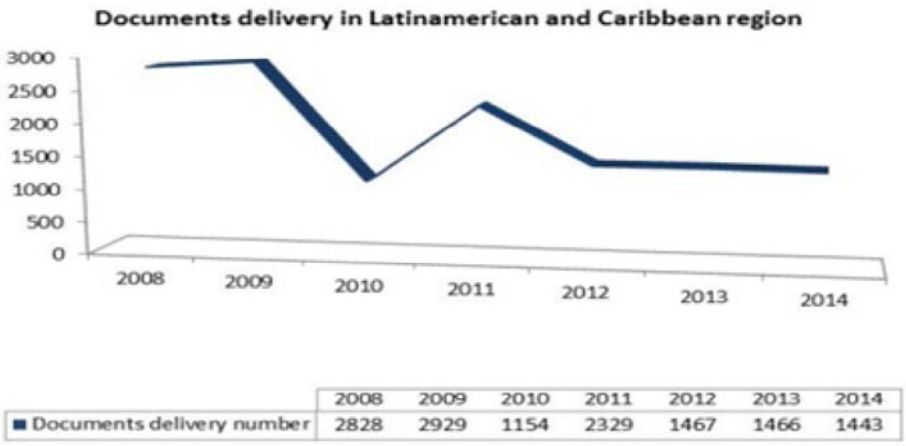


FIG. 1. Document delivery in Latin American and the Caribbean.

33 professionals have been trained on topics such as electronic document delivery, inputting documents to the INIS database, promotion of information services, copyrights, strategic planning, information management, implementation of quality standards in libraries, and trends and prospects of new information technologies.

An increase in the regional participation of INIS was one of the successes achieved by the project. The average contribution of the region in the five years before the project was 2173 documents. In 1999, this contribution increased to 3154 documents.

As shown in Figure 1, the last five years have had significant fluctuations, which would be good to analyze through a survey in the near future.

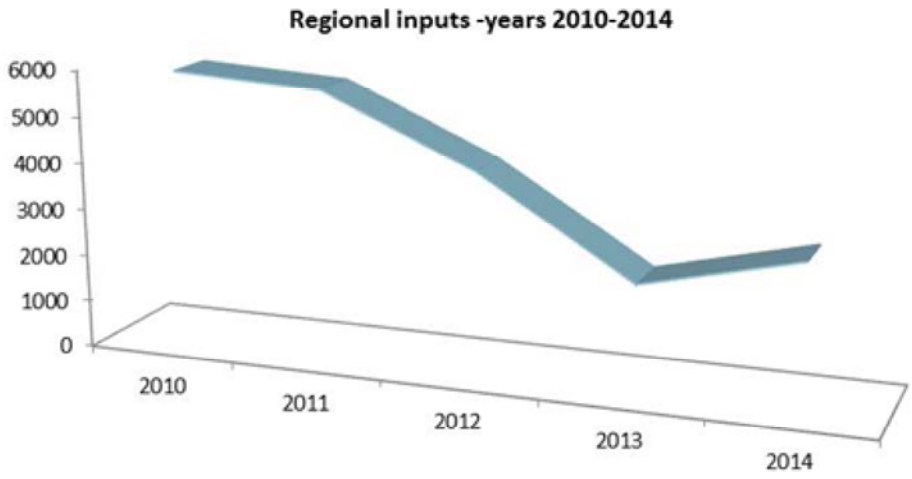
Other achievements throughout the years have been the increase in the number of users using RRIAN Sonar, a professional service development consisting of selective dissemination of information that allows registered users access to INIS database updates.

The Nuclear Information Centre–CNEN in Brazil has offered this alert service to regional users, and promoted conferences through the website. At the same time, a Web-based electronic bulletin was created to disseminate nuclear information (http://www.cnen.gov.br/produtos/cin/inf-tec-cient.asp).

Document delivery

The RRIAN document delivery exchange, through regional cooperation, exchanged 168 documents in 1999, the first year of the project. Since then, it has shown a fluid and sustained increase. The second year showed substantial growth, providing 777 documents totaling 7164 pages, thus strengthening regional cooperation.

The ARCAL XLII project has succeeded in giving sustainability to the region, as shown in Figure 2. Regional document delivery has provided information within the region despite budget restraints. Working together over the years has been the best way to overcome weaknesses and share strengths.



	2010	2011	2012	2013	2014
Number of records	5924	5730	4290	2260	3039

FIG. 2. Regional Inputs –2010-2014.

Changes in charging policy to INIS database access

The INIS database charging policy was given special attention, when in 2007, RRIAN asked the INIS Secretariat for free regional access to the INIS database, and at the *11th Joint INIS/ETDE Technical Committee Meeting* a free access pilot project for Latin America and other voluntary countries was agreed upon. The following countries participated in the pilot project: Argentina, Brazil Canada, France, Uruguay, and the USA. Not much later, INIS offered free worldwide access to the database.

The advent of the era of digitization has allowed for better management of old collections. Each country within the region has carried out different methods for digital preservation using different channels and levels.

Increasing the number of users in the INIS database

In 2008, INIS wanted to increase the use of its database, and therefore, a survey was conducted about INIS database usage needs and subject scope among the following countries: Argentina, Brazil, Chile, Colombia, Cuba, Mexico and Uruguay. Countries outside the Latin America region also conducted their own surveys.

The survey helped INIS' decision to move towards a Google-based search engine and to use other information sources and databases. This had a major impact on the increase in subject scope, provided easier searches, faster connection, and better control of full text documents. This effort by the INIS Secretariat to increase the number of users had a major impact within only a few years.

Nuclear education networks and nuclear knowledge management

Among the new challenges to face was the creation of a nuclear education and training network, which was established in December 2010, in a meeting in Peru, aiming to contribute to the preservation, promotion and sharing of knowledge, as well as fostering the transfer of nuclear knowledge in Latin America.

LANENT seeks to increase technical and scientific cooperation among its members by promoting the benefits, and fostering the progress and development, of nuclear technology in areas such as education, health, industry, government, the environment, and the mining industry, among others.

The goal is to arouse interest in the younger generation to nuclear technology (http://www.lanentweb.org/).

Digitization has enabled better knowledge management in the preservation of old collections. Each country in the region carried out different methods, using different channels and levels.

As support to LANENT, RLA/0/048 (networking nuclear education, training, extension and shared knowledge in Latin America and the Caribbean Project) was developed, where INIS Centres have participated in various activities such as: increasing regional preservation of nuclear knowledge (which is useful for nuclear education and training outreach activities), and the availability of digital full text collections produced in regional Member States, including PhD and Master Theses.

Once INIS Centres have received adequate equipment and software, and initiated digitization, platforms should be developed which are capable of reaching a larger number of users using freely accessible and suitable software recommended to educational institutions.

It is necessary to lead the effort to consolidate the formation of repositories so that we can manage, preserve and increase visibility to LANENT in digital content.

To conclude, I would like to say that these regional milestones which I have mentioned clearly show the impact that the IAEA and Members States have had in the development, and strengthening of nuclear information in Latin America.

Throughout my years as Liaison Officer, the INIS Secretariat has faced difficulties and challenges with realism, intelligence, and hard work, underscoring the strength of international cooperation and integration, which should continue.

IAEA International Atomic Energy Agency

Nuclear Information Newsletter

www.iaea.org/inis ISSN 2410-4940 (online)

No. 17, October 2015

45th INIS Anniversary Newsletter

Brazil: Increasing the Reach of the INIS Database by using Social Media

Fabiane Braga *has been Head of the Nuclear Information Center (CIN) at the Brazilian Nuclear Energy Commission (CNEN) since August 2013 and is the INIS Liaison Officer for Brazil.*

Teodora Marly Gama das Neves *has worked in the Nuclear Information Center (CIN) of the Brazilian Nuclear Energy Commission (CNEN) since July 1998 as a Librarian*

Diogo Pereira *has worked in the Nuclear Information Center (CIN) of the Brazilian Nuclear Energy Commission (CNEN) since 2010. He is currently responsible for managing the*

A long history of partnership

INIS began its activities in 1970 to collect and share scientific and technical information about the peaceful uses of nuclear science and technology, with participating nations collaborating to build a centralized database. In the same year, the Nuclear Information Center of the Brazilian Nuclear Energy Commission (CIN/CNEN) was created with the mission of representing Brazil in the INIS system. Since then it has played an important role in the context of Brazilian scientific and technological development as a database cooperative producer, a scientific and technical information service provider, and a knowledge generator, utilizing the INIS database.

Since the 1970's, CIN/CNEN has developed new information products and services based on the INIS database and produced in cooperation with other INIS Members, in order to support research in nuclear and related fields and to keep researchers updated on the newest publications in their areas of interest.

FIG.1. CIN fan page (facebook.com/cnen.cin).

Some examples are the Selective Dissemination of Information Service (SONAR-INIS) — an oriented system for automatic notification of references - and SERVIR-INIS — a document delivery service that helps researchers, by integrating Brazilian

Facebook fanpage and works with marketing communication activities and the document delivery service (SERVIR-INIS).

libraries with the INIS network and database, providing access to nuclear related documents. Both systems have been working together to bring the INIS database closer to the Brazilian nuclear community.

FIG 2. INIS app

Over the years, CIN/CNEN has studied and selected state-of-the-art marketing tools to democratize access to INIS content, aware of its importance to support research in national institutions at different levels of human, financial and technological resource development. In addition, we have increased the visibility of the work of local researchers who would otherwise not have their scientific documents widely disseminated.

Bringing nuclear science into the mainstream

CIN/CNEN has followed and adapted to new technologies, especially those related to information sharing and communication. The flow of communication of scientific information has been rapidly changing with the development of these technologies, more specifically with the advent of the Internet and its impact on social interactions.

Today, social media is not seen as the future of communication — it is the present reality. Among all of the social networking sites, Facebook is one of the most powerful social platforms, with millions of users accessing information on products and services every second.

According to statistics from the Nielsen Group, Brazilian Internet users spend more time on Facebook than on any other website - about 89 million Brazilians. This significant number of potential users cannot be ignored. Considering this, and looking to the future, CIN launched its Facebook fan page in January 2014 (Figure 1).

The content of the fan page is defined on the basis of CIN/CNEN's main goal: dissemination of scientific and technical information on nuclear energy and related fields. Information about events, IAEA publications, and nuclear technology information is always posted, including highlights from the INIS database. We have identified interest in the INIS database content through the increasing subscriptions of the SONAR INIS service. Also, given that social networks

are relevant information sources, some products and services were integrated to Facebook with the development of focused applications that provide quick access to users. One example is the INIS database button (Figure 2) on our cover page that enables people to search the INIS database without leaving the Facebook environment.

The road ahead

After one year on Facebook, it is clear that the creation of the fan page was a step in the right direction. It has proven to be a powerful tool for spreading nuclear information to a broader audience. Our followers are mostly made up of researchers, students and professionals working in the nuclear and related fields from several countries in Latin America. It is also important to point out that the fan page could reach a non-specialized audience, as well as the general public. We believe that by supporting the dissemination of and facilitating access to the INIS database to a new audience, this fan page may also be a tool to improve the public perception of nuclear energy by sharing information on its peaceful applications.

IAEA International Atomic Energy Agency

Nuclear Information Newsletter

www.iaea.org/inis ISSN 2410-4940 (online)

No. 17, October 2015

45th INIS Anniversary Newsletter

Tunisia: The 45th Anniversary of INIS

Ms Khemiri Najet *is the INIS Liaison Officer for Tunisia. She has worked as a Librarian at CNSTN since 1996 and has been the Training Manager since 2008.*

Since nuclear knowledge is in many ways unique, managing this knowledge requires a specific program and needs to achieve specific objectives. Without diligence in managing this knowledge, substantial portions could be lost when staff retire or when knowledge bearing objects are disused and discarded due to changing priorities. Good management of nuclear knowledge, however, can contribute to economics, safety and innovation.

Since the creation of the National Center for Nuclear Science and Technology (CNSTN), one of our principle purposes has been to create a center for effective documentation, sharing information in the nuclear field (in the center of the ladder and nationally).

Indeed, this purpose was realized from the very beginning, despite the shortcomings of modern communications media such as Internet, email, websites, etc.

FIG. 1. National Center for Nuclear Sciences and Technologies (CNSTN) Library

Since 1997, CNSTN has introduced another activity in the documentation unit: making the INIS database available to researchers and engineers. At first we tried to popularize the information in the database using traditional means; promoting the importance of this tool to CNSTN staff.

An important event that marked the course of the system and helped us disseminate it nationally was the organization of the *Fourth Arab Conference on Peaceful Uses of Atomic Energy*, held in Tunis, in November 1998.

In order to broaden the reach of information nationally, model letters were sent to gather and share information on the use of nuclear science and technology and to share the efforts needed to build a national centralized database at CNSTN.

The primary mission of INIS has been to foster the exchange of information between Member States. However, INIS has been deeply involved in nuclear knowledge preservation from the very beginning. INIS evolved from an on-line world in 1978, to CD-ROM in 1991, and finally to the Internet in 1998. It was only in 2009 that public access to the INIS database became a reality.

INIS covers literature published worldwide on peaceful uses of nuclear science and technology. The scope of INIS is very wide and reflects the knowledge domain of the IAEA. It includes physics (in particular, plasma physics, atomic and molecular physics, and especially nuclear and high-energy physics), chemistry, materials science, earth sciences, radiation biology, radioisotope effects and kinetics, applied life sciences, radiology and nuclear medicine, isotope and radiation source technology, radiation protection, radiation applications, engineering, instrumentation, fossil fuels, synthetic fuels, renewable energy sources, advanced energy systems, fission and fusion reactor technology, safeguards and inspection, waste management, environmental aspects of the production and consumption of energy from nuclear and non-nuclear sources, energy efficiency and energy conservation, economics and sociology of energy production and use, energy policy, and nuclear law.

The use of this database was both helpful and important to our Center and our laboratories, especially information related to the environment, such as waste management, site remediation, and radiation safety, non-proliferation and policy issues, medical isotopes and agricultural applications, and many more. The INIS system also provides much information on the prevention of nuclear accidents, namely: Fukushima, and Three Mile Island.

The Documentation Unit played a significant role in raising awareness of researchers and engineers at CNSTN to the modern methods and technologies of scientific and technical information, a rapidly developing field. The CNSTN Center's library has become a source of diverse information in the field of nuclear science and technology.

One of our main documentation activities is to meet the needs of users both internally (scientists and engineers of the Centre) and externally (scientists from research centers and universities, ENIT, ENIM, ESIA, INAT, etc.) and to provide them with bibliographic references and documentation related to their field.

Our library has established a bibliographical bulletin which includes new acquisitions and developments of the INIS database and which is regularly sent to research institutions involved in the use of nuclear techniques (greater research schools such as ENIS, ENIM, ENIT, ESIA, faculties of Sciences, Ministries, etc.).

I have participated in several seminars, trainings, and meetings that helped me develop my skills in the field and especially expand the scope of the INIS network on both national and international levels.

FIG.2. The 2nd Conference on Radioisotopes Production and Utilization and the 11th Cyclotron Research Workshop.

The purpose of these training courses is to provide comprehensive information about the role of INIS in supporting national nuclear activities and programs, and to provide training on the use of INIS products and services and INIS input preparation. These courses address the important role of the national INIS Centre, and the need to establish regional cooperation among national INIS Centres. The trainings allow an exchange of information and offer practical sessions on specific topics.

Conclusion

Nuclear information sources may include a wide range of content for a variety of purposes and users. The focus of each source, and therefore, which content to manage, depends upon the policy decisions made by each institution or administrator.

One of the disadvantages in our Center is that our researchers do not give much importance to this tool, despite its scientific contributions in research. This is mainly due to a lack of awareness of the system and its importance. We must educate both managers and operators by offering them the necessary resources (physical and material).

In conclusion, CNSTN will continue to work with all members of the system and to ensure the reception of the most recent information in the field of scientific research and technology, and make use of the provisions in the field.

IAEA International Atomic Energy Agency

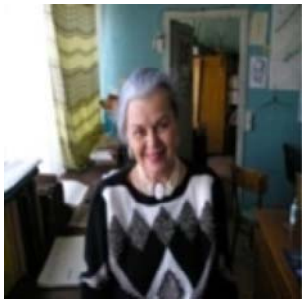
Nuclear Information Newsletter

www.iaea.org/inis ISSN 2410-4940 (online)

No. 17, October 2015

45th INIS Anniversary Newsletter

Ukraine: The 45th Anniversary of INIS



Zhanna Pysanko *is the Ukrainian INIS Liaison Officer and an Experimental Physicist at the Research Reactor, Institute for Nuclear Research, Kyiv, Ukraine*

This article discusses the cooperation between the Ukrainian INIS Center and the INIS Secretariat since 1973. The Ukrainian INIS Center is a unit within the Institut for Nuclear Research, National Academy of Sciences of Ukraine (Kyiv). The Center carries out the goals of INIS: compiling information in the field of nuclear science and technology, processing selected publications as per INIS regulations, distributing NCL from the INIS database, and statistical and semantic analyses.

Out of 130 Member States and 24 international organizations, the Ukrainian INIS Center continuously ranks among the top 10 to 12 countries for the amount of annual input submitted.

According to the order of the Presidium of the Ukrainian Academy of Sciences in June 1973, the Institute for Nuclear Research was charged with the organization of the INIS Center for the collection and processing of scientific papers published within the Ukraine in the field of nuclear physics and its peaceful uses, for submission to the INIS Collection, in order to familiarize the international scientific community with the works of Ukrainian scientists. This, naturally, increases the scientific prestige of the country.

The INIS Liaison Officer, who was previously appointed by the government, acts as the operational link between the INIS Secretariat and Member States. Currently, in the Ukraine, the nomination is made by the State Inspectorate for Nuclear Regulation. The ILO is responsible for organizing the collection of information within its own territory, preparing the information for input into the INIS Collection, and providing operational services, receiving and using INIS output products.

In September 1973, Ms Pysanko was nominated as the INIS LO of Ukraine. From 1973–1991, the INIS Center of Ukraine worked as part of the Soviet Union INIS Center. In 1996, the Center was reorganized into the Ukrainian INIS Center, located at the Institute for Nuclear Research of National Academy of Sciences. At present, 3 people work in our Center.

The main goals of the Center are:

- To collect information, published within the Ukraine, in the field of nuclear science and technology;
- To process the material according to INIS regulations, and format the input for submission to the INIS Secretariat;
- To analyze the information in the INIS database for potential users at the Institutions of the Academy of Sciences and among scientists from other departments;
- To promote the INIS Collection, ensuring that users obtain a complete set of the requested information.

