

International Conference on Nuclear Knowledge Management: Strategies, Information Management and Human Resource Development, 7–10 September 2004, Saclay, France

## Special Session on the International Nuclear Information System (INIS)

### Extended Synopses

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INTERNATIONAL CONFERENCE ON NUCLEAR KNOWLEDGE MANAGEMENT:  
Strategies, Information Management and Human Resource Development,  
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International Nuclear Information  
System (INIS)

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## Special Session — IAEA Information Systems

Thursday, 9 September 2004, 9:00, Lecture Hall

# PROGRAMME

### 09:00 Introduction

- Y. Turgeon (IAEA INIS & NKM)

#### **Welcoming Remarks from INIS**

- G. Schultheiß, Germany

#### **Welcoming Remarks from the Session Chair**

### 09:30 Users Requirements from Industry, Researchers and Academic Institutions

- R. Workman (British Nuclear Fuels plc, Warrington, UK)

#### **INIS and Technology Knowledge Preservation**

This presentation will describe the way in which INIS can be utilised by those organisations, such as BNFL, who are developing knowledge preservation programmes in core technologies. It would seek to explore ways in which a similar approach to that adopted within BNFL's Nuclear Sciences and Technology Services group might be utilised within the IAEA with potential benefits to the INIS user community.

- P. Gourmel (R&D Dept., Framatome Anp, Paris, France)

#### **Framatome Experience and Expectations with the IAEA Information and Knowledge Management**

Framatome Anp is using several databases and knowledge management services provided by IAEA. We especially need information and knowledge services about international nuclear safety standards and guidelines, about nuclear technologies for example operational data from industrial plants, nuclear component manufacturing and operating standards, methods and practices, operating and incident information and analysis from worldwide nuclear plants, nuclear research publications and experimental data from research reactors, country nuclear economic profiles. We also are interested into long-term know-how preservation actions (HTGRs, decommissioning, waste management etc). Framatome appreciates the high quality of knowledge management systems provided by the IAEA and supports the integration of existing knowledge bases into a "nuclear knowledge portal".

- R. Grover (Department of Atomic Energy, Mumbai, India)

#### **Expectations from INIS**

This presentation will convey India's expectations from INIS in terms of contents, access, comprehensiveness and timeliness.

- Xue Enjie (INIS Division, China Nuclear Information Center, Beijing, China)

#### **CNIC Experience with INIS**

This presentation summarizes the China Nuclear Information Centre's (CNIC) experience with INIS services, and their users' needs and expectations. Users expect INIS to be not only a bibliographic database, but to become a nuclear information portal with access to the full text of documents. Users would also like INIS to collect more types of nuclear information, for example video, audio and other information.

- J. Yeomans (Scientific Information Group, ETT Department, European Organization for Nuclear Research (CERN), Geneva, Switzerland)

**Integrating INIS into a High Energy Physics Information Environment: Thoughts from CERN**

Information searchers from the high energy physics community expect an integrated information environment. The CERN Library offers its print and electronic collections through a combined Web interface and maintains the database by semi-automated processes to upload bibliographic and full-text records. Suggestions are offered by which INIS could develop its own Web interface and better match HEP users' expectations. These include implementing full-text linking, increasing currency, expanding search and display functions and developing the richness of the data. Links with the National Nuclear Data Center and Crossref could also increase its visibility.

- V. Koupriyanov (TSNII Atominform, MINATOM, Moscow, Russian Federation)

**INIS Multilingual Thesaurus and Nuclear Knowledge Management**

Historically several national nuclear programs have been established (American, English, French, German, Russian, etc.) with their own national nuclear terminologies. In order to manage nuclear information and knowledge at the international level it is necessary to have appropriate multilingual linguistic tools. This presentation will describe the important role of the INIS Multilingual Thesaurus as a main linguistic tool for the nuclear knowledge management.

**11:30 Coffee Break**

**11:45 Central and Regional Developments/Experiences**

- A. Chavez (Comisión Nacional de Energía Atómica, Buenos Aires, Argentina)

**RRIAN: Building together information services at regional level**

RRIAN, the Regional Information Network in the Nuclear Area, has been established to develop a network of information centres in Latin America and the Caribbean. Its main aim is to improve the access and use of nuclear literature based on electronic delivery. RRIAN also encourages Latin American and Caribbean (LAC) countries participation in INIS to enable the results of research undertaken and published in the region to become more widely known and accessible. Partners in this initiative are Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Ecuador, El Salvador, Guatemala, Mexico, Nicaragua, Paraguay, Peru, Uruguay and Venezuela. Achievements, difficulties, and future challenges are presented.

- Y. C. Chun (Korea Atomic Energy Research Institute, Daejeon, Korean Republic)

**Regional Access in Asia and the Pacific Region Through the INIS2 Site at KAERI**

Presentation on the INIS2 Database Host Site (<http://www.inis2.com>) in the Republic of Korea.

- T. Atieh (INIS & NKM, IAEA)

**INIS Usage and Users Needs**

The presentation will provide an overview of the usage of INIS products and the type of users in Members States. It will review users' needs and the INIS Secretariat initiatives to fulfil those needs; to facilitate the dissemination of nuclear information in Member States; and to reach potential users worldwide.

**12:30 Lunch**

**14:00 INIS Strategic Development and the IAEA Library**

- Y. L. Yanev (INIS & NKM, IAEA)

**Welcoming Remarks**

- A. Sorokin (IAEA Library)

**Nuclear Libraries Networking: Sharing of resources and expertise**

Networking of nuclear libraries is an important issue in the global effort to share information resources and expertise for the improvement of peaceful uses of nuclear energy and the development of nuclear sciences and technologies. The purpose of networking is to provide cost-effective access to information resources, and the exchange and distribution of information within the network. It is a mechanism for cooperation and collaboration to strengthen the participating libraries for making optimal use of existing resources. A consortium of nuclear libraries could be established in order to avoid duplication of efforts in creating collections of resources and reduce the cost of its development. Use of the Internet technology can facilitate information building, sharing, and enhance the dissemination of information. In order to organize information flow from and to the network it is advisable to develop an International Nuclear Electronic Library (INEL). Collaborative reference and information services would provide consultancy and reference services to researchers through an international network of nuclear libraries. The IAEA Library, as part of the IAEA Consortium of Nuclear Libraries, and INIS could play together an active role in building such a platform, which would form the foundation for a worldwide Nuclear Knowledge Portal.

- Y. Turgeon (INIS & NKM, IAEA)

**Preserving and Accessing Nuclear Knowledge: Extending the INIS model**

INIS was created nearly 35 years ago with the mission to provide its Members with access to scientific and technical information. Although its methods of collection and distribution have evolved, the mission and objectives of INIS have remained constant: building a bibliographic database, and collecting and distributing the full text of non-conventional ('grey') literature. It is now agreed that the INIS model must evolve to meet the needs of a changed environment, both political and technical, as well as a different users base. This paper discusses key changes to the INIS model.

**15:00 Coffee Break**

**15:15 Panel and audience discussion on strategic directions for INIS**

Panel Chair: G. Schultheiß, Germany

**17:00 Rapporteur's Summary**



## **INIS and Technology Knowledge Preservation**

### **R. Workman**

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British Nuclear Fuels plc  
Warrington, UK  
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### **BNFL Knowledge Preservation**

It has been recognised, within BNFL's Nuclear Sciences and Technology Services group, that it is vitally important to preserve knowledge on key technologies as the organisation moves into uncharted waters heralded by the re-organisation of the UK nuclear industry in April 2005. Within BNFL itself, data, information or know-how have combined to form knowledge for future use. This knowledge has been accumulated in various forms over 6 decades. The challenge is to preserve key knowledge in a form that will be of most benefit to future generations.

A programme of work has been undertaken over the last 3.5 years. By focusing on key technologies, and the technologists associated with this work, it has proved possible to align individual tacit knowledge with the explicit knowledge contained within documents and internal information systems into a "knowledge package". This is, effectively, a re-packaged knowledge base.

NB. This work has been described in more detail within a paper submitted to the conference entitled "Preservation and re-use of nuclear knowledge within the UK nuclear industry".

### **Knowledge gap**

There is, however, an element missing from within these "knowledge packages". It is the identification of key documents on nuclear science and technology from the public domain. The INIS database holds a vast collection of such documents, indexed and abstracted within a user friendly information system. However there has as yet, to my knowledge, been no attempt to design and implement a programme of work on an international scale similar to that developed within BNFL.

It is my understanding that, within the auspices of the IAEA and Member States, are present experts in all fields of nuclear science and technology. The harnessing of such wisdom within a programme that sought to identify key knowledge would be of benefit to BNFL – a major industrial user – as well as, I would suggest, other industrial, academic and government users of INIS world-wide. It might also encourage these organisations to share more of their own in-house knowledge sources, through participation in the programme. I would expect such a programme to be facilitated by the INIS Section.

### **IAEA Knowledge Preservation**

The initial focus for any IAEA programme of work of this nature would be the selection of a few core technologies, with the potential for growth into other technology areas. Once agreement had been reached, and experts identified, a strategy could be developed which would lead to an output that would be of the widest possible benefit.

