

# Nuclear Knowledge Bases and Portals - Application to Fast Reactors

Technical Meeting on the Status of the International  
Knowledge Base on Nuclear Graphite  
26–27 March 2015

presented by Mikhail Khoroshev

IAEA, Nuclear Power Technology Development Section (NPTDS) Email: [M.Khoroshev@iaea.org](mailto:M.Khoroshev@iaea.org)



**IAEA**

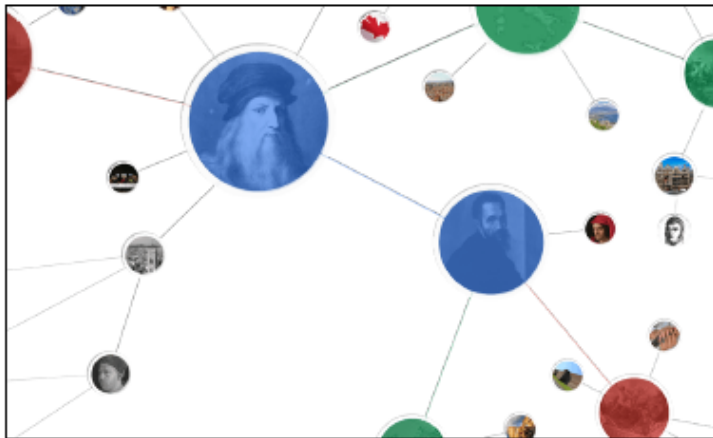
International Atomic Energy Agency

# Objectives and Methods

- Objectives
  - Knowledge Sharing
  - Knowledge Preservation
  - Knowledge Development
  - Search and Discovery
  - Collaboration and Communication
- Knowledge bases user interfaces
  - Portal, Wikis, Web Sites, Applications ...
- **Method:** Knowledge Representation and Knowledge Modeling

# Semantic Web and Linked Data (1)

## The Essence of the DataWeb



- **Entities**, not documents!
- **Things**, not strings!

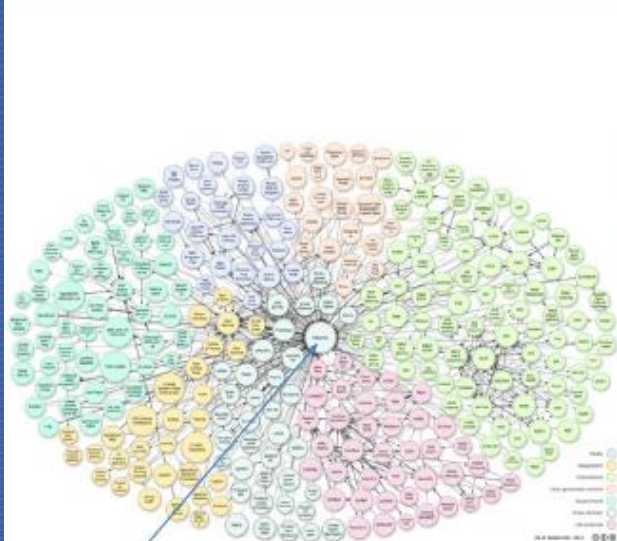
# Semantic Web and Linked Data (2)