The Ukrainian Center staff has analyzed approximately 23 periodical publications. In recent years, the number of scientific conferences relating to INIS scope has increased. However difficulties exist regarding the list of conferences. Unfortunately, there is no publication that is associated with a list of conferences in the Ukraine so the INIS Secretariat informs us of the conferences taking place in our country.

The Ukrainian Centre's topics of input cover around 80% of INIS categories. The most significant topics are nuclear theory, the physics of elementary particles and fields, nuclear and radiation physics, plasma, materials science, nuclear reactors, ecology, radiology, nuclear medicine, the effect of radiation on living organisms and biological materials.

Input is fully implemented by our Center's staff except for a few cases where we consult with the appropriate experts or authors. We create the bibliographic description, assign subject headings, transfer contents of the article by descriptors, carry out verification, or where absent, provide the abstract. Whenever possible, we submit the complete NCL text to the INIS Secretariat. Sometimes (quite often), due to financial constraints, we reserve the conference materials in the form of abstracts. However, if the information is needed for users both in the Ukraine and other countries, we will provide certain issues. We receive frequent requests from the Liaison Officers of Brazil, Canada, the Czech Republic, France, and others countries.

The Centre regularly provides information to the INIS Secretariat. Unfortunately, there is no exact data from 1973–1991, as there was only one entry from the former Soviet Union. On average, the Center processes and sends about 600 inputs per year. Since 1992, the INIS Ukrainian Center has entered 32 800 documents into the Collection, among which more than 40% are hard to find (preprints, conference proceedings).

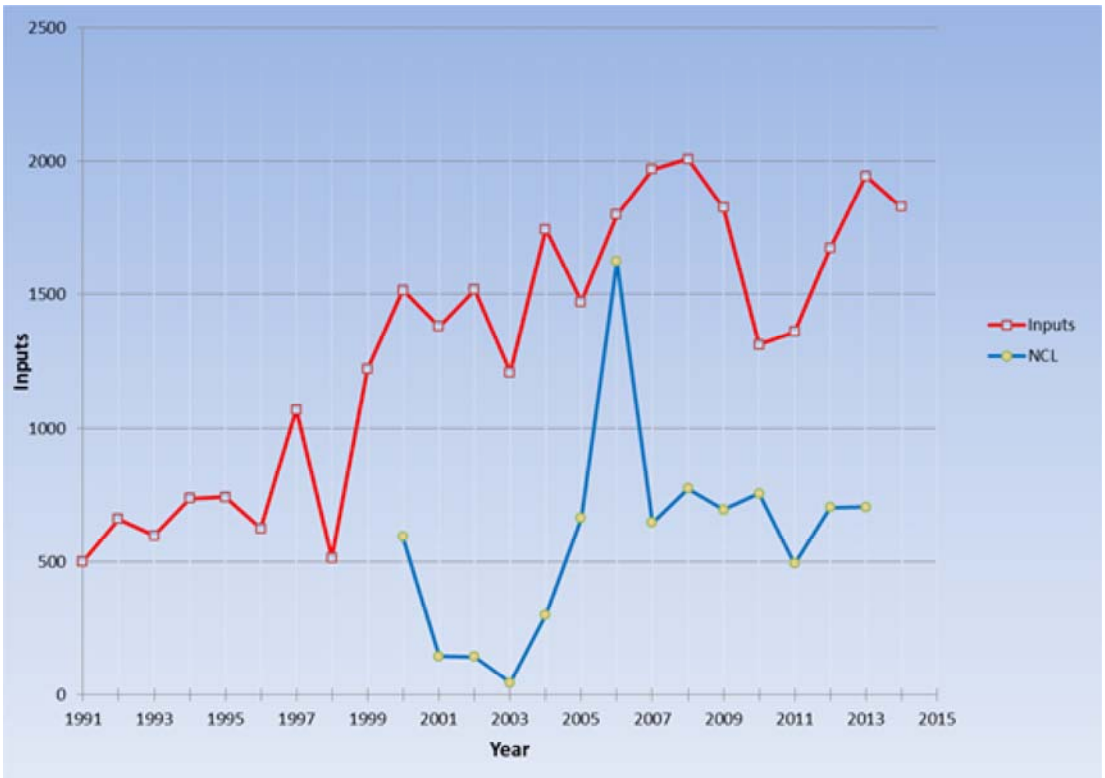


FIG. 1. Input to INIS Database from the INIS Ukrainian Center.

For more than 40 years, the INIS database has continued to develop and improve. Time has shown the feasibility of incorporating INIS technology, flexibility and the desire for self-improvement. Clear indexing rules and subject heading for bibliographic records improve the searchability of the INIS Collection. Expanded subject scope, the introduction of new descriptors, and programs such as FIBRE and SPIRS are regularly improved. Advanced searches using INIS output products are even more dramatic. INIS output has moved from monthly updates on magnetic tapes, to diskettes and CD-ROMs, and finally, to free access on the Internet.

The Ukrainian Center provides information to a number of organizations such as the State Nuclear Regulatory Inspectorate of Ukraine, National Academy of Sciences Institutes, Universities and others. Ukrainian INIS Center staff continues to provide methodological assistance to subscribers by providing access to the INIS database via the Internet.

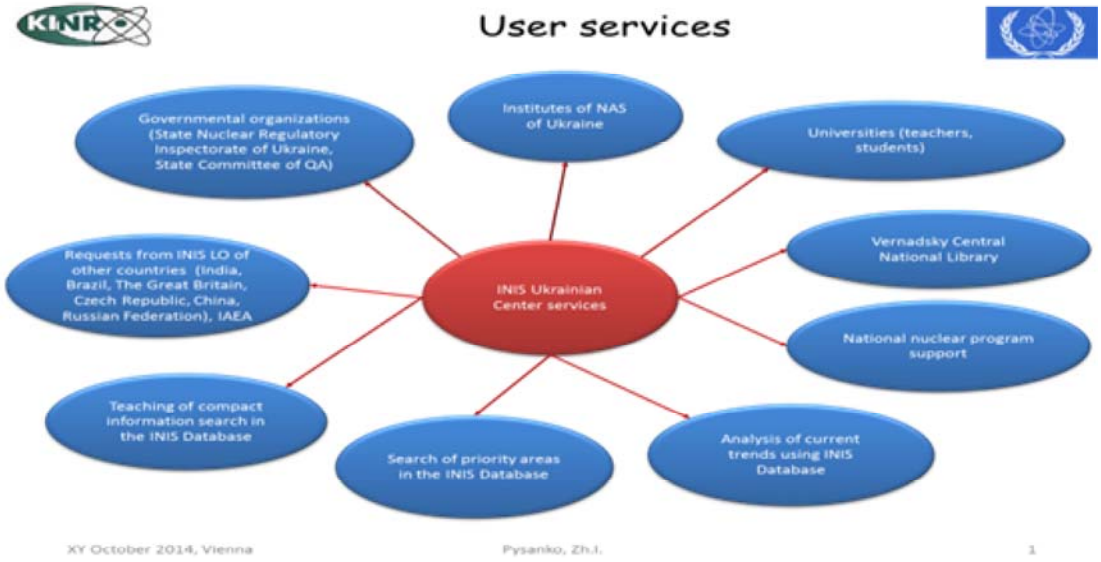


FIG. 2. User Services

Our Center also analyzes information from the database. Summary information can be obtained using descriptors to find relevant publications, as it is logical to assume that the number of publications, particularly in industry, reflects the intensity and urgency of the work. Thus, it is possible to predict the areas of priority. Statistics give a general picture of the position of both international and national publications.

In order to support scientific research, the INIS Center at the Kharkov Physico-Technical Institute of NAS Ukraine has also been involved in the implementation of a number of KhPTI themes, preparing analytical articles and reviews, published in conjunction with researchers, and based on the INIS, MSCI, and INSPEC databases.

The Ukrainian Center staff has participated in:

-Training courses, which allow the Center to maintain a high level of quality input;

- International and national conferences held in the Ukraine at the Kiev Polytechnik University, Lviv State University, Kyiv-Mohyla Academy, Kharkov State University, and the Sevastopol Technical University;

- Presenting lectures on a regular basis about the INIS database. Presentations have been made at the Physics Department at Kyiv Taras Shevchenko National University, the Library at the University of Culture, and a number NAS Institutes in the Ukraine.

FIG. 3. Co-authorship of INIS Ukrainian Center colleagues in publications

Ukrainian Center staff has published more than 60 articles in cooperation with collaborators from the Kharkov Physical-Technical Institute.

A new stage of work has begun in collaboration with the Ukrainian State Center for Quality (department standards), using the help of specialists, to eliminate differences in the interpretation of physics terms in English, Russian and Ukrainian, and to harmonize them with the meaning given in the thesaurus.

In 1994, in the framework of IAEA UKR/0/002, a project was initiated to provide the INIS database on CD-ROM to our Center. Later, computers and microfiche readers were also provided, contributing to the promotion and increased usage of the INIS database.

Our staff has participated in 13 INIS training courses and 2 scientific visits to the UK and Germany. INIS Secretariat staff has visited the Ukrainian Center three times, helping to resolve various issues.

We would like to express our appreciation to the staff of the INIS Section for their goodwill and active cooperation. Over the years, we have always felt the support and assistance of the INIS Secretariat. we strongly believe that our collaboration will continue to be fruitful.

IAEA International Atomic Energy Agency

Nuclear Information Newsletter

www.iaea.org/inis ISSN 2410-4940 (online)

No. 17, October 2015

45th INIS Anniversary Newsletter

Hungary: INIS and Hungary

Mr Sándor ZSIGA*has been working at the Hungarian INIS Centre as a team member since 1997 and as the INIS Liaison Officer since 2005*

Fig. 1. Mr Peter Roboz

Physicists, chemists, researchers, and information specialists in Hungary, who are familiar with INIS, associate it with a certain person, Mr. Peter Roboz.

Mr Roboz suggested that Hungary join INIS in 1970, knowing that it would prove to be an important and fruitful partnership for Hungary, as well as INIS. 45 years have passed since then and the INIS database has grown significantly. Today, the INIS database contains over 3.7 million bibliographic records, 20 738 of which were contributed by Hungary over the last 25 years. This may not sound like a lot, but Hungary has continuously sent input from the outset and this small country has always been among the top twenty most active INIS Members. Mr Roboz was very active in the INIS family until his death in 2004. His name is synonomous with INIS.

Mr Roboz wrote 2 important papers about the INIS database for the Hungarian Journal, Scientific and Technical Information /TMT/*: Interactive Information Search Service in Hungary with Direct Access to INIS Database* (1981/8-9), and (mind the year!*) Databases Hand in Hand: INIS and Energy Database* (1998/11).

On a final note, it is worth mentioning that the 3 millionth record input into the INIS database at the end of 2008 was a Hungarian journal article from the 2007 ATOMKI Annual Report (Figure 3).

FIG. 2. In 2007, the Hungarian INIS Centre moved into the central building of the Budapest Technical and Economics University.

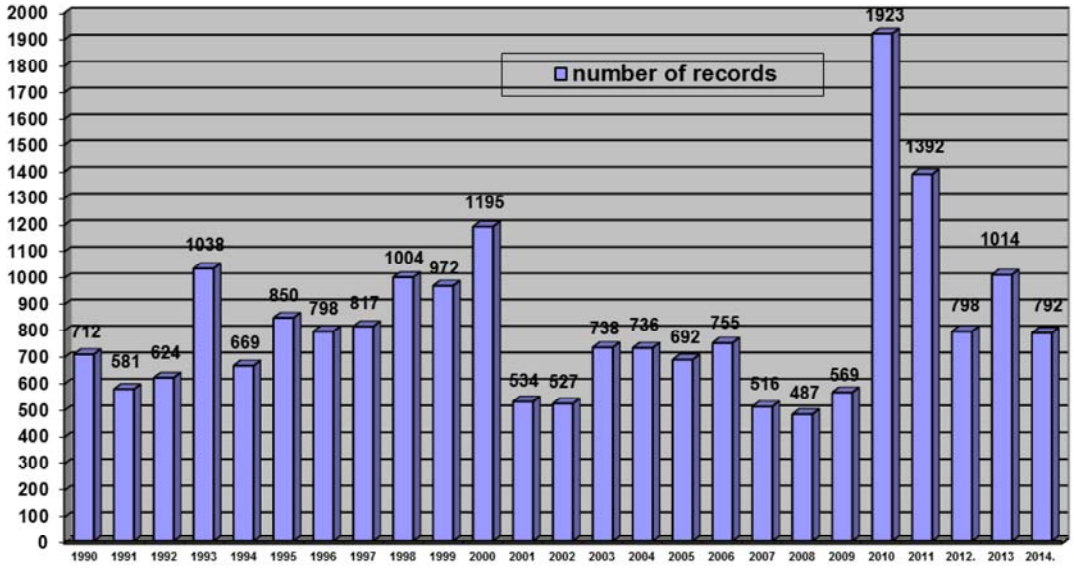


FIG.3. Number of INIS input records from 1990 to 2014

FIG. 4. The Budapest Research Reactor in KFKI Atomic Energy Research Institute of the Hungarian Academy of Sciences.

FIG. 5. The Training Reactor in Budapest University of Technology and Economics.

IAEA International Atomic Energy Agency

Nuclear Information Newsletter

www.iaea.org/inis ISSN 2410-4940 (online)

No. 17, October 2015

45th INIS Anniversary Newsletter

Croatia: 20 years of INIS membership

***Sunčana Podhraški Benković**, has been the ILO since September 2014 and works at the State Office for Radiological and Nuclear Safety as the Head of Independent Service for Common Affairs.*

The International Nuclear Information System (INIS) is the world's leading information system on the peaceful use of nuclear energy.

The Republic of Croatia joined the IAEA in 1993 and became an INIS member in September 1994. The Croatian INIS Centre is located in one of the regulatory bodies in charge of nuclear safety. It was first a part of the Ministry of Economy, Department for Nuclear Safety. In 2005, it moved to the State Office for Nuclear Safety and since 2011, has belonged to the State Office for Radiological and Nuclear Safety.

The Croatian INIS Centre is rather small because, presently, it has only two staff – the INIS Liaison Officer and the Alternate INIS Liaison Officer. It deals with the organization, collection and preparation of inputs, as well as the use of INIS output products. In the beginning, inputs were prepared by outside users. During that time Croatia had one National ILO (in the Ministry of Economy) to coordinate all INIS work. Later, inputs were prepared by the Alternate ILO (outside of the Ministry of Economy) through an on-line platform. In 2005, Croatia established a new regulatory body, the State Office for Nuclear Safety, where INIS was located until 2010. In 2011, Croatia merged the two regulatory bodies, creating the State Office for Radiological and Nuclear Safety. The INIS Centre has been there ever since. Inputs are now prepared by the ILO. At the end of 2014, Croatia appointed a new ILO; however, she is not quite so new, as she was also the ILO from 2005–2010.

Because of the frequent changes in ILO, due to the constant move of employees in the state administration body in charge of nuclear safety, the INIS Centre work flow was sometimes interrupted.

It also affected the participation of ILOs in INIS trainings; however, INIS promotion and input never stopped. Training was mainly attended for general INIS matters and once for inputting. The ILO regularly attends the bi-annual INIS Consultative Meetings.

Several experts and university teachers have been trained to search the INIS database and formulate inputs for INIS.

The INIS CD-ROMs were available in the INIS Centre and in the National University Library until 2010. After opening free access to the INIS database, the CD-ROMs were discontinued.

In its first year of INIS membership (1995), Croatia submitted 8 inputs on worksheets using the INIS Input Training Kit. The following year, 1996, Croatia entered 63 inputs using FIBRE. Since then, the number of Croatian inputs has grown, with the average input around 100. This number is used as a target for the amount of input each year.

The chart below shows the number of inputs by Croatia since 2000, demonstrating that the input remains constant at around 100. The visible deviation in input in 2001 and 2009 was because of bi-annual or tri-annual conferences held in Croatia. Our Center enters mostly NCL, as Croatia is a non-nuclear country. NCL is mainly produced during these conferences/meetings so the amount of input submitted by the Croatian INIS Centre depends on events related to nuclear and radiological safety.

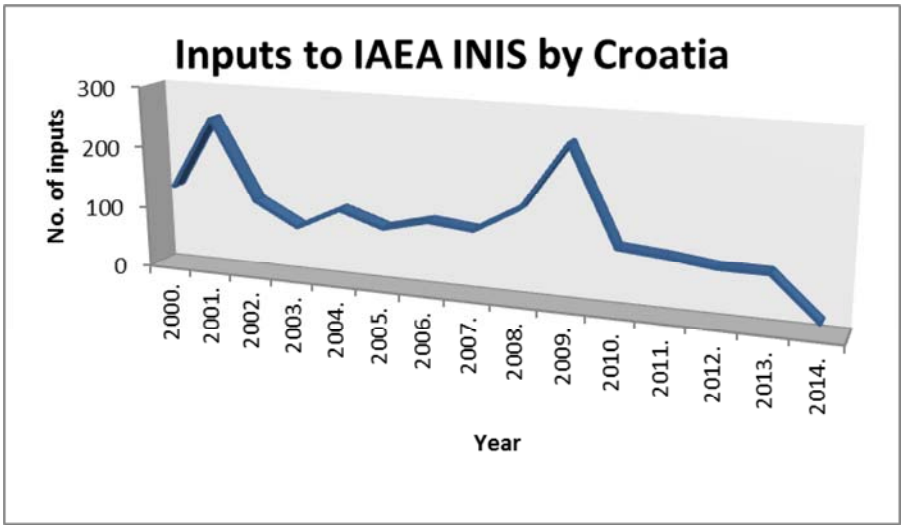


FIG. 1. INIS inputs by Croatia since 2000

Croatia, a member of INIS for 20 years, is doing its best to increase the usage of and input to the INIS database.

Promoting INIS

The ILO and Alternate ILO work hard to promote INIS usage, although they do not work with INIS on a daily basis. They use all available resources to promote INIS during conferences, seminars and meetings throughout Croatia. Banners and small posters are prepared by the ILO and INIS promotional materials, such as INIS brochures and bookmarks, are also distributed.

A direct link to the IAEA website and to the INIS Collection Search has been placed on the main Web page of the State Office for Radiological and Nuclear Safety (www.dzrns.hr), which is where the INIS Centre is located. Although this seems like a simple task, there are restrictions on using regulatory Web pages for international purposes.

FIG.2. Promoting INIS at the 10th Symposium of Croatian Radiation Protection Association.

