

# Public Interest in Accessing the INIS Collection

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Since its creation in 1970, the International Nuclear Information System (INIS) has collected and provided access to more than 3.8 million bibliographic references to publications, documents, technical reports, non-copyrighted documentation, and other grey literature, as well as over a million full texts. Overall, there are 800 GB of data in the INIS repository. Public interest in accessing this collection has been remarkable. This year alone, there were more than one million sessions and almost two million page views. During the same period, there were 1.6 million full text document downloads.

The INIS collection consists of seven types of literature – computer media, patents, books, reports, journal articles, miscellaneous and audio-visuals. This paper provides an overview of the INIS collection subject coverage, and the distribution of different types of grey literature. It also provides INIS repository access statistics based on Google Analytics and other Web search data pertaining to public interest in accessing these different types of literature and the uniqueness of the collection.

As one of the world's largest collections of published information on the peaceful uses of nuclear science and technology, INIS represents an extraordinary example of world cooperation. 154 INIS members share and allow access to their valuable nuclear information resources, preserving them for future generations and offering a freely available nuclear knowledge repository.

## **Keywords**

Nuclear information; Document repository; Grey literature; INIS; IAEA

## Introduction

Since its creation in 1970, the International Nuclear Information System (INIS) has collected and provided access to more than 3.8 million bibliographic references to publications, documents, technical reports, non-copyrighted documentation, and other grey literature, as well as over a million full texts. The INIS repository hosts one of the world's largest collections of published documentation and information on the peaceful uses of nuclear science and technology.

This paper reviews the public interest in accessing the INIS collection. Although who accesses INIS is an important question, greater emphasis is placed here on the question of why there is public interest in accessing this valuable collection of nuclear grey literature.

It is assumed that the reasons for public interest lie in three main features of the collection, namely, its subject coverage, type of documents and uniqueness. These three features are the focus of this paper. Available website analytics are used to confirm these assumptions and, at the same time, offer possible direction for further improvements in INIS collection services.



Figure 1: Beginning of automation in INIS

## International Atomic Energy Agency (IAEA)

The IAEA is regarded as the world's centre of cooperation in the field of safe, secure and peaceful uses of nuclear technologies. It was set up in 1957 as the world's "Atoms for Peace" (IAEA, 2015) organization within the United Nations system. As of November 2015, the IAEA has 166 Member States.

The IAEA Secretariat is headquartered at the Vienna International Centre in Vienna, Austria. It also operates liaison and regional offices in Geneva, New York, Toronto, and Tokyo. The IAEA runs and supports research centres and scientific laboratories in Vienna and Seibersdorf, Austria; Monaco; and Trieste, Italy. The



Figure 2: Vienna International Centre

IAEA Secretariat is a team of 2560 multidisciplinary professional and support staff from more than 100 countries.

The IAEA's mission is guided by the interests and needs of Member States, strategic plans and the vision embodied in the IAEA Statute. Three main pillars — or areas of work — underpin the IAEA's mission: Safety and Security; Science and Technology; and Safeguards and Verification.

The work of the IAEA is carried out through six departments (IAEA, 2015): Nuclear Energy, Nuclear Safety and Security, Nuclear Science and Applications, Safeguards, Technical Cooperation, and the Department of Management. Although supporting the entire Agency, the Nuclear Information Section (NIS) is organizationally part of the Department of Nuclear Energy. The Department's main tasks are to foster the efficient and safe use of nuclear power by supporting interested Member States in improving the performance of nuclear power plants, the nuclear fuel cycle, and the management of nuclear wastes; catalysing innovation in nuclear power and fuel cycle technologies; development of indigenous capabilities for national energy planning; the deployment of new nuclear power plants; and the advancement of science and industry through improved operation of research reactors.