The features of such a synthesis of knowledge on any given technology could include :

- Documents within the open literature
  - Key reports, conference papers, journal articles, books
    - Written, and peer reviewed, by the experts
    - INIS bibliographic details, enriched by specialist knowledge on the significance and context of this work
- Web-sites
  - Information about the key individuals in the field
  - Further authoritative knowledge of a “work in progress” nature
    - eg Technical Working Groups; collaborative research programmes
  - Information about specialist organisations in the field
- Knowledge creation
  - Seminars, attended by experts, captured on video
  - New commentaries on earlier work
  - Production of state-of-the art reviews

The resulting technology “knowledge package” would be structured to reflect the knowledge aspects that the programme was designed to capture. Each “knowledge package” would be presented to the end user as a specialised knowledge base, complementary to the INIS database.

## **Framatome Experience and Expectations with the IAEA Information and Knowledge Management**

**P. Gourmel**

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Framatome Anp is using several databases and knowledge management services provided by IAEA :

**Safety** related IAEA publications like fundamentals, requirements, safety standards and guidelines are used in many Framatome activities. Such publications available on IAEA website are often consulted or downloaded by engineers.

IAEA **expertise in nuclear technologies** capitalized through technical documents, reports : the famous TECDOCs is also used on a regular basis by nuclear engineering teams at Framatome. Current fields of interest are for example nuclear plant ageing, waste management, accident analysis reports. Other fields of interest are also experimental data from research reactors, operational data from industrial plants, operating standards and methods. Generic and non-commercial nuclear knowledge should be shared. IAEA knowledge management systems play a key role to meet those needs.

Industrial know how preservation actions like HTGR knowledge, nuclear graphite plants knowledge capitalization actions are very useful. In the two cases cited, preserved knowledge is actually re used in new projects.

Sharing **operating experience from world plants** is crucial among actors of the nuclear industry. An important mission of IAEA is to facilitate it. Business activities need up to date information about worldwide nuclear plants. We commonly use **PRIS**: the IAEA database of nuclear power facilities in the world, world nuclear plants incidents reporting system.

Business activities are also based on world energy data provided by **ETDE** database.

Framatome **R&D** activities need bibliographic information about nuclear research results. The **INIS** database, with more than 2 millions bibliographic items is an important source for bibliographic studies prior to R&D activities at FRAMATOME. Nuclear experts management system might also be used to facilitate communication between professionals.

The **country nuclear power profiles** database provides up to date information about nuclear and non nuclear energy features for each member country of the IAEA organization. This information is particularly appreciated in marketing activities.

Other databases are also consulted in miscellaneous activities. Let us cite Extra budgetary programs database as an example.

### **Conclusion**

We support IAEA efforts to integrate existing knowledge bases in the form of a “nuclear knowledge portal” and appreciate the high quality level of knowledge management systems provided by IAEA organization.



## Expectations from INIS

**R.B. Grover**

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The following points will be covered in my remarks:

1. Full text to the INIS articles should be available Online either accessible through INIS/its mirror server or publisher's website servers. A mechanism should be evolved to recover the cost payable to the publisher for such access or download, from the beneficiaries.
2. Availability of NCL is an unique aspect of INIS and is very important for INIS users. The process of conversion of NCL into electronic form should be accelerated.
3. The comprehensiveness of INIS should be ensured. At present about 4% records which fall within the scope of INIS are available in other S & T databases like INSPEC, Chemical Abstract (CA) etc. but not in INIS. A significant portion of this percentage is of NCLs. A systematic effort should be initiated to achieve close to 100% comprehensiveness.

This was particularly noted by my colleague Dr Vijai Kumar while conducting the study on R&D publications in PHWR using INIS & other databases.

4. A project for merging NSA (1948-76) with INIS may be planned with respect to NSA records falling in the scope of INIS.
5. Timeliness of inputting is very important. Much more efforts are needed to sensitise and encourage member states to make necessary provisions to secure adequate financial, human resources and infrastructure at the disposal of INIS Liaison Officer to achieve comprehensiveness of INIS database as well as its timeliness. Voluntary contribution of some members are appreciated but it is not a permanent solution to achieve comprehensiveness close to 100% and reasonable timeliness.
6. These aspects may be included in the mandate of INIS Advisory Committee for consideration and recommendations.



# Integrating INIS into a High Energy Physics Information Environment

## Thoughts from CERN

**J. Yeomans<sup>a</sup>, T. Basaglia<sup>a</sup>, R. Baudic<sup>b</sup>, I. Picchioli<sup>a</sup>**

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CERN, the European Organization for Nuclear Research, is the world's largest particle physics laboratory. Around 3000 people are employed by the institution and 6500 scientists regularly come from 500 universities around the world to use the facilities for their research.

### Role of the CERN Library

The CERN Library must provide information to a huge number of users from a variety of subject backgrounds, countries, companies, and institutions, and not only whilst they are at CERN. These users might require material ranging across textbooks, research papers, standards or videos.

The Library aims to hold physical copies of all relevant monographs, conference proceedings and journals and also has a huge collection of grey literature, however, the main body of material is available online via the CERN Document Server (CDS). This database is not only the traditional library catalogue, but also the gateway to CERN's huge collection of online resources, integrating bibliographic records, online full-text and other online resources.

Increasingly, much of the material is received in electronic format and either linked or uploaded; printed material, especially grey literature, is also scanned to produce pdf or text files for uploading. Grey literature alone accounts for approximately 60,000 documents a year yet due to the automation of many processes, staff time is used more efficiently in development activities rather than procedural processes.

A semi-automated process is used for the uploading of bibliographic records from a variety of databases. In most cases this has been achieved by working with programmers to produce search and upload algorithms and has been implemented by special permission from the database owners. By this method we have been able to obtain basic records from some of the most useful high energy physics (HEP) sources: arXiv; Inspec; INIS; IN2P3; Mathdoc; and to use staff time more effectively to enhance these records, for example, with full-text links.

Typical CERN library users are very demanding and have similar needs and high expectations: often they are sophisticated searchers, they want to search quickly and can be impatient, they need to be able to locate specific documents when they need them, they want up-to-date information, and they expect to find most of the documents they need online.

The challenges for the Library, therefore, are to provide an integrated, yet easily navigable, information environment which is done primarily through the CDS software.

## **Identified INIS improvements**

INIS has many good features but has some quite major drawbacks which deter our librarians from recommending it and HEP users from relying on it. It is worth noting that our environment prevents us from offering the database on CD so our users access it via the Web.

The main problem is the absence of links to full text: either to journal articles which are already available online, or to scanned NCL. This, combined with the lag between publication and input of records for important journals, degrades INIS's strength in grey literature. Our users are used to the one-stop-shop approach and expect to find grey literature alongside conventional literature, bibliographic information alongside full text.

Certain display features of the database cause frustrations for users: the default display order is opposite to their expectations, i.e. 'last in, first out', the display options are inflexible, the download functions limited. The direction of most major databases, especially for physics, is towards integration across sources and yet in order to find alliances, INIS will need to show features common to these databases. For nuclear physics we include those full-text databases commonly called preprint servers and it is to these that INIS must also look.

The database's Web interface can give unreliable search results and often times out altogether for complex search strings. These bugs give a lack of credibility to the data itself and must be rectified if users with a preference for Web are to be encouraged.

As the database grows, the accuracy of records needs to be addressed with an improvement of the use of the excellent thesaurus, and standardisation and clarification of resource-type definitions. Searching could be enhanced with the introduction of citation searching, and numeric data fields; these are the directions in which we see similar databases moving.

For the delivery of the INIS NCL to CERN users, Library staff are currently uploading full text from INIS on CD-ROM to the online CDS database. However, a way to convert pre-2002, multi-page TIFF files to PDF has had to be found as the TIFF format is virtually obsolete in our environment. For the kind of developments mentioned above it is problems like this that INIS will need to solve.

We believe partnerships with the following could improve the database's visibility and might help to drive the developments we hope to witness:

- (1) National Nuclear Data Center (<http://www.nndc.bnl.gov/index.jsp>).
- (2) Crossref – links to INIS alongside Inspec at online journal websites.

## **Conclusion**

For CERN's users, we believe INIS should begin to focus on its Web product and the benefits and enhancements that Web technology can bring. Developments in line with other databases need to be considered in order to aim for integration of services. If this does not happen, INIS is at risk of becoming further sidelined by HEP users.

Automation of many processes can conserve staff time for future developments and CERN is keen to collaborate with INIS where this might be beneficial. We realize, however, that the user community for INIS is disparate and priorities for others might differ wildly from CERN's. A discussion of these varied needs is welcome in order to gain some consensus on the future of INIS.

# **INIS Multilingual Thesaurus and Nuclear Knowledge Management**

**V. Koupriyanov**

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## **Multilingual Approach to a Nuclear Knowledge**

INIS System has celebrated recently the 30 years jubilee. This system is unique by set of characteristics. One of them is initial idea about necessity to use the different language information on the nuclear science and technology under a unity field area.

It was proposed to take the multilingual dictionary of the terms as a base of this unity and the thesaurus and classificatory designed on this base.