Promotion is primarily related to INIS database usage, since the inputting is done by the ILO. The main users of INIS in Croatia are students, university teachers, scientific experts and companies involved in this particular scientific field.

ILOs make the most of opportunities to promote INIS during conferences sponsored by the State Office for Radiological and Nuclear Safety. Croatia, as a small, non‑nuclear country with a small INIS Centre, has given its best efforts over the last 20 years, with occasional ups and downs. Usage statistics of the INIS database depend on projects that are carried out in Croatia, the activities of the scientific community, events in the region and the world, and even political developments in the context of this specific topic. As a new member of the European Union, we hope there will be significant moves forward in the future.

The main problem Croatia is facing is time – more time to spend on INIS matters. But with the age of computers, free on-line access, free portals, and e-modules, Croatia hopes to improve — improve usage of the INIS database and the amount of Croatian literature available. But this also depends on the work of other stakeholders.

We hope the next 20 years will be significantly better for the Croatian INIS Center.

IAEA International Atomic Energy Agency

Nuclear Information Newsletter

www.iaea.org/inis ISSN 2410-4940 (online)

No. 17, October 2015

45th INIS Anniversary Newsletter

Bulgaria: INIS Center - 45 years experience

***Albena Georgieva** joined the Bulgarian INIS Center in 2000. In 2002 she was appointed as Alternate INIS LO and in 2006 as INIS LO of Bulgaria.*

Nuclear facilities in Bulgaria

Bulgaria is one of 35 countries in the world operating nuclear power plants. Bulgaria's nuclear program was launched in 1956 with the construction of an IRT-2000 research reactor at the Institute for Nuclear Research and Nuclear Energy (INRNE), which was commissioned in 1961. The reactor is now under reconstruction.

In 1960, construction of the first Bulgarian nuclear power plant started. At the moment, there are 6 power units at the Kozloduy NPP site; 4 of them (VVER-440/B-230) under decommissioning and 2 (VVER-1000/B-320) in operation. Several storage facilities for radioactive waste, mainly from the Kozloduy NPP and from various sources of ionizing radiation in medicine and industry are also in operation.

The Kozloduy NPP, INRNE, Sofia University, the Technical University, and the State Enterprise Radioactive Waste are the main generators of nuclear information in Bulgaria and the main consumers of INIS products. The Bulgarian INIS Center, therefore, maintains continuous and effective cooperation with these Institutions.

Establishment of the Bulgarian National INIS Center

Bulgaria has been a member of INIS since its establishment in 1970. The first INIS LO was Ms Illika Miteva when the Bulgarian INIS Center was situated at the Central Institute for Scientific Information. Since 1993, the National Center has been part of the Bulgarian Nuclear Regulatory Agency (formerly the Committee on the Use of Atomic Energy for Peaceful Purposes).

The Bulgarian INIS Center fulfills all INIS responsibilities including input preparation, promotion, and searching the INIS database. In 1996, under the IAEA TC project *RER/0/011 Upgrading the Nuclear Information Centre*, equipment was delivered and installed in the Bulgarian INIS Centre.

Bulgarian National INIS Center activities

Bulgaria submits national input, both NCL and conventional literature (CL), to the INIS database on a regular basis and in a timely manner. The number of Bulgarian documents in the INIS Collection (as of 31 December 2014) is 11 341, of which 2651 are full text documents.

More than 100 journals have been referred to theINIS database since 1970. Presently, 12 journals are scanned, six of which are key journals. NCL documents are mostly conference proceedings.

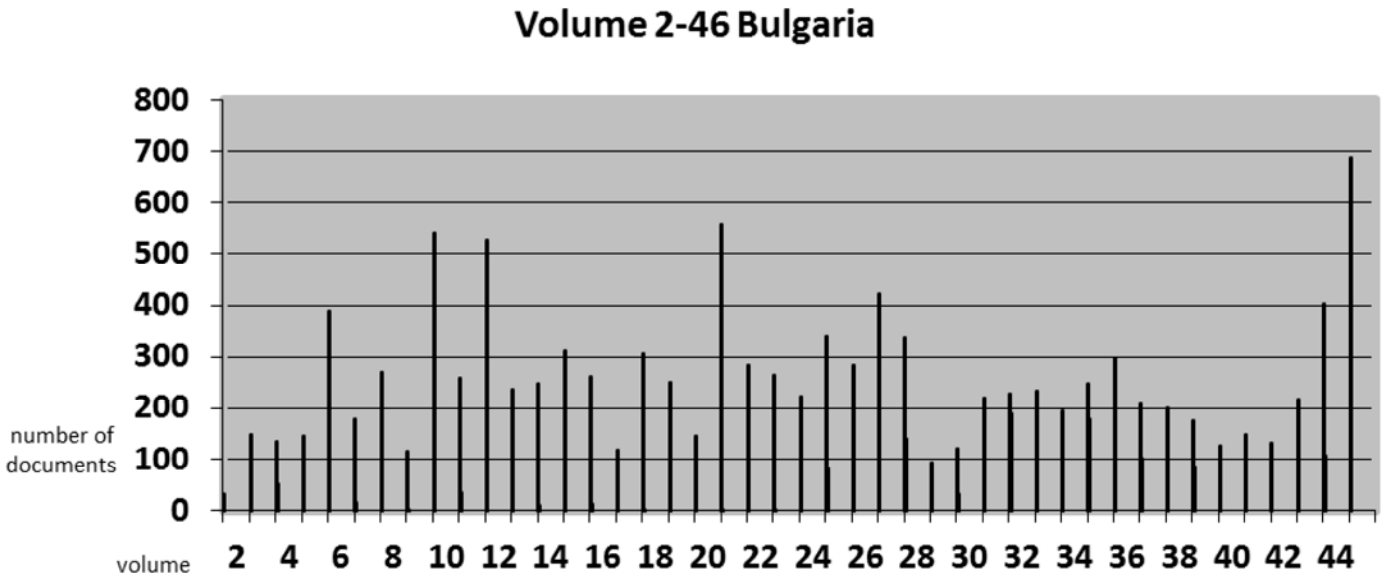


FIG. 1. Distribution of documents by volume.

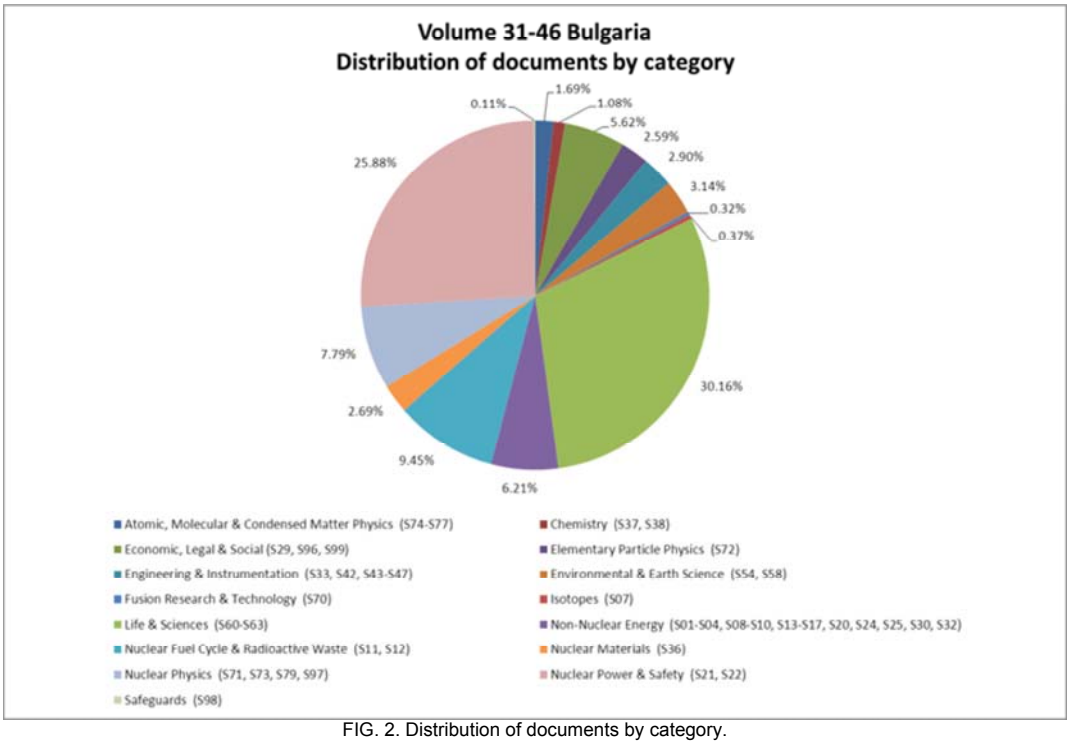


FIG. 2. Distribution of documents by category.

TABLE 1 NUMBER OF DOCUMENTS (INCL. FULL TEXT DOCUMENTS) BY VOLUME.

Volume	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Bibl. records	32	149	135	146	390	178	270	116	542	260	528	238	248	313	262	119
Full text	0	129	52	2	38	15	32	3	8	36	4	19	10	1	12	9

Volume	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
Bibl. records	306	251	145	558	285	265	222	339	284	422	337	92	122	221	228
Full text	2	136	0	2	1	1	2	83	32	30	139	12	31	80	191

Volume	33	34	35	36	37	38	39	40	41	42	43	44
Bibl. records	235	196	248	298	210	200	175	127	148	133	218	403
Full text	115	88	178	237	101	41	84	26	121	0	137	107

NIS system development

The Bulgarian INIS Centre has always been an active INIS participant; preparing input and contributing to the development of INIS tools and products. Even in the early years of operation, the Bulgarian Centre implemented some of the most advanced IT technologies and products of the time — such as CD-ROM, an on-line system, and an expert system.

The Bulgarian INIS Centre has promptly implemented new developments, as technology has evolved throughout the years from INIS worksheets, magnetic tapes and microfiches to diskettes, CD-ROMs, e-mail, ftp and the Internet. The Web version was launched in 1996.

The Bulgarian INIS Centre has participated in both the discussion and testing of INIS software products, especially FIBRE, and in the discussions and decisions of the INIS/ETDE Joint Committee Meetings and Working Groups.

The most significant contributions were made in the definition of the current INIS Subject Categories Scheme, the definition of the new indexing rules, and in thesaurus development.

INIS promotion

Promotion of INIS activities and products among Bulgarian users has been initiated in several ways. Articles and advertisements about INIS have been published in leading scientific journals in Bulgaria. INIS flyers are distributed and the use of INIS products are demonstrated during conferences.

FIG. 3. Flyer about the Bulgaria INIS Center.

FIG. 4. Opening of the meeting by Mr. Borislav

Cooperation with the INIS Secretariat

FIG. 5,6,7. Meetings Session; Group Photo; Visit to Kozlody NPP

In 2002, Bulgaria hosted the 30th Consultative Meeting of INIS Liaison Officers. The meeting was organized by the NRA and the IAEA, with the assistance of the Kozloduy NPP, and took place in the Sheraton Hotel 'Balkan', Sofia. Representatives from 54 Member States, 2 international organizations and 4 observers participated in the meeting. Discussions took place in an open and creative atmosphere. The participants visited the Kozloduy NPP and learned about the plant's operation.

Throughout the years, the Bulgarian INIS Centre has cooperated closely with the INIS Secretariat, receiving advice and help when needed and contributing to the improvement and performance of the system through the submission of high quality input and participation in discussions and decision-making. With the help of the Secretariat, the Centre has established valuable contacts with other National centers in information and knowledge exchange.

For the last 45 years, Liaison Officers and other specialists of the Bulgarian INIS Centre have enjoyed professional, helpful, and friendly relations with the INIS family.

IAEA International Atomic Energy Agency

Nuclear Information Newsletter

www.iaea.org/inis ISSN 2410-4940 (online)

No. 17, October 2015

45th INIS Anniversary Newsletter

CERN: Operating in Synergy

Jens Vigen, CERN's INIS Liaison Officer, at the 37th Consultative Meeting of INIS Liaison Officers October 2014 (Photo IAEA).

When looking at the history of INIS and CERN's involvement, one has to look further back than the printed INIS Atomindex and magnetic tapes, which were first published in April 1970.

FIG. 1 CERN photo 171
The united nations Conference on the Peaceful Uses of Atomic Energy, delegates visiting the CERN laboratories. From left to right: Jack R. MacCabe (Head of the CERN Public Information Office), Dag Hammarskjöld (Secretary-General of the United Nations), Cornelis Bakker (CERN Director-General) and Francis Perrin (French high-commissioner for atomic energy and French delegate to the CERN Council).

CERN was established, under the auspices of UNESCO in 1954, as an independent international organization. The IAEA was set up, within the United Nations family, as the world's "Atoms for Peace" organization in 1957. The first major interaction between the two organizations took place during the *2nd International Conference on the Peaceful Uses of Atomic Energy* in Geneva in 1958. On this occasion, CERN had a stand at the exhibition and the delegates were invited to visit the CERN laboratories[1].

Years later, when an international system for nuclear information was proposed, former CERN librarian, Herbert Coblans, who actually established the CERN Scientific Information Service, was invited to take part in the INIS study team that worked in Vienna from March to June 1968. This study[2] eventually led to the creation of INIS as an information service. However, despite Coblans' involvement, CERN was, for its own reasons, skeptical about the scope of INIS.

In a letter to Prof. Eklund, Director General of the IAEA, CERN Director General Prof. Gregory wrote: *"Thank you for your letter of 18th December* [1969] *concerning the participation of CERN in INIS. Since, with few exceptions, CERN's domains of interest are outside of the initial scope of INIS, it appears to me that the time for deciding on CERN's participation would come at a somewhat later stage, when INIS' present scope becomes a more immediate prospect."*

However, Prof. Gregory did not close the door; luckily he added towards the end of the letter *"I would like to suggest, therefore, that Dr. Lew Kowarski and Dr. Alfred Günther should be agreed by your secretariat for the task of maintaining the liaison and as recipients of such information as you decide to make available to us at the present stage."*

In this way, Drs. Kowarski[3] and Günther[4] were jointly named INIS Liaison Officers, and CERN officially became part of INIS operations – a link that has continued ever since.

However, other 'frictions', in addition to the subject matter, existed which made CERN appear reserved, even if this is not mentioned in Prof. Gergory's letter. In the 1968 study (page 71), it was stated *"The preprint has thus become a form of personal communication …, it should not be part of the scientific record",* while this was fully orthogonal to the mode of operation that had developed within the field of high-energy physics, a situation that is described in the paper *Preprints in particles and fields,* by Rosenfeld et al.: *"The importance of preprints was recognized by some of the large high-energy physics laboratories. O. Piccioni at Brookhaven took the initiative in the late fifties to begin a BNL preprint list; and a very effective preprint handling technique and a list was developed by Mme. L. Goldschmidt-Clermont at CERN. (A major problem at that time was persuading authors to send preprints to a "library" rather than only to colleagues, a situation which has since been reversed.) When the Stanford Linear Accelerator Center Library was opened in 1962, preprints were the first concern and, with the help of Mme. Goldschmidt-Clermont, a preprint system similar to CERN's took root. At DESY, preprints have for several years been given subject Indexing along with the more conventional literature in the DESY high-energy physics index."*

As most of CERN's scientific output is published by third party publishers, the Organization's input to INIS over the years has remained limited. However, CERN has had a tradition, since the very beginning, to collaborate with INIS on technical issues. On a note from Kowarski to Günther, exchanged during the first INIS panel on subject scope matters, held in Vienna in July 1971, Kowarski wrote: *"Would you say that the mechanization of CERN Library, as it is now going to be adopted, is relevant, in a practical way, to CERN's collaboration with INIS, if full scope is decided? How soon?"* This is intriguing reading as we still collaborate on the same type of matters today. INIS was actually one of the first database services to link out to information resources in high-energy physics, a development that took place long before DOI linking became mainstream.

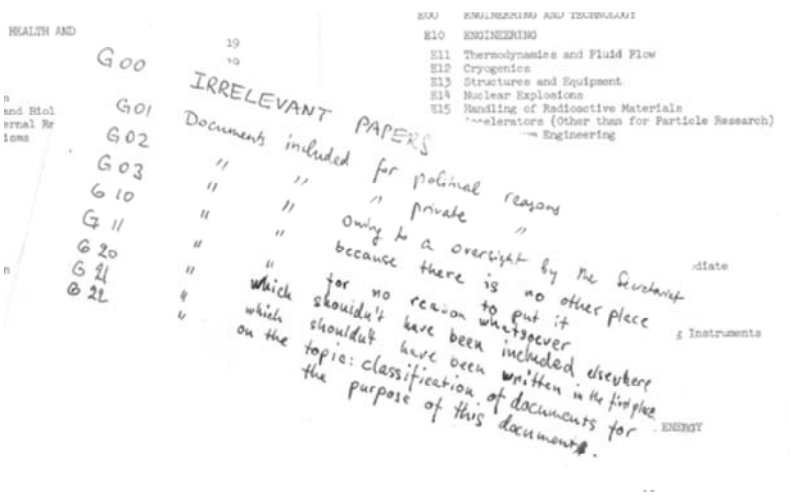


FIG. 2.

The original INIS subject categories went from A-F. Kowarski, with his good sense of humor, expanded the classification to also include a category G.

The original INIS subject categories went from A-F (Figure 2). Kowarski, with his good sense of humor, expanded the classification to also include a category G. This proposal was presumably never officially discussed, but most likely reflects some level of frustration at the time (The Kowarski file, B324, in the CERN Archive).

Among more recent developments, CERN salutes INIS' 2009 decision to offer open access to the database. Continuing to make nuclear information, from data to publications, available through open access to interested parties around the world will ensure INIS' role and success for many years to come.

[1] Photos from the CERN stand at the exhibition "Peaceful Uses of Atomic Energy" https://cds.cern.ch/record/761042

[2] http://www.iaea.org/inis/collection/NCLCollectionStore/_Public/46/010/46010908.pdf

[3] Prof. Lew Kowarski was at the time chairman of the CERN Library committee. It should also be noted that he was UNESCO delegate to the International Conference on the Peaceful Uses of Atomic Energy in 1955.