## ‘Things’ not ‘Strings’

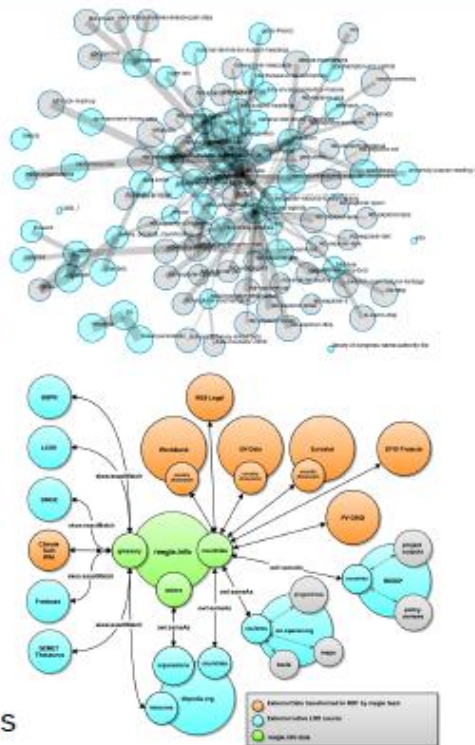


# Semantic Web and Linked Data (3)

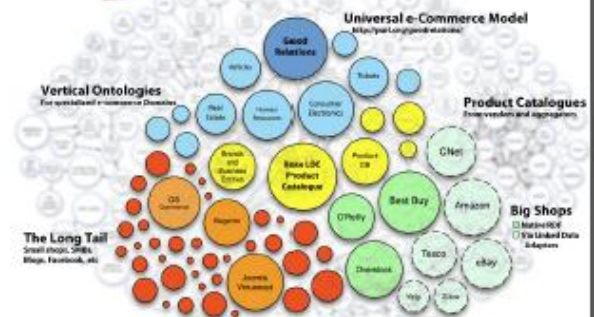
## Giant Global Graphs



12.6 Mio. Entities  
2.46 Mrd. Facts  
119 Languages  
45 Mio. links to other sources



### LINKED OPEN COMMERCE



<http://linkedopencommerce.com/>

# NKM initiative: Knowledge Organisation Systems (KOS) in Nuclear

- Nuclear Knowledge Management section (NKM) activities:
- Glossaries and Taxonomies in the Nuclear Domain
  - IAEA: joint development of NKM-Section and Member States (MS):
    - Taxonomies for Fast Reactors, Nuclear Accidents, VVER
    - Many more KOS's available in other IAEA-Sections (INIS-Thesaurus, NE-Glossary, NS-Glossary ...)
    - KOS developments in Member States
    - Applications based on KOS, e.g. search enhancement, querying KB's, combining information from many sources, ...

KOS building blocks:

|               |                     |                          |
|---------------|---------------------|--------------------------|
| • Wiki        | • blog of newsgroup | • CRP                    |
| • terminology | • project profiles  | • data models & codes    |
| • taxonomy    | • MS                | • consultancy meetings   |
| • news        | • FRKP-Fr-KOS       | • education and training |
| • outreach    | • publications      | • other                  |

# Knowledge Base Challenges

- Scope:
  - Rapidly increasing number of documents
    - free text search has limits
      - improving search by metadata, but manual markup very limited
  - Internal and external repositories (e.g. INIS, NuArch, ...)
  - Document silos
- Structuring and navigation
  - Complex domain areas
  - Querying (complex) knowledge bases
  - *Enrichment* of knowledge bases by external data (in other institutions, on the Web) → Linked Data

# NKM activity:

## Developing Knowledge Portals (1)

- Installing a SharePoint development platform for Knowledge Organization System (KOS)
- Installing a software tool enhancing KOS with the semantic technology and documents auto-classification (PoolParty Server), **including enrichment of the taxonomies and thesauri with ontology features** (classes, relations, attributes), automatic tagging (manual intervention possible) and structured data extraction

# NKM activity:

## Developing Knowledge Portals (2)

- **Semantic Search** (enhance search with synonyms, relations, facets, ...): Webpart in SharePoint
- Knowledge Base navigation and discovery: Taxonomy Navigator webpart in SharePoint
- External applications and linked data (based on the W3C's semantic web standards)
- Development of several **Knowledge Portals including FRKP**

# Fast Reactor Knowledge Preservation Portal (FRKP) - joint activity of NKM and NPTDS

- **Any fast reactor related documentation that MS wish to share**
- **Full papers of consultancies and technical meetings;**
- **Old reports will remain available through INIS repository**
- Document repositories on SharePoint
  - Uploads by MS themselves possible
  - Principle for Rights Management: Documents provided by MS will be in control of MS (e.g. definition of rights for other parties)