## IAEA Nuclear Information Goals

The main nuclear information goals of the IAEA (IAEA, 1956) are to (a) Foster the exchange of scientific and technical information on the peaceful use of nuclear science and technology, which involves collection, processing, preservation and dissemination of information; (b) Increase awareness of the importance of managing nuclear information resources; (c) Assist with capacity building and training; and (d) Provide information services and support to Member States.

The collection, preservation and dissemination of nuclear information and knowledge is, in turn, the main responsibility of the Nuclear Information Section (NIS), more

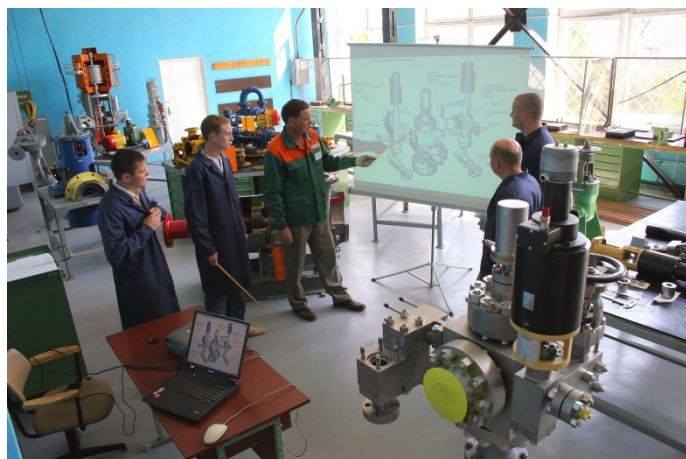


Figure 3: IAEA workshop

specifically of INIS.

NIS consists of the IAEA Library Unit, the INIS Unit and the Systems Development and Support Group. It fosters the exchange of scientific and technical information on the

peaceful use of nuclear science and technology; increases awareness in Member States of the importance of maintaining efficient and effective systems for managing such information; provides information services and support to Member States and to the IAEA; and assists with capacity building and training.

## International Nuclear Information System (INIS)

INIS represents an extraordinary example of global cooperation, where 154 (IAEA, 2015) members allow access to their nuclear information resources, including grey literature, in order to preserve them for future generations and offer a freely available nuclear knowledge repository that can contribute to the world’s sustainable development and further the use of nuclear energy for peaceful purposes. In addition to over one million full texts, more than 3.8 million bibliographic references to publications, documents, technical reports, non-copyrighted documentation, and other grey literature are made available. Overall, there are 800 GB of data in the INIS collection.

The role of INIS is to (a) Collect and process bibliographic metadata and full texts of nuclear literature; (b) Preserve NCL, such as documents, reports, theses, and other full text publications; (c) Disseminate publications from the INIS repository free of charge to all Internet users primarily through its website, which became free, open and unrestricted in April 2009 (IAEA, 2009).



Figure 4: INIS website

Full text documents available from the INIS collection represent almost entirely nuclear related non-conventional literature (NCL) or grey literature. This PDF collection contains some very important historic and technical documents collected by INIS during the last 45 years (IAEA, 2015). Since much of this documentation originated in paper form, digitization of this collection was a huge project, converting millions of microfiche pages to electronic, fully searchable files. Optical Character Recognition (OCR) was performed on all documents within the collection, making it easy to index and search. Besides being a source of information when searching, the availability of full text gives INIS a special role in the area of nuclear information and documentation — acting as the main custodian of this world information heritage and preserving this codified, specialized, scientific and technical knowledge.

## **INIS Repository**

As of 1 November 2015, the INIS repository contains 3,860,194 bibliographic metadata records. Of those, 1,071,909 are full text documents, 751,198 of which are directly available from INIS, with the remaining 320,711 NCLs available from other sources. Only a small portion of the full text documents is restricted and kept for internal use.

On average, INIS adds around 120,000 bibliographic records and 13,000 full text PDF documents annually to its collection. The collection is accessible from the INIS website.