[4] Dr. Günther was at the time head of the CERN library and the Scientific Information Service

IAEA International Atomic Energy Agency

Nuclear Information Newsletter

www.iaea.org/inis ISSN 2410-4940 (online)

No. 17, October 2015

45th INIS Anniversary Newsletter

INIS at 45 years

Claudio Todeschini *joined the INIS Section during the final phases of the design of the INIS System and then became a Subject Specialist for Engineering and Instrumentation. He was later promoted to Head of the Subject Control Unit and finally was appointed Head of the INIS Section until his retirement.*

Do you remember punched paper tape? That's how many INIS Member States sent their input to the database in the early years of the system. And you had to be careful with that tape; a torn paper tape was a nuisance. Of course the rolls of paper came by post, how else? And if it took two weeks to get a postal package with paper tape in it from somewhere in Asia to Vienna, so be it! Of course the more sophisticated INIS imputing centers used magnetic tapes. Yes, magnetic tapes were also shipped by post from the ends of the earth to Vienna and that also sometimes took weeks. I recall the total thesaurus revision that we undertook in 1971. INIS had taken over the nuclear terminology contained in the thesaurus of the ENDS system (European Nuclear Documentation System of the European Community) but soon decided on a total revision, total in the sense that we decided to revise both the terminological content of the thesaurus AND the structure (interrelationships) that was given to the terminology. Who were the "we" who carried out the revision? Staff at the national INIS centres of Czechoslovakia (as it was at the time), France, the U.S.A. and staff at the University of California in Berkley, California, plus of course the INIS staff in Vienna. Magnetic tapes were naturally the support used for the exchange of data. Can you imagine the crisscrossing of tapes around the globe during that one year of work? Almost incredible by today's standards, where the tip of a key will send immeasurably vaster quantities of data anywhere on earth within a fraction of a second!

But work on the thesaurus brings back other memories. There was the time – a Friday - when we printed out the first 'draft' version of the thesaurus. It was printed on one of those endless rolls of 'computer paper' that ended up as a thick stack of paper, with two endless rows of holes on the left and right edges used to feed the paper through the printer. I remember looking at the 'draft' with the computer programmer that had written the program for the printer and we couldn't make any sense of the jumble of terms spilled out by the machine. After careful consideration we realized that all the thousands of terms were in alphabetical order all right, but sorted by the second letter of each term. The Head of the INIS Section decreed that the program had to be changed immediately and the whole thesaurus reprinted during the week-end and made ready for Monday morning. The programmer made the required change and a poor computer/printer operator then spent the weekend rerunning the machines to produce the draft with a sensible alphabetical order for all the terms. Incidentally, the operator that spent his weekend doing that, was one of the many young musically talented staff members that had come to Vienna (in his case from the Middle-East) hoping to make a career in music, as he had a beautiful baritone voice. On many occasions, knowing that I was Italian and therefore, by definition (!) an opera lover, he would greet me in the corridor by singing a well-known aria from some Italian opera.

FIG. 1. At the celebration of 25 years of INIS. (l. to r. Edward Brunenkant, Keynote speaker, former Director, Division of Scientific and Technical Information; Dr. Hans Blix, Director General, IAEA; Ms. Joyce Amenta, Director, Division of Scientific and Technical Information; Mr. Alexander Sorokin, Head of INIS Section.

INIS was always proud – and rightly so – of its collection of the full text of the 'non-conventional literature'. How was it stored? On microfiche of course. The 'Clearing House' within the INIS Section had a string of rooms to house not only the thousands and thousands of microfiche, but also for the cameras with which to photograph each page of the documents in the collection and for all the tanks and chemicals needed to develop the films and for the microfiche readers used to check all the fiche produced. The cameras photographed away and after each photo, someone had to turn the page. "Have a good day Mr. Operator" as he spent day after day turning thousands of pages, one at a time!
But then, right from its founding, the INIS system was intended to be at the avant-garde of information technology and so the constant driving force was for the system to remain at the cutting edge of developments in that field. The thought of having a spelling check on every word in every abstract (of course only in the English language at the time) was mind boggling! Today it is available on the simplest of mobile phones. And so we could continue to recall the advances from which INIS profited in its core activity of data processing; its crucial aspect being that of making all the data gathered and included in the database readily available to institutional and individual users throughout the Member States. From the beginnings of a printed semi-monthly Atomindex, (to be put on the shelves of libraries at nuclear research centres, universities or at industrial companies involved in nuclear work), plus copies of the updates to the database made available to the INIS centres of participating Member States via magnetic tapes (all distributed by post to all corners of the globe via what is known today as "snail-mail") things then changed with changing technology to reach today's instant availability world-wide via the Internet.

But apart from its technological aspects and the continuous developments that these were subjected to and from which the system profited, it was the human aspect of the system, that is, the people that made INIS work, that was so interesting, challenging and finally rewarding for all those involved. And here we must immediately stress that what made the system such a success over these past 45 years, was that it was based on the cooperation between people working at the INIS Secretariat in Vienna and the many many members of the staff at the national INIS centres in all the Member States. As has frequently been pointed out, without that close cooperation, first of all between the Member States and secondly between the Member States and the Secretariat, there was no chance that the system could be a success. And while we are talking about INIS staff, it should be noted that the Division of Scientific and Technical Information, of which the INIS Section was a large part, was the first Division ever at the IAEA to have a woman as its Director! (see picture below).

FIG. 2. Dr. Hans Blix addressing the INIS Liaison Officers at the celebration of 25 years of INIS

The interest in making INIS a success was pushed by what we could say were two ‘groups’ of Member States. The first group consisted of the industrialized, technologically very advanced States whose interest was to obtain ready and quick access to nuclear information no matter where it was being generated without incurring disproportionally high costs. Since they were the States generating by far the largest volume of nuclear information, it was just a question of having all this information processed only once for the benefit of all, with costs shared in some agreeable manner. The second group consisted of States that did not have a well-developed industrial base or nuclear research facilities nor possessed sophisticated information technology infrastructures but certainly had an interest in enjoying the benefits that the exploitation of the peaceful applications of nuclear energy could bring to their peoples. These States also had an interest in having ready access to nuclear information though they themselves generated little new information.

The cooperation between these two ‘groups’ of States was a ‘win-win’ proposition. Once it was agreed that the most equitable policy for cost sharing was that each participating Member State should process and prepare for input to the database information on all the nuclear literature published within the national confines of that State, practically all other considerations for establishing the system were of a technical nature. These could be dealt with efficiently and relatively easily by information specialists not burdened by political or financial considerations. Once the Member States had agreed on the basic operational structure of the system and on the fact that the responsibility for the central processing of the collected data was to lie with an organization within the United Nations family, the way was clear for the start to the system. Only financial considerations, first and foremost within the Member States (establishment of an INIS inputting centre at each Member State), and then at the International Atomic Energy Agency, were to be resolved. Not always an easy task.

At the INIS Secretariat, within the IAEA, the very early years of INIS, the 1970’s, were perhaps the most interesting as seen from the personal perspective of those of us that were there. There was the excitement of working with world ranking specialists and ‘experts’ from all corners of the globe and establishing personal relationships with them; working relationships of course, which however also led to friendships that lasted over the years. The INIS staff in Vienna was also very mixed, made up of men and women with many different mother tongues and, though English was the language most frequently used for official correspondence, the possibility of communicating in many languages was also helpful in establishing those easy and informal working relations that led to successful cooperation in achieving the goals that INIS had set itself.

Technical matters were the concern of all members. To ensure that all operational aspects of the system were implemented only with the agreement of the members, meetings of technical committees were arranged and changes to the system were made following approval by all the members. A key modus operandi implemented from the very first years of operation was to hold each year a meeting of all the INIS Liaison Officers, each Officer having been appointed by the nuclear authorities of that Member State. It was also agreed to hold these yearly meetings alternatively one year in Vienna and the next year in one of the Member States at the invitation of that State. Thus the Liaison Officers and the Vienna staff started referring to the group as 'the INIS family'! The 'family' became familiar with the working environment in many of the participating Member States, because of the meetings held in various countries and also because of the many training seminars, taught by INIS staff also held in many far away countries. This also further ensured a strong cooperative spirit based on personal relations. That part of the 'family' that was actually the staff at the Secretariat in Vienna, of course celebrated birthdays, weddings, birth of babies and other notable events as if they all really were members of an enlarged family. Have you ever blown out the candles on a birthday cake that was balancing on the top of a magnetic tape drive?

FIG. 3. First ever INIS Regional Training Seminar, Trombay Nuclear Research Centre, Bombay (now Mumbai), India; December 1970. Front Row: 6th from l. - Dr. V.A.Kamath (Indian Liaison Officer); 7th from l. – Ms. M. Bingelli (INIS staff, Instructor); 8th from l. - Mr. C. Todeschini (INIS staff, Instructor); 10th from l. – Mr. M. Komurka (INIS staff, Instructor).

INIS was also responsible for the holding of at least two International Symposia, one in Varna (Bulgaria) and the second in Leningrad (Soviet Union), attended by many world experts in Information Systems. Notable was also the special celebration held in 1995 in conjunction with that year's meeting of the Liaison Officers, to commemorate the 25th anniversary of INIS operations. Four world authorities were invited to give keynote addresses, plus a former Director of the IAEA's Division of Scientific and Technical Information, within which the INIS Section was located, was also invited. He had been instrumental 25 years before in convincing Member States and the IAEA to set up the system (see picture below). The meeting was addressed by the Director General of the IAEA, Dr. Hans Blix. As is well known, ten years later the IAEA shared with its Director General at the time, Mohammed el-Baradei, the 2005 Nobel Peace Prize. Each member of the INIS staff can therefore rightly claim (!) to have won the Nobel Peace Prize (or a little piece of it)!

"Who needs a large database of nuclear information? It's all on the Internet anyway!"

Heard that before? Try to find recent papers that give you information on the exact level of radiation that the seeds or sources should have for effective brachytherapy of a tumor in the prostate. Got the right terms to define the information you need? YES SIR! Got your information from INIS!

Want to know the full history of INIS in all its details? See the book I was asked to write in 2010 by the IAEA: The International Nuclear Information System–The First Forty Years 1970-2010.

IAEA International Atomic Energy Agency

Nuclear Information Newsletter

www.iaea.org/inis ISSN 2410-4940 (online)

No. 17, October 2015

45th INIS Anniversary Newsletter

INIS strategic planning and INIS Clearinghouse document delivery: from four weeks to four minutes

Emil Levine *came to the UN IAEA/INIS as a consultant in May 1994. He was tasked to develop a five year Strategic Plan for INIS. Given a background in micrographics, imaging, information science and library science, he became Head of the INIS*

Germain St-Pierre *joined INIS in 1988 as a micrographic technician. He acted as the contact point during the development of the INIS Imaging System (1995-1996), and then as system administrator of the full system (1997-2002).*

I joined INIS in May 1994 as a consultant to create a Strategic Plan for 1995–2000. I had left a US Department of Justice contractor, Aspen Corporation, which operated the National Criminal Justice Reference Service (NCJRS), as chief of two libraries and manager of a clearinghouse for the world's criminal justice literature. NCJRS collected this literature, created a bibliographic on-line database and converted non-copyrighted literature to microfiche. The government contract had to be renewed every five years and the Aspen proposal was basically a five year strategic plan, to which I contributed. Thus, when I came to INIS, I had an understanding of the process. The next six months were devoted to preparing STRATEGIC GUIDELINES FOR INIS DEVELOPMENTS 1995–2000 with the caveat:

Notice: The guidelines proposed in this report are those of the Information Consultant. They represent a wide range of options that are being presented for further refinement by Peer Reviewers, INIS Consultants and finally the Advisory Committee for INIS. Forwarding of these guidelines does not represent concurrence or non-concurrence by the INIS Secretariat. 30 September 1994.

Alexander Sorokin, Head of INIS at that time, provided patient and essential support for the preparation of the document (and I must admit his English was better than mine!). The study was presented as a Draft to the Advisory Committee for INIS in late 1994. Highlights of the report included:

An electronic information exchange, using the Internet or similar systems, could be developed for INIS National Centers and Member State users. This would expand the mission of INIS to include information center functions, including electronic collection and dissemination of document and non-document nuclear information. ...

CD-ROM, imaging and the electronic information exchange could be used for further dissemination of the INIS database and full text non-conventional literature…

All INIS data now contained on microform, both source documents and COM bibliographic data could be delivered on CD-ROM. Scanned images of the NCL could be delivered with retrieval software identical to that on the INIS database CD-ROM, or with some lesser level of retrieval capability.

Interestingly, several senior INIS staff and Advisory Committee members criticized the Strategic Study with the comment that 'the Internet' was an 'American thing'.

During this period I was asked to apply for the position of Head, INIS Clearinghouse. I had extensive experience with micrographics in the US Navy, US Drug Enforcement Administration and professional organizations. I had written a chapter in my textbook about microform and many articles. Aspen Corporation was a world leader in scanning/imaging technology. I was selected for the position and saw two tasks: to make the current process of converting NCL more efficient; and to plan for the conversion of the process from photographic to electronic imaging. The workload was enormous.

	1994	1995	1996	1997	1998	1999	Total
Titles	12,791	11,838	10,125	7,977	6,673	12,671	62,075
Microfiches	18,851	18,026	16,273	11,242	9,238	13,173	86,803
References	26,601	27,173	26,971	26,086	15,153	19,956	141,940
Pages	**1,307,252**	**1,179,954**	**1,044,906**	**669,136**	**447,625**	**646,594**	**5,295,467**

TABLE 1. MICROFICHE PRODUCTION AT INIS SECRETARIAT 1994–1999.

I had examined INIS microfiche in the US and considered it of excellent quality. I learned that every microfiche had a resolution chart that was examined under a microscope and that every microfiche was filed according to Report Number.

FIG. 1. Bruning Storage Cabinets holding 350,000 reports on microfiche.

As part of streamlining the process, we began to examine only every fifth microfiche and filed new microfiche by the sequential INIS number. These minor changes saved almost a half man-year.

Upon reviewing the production process, I learned that the backup copy of the collection was also being stored at the IAEA. This was not in keeping with good archival doctrine and I eventually completed a partnership with the Zentralbibliothek für Physik (Central Library of Physics, University of Vienna).

They agreed to act as a depository library for the INIS NCL microfiche and hence provide a secure 'off site' storage and contingency support to the master collection. INIS gave them, at no cost, a copy of all future INIS products, including CD-ROMs and free access to the on-line

database. An appropriate ceremony took place in December 1997. Austrian Foreign Minister, Benita Ferrero-Waldner, personally accepted the gift, valued at $3.5 million (350 000 reports), on behalf of Austria, and Wolfgang Kerber, director of the library.

A contract was awarded to the French company Jouve for a total system for imaging NCL and placing it on CD-ROM. Training for the new technology began immediately and all staff received a computer, instructions in use and had specific tasks. Classes were held on the technology of imaging. Germain St-Pierre was appointed 'Systems Administrator' and given the necessary training. (When I was informed by Personnel that G staff were not eligible for the type of training I deemed necessary to operate a million dollar imaging system, I suggested that they be promoted to P Staff!!! They got the training.)

Herbert Loserl, the senior G staff member of the Clearinghouse, readily accepted new responsibilities and rapidly learned the new technologies. One of his first tasks was to computerize previously manual processes and records of production. His positive attitude and leadership was a main factor in the rapid success of the new system.

FIG. 2. Messrs Emil Levine and Wolfgang Kerber during the transfer ceremony in December 1997.

The results were the INIS Imaging System (INISIS) which produced its first CD-ROM on 6 May 1997. As part of this conversion, the INIS staff was reduced by three personnel, the time to produce a document was reduced by 2 weeks and the space required by the equipment was reduced by one-third. Microfiche continued to be produced from the electronic images by an external contractor. This also allowed removal of a large facility used to make microfiche copies.

A more significant part of the conversion was improved service to INIS users worldwide. Several CD-ROMs with NCL full texts in TIFF, and later in PDF format, were sent to subscription users worldwide every month.

Previously, in order to obtain NCL, a user had to request a report from INIS by phone, fax or telex after searching the hardcopy Atomindex or INIS database. The master microfiche was retrieved and copies were made on a weekly basis and disseminated by mail. Typically, it took approximately four weeks from time of request to time of receipt of the NCL microfiche, which was sent by mail. This also involved significant time on the part of the Clearinghouse staff. As part of INISIS, the NCL full text images were linked on-line to the INIS database. A user could then review the document and if desired, immediately download it. The delivery process dropped from four weeks to four minutes!

I was retired from INIS in November 1999 but was asked to return at the end of 2001 to conduct another Strategic Study, entitled *INIS Strategic Directions.* A highlight of this study included:

> *As recommended at the 29th Consultative Meeting of INIS Liaison Officers, this should include making the INIS database available free to all institutions of higher*

learning that have a validated nuclear science program.

I had continually recommended that the database be made free, as the original intention of creating INIS was sharing this information worldwide. In January 2002, this became reality for all students of registered universities. In 2009, INIS access was opened worldwide at no cost. Usage of the database increased tenfold within a few months!

Member States are now collecting and submitting most of their NCL in electronic format. It is sent to INIS for quality control and consolidation. Consequently, INIS staff has been gradually reduced. The amount of NCL disseminated has remained constant, and an ongoing process to digitize the entire INIS collection on microfiche will be completed in 2016, a process I started in 1999.

Before leaving INIS in 1999, I realized that the future would provide a reduced requirement for INIS imaging and recommended the Clearinghouse become a resource for all of the IAEA. Today it serves that purpose.

IAEA International Atomic Energy Agency

Nuclear Information Newsletter

www.iaea.org/inis ISSN 2410-4940 (online)

No. 17, October 2015

45th INIS Anniversary Newsletter

INIS in My Life

Anatoly Tolstenkov joined the IAEA in 1986. In 2002 he was deeply involved in IAEA nuclear knowledge preservation activities and in 2004 became Head of the INIS Unit. He retired from the IAEA in 2008 and is the Alternate INIS Liaison Officer of Russia.

The first time I learned about INIS was in 1975, when I began my career as a junior researcher at the Institute for High Energy Physics (IHEP). At that time, I could not imagine that my future life would be so closely linked to this unique system.

Having begun scientific work at IHEP, I faced a serious problem of lack of access to foreign nuclear information that was a vital pre-requisite for any scientific activity. At the time, there were only 3 main ways to access foreign information: the use of the Russian information system Referativnyi Zhurnal; a subscription to the leading nuclear journals such as Physical Review and Nuclear Physics; and direct personal contacts, mainly at international conferences. This was obviously insufficient, and access to pre-prints and reports was necessary, considering that at that time there was a significant time lag in published journal articles.

Receiving the first magnetic tape with INIS records was a momentous occasion for scientists at my Institute. The first use of INIS information demonstrated the many innovative ideas and thoughts used to develop INIS. Obviously, at that time, there was no other nuclear information system that could compete with INIS on completeness of coverage, the volume of the information, and on the number of people involved in data collection and processing. Even now, I continue to be amazed that from the first day of operations, INIS started collecting NCL documents. As a result, the INIS NCL archive, with over 700 000 documents, was created and many of the documents from the NCL archive remain relevant to modern nuclear research.