FRKP will become part of the IAEA tools. In this regard the MS are expected to trust the classified users. However the MS will be in power to define the level of access for various users

# FRKP Users

The **target audience** :experts and general users of fast reactor data and documentation

The **Users' group** will have several categories of users:

- Data providers
- Taxonomy users
- Readers

# FRKP development

- Pilot search implementation on SharePoint 2010
  - Taxonomy to improve choice search terms

*(Taxonomy for Fast Reactors was developed in 2004-2005 and needs revision. NPTDS plans a meeting to establish a users' group of FRKP with the primary task to revise the taxonomy and get commitments for this work by relevant stakeholders)*
  - Searching INIS
  - Connection to SharePoint Search
- Forthcoming development steps
  - Pilot portal in SharePoint 2013
  - Designing the portal pages
  - Uploading and autotagging documents from IAEA and MS
  - FRKP should be promoted in Google as quality information on fast reactors

# FRKP development issues

- For discussion:
- What is expected from the document/data suppliers and end-users (e.g.FR community, GCR community, etc)
- What the IAEA can do and in which time frame
- MSs requirements to populate the system.  
The draft letter on joining the FRKP is a good example
- What else can we undertake with MSs?



IAEA

Atoms for Peace

الوكالة الدولية للطاقة الذرية  
国际原子能机构  
International Atomic Energy Agency  
Agence internationale de l'énergie atomique  
Международное агентство по атомной энергии  
Organismo Internacional de Energía Atómica

†

Vienna International Centre, PO Box 100, 1400 Vienna, Austria  
Phone: (+43 1) 2600 • Fax: (+43 1) 2600  
Email: Official.Mail@iaea.org • Internet: http://www.iaea.org

In reply please refer to: 653.TI-0  
Dial directly to extension: (+431) 2600-25850 / -227866

Recipient Name

Recipient Address

### ANNEX III: Draft Letter to Member States with a FR Programme

DEAR MR / MS,

I have pleasure in inviting **(country name)** to contribute to and use a new **Fast Reactor Knowledge Preservation Portal (FRKP Portal)** - a special application to fast reactors of the IAEA nuclear knowledge bases and portals.

In response to needs expressed by Member States and within a broader IAEA-wide effort in nuclear knowledge preservation, the IAEA has been carrying out a dedicated initiative on Fast Reactor Data Knowledge Preservation (FRKP). The main objectives of the FRKP initiative are to: 1) Halt the ongoing loss of information related to Fast Reactors (FR); and 2) Collect, retrieve, preserve and make accessible already existing data and information on FR. These objectives require the implementation of activities supporting digital document archival, exchange, search and data retrieval, as well as implementation of activities facilitating the knowledge preservation over the next decades.

To this purpose the IAEA developed and made available the Fast Reactor Knowledge Organisation System (FR-KOS), which is currently populated by documents provided by some Member States with an active FR programme. However, the current FR-KOS system requires considerable financial efforts for its maintenance and the licence renewal. Moreover, the FR-KOS is not interfaced with the larger International Nuclear Information System (INIS library) of the department of nuclear energy.

As a consequence, following the advice of the FR community, the IAEA has recently decided to develop a new Knowledge Preservation Platform of broader application to the nuclear community, which is more cost effective, has improved features and capabilities and better linked to existing IAEA databases. One of the first implementations will be dedicated to the Fast Reactors with the aim of creating a comprehensive and well-structured international inventory of fast reactor data and information provided by different Member States. The new FRKP portal is envisioned to control and manage both publically available as well as restricted forms of information.

The users of the FRKP Portal will be national nuclear authorities, regulators, scientific and research organizations, commercial companies and all other stakeholders involved in fast reactor activities at national or international levels. The information and the documents will be stored and made accessible to authorised users, who will get the credentials from the IAEA. The FRKP Portal allows Member States to specify and control access to the documents that they provide to the Portal.