Currently this idea is not finally full accepted. In really good condition the only English-language tools for classification and finding are to be for society. However, the efforts to realize the multilingual system are in progress now by INIS section. There are the follow synchrony versions for multilingual dictionary: English, Spanish, French, Russian, German, Chinese are in preparing, and Arabic is in plan.

The principal technological decision for the following efforts on a knowledge management is the pair of combined tools. They are multi language dictionaries of terms and thesaurus, which shows the reference system on the terms of the dictionary.

The INIS abstracts base initially was developed as international bibliographic system. It was the simplest decision to create the base using the only English language. However, historically, there were several science schools for knowledge formulation in the nuclear science and technology beginning on the early stages of a nuclear project (end of 40s of the last century). There are English-American, Russian, French, German, and some others among them. The special directions were formed in each system by confidential character of investigations. In the same time the specific science schools as well as a terminology and of cause there were used terms and notes of the different national cultures. In the Cold War condition these differences were revealed as opposition to English-language and Russian –language schools.

Finally, speaking of the knowledge systems in nuclear science and technology, in my mind, there are some versions of this knowledge. This is knowledge that have developed on the base by expert experience of different cultures, namely English-language, French-language, German-language, Russian-language, Japan-language ones.

More significantly these differences are revealed not in terms but rather in joint notions and methods. For example, in Russian-language literature the name “polinoms of Chebyshev” are disseminated, and they are almost non-used in English-language science vocabulary. They use actually the term “mass crossing” in parallel with term “corrosion”, and so on. Technological isolation of the former USSR countries in COCOM conditions has led, for example, to the following situation: the experts of Russian-language science schools for their nuclear physics accounts have developed the analytical methods for complicated dynamic systems. They did it

through simplicity, approximation, and one-measured approaches and so on. Numerical decisions by high-speed computers like it were done by USA and Japan experts were not provided. This was revealed through multi group constants' using, and in development of libraries with data on cross-sections and so on. There are enough the same examples.

At the creating the bibliographic INIS system there were not necessity to consider the specific different schools and terminology because of the result of finding in the data base was presented as a special abstract. This abstract was considered as keeping item, namely essence, object.

However, the specific aspects are manifested it if we work with joint notions, namely with knowledge.

In this connection at the knowledge keeping and management task formulating it is necessity from the initial stage to provide the corresponding lingual tools, which could allow considering above noted differences. The practice of using by modern finding Internet machines (GOOGLE, YAHOO and so on) shows that INIS approach (identification through thesaurus words as indicators but not the words of article finding) is only acceptable in case if we find the component (for example, to select the information on water corrosion for manganese steels).

In addition, principally new point in the knowledge management system in comparison of any библиографической system is necessity to describe and to find the formulas, numeric tables, diagrams and other graphic images.

The noted differences in classified approaches national investigations as it was before are displaying during the student' education in the universities. Without details it can be established that the term finding in the full text information systems, but not words, requires deep knowledge of a language by which these term are formulated. The situation begins to be more complicated by non- comparison of polisemies in different languages. For example, there are names of colors to describe the rainbow in the sky are differing in English and in Russian. Obviously, the index problems at the formal description of the field area (knowledge formalization), and the following finding of the essences the lingual aspects will appear more and more. The modern version of the multi language INIS dictionary is a tool we need to create a multi language INIS thesaurus because the hierarchy system of an English language thesaurus is constructed on the formal reference using to the words of Basic English dictionary by their unique number in a fixed list. The installation of this reference system into the Russian language part of a multi language dictionary gives a possibility automatically to create an authentic thesaurus of INIS terms for Russian language by the words Russian language part of a dictionary.

The same situation could be applied to any other language, for example to Georgian.

Obviously, at this approach to thesaurus development the system of keeping objects' index is totally storied (in the present time — abstract the only) at the crossing from English-language tools of description to the Russian-language ones.

It allows, first of all, the possibility to organize a finding of objects in the keeping base by any language for query none depended on the language for created index.

Namely, query formulated by Russian-language user to the INIS data base (in English) will be automatically realize in full volume if a simple translator will placed under the words from English-language part of the dictionary instead Russian ones. The special number in the dictionary could realize it.

However, historically it was the situation where the Russian-language dictionary and thesaurus of the Information System for Russian National INIS Center are in Russian (SARI – The System of Computer Information Distribution). Minatom created this system in the 1980s years

of the last age. It was developed without synchronize to English-language version of thesaurus, and in fact, was improving separately up to 2000. It has driven to an absence of a real possibility to use the Russian- language terms for finding in the English-language INIS data base.

The efforts for developing the synchronize version of English-Russian- language dictionary was initiated by IAEA INIS Section' experts at the Russian National INIS Center in 2001. In parallel it was created the Georgian-Russian dictionary of nuclear safety terms under frame of Russian and Georgian experts' collaboration. At the present time, there are efforts on Georgian-English-Russian thesaurus development.

The multi lingual problems at the knowledge management presentation were discussed jointly with INIS representatives and Members of the Special Committee included the NIS countries during the 6th Meeting of NIS Committee on peaceful using of atomic energy (April 14, 2004). The Meeting Order pointed the importance to activate the efforts on access to the nuclear-technological knowledge for the national experts. In the present time, the Workshop Team is established. This Team is in progress to provide the Report on abilities and needs have countries-participants for nuclear-technological knowledge management.

The main challenge here is non-ability to financial supporting of these efforts in a full volume.

Above pointed lingual and national characteristics are displayed at the using of INIS bibliographic data base. At the developing of the knowledge management system it will be displayed more and more. On this base the direction and selection of the priorities for these efforts should consider the lingual problems of the potential users.

In the simple case it could be strong rules for classification and catalogs creation of the field area (as it was done early by Karl Linney) on a base of hierarchical thesaurus model. It is necessity the developing of the object-oriented knowledge presentation system in the full volume (in form as aggregate of meta-descriptions for significant components: text, graphics, formulas and so on).

In reality, the existing abstracts INIS data base system particularly covers the first stage of knowledge management task, namely, it gives possibility to get an accordance between finding image and the document' title where this image is. It could be realized through results of finding by key words. However, the full task of knowledge management proposes that a user will get not only reference to the original information as a result of query for the specific date base but in addition he will get some essence. In other words the data base should be not only catalog with abstracts but rather encyclopedia.

At the present time, the content of those objects and tools for manipulation for them is widely discussing by the printed sources. In particularly, as base tool for funding and access they propose the XML language (eXtensible Markup Language) that allows to locate the texts and their fragments (objects) by such manner that a query to a system would bring a queried data for user. (<http://www.w3.org> ).

The special language tools for several field areas as mathematics — MathML (<http://www.w3.org/math/> ), chemistry — CML (<http://www.xml-cml.org>), biological information science — BSML (<http://www.visualgenoms.com> ) are developed to the moment.

Specially, we pay attention to the efforts of American Standard and Technology Institute (NIST USA) on the development of material properties description language - MatML (Sturrock, C.P., Begley, E.F., and Kaufman, J.G., "NISTIR 6785 MatML - Materials Markup Language Workshop Report," National Institute of Standards and Technology, Gaithersburg, MD, August 2001).

Conceptually, Workshop Team on meta-data (OCLC/NCSA Metadata Workshop, 1995) creates approaches to macro-description tools' development (meta-data). These approaches are good studies and concentrated in so-called Dublin Core. The Core includes 13 key notions that should be placed in the document, which describes the knowledge.

In the current October the next international DC conference will be hosted in China.

<http://dc2004.library.sh.cn/english/prog/index.htm>).

It is expediently, taking account above, to develop analogic requirements to the tools for description and presentation of knowledge for the tasks of knowledge management in the nuclear science and technology area by IAEA. At the initial stage we propose to describe restrictions and requirements for the multi lingual presentations to provide the active using these data by experts – IAEA speakers. Also it is useful to take as basic system of the field area the INIS classificatory and thesaurus, and, naturally, to take abstracts data base of INIS.

It is necessity to complete the term structure of thesaurus for more effective knowledge management. It is necessity to add for term the system of horizontal relations displaying the synonyms (multi lingual, the only), associative relations, and to describe the commentary (interpretation) for every term. We think that it is more difficult to form the synonyms lists because the synonyms of different languages could be differ. For example, it is known that to describe the big man in Russian they actually use synonym “brow” and in English they use the synonym “nose”.

Obviously that to present the knowledge in nuclear science and technology area it is necessity to make structures for all field area as notes (knowledge elements), to develop the similar requirements for these elements' description, and to form the models of finding these elements in the bases. We should organize the finding with using of the tools that are constructed considering the national and lingual characteristics of knowledge.

### **Access Restrictions for Nuclear Knowledge**

Nuclear knowledge in a signified step has a corporate character. Obviously, the access to them should be regulated by owner of data base, and, first of all, they should be open for representatives of countries that created these data base. Also, the principals fixed by Nonproliferation Nuclear Weapons Orders and by other documents should work in this connection.

### **Commercial Aspect of Nuclear Knowledge**

One of the most difficult tasks where it is necessity to take a decision at the efforts for keeping the nuclear knowledge is commercial value of them. At the present time, in knowledge complex it could be separated obviously several objects that are used effectively by different commercial communications.