The INIS repository website<sup>1</sup> attracts many visitors and users. In 2015, there were over 1 million registered sessions and over 2 million pageviews, indicating 2 pages per session. Over 725,000 visitors came to the website with a bounce rate (single page visit) of 61%. At the same time, 30% of all visitors returned, most of them from Brazil, Canada, France, Germany, India, Japan, South Korea, the UK, and the US.

In 2014, there were 423,000 downloads, while in 2015, this number increased to 1.6 million, out of which 100,000 were registered through the INIS Collection Search (ICS)<sup>2</sup>, with the remaining 1.5 million through Google.com or Google Scholar.

The most frequently used search terms in the ICS were nuclear reactors, radioactive waste, environment, Fukushima, and accidents. The most frequently downloaded documents through Google were those related to radiology and nuclear medicine, reactor safety, and radiation protection.

## **INIS collection by subject**

The INIS collection covers around 50 well defined subject categories (IAEA, 2010) which are regularly maintained by INIS, and provides scope descriptions used by national and regional centres to categorize nuclear literature for INIS input. The INIS Joint Reference Series publications are also available on the INIS website.

The INIS collection covers all aspects of the peaceful uses of nuclear science and technology, such as nuclear reactors, reactor safety, nuclear fusion, applications of radiation and radioisotopes in medicine, agriculture, industry and pest control, as well as related fields of nuclear chemistry, nuclear physics and materials science. Special emphasis is placed on the environmental, economic and health effects of nuclear energy. Legal and

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<sup>1</sup> <http://www.iaea.org/inis>

<sup>2</sup> <https://inis.iaea.org/search>

social aspects associated with nuclear energy are also covered. Figure 5 lists a complete set of INIS Subject Categories.

- S01 Coal, lignite, and peat
- S02 Petroleum
- S03 Natural gas
- S04 Oil shales and tar sands
- S07 Isotopes and radiation sources
- S08 Hydrogen
- S09 Biomass fuels
- S10 Synthetic fuels
- S11 Nuclear fuel cycle and fuel materials
- S12 Management of radioactive wastes, and non-radioactive wastes from nuclear facilities
- S13 Hydro energy
- S14 Solar energy
- S15 Geothermal energy
- S16 Tidal and wave power
- S17 Wind energy
- S20 Fossil-fueled power plants
- S21 Specific nuclear reactors and associated plants
- S22 General studies of nuclear reactors
- S24 Power transmission and distribution
- S25 Energy storage
- S29 Energy planning, policy and economy
- S30 Direct energy conversion
- S32 Energy conservation, consumption, and utilization
- S33 Advanced propulsion systems
- S36 Materials science
- S37 Inorganic, organic, physical and analytical chemistry
- S38 Radiation chemistry, radiochemistry and nuclear chemistry
- S42 Engineering
- S43 Particle accelerators
- S46 Instrumentation related to nuclear science and technology
- S47 Other instrumentation
- S54 Environmental sciences
- S58 Geosciences
- S60 Applied life sciences
- S61 Radiation protection and dosimetry
- S62 Radiology and nuclear medicine
- S63 Radiation, thermal, and other environmental pollutant effects on living organisms and biological materials
- S70 Plasma physics and fusion technology
- S71 Classical and quantum mechanics, general physics
- S72 Physics of elementary particles and fields
- S73 Nuclear physics and radiation physics
- S74 Atomic and molecular physics
- S75 Condensed matter physics, superconductivity and superfluidity
- S77 Nanoscience and nanotechnology
- S79 Astrophysics, cosmology and astronomy
- S96 Knowledge management and preservation
- S97 Mathematical methods and computing
- S98 Nuclear disarmament, safeguards and physical protection
- S99 General and miscellaneous

Figure 5: INIS subject categories

In order to review the INIS collection by subject area, 49 subject categories were grouped into 14 subject areas. The biggest number of documents in the INIS collection falls under the category of Economic, legal and social (8.2%). This is followed by Environment and earth science (5.7%), Elementary particle physics (5.1%), Engineering and instrumentation (4.7%), and Chemistry (3.4%). Figure 6 gives a more detailed breakdown of INIS collection subject categories and the number of documents contained in each one.