†

The Member States are currently providing fast reactor related information to existing IAEA knowledge management systems. We encourage continued supply of documents to populate these systems. In order to favor this process the IAEA is requesting the **Member State** to identify if there is any specific requirement or pre-requisite (beyond what is already in place) that may be needed to fully support providing **both publically available and protected information** to the FRKP Portal.

Your assistance in providing the response by \_\_\_\_\_ is highly appreciated.

†

The IAEA responsible officer is Mr Monti (Email: [s.monti@iaea.org](mailto:s.monti@iaea.org)) and Mr Mikhail Khoroshev (Email: [m.khoroshev@iaea.org](mailto:m.khoroshev@iaea.org)) of the Nuclear Power Technology Development Section (Tel: +43 1 2600 ext: 22850). For direct communication between the responsible officer and the expert(s) designated to work on the Portal from your country the full name and complete contact details including postal address, telephone/fax numbers and e-mail address of the expert(s) should be provided.

†

Yours sincerely,

DIRECTOR  
DEPARTMENT OF NUCLEAR ENERGY

(Ctrl)

# EXAMPLE 1 LMFNS portal

IAEA-PLMS: My home x Flughafen Wien - Aktuell x A1 Webmail x Пилоты рулявшего "Аз" x Китай сигнализирует ОБСЕ x Global Research: Китай x

plms-nkm.iaea.org/m2/my/

You are logged in as Mikhail Khoroshev  
English (en)

IAEA Learning Management System

IAEA CLP4NET

My home ▶ My courses OPEN LMS PO

Custom

### Main menu

- Site news
- List of all courses
- Login instructions and FAQ
- LMS Manual (EN)
- LMS Manual (ES)
- Registration form
- Student feedback form
- Contact us

### Navigation

- My home
  - Site home

### Course overview

## Experimental Facilities for Development and Deployment of Liquid Metal Cooled Fast Neutron Systems (LMFNS)

### Latest news

- User Admin 2  
System upgrade
- Vojtela Martin 1  
Messaging advice
- Older topics

### Online users

(last 5 minutes)

- PAMPILLON Bar
- Khoroshev Mikha
- RODRIGUEZ GU

EN 15:50 2015-03-25

## Navigation

### My home

- Site home
- Site pages
- My profile
- Current course
  - LMFNS**
    - Participants
    - Badges
    - General
    - Communication
    - Meeting materials
    - Catalogue of experimental facilities
    - Useful files and references
    - Collaboration
  - My courses

## Administration

- Course administration
  - Turn editing on
  - Edit settings
    - Users
    - Filters
    - Reports
  - Grades
  - Badges
  - Backup
  - Restore
  - Import
  - Reset

## Liquid Metal Cooled Fast Neutron Systems.

 NES Publication - LMFNS Catalogue

## Communication

-  Discussion forum
-  Messaging

## Meeting materials

-  Technical Meeting (TM) on "Existing and proposed experimental facilities for fast neutron systems", 10 – 12 June 2013
-  1st Consultancy meeting on the Development of the LMFNS Catalogue, 25-27 March 2014
-  2nd Consultancy Meeting on the Development of the LMFNS Catalogue 16-18 December 2014
-  3rd Consultancy Meeting on the Development of the LMFNS Catalogue 9-11 June 2015

## Catalogue of experimental facilities

-  Inputs from IAEA Member States
-  Na - based facilities
-  Pb/LBE - based facilities
-  Cross-cutting facilities
-  Template 44.8KB

## Useful files and references

## Recent activity

Activity since Wednesday, 25 March 2015, 11:47 AM

[Full report of recent activity...](#)

Nothing new since your last login

## Online users

(last 5 minutes)

 Khoroshev Mikhail

File Home Insert Page Layout Formulas Data Review View

Clipboard: Cut, Copy, Paste, Format Painter

Font: Calibri, 11, Bold, Italic, Underline, Text Color, Background Color

Alignment: Wrap Text, Merge & Center

Number: General, Percentage, Decimals, Fractions

Conditional Formatting: Normal, Bad, Good, Neutral, Calculation, Check Cell, Explanatory, Followed Hy..., Hyperlink, Input