First of all it is data base with properties of matters and materials. (The example of the effective using is STN). Also, it should be displayed computer applications and their algorithm descriptions (best practice). There is FAAE system of standard and reference data that includes information about properties of matters and materials in the nuclear science and technology area in Russia. This system structure includes 17 special Centers supporting the data bases about different properties of matters (as well as International Center of Nuclear Data).

Obviously, the next getting the same data is practically impossible because the investigations were completed. Obviously also, that these data are significant part of discussed knowledge. The analysis of structure for these data allows showing that we can allocate as commercial part as common science part. The significance of this or that characteristic can not be considered as

commercial secret because it can not directly to be in commercial using. The significance makes to be considered as an object for sale in that case only if its reliability and error are known. However, for the science purpose the significance is the subject of interest because allows to construct the models, to bring hypothesis and so on.

It is simple to separate a commercial value and science value in almost any object of a technological knowledge. In the same time, it is methodologically important to provide the knowledge verification, namely, to manage of only that knowledge which we could trust by opinion of experts, and they could not deceit of potential user. We should identify accurately the goals and tasks of activity on the knowledge management, and so we can avoid conflicts with author' rights because the using of knowledge are considering with scientific and educational purposes.

### **Purposes and tasks**

At a conclusion the purposes and tasks of Russian National INIS Center under the knowledge management task in collaboration with IAEA could be formulated as the following:

- (1) A participation in the IAEA Workshop Team on creation and synchronization with IAEA' INIS
  - of lingual tools for queries to knowledge data providing,
  - of developing the requirements for the structure and formats for knowledge presentation (multi lingual thesaurus, dictionary of interpretations, new classificatory and so on).
- (2) A forming the Project under the NIS Committee on peaceful using of atomic energy IAEA to provide the base knowledge and to provide the corporate access to them.
- (3) A participation in IAEA Projects connected with knowledge using, in particularly, under the INPRO Project, first of all to participate in the knowledge forming about fast reactor technology (Russia, Kazakhstan, Georgia, Ukraine, and Belarus).



## RRIAN

### Building together information services at a regional level

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#### Background

During the eighties the Project “Nuclear Information” RLA0009 ARCAL X was launched under the *Regional Cooperative Agreement for the Advancement of Nuclear Science and Technology in Latin America and the Caribbean (ARCAL)*.<sup>1</sup>

On this initiative Information Units (IU)<sup>2</sup> devoted to the management of nuclear information were identified. Mapping this information made it possible to detect the lack of this sort of IU in some countries of the Region. The Project allowed to set up an IU in each country of this group in order to assure the local provision of nuclear information services. Other outcomes were the automation of library processes in several IU which had not reached this stage of development, the creation and maintenance of a union catalogue, the provision of documents in full text by means of the Bibliographic Cooperative Network “RECOBI”, the Spanish translation of “INIS Input Training Kit” and several capacity building activities for the management of nuclear information services with emphasis on INIS methodologies.

The ARCAL X Project lasted eight years (1984-1992). After its conclusion the sustainability of this undertaking could not be completely assured. One of the problems was the lack of a formal framework to support the relationships among the IU. Some years later, the IU found themselves working without coordination. Other elements contributed to reinforce this situation: serious budget constraints in their major institutions, loss of trained people as a result of IU downsizing or restructuring, among others.

In 1996 the IU had again the opportunity to submit a new proposal under ARCAL framework. The challenge was to reverse the situation among the IU and, at the same time, to take advantage of the improvements that the Information and Communication Technologies (ICT) made possible. The Project was formulated taking into account the results of a survey delivered to each IU for updating the information about their strengths and weaknesses.

The main reasons that triggered the IU to submit a new proposal were the following:

- The need to cement the ties between the IU
- The necessity to keep pace with ICT developments, both by setting up new information services and upgrading obsolete equipment
- The need to broaden and improve professional skills and develop new competences in IU human resources by means of capacity building activities

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<sup>1</sup> ARCAL is an agreement established by the IAEA which provides a framework for Member States in Latin America and the Caribbean to intensify their collaboration through programmes and projects focused on the specific shared needs of its members.

<sup>2</sup> IU is used in this paper to refer both to libraries and information centres.

### **ARCAL XLII activities and achievements (1999-2000)**

The ARCAL XLII RLA 0017 Project: “Regional Information Network in the Nuclear Area” was launched in January 1999 and applied for the biennium 1999-2000.

Partners in this initiative were Argentina, Bolivia, Brazil, Colombia, Costa Rica, Cuba, Chile, Ecuador, Guatemala, Mexico, Nicaragua, Paraguay, Perú, Uruguay and Venezuela. The First Project Coordinators Meeting was held in Buenos Aires, Argentina at CNEA<sup>3</sup>. Its Technical Officer was Mr. Claudio Todeschini from INIS Secretariat.

The first step was the creation of the Regional Nuclear Information Network (RRIAN) in order to build the framework conditions that would allow the interaction among the IU in a systematic, organised and formal way. At the same time, RRIAN would contribute to encourage and promote the cooperation and collaboration on nuclear information issues. The ultimate objective of the Project was to facilitate the access to national and international information in a fast, efficient and effective way by means of IU equipped with advanced ICT and duly qualified personnel.

During the Project, the IU worked jointly to achieve several products:

- The development of a Union catalogue of IU’s serials holdings accessible via the Internet
- The inclusion of the bibliographic records of conferences from the IU collection into the Union catalogue maintained by CIN
- The development of an Electronic Document Delivery System via the Internet
- The launch of RRIAN’s Home Page
- The set up of different virtual Forums for specific tasks
- The translation of printed and electronic handouts which help in INIS input procedures
- The design, print and delivery of promotional and marketing brochures
- The development of two bibliographic compilation documents: “*Accidents and Incidents in the Nuclear Area that have Occurred in Latin America and the Caribbean*”<sup>4</sup> and “*Nuclear Legislation in Latin America and the Caribbean*”<sup>5</sup>
- The organization of two Regional Training Seminars in Paraguay and Cuba
- The acquisition or upgrade of IU’s software and hardware

The ARCAL XLII Final Coordinators Meeting was held in Rio de Janeiro, Brazil at CNEN<sup>6</sup>. After two years of intensive work, RRIAN partners succeeded in accomplishing the goals of the Project.

### **RRIAN activities and achievements (2001-2003)**

After the conclusion of ARCAL XLII Project, the challenge for RRIAN was to continue its activities without third-party financial support.

In 2001, CIN<sup>7</sup> significantly contributed with the net activities by launching “SONAR-RRIAN”, a personalized selective information service. This initiative allows to keep registered users informed about new information included in the INIS Data Base, which is selected according to

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<sup>3</sup> National Atomic Energy Commission. <http://www.cnea.gov.ar>

<sup>4</sup> See: <http://www.cnea.gov.ar/rrian/libro.pdf>

<sup>5</sup> See: <http://www.cnea.gov.ar/rrian/arc-al-leg.htm>

<sup>6</sup> Comissão Nacional de Energia Nuclear. Brasil

<sup>7</sup> Centro de Informações Nucleares. Comissão Nacional de Energia Nuclear.

customized user profiles. The user receives the references by email, can examine the documents, select those items of interest and requests the full text on line.

In order to support the INIS Secretariat initiative that gives free access to INIS Data Base for universities, RRIAN set up a site to help the regional academic sector to get this access more easily. Furthermore, a new virtual Forum was launched to promote the collaboration among RRIAN's INIS cataloguers.

In 2002, RRIAN welcomed El Salvador as a new partner. Furthermore an INIS Data Base Regional Host was launched. The Host, located at CIN, allows regional users to access the Data Base which contains bibliographic records from the year 1991 to the present. It is important to note that INIS Secretariat gave the support for organizing two RRIAN's Coordinators Meetings in Sofia (Bulgaria) and Vienna (Austria) under the framework of INIS Liaison Officers Meetings.