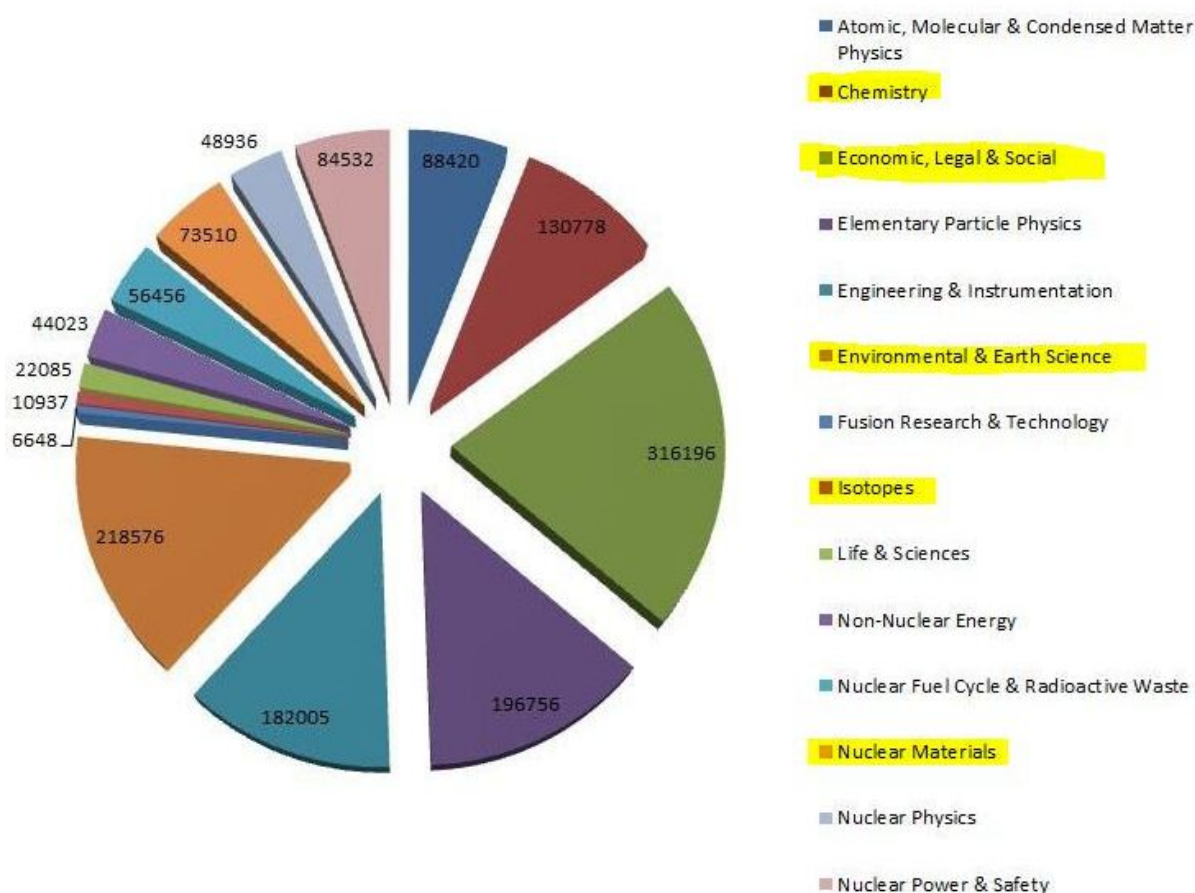


Figure 6: INIS collection by subject

### INIS collection by record type

The INIS collection consists of seven types of literature – computer media, patents, books, reports, journal articles, miscellaneous and audio-visuals. The most populous are journal articles, comprising almost 62% of all records available in the INIS collection, followed by miscellaneous (11%) which include theses, pamphlets, brochures, conference proceedings, and reports (16%). Accordingly, it can be concluded that around 73% of the collection is represented by standard non-grey literature and only 27% is actually grey literature.