Working with INIS, we realized that INIS was not only an excellent source of information, but also a source of technology to work with nuclear information. One example of this is the INIS Thesaurus, which structures information, thus significantly increasing the efficiency of searches. The use of controlled keywords, as well as MQ-pairs (main descriptors and qualifiers), for the description of document content provided a highly efficient mechanism to find information. I can say that INIS has a ‘Find’ paradigm, which is different than a ’Searching‘ paradigm.

INIS is an excellent example of information technology transferring. Based on INIS standards, rules and methods, our Institute developed the first computerized information system on high energy physics and elementary particles in 1978. I would also like to mention that the INIS DB was the main source of information used while working on my thesis.

In 1986, at the will of destiny, I got a contract with the IAEA and began my long journey with INIS as a member of the INIS Computer Support Group, which completely changed my life and the life of my family. Working at the INIS Secretariat, I learned about INIS from the inside. It was a pleasant surprise for me to learn that INIS was not only an information system, but also a unique

culture of working with nuclear information in an international environment. I also learned that a system based on international cooperation can be much more effective and efficient than a system based on competition.

I was very happy to work at the INIS Secretariat with staff who were friendly and professional, independent of nationality, age and educational level. Unfortunately, it is impossible to list all those with whom I was lucky enough to work. Nevertheless, I would like to mention Mr Alexander Filippov, Mr Alexander Sorokin and Mr Claudio Todeschini, who headed the INIS Section, and also Ms Barbara Mayer, who was the real custodian of INIS family spirit for several decades. Several generations of INIS staff contributed to the successful development of INIS.

Working in the INIS Secretariat, I was very happy to participate in its permanent development. I have also witnessed the leading role of INIS in many IAEA activities: INIS became the first computerized information system; INIS created the first Web page within the IAEA; and the INIS DB was the first database accessible via the Internet. The IAEA's nuclear knowledge management program also got its start in the INIS Section.

I am deeply convinced that efficient INIS operations, and its resilience for 45 years, was achieved due to a strong synergy of modern information technology and the highly professional staff of the INIS Secretariat and the INIS national centers.

Even now, being a retiree, I continue to feel like a member of the international INIS family. I am very proud of it!

Congratulations to all who developed, managed, and maintained INIS, and to those who are now supporting and developing INIS on the 45th anniversary of the International Nuclear Information System!

IAEA International Atomic Energy Agency

Nuclear Information Newsletter

www.iaea.org/inis ISSN 2410-4940 (online)

No. 17, October 2015

45th INIS Anniversary Newsletter

Special Memories at INIS

Domenico Pistillo is an ICT expert who enjoyed working for INIS during his time spent at the IAEA. He is currently working in Geneva for the World Intellectual Property Organization in the Enterprise Architecture Division.

INIS: a worldwide hub where nuclear information is preserved, validated, and made universally available. Within this special edition of the Newsletter, celebrating the 45th birthday of INIS, you will probably read this definition, and many more, of the International Nuclear Information System.

However, INIS has some special aspects, not immediately visible to those who interact with the System and the INIS Secretariat, which make it unique in the scientific environment. In this article, I will try to share my experience with INIS and the memories that have stayed with me, even after my departure.

I joined INIS in 2006 as an IT Systems Engineer. I must say that I found a very complex IT infrastructure with over 20 servers and several software applications which, given the small size of the INIS Unit, clearly reflected the multitude of activities INIS was (and still is) involved in. From the start, I felt that INIS was perceived in a different way by other people involved with Information Technology. In fact, since its birth in 1970, INIS has proven to be extremely innovative and open to embracing new technologies, compared with other parts of the Agency.

For example, Livelink was proposed and installed for the first time by the INIS Unit before becoming the IAEA standard tool for enterprise document management, and presently, is uniquely and sharply customized to fulfill INIS' critical weekly task of processing thousands of bibliographic and full text records.

Moreover, INIS developed the first 'app' for iPad within the IAEA, and was the second Unit to create a version of its official website tailored for mobile devices (such as smartphones and tablet PCs). INIS also created its own customized QR code (if you have never seen it, you can find it on the INIS website Contacts page). Lastly, INIS was the only Unit capable of customizing the Google Search Appliances (GSA), used by other sections within the Agency, thus creating a very powerful search engine (the INIS Collection Search) enabling easy retrieval of information from a database with over 3.7 million records. All of these examples prove how innovation is a word that must undoubtedly be associated with the work carried out within the INIS Secretariat. Based on the above, I would like to share with you the following anecdote. Before leaving the IAEA, I was asked by the former Deputy Director General of the Department of Nuclear Energy to perform a survey of the status of Information Technology within the Department. When I finalized my work, one of my proposals was to nominate the Systems Development and Support Group (SDSG), the team supporting INIS in all its IT related activities and projects, to centrally coordinate all the IT activities within the NE Department, due to SDSG's natural attitude to explore new technologies and propose pioneering solutions.

To me, from a professional aspect, INIS represents a working environment where one can propose groundbreaking ideas and different visions to run a consolidated set of tasks while constantly improving. This epitomizes the right attitude towards change and improvement.

But INIS also has a different meaning to me.

I spent the entire 7 years of my contract with the IAEA in INIS and had the chance to see some of the different stages that INIS went through, the last of which was the creation of the Nuclear Information Section (NIS), which is made up of INIS, the IAEA Library and SDSG, and the establishment of the Nuclear Knowledge Management Unit as a Section (previously a part of INIS). Many people have left INIS and many new staff have arrived, bringing with them new ideas and energy, but what I always felt remained constant was the familiar atmosphere and spirit which has always characterized the INIS Secretariat. In fact, in addition to the work done on the first floor of the Vienna International Centre's F building, INIS staff enjoy celebrating events together, appreciating and supporting each other as more than simply colleagues, making this place an enjoyable work environment, not only for the importance and relevance of the INIS mandate. I have seen many former colleagues frequently visiting INIS, which emphasizes the uniqueness and specialness of INIS. All these nice words which I have written in favor of INIS might be considered, to some extent, biased, especially for those who have heard about INIS but have never worked at the Secretariat. Fair enough. I can only say that it has been an honor and a pleasure to provide my professional and personal contribution to INIS’ noble mission of collecting and sharing worldwide knowledge on the peaceful use of nuclear energy.

IAEA International Atomic Energy Agency

Nuclear Information Newsletter

www.iaea.org/inis ISSN 2410-4940 (online)

No. 17, September 2015

45th Anniversary Newsletter

45 years of INIS Liaison Officer Meetings

Written by Rebecca Kunz, with references from *The International Nuclear Information System – The First Forty Years, 1970-2010* by Claudio Todeschini.

The IAEA's mandate to "*foster the exchange of scientific and technical information on peaceful uses of atomic energy*", as stated in Article III, paragraph A.3 of the Statute of the Agency, and 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*" , was the catalyst in the 1960's for the Agency's undertaking to provide a comprehensive computerized system for the retrieval and storage of information related to the peaceful uses of nuclear science and technology.

The establishment of an International Nuclear Information System, a decentralized information system to foster the exchange of nuclear information, began to take concrete shape in 1966 with the formation, at the direction of the IAEA's Director General, Dr. Eklund, of a *Working Group on International Nuclear Information System (INIS)*. The vision was to centralize the processing of the information, as well as the output products, while decentralizing the selection, scanning, cataloguing, indexing and abstracts of the information, which would be done by participating Member States and international organizations. Each country would provide bibliographic input for literature produced within their geographic territories.

Following the approval of INIS by the IAEA's Board of Governors in 1969 and at the invitation of the IAEA's Director General, Member States (MS) were invited to designate a national INIS Liaison Officer (ILO) to act as the official contact for the INIS Secretariat, which would be located at IAEA Headquarters in Vienna. The Member States were encouraged to submit input to the system by April 1970.

Thus began many years of fruitful partnership and cooperation between INIS and its Members.

INIS Liaison Officers are instrumental in deciding the path along which INIS evolves by providing advice to the INIS Secretariat on matters relating to administration, operation and the development of INIS; being responsible for organizing the collection and preparation of literature from within their national boundaries, or international organizations, for input to INIS; and taking responsibility for the dissemination and promotion of INIS products and services within their countries or international organizations. Communication between the ILOs and the INIS Secretariat takes place on a regular basis through correspondence and Consultative Meetings of INIS Liaison Officers (ILOMs).

The **first INIS Liaison Officer's Meeting**, held in Vienna in November 1972, at the behest of the *INIS Advisory Committee* to encourage more direct involvement by the ILOs and offer an opportunity to exchange experiences and discuss operational activities, was attended by 35 Member States and five international organizations, along with numerous observers. Topics for

discussion included output products, at that time consisting of microfiche, and magnetic tapes, along with acquisition lists, indexing, thesaurus maintenance and revision, scope descriptions, and pricing of output products, among others. A statement was read by the USA delegate regarding the format of the *Atomindex*, urging an enriched service to users, easily retrievable information, use of mechanic (automated) processes, and the adaption of two-level flagging. He also explained US indexing experiences with one of their most important products, the Nuclear Science Abstracts (NSA). Another interesting part of the meeting was, when asked to estimate the expected amount of input to be provided by Members in 1973, the combined estimate of 39 Members attending the meeting was slightly more than 63 000, most of which were expected to be provided by the USA, USSR, Germany, the UK, and the Netherlands, respectively. The actual volume of input for 1973 was 56 369. This was quite a jump compared to 1970, only 3 years earlier and the genesis of INIS, where the total input was 3950. Compare that to 2014, with over 3.7 million bibliographic records, and it is easy to see the substantial growth of INIS, made possible by the valuable cooperation of INIS Members.

In 1973, at the **2nd ILOM**, two-level flagging of descriptors on a voluntary basis for the subject index of the printed *Atomindex* was agreed upon. The introduction of machine readable abstracts was also discussed, as it was believed that this would enhance the INIS *Atomindex,* at that time published in harcopy.

At the **3rd ILOM** in 1974, which took place in Varna, Bulgaria, following the *International Symposium on Information Systems: Connections and Compatibility,* the need for increased training was discussed in support of INIS Centres short on finances and staff. The use of machine-readable abstracts was agreed upon, and completion of the translation of the INIS Thesaurus into French, German, and Russian, by the respective countries was announced. The Nuclear Energy Agency of the OECD also announced their willingness to prepare input to the INIS system of their national literature in the field of Nuclear Law.

In 1975, at the **4th ILOM** held in Vienna, data flagging of records containing numerical data was discussed and a recommendation was made at the 5th ILOM in 1976 to implement a plan for this. Most importantly, a recommendation was made at the **5th ILOM** to establish an experimental cooperative computer network, giving INIS centres the possibility to search the INIS database

FIG.1. 4th ILOM 1975 in Vienna

directly from remote locations, to be implemented in 1977. This was the first step in establishing the Direct Access Project (DAP). 1976 was also the year that the INIS *Atomindex* was recognized as the sole international abstracting journal for nuclear sciences and technology.

Input increased from 3950 in 1970 to 60 402 in 1976.

In 1978, at the **6th ILOM**, unanimous support for data flagging was given. A recommendation on the DAP expressed great satisfaction with the services provided and encouraged the Agency to continue development. The database grew to 420 000 records with 120 000 full-text documents.

In 1979, the **7th ILOM** was held in the Federal Republic of Germany, at the invitation of the government. Discussions centered on the creation/publication of a multi-lingual thesaurus (English, French German and Russian), and satisfaction was again expressed with the DAP developments. The participants also expressed their satisfaction with an arrangement to provide full-text of non-conventional literature (NCL) with the British Library Lending Division (BLLD) and the Fachinformationzentrum Energie, Physik, Mathemathik GmbH. (FIZ 4), in cooperation with the Technische Informations Bibliothek (TIB). Cooperation with the IAEA's Department of Technical Cooperation (TC) was also recognized in assisting National INIS Centres with equipment and computers needed for INIS operations.

1980 hailed the tenth anniversary of INIS and the **8th ILOM**, the first to be held at the new Agency headquarters in the Vienna International Center. Much of the meeting focused on the *INIS Review and Outlook,* a paper commemorating the anniversary of INIS which had been prepared by the Secretariat, and which stressed the cooperation given by various Member States in making the system a success. The database passed 500 000 records and the ILOs reaffirmed the exclusive rights of ILOs to INIS output products within their national boundaries, including their authority to pass on these rights to third parties.

In 1981, the **9th ILOM** was held in Rio de Janeiro — the first time that an ILO meeting was held outside of Europe. The first draft by the INIS Secretariat of the *Definition of Participatory Arrangements for INIS*, provoked heated discussions at the meeting, resulting in many revisions being presented throughout the next few years. A second draft was presented to the Advisory Board in 1982 and a third draft in 1983. However, it would not be finalised and approved until 1985. The establishment of a new INIS Unit, the Centre Services Unit (CSU), was also discussed. The new unit would be responsible for promotional activities, provision of information services, training, and the development of national services. The ILOs also suggested meeting in Vienna every second year with alternate years being held in other locations within and outside of Europe.

In 1982, Dr Hans Blix, the new Director General of the IAEA, opened the **10th ILO meeting** and congratulated, encouraged and supported the achievements of INIS. The ILOs suggested that the Secretariat, in cooperation with Member States, monitor the completeness of the coverage of nuclear science and technical literature in the INIS database. An *INIS Coverage Study* was initiated and entries from INIS-related subject fields from the INSPEC, COMPENDEX, and MEDLINE databases were compared with the INIS database, using in-house software and hardware methodology developed by the International Centre for Scientific and Technical information (ICSTI). It was decided later to also include the METADEX and VINITI databases. Due to the arduous work involved using Optical Character Recognition (OCR) for the input preparation, alternate options were discussed in the hopes that it could be discontinued. The Subject Category scheme was revised, providing for a finer subdivision of the categories, at the proposal of the USA and after discussion with the Member States. In 1983, the first edition of the INIS Multilingual Dictionary (English, French, German, and Russian) was published. Although much work had been done on the Spanish translation, it was not completed in time for inclusion in the first edition.

The **11th ILOM** was held in Paris, France in 1983. The thrid draft of the *Definition of Membership Arangements for INIS* dominated much of the discussion. The *4th Advisory Committee* had met in January of that year and was not able to reach a consensus on the draft, which had been referred

FIG. 2. 9th ILOM Rio de Janeiro, 1981

to their committee both in 1981, and again in 1982 by the ILOs. The main area of contention was focused on the paragraph which read: *"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."* There were those who disagreed with "*obtaining prior approval from the Agency*" and preferred it to read "*informing the Agency*". In the end, they were not able to agree and this was noted in the recommendation given to the Director General. The *Advisory Committee* also recommended that a decision to "institutionalize" the DAP be based on the results of a study which should be done, providing more information as to whether the project "…*should be endorsed by the INIS Members as an appropriate and needed long-term function of the Secretariat*…".

At the **12th ILOM** in 1984, the INIS Liaison Officers

FIG. 3. 11th ILOM Paris 1983

recommended a general review of INIS operations and policies, as well as of the DAP. The Secretariat undertook the General Review of INIS Operations (GRINO) between 1984 and 1985,

in close cooperation with Member States, and five working groups were formed to review: General Operations; Scope, Coverage and Timeliness; Bibliographic Control; Subject Control; and INIS Services and Training. It was agreed to continue the data flagging experiment, hoping to improve input quality.

The **13th ILOM** in 1985 coincided with the 15th anniversary of INIS output products. Much discussion was given to the recommendations made by the GRINO Working Groups and a draft *Action Plan on Implementing the Recommendation of the GRINO Working Groups* was adopted. The ILOs were also informed that the draft of the *Definition of Membership Arrangements for INIS* had finally been approved by the Advisory Committee and the Director General, who then presented it to the Board of Governors (GOV/INF/476). The results of the *INIS Coverage Study* were presented, showing that although INIS coverage of NCL was good, a 10-20% improvement in conventional literature coverage could be made. INIS Membership in 1985 had grown to 88 and the amount of input had reached almost 84 000.

In 1986, the **14th ILOM** took place in Washington, D.C., at the invitation of the US government. It was at this meeting that CD-ROMs were introduced as a viable way forward for INIS to store and retrieve information in the INIS database, and a presentation was given on INIS database retrieval on CD-ROM. The participants also recommended that the Secretariat prepare a user manual for the INIS database, describing record formats, character sets, fields, etc. Optical Character Recognition (OCR) for processing input was discontinued in 1986. This year was a milestone for INIS with the INIS database reaching 1 million records!

The following year, in 1987 at the **15th ILOM**, the ILOs learned of the status of the Computer Output on Microfiche (COM), for which equipment had been installed and programs developed and tested. COM output would be available towards the end of 1987. The participants were also given a demonstration of the Automatic Indexing and Retrieval (AIR) pilot project, being conducted on the physics database in Germany. This was a foreshadowing of the Computer Aided Indexing (CAI), which would be implemented by INIS many years later. A recommendation was also made to begin implementing the INIS database on CD-ROM, which had been demonstrated the year before. Various views were expressed regarding the discontinuation of the printed *Atomindex*, and the ILO of France mentioned that although its loss was inevitable, it would most likely be replaced with something else.

During the **16th ILOM**, held in Istanbul, Turkey, in 1988, the ILOs were informed of the completion of the Spanish translation of the thesaurus by the INIS Centre of Spain, bringing the number of thesaurus translations to five. They were also informed of the participation of INIS Secretariat staff in the ARCAL X project, the establishment of a regional system within Latin America permitting efficient sharing of information resources between participating countries. The delegates recommended that CD-ROM development continue and that full distribution begin as soon as possible.

A solution had been sought to replace the subject specialists and descriptive cataloguers arduous task of using worksheets to prepare input and at the **17th ILOM** in 1989, the delegates recommended that Friendly Input of Bibliographic records (FIBRE) be produced by the Secretariat and that it should " *proceed with distribution with all deliberate speed*". This integrated data preparation and checking software package was being coordinated by the INIS Secretariat and the Computer Section and involved staff of the national INIS Centres of Brazil and the USSR. In 1989, there were 94 INIS Members and input had reached 92 676.