Selected statistical graphs depict RRIAN's achievements:

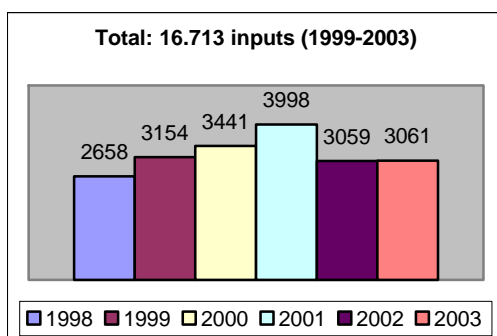


FIG. 1. RRIAN participation in INIS Data Base

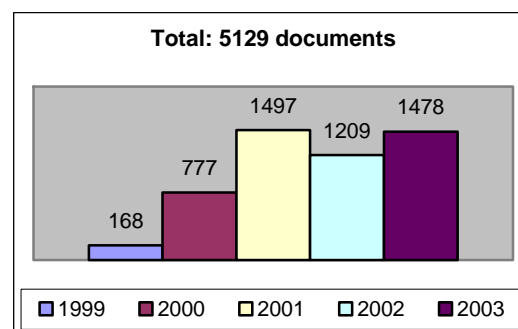


FIG. 2. Documents supplied by RRIAN

### Future trends

Much has been done and many goals have been accomplished as RRIAN made possible the integration of efforts and initiatives in the Region. Nevertheless, some difficulties had to be faced on the way, mainly derived from the economical instability and political changes that regularly occur in LAC countries. This changing unstable environment sometimes leads to demotivation and discouragement of RRIAN members. Another drawback that can be mentioned is the lack of fast Internet connectivity in some countries, which impacts negatively on the access to information services and interaction among peers. Despite these constraints, RRIAN needs to move forward and several tasks should be tackled yet:

- In order to keep pace with ICT changes, RRIAN's Web Site must become a Portal.
- New initiatives should be developed in order to satisfy today's users' needs
- RRIAN should be able to support INIS' projects or IAEA products such as multilingual initiatives and the active promotion of IAEA's publications now available freely via the Internet
- The interaction between INIS and RRIAN must also be fostered in many ways, for instance: the utilization of INIS/ETDE Spanish taxonomy version in local systems
- RRIAN should explore new ways of collaboration at international level.
- E-learning initiatives for INIS National Centres staff or final users must be encouraged

- Open source software or affordable proprietary software solutions become necessary for the development of new conceptual/functional information models in our developing countries

### **Concluding remarks**

Nowadays, IU have to face many challenges in order to keep pace with the rise of new models of information demands, the continuing improvements in ICT and the need to apply alternative tools for knowledge sharing and preservation, among other issues. At the same time, IU from developing countries like those from LAC, frequently have to deal with constraints due to political and economical turmoil. As a networked community, RRIAN has proven to be a successful partnership approach for tackling these issues.

Some of the key elements that have made possible this success<sup>8</sup> are the following:

- INIS as a common framework
- Nuclear information as a shared activity
- Easy communication due to the lack of language obstacles
- IU sharing similar goals, interests and commitment
- Recognition of similar problems and difficulties in all RRIAN countries
- Adoption of local solutions to the Regional level

A further step for RRIAN is to include in its agenda the nuclear knowledge management and preservation issues, to keep pace with recent INIS' initiatives aiming to continue contributing to achieve IAEA's objectives.

Finally, it must be mentioned that the motto coined for RRIAN: "*Working together we are more useful*", represents IU's commitment to improve the availability of nuclear information in the Region.

### **ACKNOWLEDGEMENTS**

I would like to thank all RRIAN partners who make possible the collaborative work, specially to Luiz Fernando Passos de Macedo<sup>9</sup> and CIN's staff for all the work they have done and for their willingness to share its in-house developed technology with RRIAN, to INIS Secretariat for its interest in our activities and promotion of RRIAN Coordinators meetings, to the Department of Technical Cooperation through its ARCAL Programme which support ARCAL XLII Project, and finally to the staff of CNEA's and ARN's<sup>10</sup> libraries involved in RRIAN activities for their commitment and daily efforts.

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<sup>8</sup>This Project was presented as an ARCAL success Project during the Tripartite Meeting AFRA/ARCAL/RCA, Vienna, September 16, 2001. See: [http://arc.cnea.gov.ar/documentos-proyectos/rla0022/ORA2001/ORA\\_2001-08.pdf](http://arc.cnea.gov.ar/documentos-proyectos/rla0022/ORA2001/ORA_2001-08.pdf)

<sup>9</sup> Former INIS Liaison Officer and RRIAN coordinator for Brazil

<sup>10</sup> Nuclear Regulatory Authority (Argentina)

## INIS Usage and Users Needs

**T. Atieh**

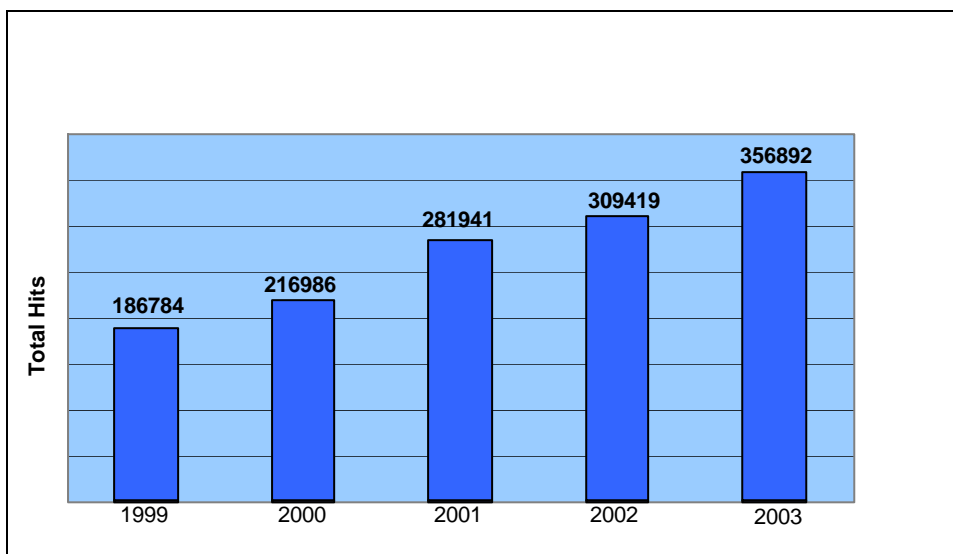
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### Usage of INIS products

Two main INIS products will be presented: INIS bibliographic database, and the INIS full text non-conventional literature (NCL) collection.

The INIS bibliographic database is the most used product, it contains over 2.4 million indexed references with English abstracts, from 1970 to the present. It is available on two different platforms:

- On CD-ROM since 1991. It has grown over the years and is currently distributed on 9 CDs. Subscribers to this product use it on a stand-alone PC; others use it in a network environment;
- On the Internet, which was launched on 1998. The application has a set of valuable features including different user interfaces to accommodate respective requirements and levels of expertise; access to the INIS authority lists and to the INIS Thesaurus, etc. This product has recorded a high number of subscriptions and universities usage is increasing.



*FIG.1. INIS Database on the INTERNET at the IAEA Host — Usage Statistics*

The second important INIS product is the INIS NCL full text collection.

The importance of these documents is that they contain Member States' achievements and results of nuclear research and development at different levels of specificity as compared to conventional literature. The INIS NCL collection consists of two main parts:

- The INIS NCL archive on microfiche, which comprises over 500 000 documents and covers the period 1970–1996;
- The INIS NCL database on CD-ROM, which contains over 200 000 documents and covers the period 1997–2003.

The availability of INIS NCL collection in electronic format has facilitated the establishment of the INIS NCL document delivery network. This network currently includes 57 INIS national document delivery centres. Over 30 000 individual requests for NCL documents are handled via this network annually.

### Users and needs

Users of INIS products and services are mainly scientists and researchers in various nuclear science and technology fields. Those end-users are staff at national atomic energy authorities and research centres, students at universities and academic institutes, as well as commercial companies.

### INIS Secretariat initiatives

Several initiatives to fulfill users' needs and to facilitate access to INIS products have been undertaken by the INIS Secretariat at the IAEA and they will be presented in the session.

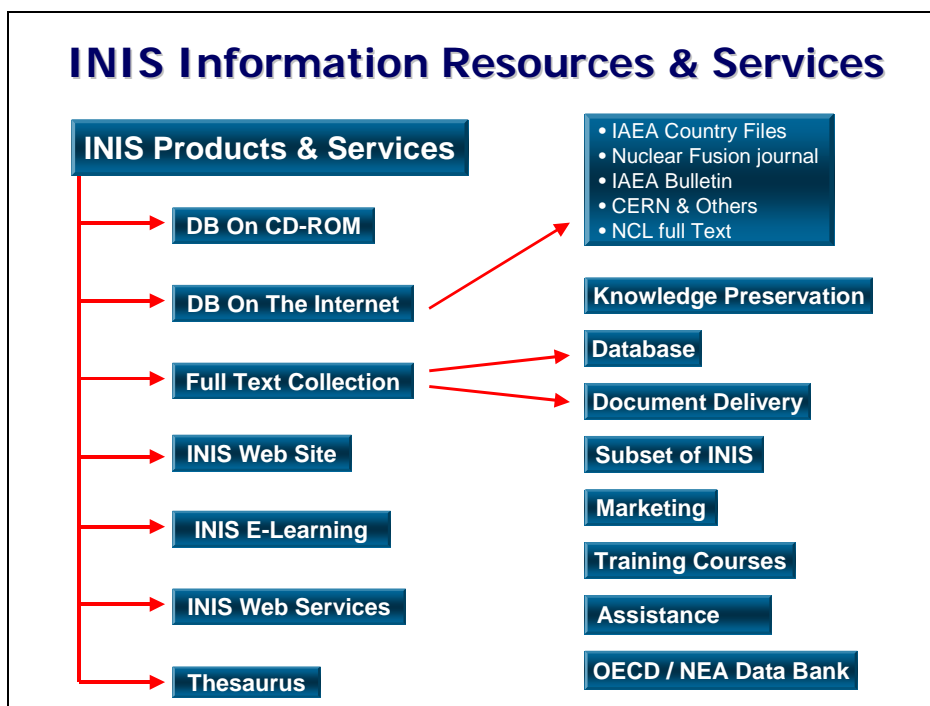


FIG. 2. INIS Information Resources and Services

## Nuclear Libraries Networking

### Sharing of resources and expertise

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Information is a critical resource and can count as a fifth factor of production, which is by no means inferior to land, labor, capital and entrepreneurship. Any form of social development presupposes access to information. However, there are a number of barriers and related challenges, which have been a stumbling block to enabling access to and sharing information and knowledge, particularly in the developing world. Hence, it is clear that sharing and strengthening global knowledge for development can be enhanced by removing these barriers to equitable access to information on economic, social, political, health, cultural, educational, and scientific activities by facilitating access to public domain knowledge.