However, it should be noted that while the INIS collection includes links to commercially available journal articles, a great majority of full texts are, in fact, grey, or non-conventional literature.

Figure 7 gives a more detailed break-down according to the various document types in the collection.

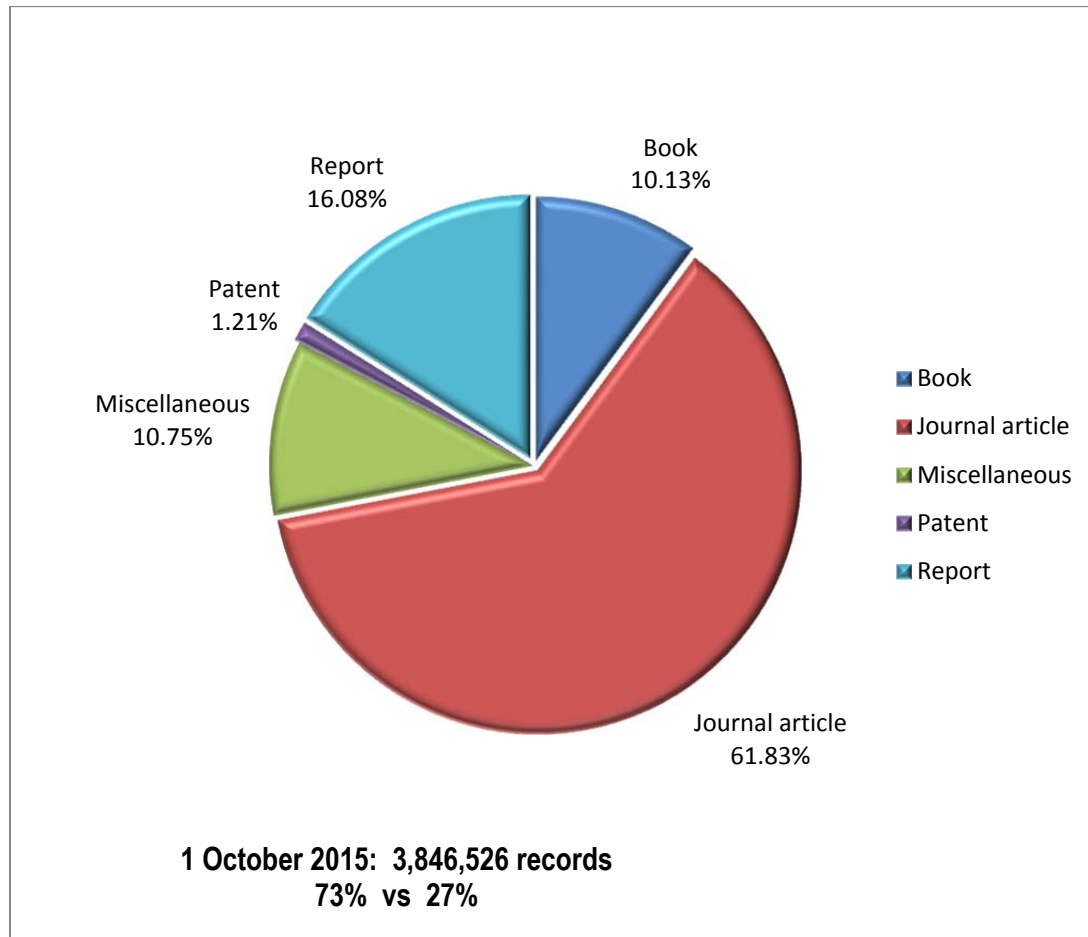


Figure 7: INIS collection by record type

### Collection uniqueness

Of significance here is that the INIS collection is not indexed by commercial database providers such as Web of Science, EBSCO, Science Direct, ProQuest, etc. Although some benefits of having the collection included in one or any of these providers could be argued, a conscious decision was made to keep INIS outside of commercial channels and to continue offering it freely through the Internet and through WorldWideScience.org.