The **18th ILOM** was held in Obninsk, Soviet Union, celebrating 20 years of INIS operations. There was continued discussion of the FIBRE software, with the hopes that it would be available by the end of the year, and the Secretariat informed the ILOs that a contract with SilverPlatter for the CD-ROM production would be implemented. The previous company had been unable to solve internal software problems; ILOs cautioned that they be asked permission by SilverPlatter for how the product be distributed within their territories. There was also much enthusiasm expressed for the

ETDE/INIS partnership, which had begun taking shape back in 1988 when ETDE adopted the format used by INIS for bibliographic records, with some modifications, for their Energy Database. The Expert System for Quality Control, using techniques of artificial intelligence (AI) to assist the subject specialists in processing input, which had been developed by INIS, was implemented in 1990.

At the **19th ILOM**, held in Vienna in 1991, a recommendation was given to expand the support given by the Department of Technical Cooperation (TC) to support INIS Centres and especially in support of projects such as ARCAL X, and AFRA-7. The recommendation also encouraged other INIS Members to initiate similar projects within 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)"* .

FIG. 4. 20th ILOM Rio de Janeiro 1992

In 1992, at the **20th ILOM**, the delegates met for the second time in Rio de Janeiro. At the recommendation of the *8th INIS Advisory Committee*, the delegates stressed the importance of a *User Needs Study*, especially with the drop in subscriptions to the printed *Atomindex* from over 1800 in 1977 to not much more than 500 in 1991. Further development of FIBRE was also supported. The application of the IAEA for associate membership in the Implementing Agreement for ETDE generated great interest from ILOs about the possible benefits for INIS Members who were not members of the International Energy Agency (IAE). Appreciation was expressed for the first version of FIBRE, which had been distributed in 1991, as well as for the first set of INIS database archival discs — one covering the years 1976-1988, and the second starting with 1989, to be regularly updated.

In 1993, at the **21st ILOM** held in Vienna, the manner in which the *User Needs Study* should be conducted was discussed, especially relating to output products and the future of the printed *Atomindex*. Discussion also focused on the *Definition of Membership Arrangements for INIS*, encouraging more active participation by Members. It was in 1993 that input began to be sent via email. Version 2.1 of FIBRE was also released during this year. The decision to develop a completely new *INIS Data Processing System (IDPS)* was also taken.

The **22nd ILOM** was held in New Delhi, India; the first time for it to be held in Asia. The *Definition of Membership Arrangements for INIS* was finally approved by the Director General in May 1994, and by the Board of Governors (GOV/INF/743). Other discussion topics included the status of the

User Needs Study; the use of the File Transfer Protocol (FTP) to exchange authority files electronically; the preparation of a PC-based training package on INIS procedures; and the establishment of an electronic bulletin board to foster the exchange of information between the Secretariat and Members. It was also agreed to produce an annual *Periodic INIS Report*, to promote INIS services and the INIS database. 1994 was also momentous in that the *Memorandum of Understanding* between INIS and the ETDE was finalized and signed. This valuable partnership would continue for many years, bringing great benefits to INIS and ETDE, until the dissolution of ETDE in 2014.

The **23rd ILOM**, held in 1995, coincided with the 25th anniversary of INIS, and the Director General of the IAEA, Mr Hans Blix, opened the meeting. The results of the User Needs Study were discussed in detail, and one of the outcomes was the agreement to discontinue the COM production as of January 1996. It was determined that the printed version of the *Atomindex* would only be discontinued upon the availability of a less expensive INIS database on CD than the one currently in production. Two articles were published in the IAEA's Bulletin about INIS. It was after this meeting that alternative methods for obtaining more cost effective bibliographic records would be explored.

At the **24th ILOM**, held in Kyoto, Japan in 1996, it was agreed to use barcodes on the full-text of NCL documents. The first version of the INIS website was launched and

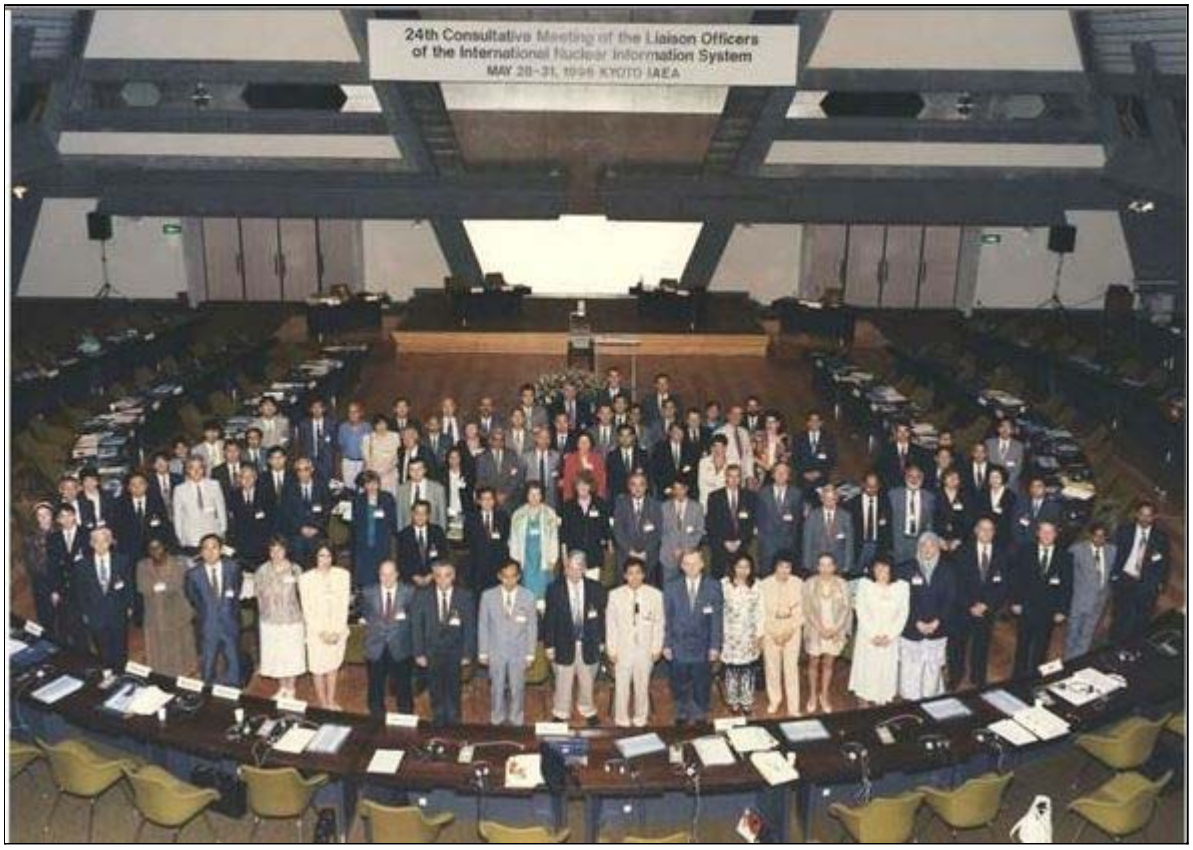


FIG. 5. 24th ILOM, 28-30 May 1996, Kyoto, Japan

presentations were given on the INIS Homepage. Demonstrations were also given on the INIS Computer-Based Training package. A presentation was given on the final report of the Clearinghouse Imaging Pilot (CHIP), demonstrating the feasibility of electronic storage of NCL on CDs. With the possibility being explored of obtaining records directly from publishers, questions were raised by the ILOs about issues of copyright, intellectual property and cost, especially regarding the distribution of electronic full-text NCL. They therefore requested that "*the INIS Secretariat 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*". The number of full-text NCL available in electronic form reached over 500 000.

At the **25th ILOM** in 1997, held in Vienna, a new license agreement policy for the distribution and sale of the INIS database on CD was presented, drafted together with the IAEA's Legal Division,

and clarifying the responsibility of each INIS member when providing full-text to INIS, as well as agreement of the literature's producer on the distribution of it by INIS. Another INIS milestone was achieved in 1997 with the number of records entered into the database reaching 2 million. The new technology for electronic delivery of NCL, studied during the CHIP project, was implemented and the new computer based training package was released. An official ceremony took place at the Austrian Foreign Ministry in December to hand over a copy of the entire microfiche collection to the *Zentralbilbiothek fuer Physik in Austria,* which would serve as a depository library for INIS NCL and provide a secure 'off-site' storage facility, as well as offer support on a contingency basis to the master collection housed at the IAEA.

1998 proved to be a year of both endings and beginnings. At the end of 1997, the last printed Atomindex was published with Vol. 28, Issue 24. The *INIS Advisory Committee* met for the 10th and last time in December 1998. The INIS database under STAIRS on the IAEA mainframe computer ceased operation at the end of December, and was replaced by the INIS database on the Internet. In 1998, the **26th meeting of ILOs** was held in Ottawa, Canada. Demonstrations were given on the CD-ROM retrieval and email delivery, as well as bibliographic reference retrieval from the online database using BASIS software. A joint project between ETDE and INIS was discussed to study the database record format and find ways for its simplification. The completion of the INIS Record Processing Sub-system (IRPS), part of the IDPS, was completed, enabling the processing of records at the Secretariat to be done electronically, rather than on paper.

The **27th ILOM**, held in May 1999, concentrated most of its discussions on how to solve the problem of the declining levels of input by INIS national centres. It was agreed to establish a Working Group to look into this issue, perhaps changing the *Definition of INIS Membership Arrangements*, and finding other ways to finance the creation of input, such as buying records from other publishing houses. The ILOs also agreed to "*sensitise their respective Government Authorities on the importance of the INIS System.*" and to raise the issue with the IAEA Board of Governors. The pilot project of the *INIS Web Services* was made available to INIS Members in August and, after enhancements, was to be made available to the public in January 2000.

FIG. 6. 29th ILOM Karlsruhe 2000

The 30th Anniversary of INIS coincided with the **28th ILOM**, which was held in Karlsruhe, Germany in 2000, the second time the meeting was held in Germany. Upon the recommendation of the *Advisory*

Committee for INIS at their meeting in December 1998, a revised text of the *Definition of Membership Arrangements* (GOV/INF/743) was agreed to at the meeting by the ILOS after extensive discussions, and presented to the Board of Governors later that year, who confirmed the revision (GOV/INF/2000/21). As presented in the revised version of the *Definition of Membership Arrangements*, the ILOs agreed to share input preparation amongst their centres and a pilot program was suggested to determine the minimum number of records to be input by each Member. The first draft of the electronic INIS/ETDE Thesaurus was also presented at the meeting. At the end of the year, the INIS Distance Learning Program (INIS DLP) was officially launched to Member States and by 2002, 54 users from 31 countries were registered.

During 2000–2001, INIS entered into agreements with several publishing houses to purchase electronic bibliographic records of journal publications to be included in the database. These included Elsevier, the Institute of Physics Publishing, Nuclear Technology Publishing, the British Nuclear Society, and the America Institute of Physics. Another milestone for INIS was the end of microfiche production in 2001. From this time forward, NCL full-text was only available on CD-ROM, to be replaced later by direct access from the INIS Collection.

At the **30th ILOM**, held in Sofia, Bulgaria, in 2002, it was decided to hold ILO meetings biannually instead of on an annual basis. Both the Institute of Physics Publishing and the British Library provided electronic records free of charge, resulting in the indexing of over 15 000 records.The Liaison Officers supported the active involvement of INIS in knowledge preservation activities at the IAEA and Member States, paving the way for the creation of the INIS and Nuclear Knowledge Management Section, which would replace the INIS Section the following year. In 2012, there would again be a reorganization of INIS, with the creation of a Nuclear Information Section, encompassing the INIS Unit, the IAEA Library Unit, and the Systems Development and Support Group (SDSG).

At the initiative of the INIS Centre of Korea, an effort to load the INIS database on their computers and to make it available as either a mirror or separate host was discussed at the **31st ILOM** held in 2003. After analysis and discussions, the decision to create a separate host was made. A domain was registered and the database was populated with over 2 million records, to be updated by the Secretariat through use of the Agency's FTP. Due to the fast and ever changing information environment and at the recommendation of the 2002 INIS Programme Evaluation Report (GOV/INF/2003/12 Annex 3), the ILOs agreed to revisit the *Definition of Membership Arrangements for INIS* and recommended that it be updated.

In 2004, as agreed in 2002 by the ILOs and supported by the IAEA General Conference, a special meeting was held as a conference dedicated to nuclear knowledge and information management in Saclay, France. The *International Conference on Nuclear Knowledge Management: Strategies, Information Management and Human Resource Development* was organized by the IAEA together with the Commissariat de l'Energie Atomique and covered policies and strategies on both nuclear knowledge management and managing nuclear information, human resources for the nuclear sector, networking in nuclear education and training, case studies on managing nuclear information, and a special session on INIS. 2004 also brought the best ever result achieved by INIS, with the addition of over 106 000 records to the INIS database. This result was possible because of the cooperation of Member States in preparing their own national input, providing voluntary contributions, and the efforts of the Secretariat in covering the backlog of scientific journals. By the end of the year, there were more than 2.5 million records in the INIS database.

The **32nd ILOM**, held in 2005, in Vienna, brought a review of the changes made to the *Definition of Member Arrangements for INIS*, and with the approval of the new text at the meeting, the ILOs decided to rename it *Arrangements for the International Nuclear information System*. However, these changes were never officially approved.

In 2006, the **33rd ILOM** was once again held in Vienna and a new INIS Mission statement, which had been drafted at the *Consultancy Meeting on Strategic Input to INIS,* held in April prior to the

meeting, was approved. The Mission Statement read: *1) To provide quality nuclear information and knowledge*

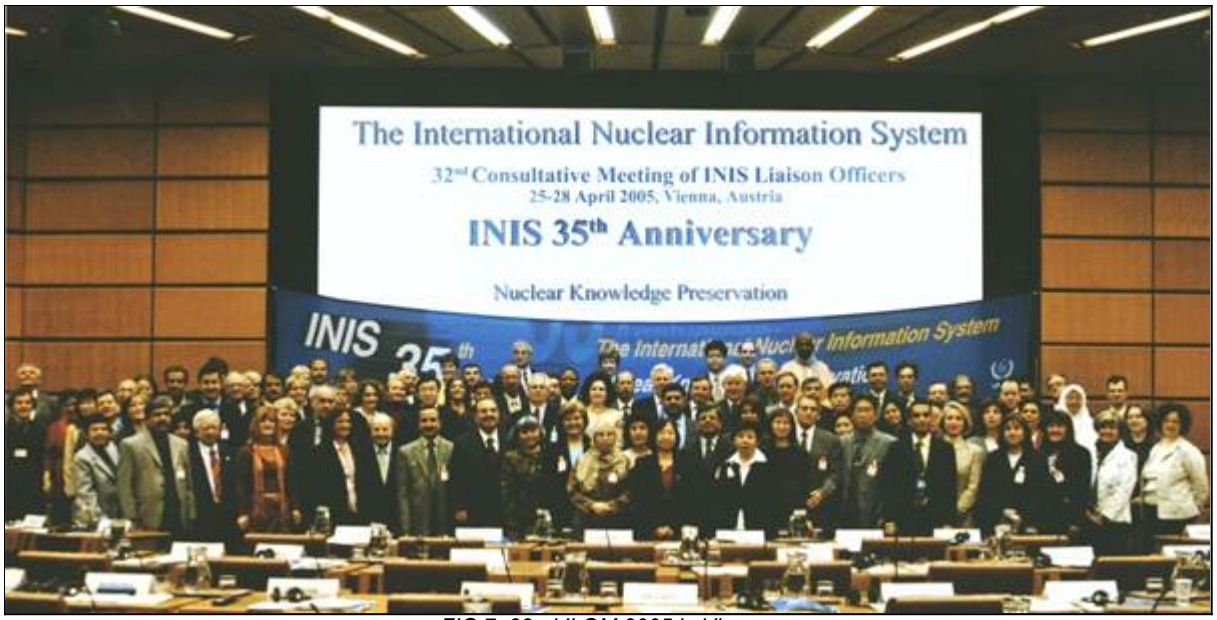


FIG.7. 32nd ILOM 2005 in Vienna

management services to Member States; 2) To create a reservoir of nuclear information and knowledge for further 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.

Also, as per the recommendations of the *Consultancy Meeting on Strategic Input to INIS*, the ILOs discussed implementing three areas of direction: *1) continued development of the database, developing full-text search capabilities, while finding ways to integrate other information types such as multimedia, videos etc.; 2) redefine the relationship between the INIS Secretariat and INIS National Centres to develop active partnerships, and share the workload of voluntary input, to increase the coverage of the database; 3) improve access to nuclear information by providing access to nuclear information resources both inside and outside the Agency, provide access to full-text referenced in the database, not only NCL, and develop multilingual retrieval capabilities, including cross language searches and Digital Object Identifiers (DOIs).*

The ILOs recommended setting up a remote access feature to CAI and also recommended that a survey be conducted reviewing all aspects of the role of ILOs in order to: gain a better understanding of the situation in INIS Member States; identify issues preventing ILOs from fulfilling their INIS mandate; and determine if there was a need for more support from the INIS Secretariat. By 2006, INIS membership had reached 140 and the number of input for that year totalled 122 412. A new version of the INIS database on the internet was launched offering a multilingual interface (English, German, Japanese and Spanish), including direct access to full-text documents, full-text search capabilities and other enhancements, and the availability of full-text NCL online. The first issue of the newsletter *Nuclear Information and Knowledge* was also launched in 2006.

By 2008, the total number of records added to the INIS database since 1970 exceeded 3 million, over 123 000 of which were added in 2008. The ILOs were informed at the **34th ILOM**, held in November 2008, about a study, commissioned in 2007 by the IAEA's Department of Nuclear Energy, on the operations model for a modern nuclear information system. The mission statement declared: *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 three drivers identified in the study for such an information system were access, content, and web technology. There was much discussion on ways to promote and market INIS within Member States. The meeting also coincided with forty years of partnership between the IAEA and the OECD's Nuclear Energy Agency (NEA) Computer Programme Data Bank, throughout which INIS had provided one staff member to support this service. Probably the most important topic of the

meeting was about opening access to the INIS database worldwide and making it freely available.

FIG. 8. 33rd ILOM Vienna 2006

Appreciation was expressed for the Pilot Access Project and support was given to gradually open access to INIS Members alphabetically by country name. It was recommended to implement open access on a country to country basis in 2009. As a result of these recommendations, the INIS database opened with free, unrestricted access to all internet users worldwide in April 2009, a momentous occasion for INIS. The possibility of extending the *INIS/ETDE Joint Reference Series*, which included the *Joint INIS/ETDE Thesaurus*, *Subject Categories and Scope Descriptions*, and the *Manual for Subject Analysis*, by adding a revised *Joint INIS/ETDE Guide to Bibliographic Description,* was discussed. The development of the Metadata Extraction Tool (MET) resulted in its launch in 2008 and the Conference Authority Tool (CAT) was implemented in 2009. By the end of 2009, more than 180 000 documents (over 9.6 million pages) had been digitized — almost 60% of the entire microfiche collection.