The expression “digital divide” has become the most used term to describe the dichotomy of a country’s participation versus non-participation in the Information Society. At first, definitions of the digital divide were focused only on access to computers and the Internet, but access alone does not bridge the technology gap. As a result, there is a wider definition today encompassing three key points: access, training, and contents.

Information and Communication Technologies (ICTs) allow people anywhere in the world to access information and knowledge almost instantaneously. ICTs unlock content stores and, linking it to related information stored both within an organization and in other places, reveal previously unknown information. Organizations that put these technologies to use as part of their information strategy gain competitive advantage. Considering access, we can see that the Internet is expanding its territory rapidly and rather soon we might be able to get it anywhere. Governments are pushing for installation of computers in public spaces, such as libraries. The market also tries to respond to this new demand by the creation of Internet cafés and so on. These different approaches might well be part of the answer to bringing access for all.

We are aware, however, that ICTs should be regarded as tools and not as an end in themselves. Under favourable conditions, these technologies can be a powerful instrument, increasing productivity and generating economic growth. Many researches therefore clearly emphasized another factor, the necessary education and training to use ICTs. Users need training in order to participate in the Information Society. For many people, learning the potentialities of ICTs may be a bigger barrier than the lack of technical access. In recent years, technology has acted as an enabler: getting bits of information from one place to another both quickly and more flexibly. It has acted as a mechanism, an option for delivery, but today, the value of technology for content has become intrinsic. Moreover, the fantastic pace of evolution of information technology obliges any participant in the Information Society to continually improve one’s knowledge. Learning does not stop once one has completed a training course.

Individuals, organizations and communities are entitled to benefit from access to knowledge and information. For that they must have access to information, which is relevant for them. The contents, which can be found on the Web determine the success of use of ICT applications. There is an increasing demand for quality of content delivered within an ICT framework. Quality of content is often more important than quantity. Libraries are striving for more specialized information to support specific subject areas and unique research needs. Aggregated databases increasingly serve as pointers to full text sources residing elsewhere. As databases become commoditized starting points, the research process drives users to very specialized databases providing highly relevant results connected to unique content. Simplifying the research step in the decision-making cycle is a growing challenge. Changing the current workflow process may require a cultural shift in

organizations, but getting relevant information to users within the context of their work will reap productivity and bottom-line benefits.

Currently on the Web, the majority of websites are in English. English speakers were the first users of the Internet, so the predominance of their language was natural. But nowadays, the situation is changing. There is a necessity to have more information in other languages on the Web. Non-English speaking countries produce less local content, making the Internet less relevant to their users. It is necessary that more users become content creators and that more local websites are established. By doing that, non-English speakers also participate in the construction of the Web and produce sites that might interest others.

We shall focus our further consideration on how the international community is addressing the digital divide issues of training and content.

Heads of State and Governments of the Member States of the United Nations gathered at Headquarters of the United Nations in New York to participate in the Millennium Summit from 6-8 September 2000. The Summit was a historic opportunity to agree on a process for a fundamental review of the role of, and challenges facing, the United Nations in the new century.

The Secretary-General of the United Nations, in his Report to the Millennium Summit, outlined the priority areas in order to reduce extreme poverty by half, in every part of the world, before 2015. Building digital bridges was one of these areas. "New technology offers an unprecedented chance for developing countries to 'leapfrog' earlier stages of development. Everything must be done to maximize their peoples' access to new information networks".

The United Nations Millennium Declaration adopted by the General Assembly encourages Member States to ensure that the benefits of new technologies, especially information and communication technologies, are available to all.

The World Summit on the Information Society addressed this issue.

At the first phase of the World Summit on the Information Society in Geneva from 10-12 December 2003, the representatives of the peoples of the world declared their common desire and commitment to build a people-centred, inclusive and development-oriented Information Society, where everyone can create, access, utilize and share information and knowledge.

The World Summit declared its resolve in a quest to ensure that everyone can benefit from the opportunities that information and communication technologies can offer. Participants of the World Summit agreed that to meet these challenges, all stakeholders should work together to improve access to information and communication infrastructure and technologies as well as to information and knowledge; and to build the capacity needed.

The World Summit strived to promote universal access with equal opportunities for all to scientific knowledge and the creation and dissemination of scientific and technical information, including open access initiatives for scientific publishing.

The Plan of Action, which was approved by the World Summit on the Information Society:

- Supports the creation and development of a digital public library and archive services, adapted to the Information Society, including developing a global understanding of the need for "hybrid libraries", and fostering worldwide cooperation between libraries;
- Encourages initiatives to facilitate free and affordable access to open access journals and books, and open archives for scientific information;
- Promotes long-term systematic and efficient collection, dissemination and preservation of essential scientific digital data;
- Promotes principles and metadata standards to facilitate cooperation and effective use of collected scientific information and data as appropriate to conduct scientific research.

The implementation of the UN Millennium Declaration and the Plan of Action, which was approved by the World Summit on the Information Society in Geneva in December 2003, can be illustrated by the following international projects:

## **Health InterNetwork**

Spearheaded by the World Health Organization (WHO), the Health InterNetwork was created, bringing together international agencies, the private sector, foundations, non-governmental organizations and country partners under the principle of ensuring equitable access to health information.

The training component of Health InterNetwork concentrates on building the skills needed to put information into action: information access and use in daily work, basic computer and Internet skills, and hands-on training to use specialized public health information, literature and tools. A training advisory group is being established to guide the development and delivery of training courses, adapted to fit the needs of institutions with different information environments.

Within the framework of the Health InterNetwork, the Health InterNetwork Access to Research Initiative (HINARI) was launched in January 2002. Led by WHO, HINARI provided free or very low cost online access to the major journals from 6 major publishers in biomedical and related social sciences to local, non-profit institutions in developing countries. Twenty-two additional publishers joined in May 2002, bringing the total number of journals to over 2000. Since that time, the numbers of participating publishers of journals and other full-text resources have grown continuously. Country needs are the basis for content development and selection; for example, publishing local and regional public health information that is currently unavailable electronically is given special attention.

It has been described by WHO Director-General Dr Gro Harlem Brundtland as “perhaps the biggest step ever taken towards reducing the health information gap between rich and poor countries.”

Currently, the Health InterNetwork pilot phase is under way to test concept validity and feasibility. One of the major tasks during this phase includes building the Health InterNetwork portal, based on needs assessments and stressing priority public health programs. The portal will also make available information technology health applications such as geographical information systems and epidemiological tools, plus courses and training offered through distance learning.

## **Access to Global Online Research in Agriculture**

Access to Global Online Research in Agriculture (AGORA) is another initiative to provide free or low-cost access to major scientific journals in agriculture and related biological, environmental and social sciences to public institutions in developing countries.

Led by the Food and Agriculture Organization of the United Nations, the goal of AGORA is to increase the quality and effectiveness of agricultural research, education and training in low-income countries. AGORA is available to students and researchers in qualifying not-for-profit institutions in eligible developing countries.

Launched in October 2003, AGORA provides currently access to over 500 journals produced by 17 publishers. The AGORA website has been developed in close cooperation between FAO and Cornell University, based on tools and systems developed by WHO for HINARI. Access to AGORA is password controlled, and potential users are required to register with FAO.

The second phase of the World Summit will take place in Tunis hosted by the Government of Tunisia, from 16 to 18 November 2005. Development themes will be a key focus in this phase, and it will assess progress that has been made, and adopt any further plan of action to be taken.

The key opportunity to contribute and be part of the World Summit is to actively participate in the preparatory process of the World Summit. This can be done, inter alia, by stimulating multi-actor cooperation and by building a constructive network.

In June 2002, the IAEA convened a high-level meeting of senior officials from academia, government, industry, the IAEA and other relevant organizations on the theme of “Managing Nuclear Knowledge”. A number of trends have drawn attention to the need for better management of nuclear knowledge: the nuclear workforce is aging, fewer young people are studying nuclear science and nuclear engineering at university level, and a growing number of universities are giving up their nuclear education programmes altogether.

## **Bridging the digital divide and preservation of nuclear knowledge are related issues**

A relationship between these two items reveals itself in the need for easy access to nuclear data and information, and retention of valuable data and information (e.g. documentation, scientific and engineering studies, research results and related data) in countries where motivation and/or resources to preserve this material are not present.

Within the Agency's major programme on Nuclear Science and Technology, the subprogramme on Maintenance and Preservation of Knowledge is working to create an Agency Nuclear Information Resource System. This service would build on the Agency's existing databases of nuclear, scientific and technological documents, while networking with other libraries and electronic information centres, to provide an enhanced nuclear information resource.