Analysis shows that around 80% of the INIS collection is uniquely available in Google.com solely from INIS. In order to verify this, a brief analysis was conducted using the most frequently used search terms – radiology, reactor safety, and radiation protection. The first



20 documents returned from each term in ICS using the search construction “exact phrase” + full text availability were then sought in Google.com using their exact full title, file type (PDF), excluding the iaea.org, worldwidescience.org and google.com websites. Radiology landed 2 outside links, while the other two had one link each. It was interesting to note that the links found were, in fact, the links from the originating publisher of the document, who also submitted the document to INIS.

## Access analytics

As already established, journal articles represent the largest percent of the INIS collection (62%), followed by reports, miscellaneous, and patents. The last three types are grey literature and, combined, they make up 27.78% of the collection. Interestingly enough, the number of accesses, out of the total 1.3 million in 2015, when converted to a percentage, indicate almost the identical value (27.44%) as its representation in the collection, as shown in Figure 8.

	# of records (3,856,529)	% of the collection	# of records accessed	% of records accessed	# of accesses (1,296,607)	% of all accesses
<b>Journal article</b>	2,386,933	61.89%	108,074	4.53%	500,342	38.58%
<b>Report</b>	618,619	16.04%	60,260	9.74%	266,194	20.53%
<b>Misc.*</b>	406,386	10.54%	44,159	10.87%	211,971	16.33%
<b>Book</b>	390,067	10.11%	35,944	9.22%	304,192	23.46%
<b>Patent</b>	46,429	1.20%	2,212	4.76%	7,546	0.58%
<b>Multimedia</b>	7,829	0.20%	1,284	16.40%	6,498	0.50%
<b>Obsolete types**</b>	266	0.00%	19	7.14%	104	0.00%

27.78%

27.44%

Figure 8: INIS collection access statistics by document type

\* Miscellaneous: theses, pamphlets, brochures, conference proceedings

\*\* Obsolete: G: Maps; F: Audio-visual materials; C: Conference

It is interesting to note that, although journal articles make up the biggest part of the collection, only 4.5% of them were accessed compared to multimedia (16.4%), miscellaneous (11%) and reports (almost 10%).

## Conclusions

Returning to the starting assumption that the reasons for public interest lay in three main features of the collection, (subject coverage, type of documents and uniqueness), and based on the above analysis, a number of interesting conclusions can be drawn.

Open access collections, repositories and databases can attract a huge number of users, especially if the subject is of broad interest. However, even specific subject related coverage collections attract special user groups in bigger numbers. In the case of INIS, these are the Internet domains .edu and .gov.; the education sector because of interest in research and development and the government sector mainly because of relevant administrative documentation and policy documents.

It is also interesting to note that the most frequently downloaded documents are NOT from the most populous parts of the collection. Although journal articles make up the greatest portion of the INIS collection, grey literature (reports and miscellaneous) is the most frequently accessed.

Discovering that around 80% of the INIS collection is unique was a large incentive to continue collecting the same type of information and documentation and to further enhance INIS as an international collaborative effort. Related to that were the findings that when full text NCL is available on websites other than INIS, it is usually only on the originator's website.

It can also be concluded that the percentage of accesses to NCL (part of the total number of accesses) is directly proportional to their representation in the collection. However, as already stated, the total percentage of records accessed is much higher, representing special interest in that part of the collection.

Finally, it seems that users are looking for information irrelevant of its form and that they gravitate mainly towards full texts, which might explain why multimedia is so frequently downloaded and why there is twice as much interest in accessing reports as in journal articles.

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