In 2010, the ILOs met in Vienna for the **35th ILOM**. The participants of the meeting congratulated the INIS Secretariat on the pilot project of making INIS full-text NCL searchable and recommended that the Google Search Appliance be made the search tool for both NCL and bibliographic records. They also recommended revisiting the *INIS Membership Arrangements* with a view to adapting it to changed realities and creating appropriate usage guides for the INIS database. Further integration of INIS into global information networks was also encouraged. A recommendation was made to further develop the Metadata Extraction Tool (MET) and to make it available to the INIS Centres. The delegates also recommended further developing the Computer-assisted Indexing system (CAI). The *English Thesaurus*, *ETDE/INIS Joint Reference Series No. 1 (rev. 2.3)* was made electronically available to all users, as was the *ETDE/INIS Joint Reference Series No. 2(Rev.1), Subject Categories and Scope Descriptions*, thanks to the work of the ITC subgroup on subject category publication review. The INIS National Centres of China, France, Germany, Russia, Spain and Syria were commended on their work maintaining and updating their language versions of the Multilingual Thesaurus.

On March 11, 2011, the Fukushima Daiichi nuclear power plant in Japan was hit by an earthquake and a tsunami. Later that same month, a customized search was devised to specifically cover the Fukushima Daiichi nuclear power plant in the INIS Collection. INIS created a Twitter account and made its first Tweet in August 2011, and in November, INIS was listed as one of the Open Access Repositories under UNESCO’s Global Open Access Portal under Thematic Areas/Sciences/Nuclear science.

In 2012, as mentioned previously, a restructuring in the Department of Nuclear Energy took place, creating the Nuclear Information Section. Efforts were made to enhance existing information products and services, as well as to introduce new ones. One of these was the creation of *one access point,* where over 90 000 IAEA Library bibliographic records were added to the INIS Collection Search, enabling a simplified and more efficient single access point to both the INIS and IAEA Library collections through the INIS Collection Search web interface. The **36th ILOM**, held in October of 2012, gave its support to moving toward Unicode in the use of input preparation and the enhancement of WINFIBRE. The participants also acknowledged their appreciation in the coordination of the Thesaurus Advisory Working Group. Many enhancements were made to the INIS Collection Search, one of which was the integration of the INIS Collection, with its 3.3 million records, and the Joint INIS/ETDE Thesaurus, with over 30 000 well defined nuclear terms, in the Advanced Search, allowing users to fine-tune their queries before they are performed. Another improvement was the suggestion to use the list of thesaurus descriptors for searching. The INIS Secretariat was commended for conducting the website user survey, and encouraged to explore the use of modern e-learning tools, as well providing adequate training materials and presentations. INIS Members were encouraged to use the INIS search widget, which had been developed in 2010, and to add links to INIS from their web pages. INIS developed a version of the INIS website for use on mobile devices such as iPhone, Blackberry and Android. A new version of the INIS Interactive Multilingual Thesaurus was developed and placed on the INIS website. Descriptors can now be entered in Chinese, English, French, German, Japanese, Russian, and Spanish. After selecting a term, translations are also available in each of these languages. This is one of many examples of cooperation with Member States. Looking towards the future, increasing the use of social networking tools, fostering the further integration of INIS into global information networks, and exploring alternative methods for collecting metadata and related NCL were all recommended by the participants of the meeting. Using new information technologies and methodologies to continue the development of INIS were recommended as the way forward for INIS. The number of records input into the INIS Collection has steadily increased over the years. In 2012, 130 988 records were added to the INIS Collection. This remarkable achievement was a direct result of each participating INIS Member's contribution throughout the past 43 years.

FIG. 9. 37th ILOM Vienna 2014

The **37th ILOM**, held in 2014, welcomed Afghanistan as its 129th Member State. Appreciation was stated by the participants of the meeting for the input of 128 000 records in 2013, and, as of October 2014, the input of over 90 000 records. A review of the NCL copyright practices and drafts related guide to be used for the INIS Collection was recommended, as was finding ways to include more nuclear patents and publications by other commercial publishers in the INIS Collection. The participants appreciated the enhancement of FIBRE+ and encouraged the introduction of FIBREonline. A review of the possible use of the Invenio software for input was also recommended. In close cooperation with the INIS Liaison Officer of the USA, the INIS Secretariat was encouraged to review the impact of the new USA public access policy on INIS input and purchasing practices. The delegates recommended simplifying the existing INIS procedures and standards, particularly the update of the *INIS Guide to Bibliographic Description* (2009), taking into account current bibliographic standards. More Members were encouraged to join the Thesaurus Advisory Working Group, and to explore ways to transform the Thesaurus into an ontology, improving its use in subject analysis and information retrieval. Enhancements to the INIS Collection Search (ICS) were recommended by introducing an option to search only

bibliographic records, improving help and guidance materials related to the use of UNICODE, creating easy to follow statistics for single, most frequently downloaded articles and developing Application Programming Interface (API) for searching the INIS Collection, as well as other tools such as selective Dissemination of Information (SDI). Over 14,2 million pages and 288 000 PDFs have been digitized from microfiche. In 2013, SDSG worked hard to extend the compatibility of the 'NE News' application, already available for the iPad, and it became available on both the iPhone and Android devices. At the request of the Korea Institute of Science and Technology Information (KISTI), translations of INIS bibliographic records were made available in Korean. One of the greatest achievements in 2014 was the placing of the public Non-Conventional Literature (NCL) collection, consisting of over 330 000 full text PDFs, into Google's index. Between January and April 2014, the INIS Collection Search (ICS) achieved more than 1 million pageviews. In addition, the ICS had more than 465 000 visits from more than 360 000 unique visitors in the first four months of 2014. This was in contrast to 2012 where the ICS had 561 998 pageviews, 77 853 visits and 38 070 unique visitors. Almost all of the increase in traffic can be attributed to making ICS searchable trough Google. Looking towards the future, the following recommendations were made at the 37th ILOM: introducing alternative ways to collect INIS input metadata and related NCLs, such as harvesting, fostering further integration of INIS with other global information networks, particularly with the International Nuclear Library Network (INLN), exploring ways to create an open source discovery system for nuclear energy literature, cooperating with non-commercial discovery services, keeping the INIS Collection away from commercial vendors, keeping it open and free to all Internet users, the future use of Google Analytics and other evaluation tools, and creating an INIS Advisory Group, using modern electronic collaboration tools. It is obvious from this vision of the road ahead for INIS, that there are many great things in store, as well as many things still to be accomplished.

INIS, along with its Members, has achieved much in the past 45 years and it is not possible to list all those achievements here. From 55 Members in 1972, to 154 in 2015, INIS has grown by leaps and bounds, and will hopefully continue to do so in the future. Without the collaboration and commitment of its Members, the accomplishments of INIS would not be possible.

Steve Jobs once said, *"If you look really closely, most overnight successes took a long time"*. The success of INIS has been demonstrated by over 45 years of cooperation between the INIS Secretariat and its Members and, with continued joint efforts, will pave the way for many more years of innovation for the world's leading database on the peaceful uses of nuclear science and technology.

Impressum
Nuclear Information Newsletter No. 17, September 2015
Prepared by The Nuclear Information Section (NIS)
Department of Nuclear Energy International Atomic Energy Agency
Vienna International Centre, PO Box 100
1400 Vienna, Austria
Email: NIS - Section Head Office
Websites: INIS IAEA Library

IAEA International Atomic Energy Agency

Nuclear Information Newsletter

www.iaea.org/inis ISSN 2410-4940 (online)

No. 17, October 2015

45th INIS Anniversary Newsletter

The INIS Thesaurus: historical perspective

Mr Bekele Negeri Duresa *is a Biologist and Information Scientist. He has been working with the IAEA since 1995, mostly as a Subject Specialist and Nuclear Information Specialist for INIS. Prior to joining the Agency, Mr Duresa served as the National Liaison Officer of Ethiopia.*

Ms Olga Vakula *has a chemical background and has worked as a Subject Specialist for INIS for 3 ½ years. She performs subject analysis of records in Chemistry and Material Science related categories and maintains the Thesaurus on the INIS website.*

Introduction

The INIS Thesaurus is a controlled terminological knowledge base that has been developed over the years through the contribution of INIS Member States in all areas of peaceful applications of nuclear science and technology, which is also the subject scope of the INIS Collection. The thesaurus is primarily used for subject indexing of input into the INIS system and for retrieval of information from the database. Thanks to the vital support of INIS Member States, the thesaurus has been translated into eight languages (i.e. all IAEA official languages plus German and Japanese) and is available on-line to assist our global users as a tool for retrieval and for general reference. It is a dynamic information resource that is continually updated to cater to new developments of terminologies in nuclear science and technology.

Since its inception in the 1960's, it was decided that the subject analysis for INIS input preparation be based on its own subject categories, which also determines its scope, and keyword indexing using a thesaurus. This article briefly describes the development of the INIS Thesaurus from a historical perspective.

Report of the INIS Study Team (1968) as the basis of the INIS Thesaurus

The Agency established a team of experts with the task of developing a detailed description of a nuclear information system and then produced a report by the *INIS Study Team*, Vienna, 4 March–28 June, 1968.

The team had to select an optimal method of content description and retrieval tools that could be used by all Member States in a standardised manner.

The team narrowed down their options to three methods, namely:

- Universal Decimal Classification (U.D.C.);
- Subject Headings (with a modifier line) as used by National Science Abstracts (NSA);
- Keywords, for example as in the ENDS system of EURATOM.

Indexing using keywords was chosen as the preferred method and this decision entails the adoption or development, and ultimately the continued maintenance, of a controlled vocabulary thesaurus.

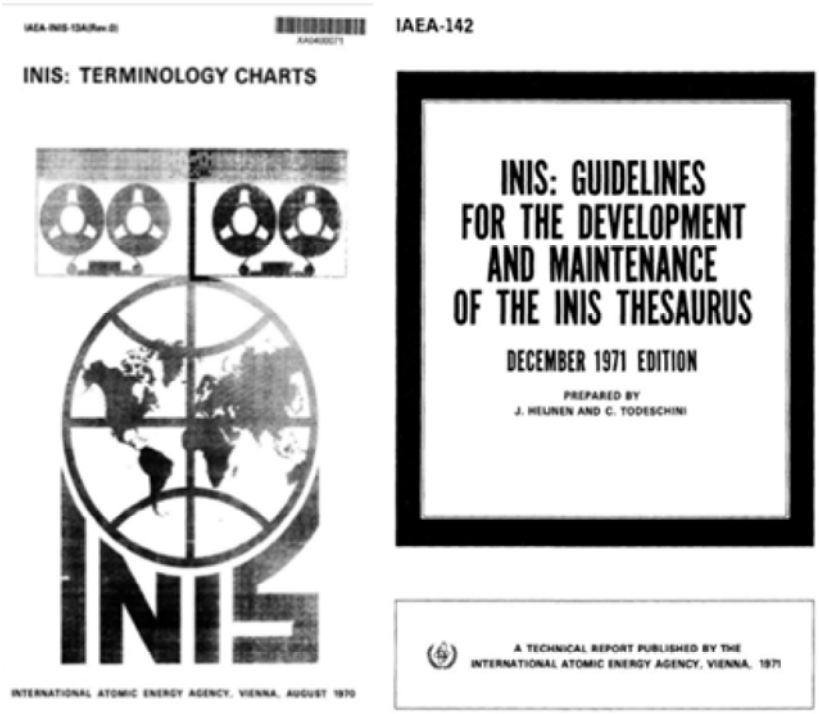


FIG. 1. INIS: Thesaurus and INIS: Terminology Charts.

The EUROATOM Thesaurus as the foundation of the INIS Thesaurus

The IAEA Board of Governors, at their meeting on 26 February 1969, approved the International Nuclear Information System (INIS) on an operational basis as early as possible in 1970, and also recommended that the Agency, as far as possible, take maximum advantage of the work of other effective systems to collect information, including the EURATOM system. Special emphasis was given to the need for cooperation with EURATOM so as to avoid duplication, and to draw benefits from the developmental work that they had already done, particularly in the creation of a thesaurus of nuclear terminology.

Accordingly, a contract between the IAEA and EURATOM was signed in November 1969 to adopt the EUROATOM terminology to the INIS Thesaurus. This involved stationing an INIS staff member in Luxembourg for the duration of the contract (November 1969 to June 1970) to work closely with the EURATOM staff on the adaptation of the thesaurus for the needs of INIS and to act as liaison between the two organizations. The project produced:

The first draft INIS Thesaurus consisting 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 part consisted of ‘Terminology Charts’, which were a mixture of text and graphic displays of the text prepared to illustrate the interrelationships between terms.

The first version of the INIS indexing manual: while in Luxembourg, the INIS staff member also wrote this manual, to be used by indexers at national INIS Centres to select indexing terms from the new INIS Thesaurus.

The thesaurus, in its two parts, and the software for its maintenance and updating: by June 1970, when the INIS staff member stationed in Luxembourg returned to Vienna, an informal meeting between the IAEA and EURATOM staff took place in Vienna, at which these were officially handed over to the IAEA.

Adoption of Standards and the full revision of the INIS Thesaurus

Based on the recommendations of the *Panel on Improvements or Alterations in the General Development Pattern of INIS*, Vienna, November 1970, draft guidelines for the development and maintenance of the INIS Thesaurus were drawn up. The draft was based on *Guidelines for the Establishment and Development of Monolingual Scientific and Technical Thesauri for Information*

Retrieval prepared by UNESCO, Paris, July 1970. On the basis of the guideline, participating centres reviewed each term in the EURATOM Thesaurus as adopted by INIS, removed errors and inconsistencies, ensuring a univocal representation of every concept by one and only one descriptor in the thesaurus and, above all, linked each term to other thesaurus terms that had a logical and/or semantic association with the term in question. With the development of a structured terminology, there was no longer a need for the Terminology Charts, which were used to depict the relationship of the terms. The final version of the new INIS Thesaurus was produced in Vienna and presented to the *Working Group on Thesaurus and Related Technical Questions* in November 1971. The *INIS: Guidelines for the Development and Maintenance of the INIS Thesaurus*, used by all participants in the study as the basis for the revision and restructuring of the terminology of the thesaurus, was published by the Agency in December 1971.

Development of the INIS Multilingual Thesaurus

Since the inception of INIS, much effort has gone into the development and maintenance of the INIS Thesaurus, first in English, and later in additional languages as various INIS national centres undertook the translation of the terminology in their respective languages.

At the *Third Consultative Meeting of INIS Liaison Officers* held in Varna, Bulgaria in October 1974, delegates from the USSR and the Fed. Rep. of Germany announced that their centres had started preparing the total translation of the INIS Thesaurus into Russian and German, respectively.

During the *Seventh Consultative Meeting* in Karlsruhe, Germany in May 1979, due to the upcoming publication of the Russian version of the INIS Thesaurus later that year, the possibility of creating a Multilingual Dictionary, in English, French, German and Russian, was discussed.

In 1983, the first edition of the *INIS Multilingual Dictionary* (English, French, German, Russian) was completed and published. The Spanish translation, though much advanced, was not yet finished at this time and was completed in 1988.

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, the INIS Secretariat acquired a thesaurus management system that supported Unicode and, during the same year, versions in Chinese and Arabic were completed by the INIS Centres of China and Syria respectively.

History of the INIS/ ETDE Joint Thesaurus

In January 1987, a number of International Energy Agency (IEA) Member States of the OECD, signed an ‘Implementing Agreement’ to operate a new system referred to as the Energy Technology Data Exchange (ETDE). 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 use the full INIS input as the input to their database in the area of nuclear energy.

Following much work on the part of both 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, Germany in June 2000.

One of the significant outcomes discussed at the *6th INIS/ETDE Joint Technical Committee Meeting*, held in Vienna in 2000, was the completion of the joint INIS/ETDE Thesaurus, which was later published in 2001. This thesaurus became part of a new *Joint Reference Series* published in collaboration with ETDE.

However, in March 2015, after more than 27 years of cooperation, the INIS/ETDE Joint Thesaurus became the INIS Thesaurus, due to the official end of the ETDE in June 2014.

Present status of the INIS Thesaurus

The INIS Thesaurus continues to be updated on a regular basis, giving users the opportunity to consult the latest version in a single document on the INIS website. The up-to-date thesaurus is also integrated into FIBRE+ (input preparation software), Computer Assisted Indexing (CAI) software, INIS Record Processing Software (IRPS) and the on-line INIS Collection Search (ICS).

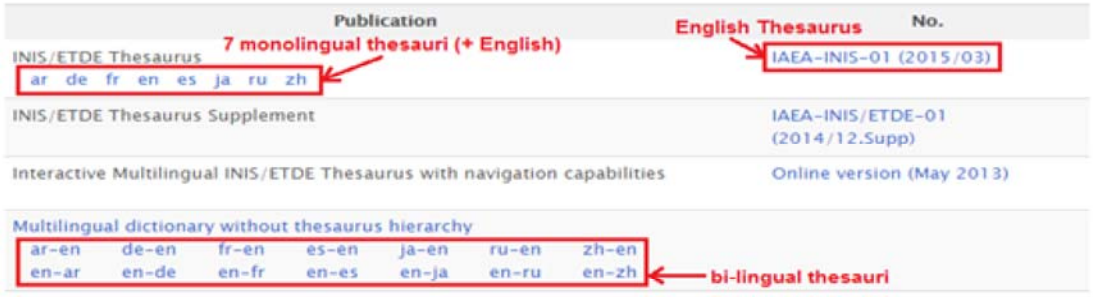
The English Thesaurus is updated on a monthly basis and is available in PDF from the Publications section of the INIS website. Those who have access to the Member's Area on the INIS website can download both the full (all levels of narrow terms) and short (1 level of narrow terms) versions of the English Thesaurus in XML-format.

The Multilingual Thesaurus, in addition to English, includes 7 languages — Arabic, Chinese, French, German, Japanese, Russian and Spanish. As agreed at the 37th ILOM in October 2014, both the monolingual thesauri and the bi-lingual thesauri are updated twice a year – in January and in July.

Regarding implementation, the INIS Secretariat continues to solicit translation lists from the respective national INIS centres to be imported into the INIS Thesaurus.

The first quarter of 2015 resulted in 4 monolingual (and 8 bi-lingual) thesauri updates, including Chinese, Japanese, German and French. All of them are available in PDF on the INIS website.