The function of information resources management is a main one performed by all libraries. This includes selecting, acquiring and processing information sources in all formats. In recent years, the information business was affected by the difficult situation in the economy. This led to an explosion of costs of scientific journals.

Libraries responded to price increases for journals in the following manner:

- Libraries had no choice but to cancel a significant number of journal subscriptions and to reduce monographic purchasing. The effect has been that libraries have become more dependent on inter-lending and document delivery services in order to fulfill the requirements of their users. Libraries have directed a significant amount of energy toward improving document delivery models and interlibrary loan systems.
- Libraries have defined the best market place and acted as collective buyers of information products needed. The idea here is that more systematic purchasing on a local and national basis may provide savings and have more influence in the market place.

The situation of limited resources versus increasing needs will continue, no matter what the worldwide economy does in forthcoming years. Therefore, the institutions involved in information and documentation should work together more closely in order to ensure a sustainable supply of information. Co-operation between libraries themselves and between libraries and publishers, database producers, agents and other intermediaries should increase.

A number of publishers offer consortia access to the whole range of their journals. Consortium purchasing offers for the single library the opportunity either to get access to more journals than it currently has subscriptions to, thus, reducing costs of interlibrary lending operations and document delivery services, or to reduce the costs of acquisitions.

Given that no additional funding is available, libraries should establish partnerships and strategic alliances in order to fight the financial problems and at the same time take advantage of the new opportunities offered by scientific publishing and consortium licensing.

Trends toward nuclear knowledge management, in particular, call for new partnerships. Web standards and broad access to the Internet are creating a new, collaborative technological landscape. It is time for careful thought and tough-minded strategic responses.

A scenario for a strategic response of nuclear libraries to these challenges could be as follows.

### **Consortium of Nuclear Libraries**

As a first step, the Consortium of Nuclear Libraries could be established. Activities of the Consortium of Nuclear Libraries could include:

- Acquisition/licensing of nuclear information resources required in support of the implementation of national nuclear Programmes;
- Inter-library lending of publications and document delivery services;
- Building up a united catalogue of nuclear information resources shared among Member States participating in the Consortium;
- Developing and maintaining a Consortium Website.

There are already many good examples of successfully operating consortia at the national level in countries of Africa, Asia, Europe, North and Latin America as well as at an international level.

The IAEA Library is a member of the Consortium of UN Libraries led by the UN Dag Hammarskjöld Library (UNDHL). In 2003 the Consortium had 54 participating agencies in 73 offices worldwide. The Consortium has a coordinator at the UNDHL and each participating library/organization has identified a liaison contact person.

Communication between UNDHL and the members is done either via email between the UNDHL coordinator and the individual member/liaison person or via a shared secure site on the Internet. All members have been provided with a set of IDs and passwords to access the site. This serves as a forum for consortium issues, but also as a site for broader inter-agency library concerns. The Consortium holds an annual meeting, the Knowledge Sharing and Information Management (KSIM) Meeting.

Through a Memorandum of Agreement the members agree to the terms and conditions for participating in the Consortium.

UNDHL or members may suggest new services for consortium purchases. If there is sufficient interest in a new service, UNDHL will investigate the terms of access for the service and, if possible, arrange for free trials of new services. UNDHL negotiates a subscription arrangement with the provider of the service on behalf of the consortium. UNDHL consults with the consortium members in negotiating such arrangements. The terms and conditions are communicated to the members and the members need to notify UNDHL in writing within 30 days whether it wishes to have access to the service or not.

A member may notify the UNDHL that it wishes to have access to an existing service at any time and the UNDHL shall, if possible, include the member in its subscription to such service.

The member is not obligated to participate in any service available to consortium members unless it has expressed an interest to participate.

Participation in the Consortium of UN Libraries helps to reduce the cost of acquisitions and to save staff time required for concluding license agreements.

The establishment of a Consortium of Nuclear Libraries could be a first step on the way to bridging the digital divide in the nuclear field.

### **International Nuclear Electronic Library**

The Internet has completely changed the world of information over the last five years. This has led to many innovative digital library projects in many countries. Due to co-operation between the libraries, a virtual research library is gradually becoming a reality. For the end-user it means that the user can access a lot of information from the workplace, although we cannot yet speak of one-stop shopping for all kinds of information, that can be accessed in a reliable and cost effective way.

In an expanded digital environment, cooperation of nuclear libraries with other information holders could likewise be expanded. Synergy of the International Nuclear Information System and the IAEA Consortium of Nuclear Libraries could result in establishing an International Nuclear Electronic Library (INEL). Information resources of INIS and INEL would supplement each other and would further address the issue of the digital divide.

Information consumers are exhibiting three characteristics that need to be taken into consideration while developing the International Nuclear Electronic Library. Firstly, information consumers are spending nowadays more time online doing things for themselves. Secondly, these information consumers are generally satisfied with the results they get, whether from Google or from other Web services, even though the results may not be as authoritative, reliable, and accurate as librarians would like. Therefore, subject experts and information

professionals have to be employed to select and evaluate information sources to ensure sufficient credibility of INEL. Thirdly, information consumers, especially young adults, expect seamless access to whatever they want.

Future activities of the International Nuclear Electronic Library could include:

- Building up collections of information resources for nuclear knowledge preservation and maintenance purposes, including backward digitization of selected information materials;
- Developing new INIS-INEL information services which ensure seamless access to the whole of the INIS-INEL electronic resources;
- Providing a virtual Nuclear Reference Service to researchers through an international digital network of INIS National centres and nuclear libraries.

There are many virtual reference services in place in different countries. I shall give you only one example, which could be used as a model, if we wish. This is the Collaborative Digital Reference Services (CDRS), launched by the Library of Congress in the spring of 2000. CDRS provides a professional reference service to researchers through an international, digital network of libraries and related institutions.

The workflow looks like this: an end user sends the query through a CDRS member to the online Request Manager (RM), a software for processing and assigning. The RM searches a database of CDRS member institution profiles looking for the member institution best suited to answer the question. Matches are made on the basis of a set of data elements. Once a match on an institution has been made, the query is sent to that institution for answering. After the query has been answered, it is routed back to the original CDRS requesting library via the RM to allow for closing out the case and completing other administrative tasks. Further development of CDRS resulted in establishing the QuestionPoint – a virtual reference service with a growing membership of more than 300 libraries of all types.

This unique and innovative global network enables member institutions around the world to expand and enhance their information services through access to and delivery of materials owned by other institutions within the QuestionPoint service. This service also puts the collective expertise of libraries around the world at the service of an individual reference question.

The June 2002 meeting on Managing Nuclear Knowledge, which was mentioned earlier, came to the conclusion that urgent action throughout the nuclear community is needed to sustain the present level of deployment of nuclear technology. These actions should include, inter alia, the integration of existing nuclear databases in the form of an easily accessed “Nuclear Knowledge Portal”.

Synergy of INIS and the IAEA Consortium of Nuclear Libraries could result in creating a solid infrastructure for international co-operation in nuclear knowledge maintenance and preservation activities. Synergy of INIS and the IAEA Consortium of Nuclear Libraries is a necessary prerequisite for developing a worldwide “Nuclear Knowledge Portal”.

National INIS centres within INIS and the libraries participating in the IAEA Consortium should serve as the core institutions, but membership should be expanded by incorporating other stakeholders such as research institutions, academics, information centres of excellence which possess nuclear information resources.

All stakeholders would need to work on building strong links between library services and information systems and new developments in e-learning and scholarly communication. This means, for example, that libraries would need to be proactively involved in the development of institutional repositories and e-learning initiatives and would have to take a stronger role in the management of their institution’s intellectual assets. Libraries would also be required to devote more resources to digital content management and to think about preservation as part of the responsible stewardship of those resources.

Information and telecommunication technology is responding to the market requirements in science and economy quickly, flexibly, and intelligently. Information specialists and librarians also have to take proactive steps in order to anticipate future trends and requirements. Just reacting is not sufficient. Further developments would consider Web technologies and tools used by library users and would be adapted as much as possible to their working environment. The focus would be on solutions that support information and knowledge management and render work processes more efficient.

### **Conclusion**

The development of information and communication networks, especially in specialized fields, is a necessity for many reasons:

To bridge the digital divide gap, thus, allowing all societies to participate in the vast amount of information available and to acquire the knowledge extracted from this information allowing to close the social and scientific gap more easily;

To make better use of the economic resources available while endeavoring to channel and distribute information on a more equal and relevant basis;

To collect, protect and preserve valuable resources of information and knowledge as a foundation and heritage of human efforts in science, culture and technology for future generations and to further development for all.

The idea of forming a consortium of nuclear libraries to encompass all the above-mentioned goals is a common sense one in view of the complex and sensitive area of nuclear energy and its applications. Action should to be taken by all members of the nuclear community to facilitate the networking of their respective libraries and information centres to further information and knowledge exchange and to have a reliable collection of resources to offer those, who want to join the nuclear community. The IAEA Library, as part of the IAEA Consortium of Nuclear Libraries, and INIS could play together an active role in building such a platform, which would form the foundation for a worldwide Nuclear Knowledge Portal.



## Preserving and Accessing Nuclear Knowledge

### Extending the INIS model

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INIS was officially created in February 1969,<sup>11</sup> and the first issue of the INIS Database was published in May 1970 in the form of magnetic tape and printed bulletin. If the contents of the original product and that of the latest release of the Database are compared, it is clear that despite changes (sometimes major) in format and methods used to capture and distribute the information, the core components of the System remain essentially the same: a fully indexed bibliographic database, complemented with a repository collection of non-conventional (NCL) or 'grey' literature.

All systems need to innovate in order to survive and remain relevant, and INIS is no exception. It is clear from the feedback received from INIS Members and users in the last years that they want to see significant changes made to this system. Such changes are expected to make INIS simpler and less expensive to operate; to extend the INIS model to cover more of the accumulated nuclear knowledge and information at the IAEA and in Member States; and to become much more attuned to the System's users needs and expectations. This is not new and, for a number of years, the INIS Secretariat has been enhancing the methods used to maintain the system, while exploring changes that could answer some of the expressed needs. Looking first at recent changes to the System, the most significant are the following:

**Data format and processing:** A new record format, much less rigid and able to accommodate various levels of input quality, has been introduced. It is designed in XML, which will make it much easier to extend without affecting the underlying processing system. We are in the final phase of redesigning our processing system with off-the-shelf tools (rather than proprietary software) to fully support it.

**Acquisition of bibliographic records from publishers:** These acquisitions complement rather than replace INIS Members' input and are designed to enhance the comprehensiveness of the System. Started in 2001, they are now expected to constitute nearly 50% of total INIS input.<sup>12</sup> A number of INIS Members are involved in the indexing of these records on a voluntary basis, thus strengthening the co-operative approach of INIS.

**Adoption of a computer-assisted indexing (CAI) system:** The system became operational in June 2004, and initial results indicate a 80-100% increase in indexing productivity. We are now looking at extending access to the system to selected INIS Centres. In future, we are also interested in using this technology to support automatic categorization and enhanced full text retrieval, features that could be used on the NCL collection and an IAEA Nuclear Knowledge Portal.

**Enhancement to the INIS Database on the Internet:** INIS will soon release a new version of the INIS Database on the Internet. In addition to an enhanced user interface designed to make

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<sup>11</sup> The Board of Governors of the IAEA, Record of GOV/OR Meeting 408, GOV/OR.408, Wednesday, 26 February 1969.

<sup>12</sup> Publishers records input for the period 2002 to August 2004 was about 14,000 (of a total of 71,000) in 2002; 30,000 (87,800) in 2003; and 40,000 (74,000) for Jan. to August 2004.

retrieval easier for end users, the main change is the introduction of direct links to a portion of the NCL collection held at the IAEA. This portion includes all documents held in electronic form from IAEA, and all those NCL whose online access has been authorised by the INIS Liaison Officers. Material on microfiche is being scanned and will be added as it becomes available. We are also activating all hyperlinks to documents not kept at the IAEA, and will be looking at methods to link to documents if no such hyperlink exists.

**Redefinition of the role of INIS at the IAEA:** The Agency must remain an authoritative source of information and knowledge on the peaceful use of nuclear energy. In order to support this objective, a more efficient relationship is needed between all Agency resources, including INIS. In this context, INIS has been reorganized to make it easier to co-ordinate a range of IAEA nuclear knowledge and preservation activities, and the development of a strong synergy with the IAEA Library has been recommended.

## **Extensions to the INIS Model**

A number of external changes are driving the need for an extension of the INIS model, including:

- A changing nuclear environment, where the earlier focus on government-sponsored basic research has changed to focus on the development of technologies and applications by industry;
- The need to capture and transfer accumulated nuclear knowledge for use by later generations;
- The oft expressed need of the users base to have online access to all nuclear materials found in INIS, including publications only available online (which should then be preserved), and to extend the contents to non-document materials.

While it is agreed that the INIS model needs to be re-evaluated in view of the above, it is also clear that a key to the System's continued relevance lies in retaining and strengthening its core functionality. For this reason, a two-tiered approach is suggested, as follows:

### **INIS 'Core'**

INIS core mission should remain that of preserving and documenting nuclear scientific and technical information in a high quality database, complemented with what is, in fact, an INIS Preservation Collection of 'grey' literature. We need, however, to review what materials should be included in future; firstly, contents no longer has to be limited to traditional document-like materials, as current technology already permits the inclusion of other types of materials requiring access and preservation, e.g. data sets; multimedia objects; knowledge bases, etc. Secondly, INIS has minimal coverage of materials published in the two decades that preceded its creation, a period which saw fundamental progress in nuclear sciences. An extension of the core database to incorporate materials from the period 1945–1970 would greatly enhance the value of the System, and we believe that future generations will want to have access to such information.

The functionality of this core can be greatly expanded by adding hyperlinks for distributed access to most (if not all) materials that is not already in the INIS preservation collection. Until recently, there was a formal distinction between INIS the metadata repository and INIS the document supplier (a function reserved for NCL delivery). Such a distinction will disappear, as INIS metadata become a direct point of access to all types of materials, commercial or not, not located at the IAEA. However, in order to be effective — and not systematically point to documents that cannot be accessed by end-users because of copyright and licensing restrictions

— INIS has a strategic interest in developing partnerships with organizations whose role is to facilitate such access. The IAEA Library proposal for an International Nuclear Electronic Library and a Consortium of Nuclear Libraries would significantly support such a concept and should be of interest to a number of existing INIS Centres.

### **Extending the INIS ‘Core’**

The materials and knowledge that cannot be incorporated directly within INIS is much larger than INIS itself. The Nuclear Knowledge Management Unit, the second half of the INIS & Nuclear Knowledge Management Section, is at work building a framework to identify and manage this corpus which, in addition to literature, should include information on experts in the field, products, technologies, methods and services. Without embarking on discussions about what this framework will be, the fact remains that INIS will be asked to index, link to, capture and/or maintain a large quantity of materials in support of activities at the IAEA and in Member States. A common ‘glue’ to all materials would be a ‘Nuclear Knowledge Portal’.

### **INIS Support for Knowledge Management Initiatives**

A key component that distinguishes INIS from generic Internet search engines (e.g. Google) is the subject analysis done using controlled vocabulary.<sup>13</sup> We all know how efficient a service such as Google (or similar Internet search engines) are at automatically identifying highly relevant information; less known, however, are their deficiencies in recall, a shortfall recognized chiefly by information specialists.<sup>14</sup> As we move towards a distributed architecture and evolve our user interface towards a Nuclear Knowledge Portal, it will be essential, in addition to adopting the technologies used by search engines, to retain as much as possible of the INIS strength in subject analysis. For this purpose, and to complement the INIS Thesaurus, INIS intends to develop a nuclear classification for the automatic categorization of nuclear knowledge.

### **‘Multilinguality’ and Localization**

Pending a sudden renaissance of interest in Western countries, nuclear development is currently most active in developing, non-English speaking states (for lack of a better expression). English is the communication language of science and the core language of INIS. However, as most users are ‘passive’ consumers of English information (once they have found it), the retrieval process would greatly benefit from the localization of the user interface and the retrieval process. INIS has already developed core elements essential for the internationalization of the System:

- The terms in the Thesaurus are already available in 5 languages: English, French, German, Russian and Spanish, and translations are under way in Chinese and Arabic;
- The new record format has been developed in XML, which uses Unicode as its character set;
- All NCL documents in Western languages (and Cyrillic) are currently ‘OCRred’ as part of the imaging process at the IAEA;
- The new interface to the INIS Database on the Internet can be localized (a German language version already exists). Future developments will include the choice of language for the descriptors.

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<sup>13</sup> The INIS Thesaurus can be considered an ontology. Earlier forms of the INIS Categories were forms of taxonomies.

<sup>14</sup> ‘Recall’ refers to the amount of relevant information retrieved. Key results that are not on the first (or second) page of results are lost to most users. As the position of a document in a list is as dependent on its ‘popularity’ (the PageRank system of Google) as its vocabulary contents, coherent result sets for specialised subjects are often impossible to build.

## Conclusion

In the recent past, INIS has concentrated on strengthening its core functions, in preparation for an expansion of its role in nuclear knowledge management and preservation. We have already built a solid collection of Internet links to significant resources available online, and will start exploiting these links with automatic classification and indexing.

INIS is an international co-operative agreement between IAEA Member States whose operations are largely guided by Membership Arrangements. The current model of co-operation is static: INIS Members supply input to the IAEA, the Secretariat merges and distributes the output. In order support the approach outlined in this document, INIS will need to be more flexible and able to react more quickly to users' demand. This added flexibility has been added to a proposed Membership Agreement recently circulated to all INIS Members. In this Agreement, the concept of national input centres would remain central, complemented by strategic partnerships to secure access to resources and materials.<sup>15</sup> The function of the INIS Secretariat is also more clearly defined, while the overall responsibilities of Members is strengthened.

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<sup>15</sup> For example, a Consortium of Nuclear Libraries (some of which could be INIS Centres) could greatly assist INIS in identifying key journals, conferences and other types of information to add to the INIS Database. It could also be used to negotiate the acquisition of metadata for all this material.





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