The publication section of the INIS website provides a simplified overview and easy access to a multitude of documents. Along with all language versions, the Thesaurus Supplement, the Interactive Multilingual INIS Thesaurus with navigation capabilities, and the multilingual dictionaries without thesaurus hierarchy continue to be updated.



The INIS on-line Thesaurus Advisory Group, created to evaluate proposals for new descriptors and other thesaurus related topics, continues to deliberate on newly proposed terms and other thesaurus matters. These discussions facilitate the increase of the thesaurus: during the debates new terms and wordblocks are created and improved, and old/out-of-date word blocks and scope notes are revised.

It also provides a good opportunity to stay in touch with subject specialists, not only within INIS and the IAEA, but also within Member States. In order to become a member of this group, one

needs to be introduced and recommended by his/her Liaison Officer.

As of March 2015, the English INIS Thesaurus contained 30 866 descriptors, 22 155 of which are valid descriptors and 8711 of which are forbidden terms.

IAEA International Atomic Energy Agency

Nuclear Information Newsletter

www.iaea.org/inis ISSN 2410-4940 (online)

No. 17, October 2015

45th INIS Anniversary Newsletter

INIS Pioneering Information Management: The early days of computerized acquisition, processing and storage of data at the IAEA

Riccardo Rubini *has been working in the field of Information Technology for over twelve years, both in the private and public sector. He currently serves as Information Architect in the Software Development and Support Group (SDSG) within the NIS Section.*

In his third Law, British author, Sir Arthur C. Clarke, states that "any sufficiently advanced technology is indistinguishable from magic". When a technology becomes estranged due to the inevitable process of obsolescence, it becomes alien to the untrained eye, unfamiliar and obscure – elements that possibly add up on the original mystique of early computers. In this article we will take a look at a number of early information technologies, some gone, some forgotten, some still alive-and-well, to unveil the magic that has greatly contributed to INIS, throughout its 45 year journey in the realms of nuclear culture for peaceful uses.

First computer of the IAEA

FIG. 1. An IBM System/360 together with peripherals; the console is visible in the forefront.

In the beginning, there was the computer: heralded as a "Giant Brain" by the press, the first computers of the 1940s, such as the ENIAC, were a jumble of vacuum tubes, crystal diodes, relays, resistors and capacitors, over a million of hand-soldered joints, spreading over an entire building: all with the same computing power as that of a modern pocket calculator. When INIS began its journey in the 1960s, computers had already come a long way. Since 1951, when John Von Neumann's machine was released by the Institute for Advanced Study (IAS), the complexity of computers' circuits had doubled steadily every two years, as first noted in 1965 by Gordon Moore, co-founder of Intel, and author of the famous law bearing his name. When Moore made his observation, the world of computers had already transitioned from vacuum tubes to transistors, the public had seen the birth of the PDP-1, the ancestor of the modern personal computer, and the paradigm of general-purpose computers had won its battle against that of one-purpose, highly specialized systems. The appeal of an all-purpose machine convinced the Agency's management to explore this emerging technology and to purchase a computer with the

ability to tackle different problems, such as handling the specialized duties required by INIS and, at the same time, solving financial or statistical problems. This machine was the IBM System/360 Model 30.

More than a computer, the System/360 was Big Blue's biggest gamble since its foundation. With legendary Thomas J. Watson, Jr. at the helm of the company, IBM's bet was to launch not one, but a full family of six mutually compatible computers, together with more than fifty peripherals, which modularly expanded the features of the computer unit. With an initial investment of $5 billion, the System/360 was part of Tom Jr.'s vision to have IBM move its major source of revenue from punched-card equipment to electronic computer systems and make a final transition from discrete transistors to integrated circuits. Aggressively pursuing success with its new system, IBM made the bold move to discontinue all five of its previous computer product lines, including the successful 1400 series, leaving customers no option but to embrace the new System/360. However, the transition to the new system was made less traumatic by IBM, with an unprecedented pursuit in compatibility. Thanks to emulation features in the System/360, the computer was fully compatible with the applications written for its predecessors, something IBM had never before endorsed. The System/360 Model 30 quickly became an incredibly popular mainframe. Orders climbed to 1000 units per month within two years of its launch, and by the early 1970s, IBM peaked at 70% of the world's mainframe market, with its customers including NASA, Ford and Volkswagen. In his memoir, Tom Jr. would recall: "The System/360 was the biggest, riskiest decision I ever made, and I agonized about it for weeks, but deep down I believed there was nothing IBM couldn't do". But how did this computer work and what did it look like? A Model 30 would normally include a Console, a Card or Punch Reader, a Printer and a number of magnetic tape drives. With its 64k byte of RAM, 8-bit micro architecture and the ability to perform circa 33 000 additions per second, it succeeded in helping NASA land the first man on the moon. There was no doubt that it would be a perfect companion for the birth of INIS, the Agency's first computerized database on the peaceful uses of nuclear energy.

FIG. 2. A close-up of an IBM System/360 console

One of the goals for the IAEA to invest in a computer system was to address the information management requirements related to the development and implementation of INIS. The deployment of a computer in the Agency had an impact at different levels of the Organization: not only did it transform the way people worked, but it changed the Agency itself by triggering a change in its organizational structure. In fact, along with the deployment of the IBM System/360 Model 30, a whole new Section was born within the Division of Scientific and Technical Information (STI). The Computer Section, whose legacy is still carried out today with the assistance of the Software Development and Support Group (SDSG) in the Nuclear Information Section, would use the IBM System/360 to develop and run applications aimed at checking the inputs submitted by the Member States, in compliance with the United Nations International Scientific Information System (UNISIST) decentralized concept. The computer soon proved to be essential in processing the inputs and producing the outputs on magnetic tapes, together with the files for the printed version of the INIS Atomindex, a monthly bulletin containing bibliographic references to the items of literature in the INIS Collection and distributed to INIS Member States. The system's printer, an IBM 1403, whose output quality would remain unsurpassed until the

advent of laser printing technology in the 1970s, allowed the Agency to print its INIS Atomindex in-house, in complete autonomy and without having to rely on the support of 3rd parties. The experience gained by the Agency in establishing, running and maintaining a bibliographic information system was so vast that, when FAO considered establishing its own information system for the agricultural sciences in 1973, namely AGRIS, INIS was clearly the model to mirror. Thus, many years of cooperation between the IAEA and FAO were established, continuing today on different projects, with the Agency sharing its IBM computer technology to process the records of agricultural literature and producing the FAO Agrindex publication.

To the modern computer user, the IBM System/360 might look cumbersome and primitive in design, its size laughable and its hardware and software specifications ridiculous; however, this computer diligently served the Agency for decades. According to Big Blue, it would take an estimated 33 million hours of operation for one of the solid-logic technology modules to fail on a System/360. The IBM System/360 impacted the world of computing and mainframes with several significant contributions. First and foremost was that of compatibility, through standardization of input and output interfaces and through the first-ever written operating software for a family of compatible processors. The IBM System/360 was also responsible for the introduction of the 8-bit byte and 8-bit architecture, which, thanks to the staggering success of computers like the Commodore 64, the best-selling home computer in history, reached millions of home users worldwide during the 1980s, launching the era of “computers for the masses” in which we live today, a concept envisioned by pioneering entrepreneurs such as Jack Tramiel, Sir Clive Sinclair, Steve Jobs and Bill Gates. On a more colourful note, it was actually possible to order these huge IBM computers and peripherals in different colours, just as it is possible today to order a laptop or a mobile phone in different colours - a testimony that the IBM System/360 was meant to be more than a simple technological step in the history of computers, a “sharp departure from concepts of the past in designing and building computers” - using the words of Thomas Watson Jr. himself.

OCR

Having introduced the IBM System/30, the reader might wonder how the bibliographic records were loaded into the computer. At first, this very time-consuming job was done manually by subject specialists and professional typists. Then, in 1973, INIS decided to pioneer another technology: Optical Character Recognition.

The idea of introducing OCR technology to INIS was an effort to optimize the workforce at the INIS Secretariat, whose mandate was to process the contributions from the UNISIST decentralized model. OCR, in essence, converts typewritten text to a digital format understandable by a computer, relieving computer users from the burden of long manual input sessions. Thanks to the rising popularity of inexpensive flatbed scanners, people nowadays are familiar with this technology, and some use it on a daily basis. For example, by feeding scanners with all kind of forms and templates, the OCR software on the computer converts, in a matter of seconds, the written text on paper into an easily-editable electronic format. In the 1970s, however, this technology was still immature and most companies or organizations could only dream of having such options at their fingertips. The first true OCR machine had been installed at Reader’s Digest in 1954 to process typewritten sales reports and transform them into punched cards for the computer. The second generation of OCR reading machines appeared between the mid-1960s and early-1970s, with IBM presenting its first model, the IBM 1287, in 1965 at the World Fair in New York. Investing in OCR technology at this time would have first required the purchase and deployment of a highly expensive OCR machine; then the understanding and adoption of its input formats; and lastly, the purchase of suitable machinery compatible with such formats. In the early 1970s, INIS found its OCR reader of choice in the Compuscan 170, a monster-machine which weighed 548kg, created by the American company Compuscan Inc., based in Teterboro, New Jersey, and whose fame rose greatly thanks to the endorsement of the US Air Force, which successfully deployed a Compuscan setup in its Foreign Technology Division (Machine Translation) facilities. Contrary to modern OCR software, a Compuscan could properly process documents using only specific and standardized character typefaces.

FIG. 3. Picture of a complete Compuscan system

FIG. 4. An IBM Selectric "Golf Ball"

Originally, these typefaces were only of two kinds for Latin characters: OCR-A and OCR-B. Easily readable both by humans and computers, these sets were sans-serif and monospaced fonts invented and released in 1968 respectively by the American Type Founders and by Adrian Frutinger, a designer of Monotype Inc., from Woburn, Massachusetts. At first, the OCR-A and OCR-B typefaces could be only be printed by the IBM Selectric typewriter, another revolutionary technology from IBM, an electric typewriter that implemented rotating typeface spheres, easily interchangeable, in place of the regular typebars found in mechanical typewriters. These rotating 'golf balls', with reverse-image letters moulded on the surface, could print the fonts understood by the Compuscan, enabling the use of standardized OCR sheets as an input to the INIS production cycle. The Compuscan could produce an output of only 100 characters per second, circa 1/15th of what current architectures offer. However, such throughput represented a consistent improvement over manual input, considering that a professional typist can type only between 50 and 80 words per minute (wpm). Later on, together with the Compuscan, the IAEA decided to make use of another OCR system, the ECRM 5200 Autoreader, which was provided by ECRM Inc. on a loan, free of charge. The ECRM 5200 could process 500 wpm in English text, and would cost the astronomical amount, by today's standards, of $37 500. Both the Compuscan and the ECRM 5200, officially as of 1974, offered the ability to process the Cyrillic alphabet, a feature of great interest to INIS, considering the prominent role of the USSR in the submission of INIS related materials.

Before becoming obsolete, the Compuscan and the ECRM machines had significantly improved the efficiency and speed of INIS operations at the Secretariat and, most importantly, had reduced the manual workload of its staff. However these machines were far from automatic. The supervision of human personnel to correct mistakes due to damaged characters was still required, with corrections performed using an uncomfortable mini-viewer and a built-in cathode-ray tube display. These days, OCR at INIS is entirely carried out by software, with the aid of modern digitizing equipment. Highly advanced modern software products, like Abbyy FineReader, InftyReader and Adobe Acrobat, offer the Secretariat the ability to convert scanned images of handwritten, typewritten or printed text of any kind, into machine-encoded text, enabling INIS users and Member States to perform simple searches throughout converted documents, in only a matter of seconds, using the INIS Collection Search (ICS) engine.

Data storage and distribution at INIS

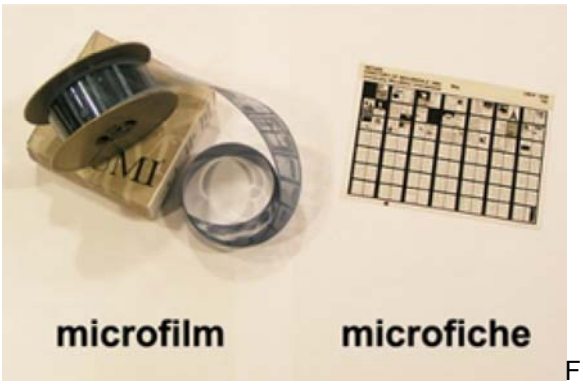


FIG. 5. Microfilm and Microfiche


formats FIG. 6. IMB 2401 magnetic tape disk drives, in blue.

Since the dawn of human history, man has sought the means to distribute and preserve *data*, *information* and *knowledge*. Assuming that *knowledge* is what we know, and *data* is the description of certain facts of the world around us; then *information* is what allows us to expand our *knowledge*. For example, in the case of a cave painting, the painting is the *information*, what is depicted is *data;* and the wall of the cave, the canvas where the *information* is stored, is what we would call a *medium*. Paraphrasing Canadian literary critic Herman Northrop Frye, for thousands of years, the most technologically efficient *medium* to divulge information has been, simply, *books*. A book needs no machinery to work: it requires only the eyes of the reader to transfer the *information* stored in it. Why then, would we ever bother giving up books in favour of other mediums? Partly because, as a medium, a book has its limitations; to begin with, a book cannot exceed a certain size, the amount of text written on a page is bound to the resolution of the human eye and storing a large collection of books would require the availability of ample storage space. But what if we could overcome these limitations by tweaking back and forth size and resolution to our liking? This is the concept behind *microforms*, micro-reproductions of documents to one twenty-fifth of the original size.

A *microform* is unreadable to the naked eye and it requires magnification to read the *information* contained within it. The use of this technology goes back to the mid-19th century, with one of its most peculiar uses taking place during the Franco-Prussian War in 1870, to deliver information via pigeon post. Both *microfilm* and *microfiches* belong to the family of *microforms*, with the latter being the main technology of choice at INIS for over thirty years, for the storage, reading, printing and transmission of its non-conventional literature. The difference between a *microfilm* and a *microfiche* is that *microfiche* images are distributed on sheets of film, rather than on a roll. A *microfiche* would contain several miniature reproductions of pages, in the standard size of 105 mm by 148 mm, commonly on a polyester base, a material whose lifetime is estimated to be as long as 500 years, much longer than any optical media on today's market, such as CD-ROM or DVD-ROM. Thanks to its size, for many years, *microfiche* offered a reliable and cheap means for INIS to increase the resources in its full text collection, without the physical requirements of additional storage areas. It was the advent of computers, however, that slowly, but inexorably, made this technology both obsolete and impractical. Microfiches are surely cheap, compact, safer and more portable than paper, but the advantages of today's digital document storage outweigh all the above. Digital documents, which can be processed by computers, have searchable text; making the content easily accessible and the distribution immediate. The space required for a digitized book is calculated in bytes, with information density on storage media augmenting every year according to Moore's law. For this reason, a project started in 2003, with the cooperation of

INIS Member States, where more than 83% of the entire *microfiche* collection was digitized over a period of 12 years, with over 288 000 full text documents converted into electronic format, more than 14.2 million pages, amounting to more than 350 gigabytes of data. *Microfiche* still survives today at INIS, where staff are busy converting the remaining 3 million pages, before finally dismissing this format.

If, on the one hand, paper and polyester were a common source for INIS inputs, magnetic media was, for years, the medium of choice at INIS for the distribution of information, with magnetic tapes being the technology relegated to oblivion. Since the 19th century, when Oberlin Smith succeeded in recording audio on a wire, magnetic storage has always been around us, having long outlasted other popular technologies, such as punch cards. In the form of tapes, floppy disks and hard drives, magnetic storage survives nowadays mostly as hard drives in IAEA data centres, with the preferred medium of distribution being the Internet or the Cloud. The first IAEA computer, the IBM System/360 Model 30, was equipped with two kinds of magnetic drives: the IBM 2314, a primordial hard drive with a stunning capacity of 25.87 MB on removable disk packs, with a maximum of eight drives being supported by the main unit; and the IBM 2401, a magnetic drive that could handle 9-track 800bpi tapes to record information in either EBCDIC (8-bit) or ASCII (7-bit) formats. It was the IBM 2400 series product line that launched the 9-track tape format, a standard that dominated offline storage and data transfer for over 30 years, with the last drive manufacturer abandoning the format only in 2003. This support had a storage capacity of less than 200 megabytes — circa 1/3rd of the capacity of a modern CD−ROM — and consisted of a 2400 ft. long reel of magnetisable oxide coating on a very thin plastic strip. For many years, it was precisely this format that INIS would use for its outputs: magnetic tapes prepared at the Secretariat in Vienna, with descriptive information and subject analysis of INIS bibliographic products distributed to INIS centres worldwide, until the Internet, more than anything else, killed this type of media. Throughout its years of operation, INIS produced a large number of tapes for distribution to its members on a bi-weekly or semi-monthly basis, without missing a beat, until 1997, when the last tape was finally produced. Tapes nowadays continue to be used worldwide, although in different formats than the 9-track reels that INIS used to produce, and they are currently enjoying a resurgence, with sales in the last quarter of 2014 amounting to $121.50 MM, according to the Santa Clara Consulting Group in CA, USA. This data medium resists obsolescence as it still has several advantages over other solutions, for example speed, reliability, cost-savings and a much longer lifespan. In a recent interview to *The Economist*, Alberto Pace, head of data and storage at CERN, claimed that, according to their calculations, extracting data from tape is still four times quicker than reading from a hard disk. As for reliability, tapes are more resistant to failure: a tape can snap, but it can be quickly fixed, simply splicing it back together; if a hard drive fails, there is no guarantee that the data can be fully recovered. Finally, with an average lifespan of over 30 years, tape still remains the cheapest physical medium on the market, costing per terabyte only about $17, compared to $35 for a common desktop hard drive. Although INIS has shifted to faster and cheaper methods of distribution to its Member States, tape is still doing quite well, considering that it has been around for 60 years, and it is still actively used at the IAEA for long-term preservation of data.

Conclusion

This article covered a lot of history in the evolution of computers and information management; however, we should never forget that, no matter how advanced or fascinating a technology is, it would be nothing without the people who operate it. As Elbert Hubbard said, “One machine can do the work of fifty ordinary men. No machine can do the work of one extraordinary man”. There is no doubt that, in the past 45 years, INIS and NIS have seen extraordinary staff come and go: visionaries, innovators, pragmatists and technicians, who surely made the machines work, but most importantly magnified, with their own unique human talents, the impact and contribution machines have had in the success of INIS and its operation.