Cells: Insert, Delete, Format

Editing: AutoSum, Fill, Clear, Sort & Filter, Find & Select

|    | A                          | B                               | C | D                            | E                     | F              | G                    | H         | I                 | J                        | K |
|----|----------------------------|---------------------------------|---|------------------------------|-----------------------|----------------|----------------------|-----------|-------------------|--------------------------|---|
|    |                            |                                 |   | Neutron<br>Zero power source | Thermal<br>Hydraulics | DBA and<br>DEC | Coolant<br>Chemistry | Materials | System &<br>comp. | Instrument<br>ation ISIR |   |
| 6  |                            |                                 |   |                              |                       |                |                      |           |                   |                          |   |
| 7  | 1 - Zero power facilities  |                                 |   |                              |                       |                |                      |           |                   |                          |   |
| 8  |                            | STELLA-1- KAERI - KoreaE.docx   |   |                              |                       |                |                      |           |                   |                          |   |
| 9  |                            | CLEAR-0-INEST-China.docx        |   |                              |                       |                |                      |           |                   |                          |   |
| 10 | 2 - Neutron sources        |                                 |   |                              |                       |                |                      |           |                   |                          |   |
| 11 |                            | nELBE-HZDR-Germany.pdf          |   |                              |                       |                |                      |           |                   |                          |   |
| 12 | 3 - DBA and DEC facilities |                                 |   |                              |                       |                |                      |           |                   |                          |   |
| 13 |                            | CIRCE-HERO-ENEA -Italy.docx     |   |                              |                       |                |                      |           |                   |                          |   |
| 14 |                            | CIRCE-ICE-ENEA -Italy.docx      |   |                              |                       |                |                      |           |                   |                          |   |
| 15 |                            | CIRCE-SGTR-ENEA -Italy.docx     |   |                              |                       |                |                      |           |                   |                          |   |
| 16 |                            | CLEAR-S-INEST-China.docx        |   |                              |                       |                |                      |           |                   |                          |   |
| 17 |                            | KYLIN2-Safety-INEST-China.docx  |   |                              |                       |                |                      |           |                   |                          |   |
| 18 |                            | LIFUS5-ENEA -Italy.docx         |   |                              |                       |                |                      |           |                   |                          |   |
| 19 |                            | V-200 - IPPE Russia.doc         |   |                              |                       |                |                      |           |                   |                          |   |
| 20 |                            | NACIE-ENEA -Italy.docx          |   |                              |                       |                |                      |           |                   |                          |   |
| 21 | 4 - Thermal-hydraulics     |                                 |   |                              |                       |                |                      |           |                   |                          |   |
| 22 |                            | B-2 IPPE Russia.doc             |   |                              |                       |                |                      |           |                   |                          |   |
| 23 |                            | DELTA_LANL_USA.docx             |   |                              |                       |                |                      |           |                   |                          |   |
| 24 |                            | ELEFANT-HZDR-Germany.pdf        |   |                              |                       |                |                      |           |                   |                          |   |
| 25 |                            | HELENA-ENEA -Italy.docx         |   |                              |                       |                |                      |           |                   |                          |   |
| 26 |                            | KYLIN2-TH-INEST-China.docx      |   |                              |                       |                |                      |           |                   |                          |   |
| 27 |                            | MINIPOT-KIT-Germany.docx        |   |                              |                       |                |                      |           |                   |                          |   |
| 28 |                            | SPRUT_ - IPPE Russia.doc        |   |                              |                       |                |                      |           |                   |                          |   |
| 29 |                            | THEADES-KIT-Germany.docx        |   |                              |                       |                |                      |           |                   |                          |   |
| 30 |                            | THESYS-KIT-Germany.docx         |   |                              |                       |                |                      |           |                   |                          |   |
| 31 |                            | V-200 - IPPE Russia.doc         |   |                              |                       |                |                      |           |                   |                          |   |
| 32 | 5 - Coolant chemistry      |                                 |   |                              |                       |                |                      |           |                   |                          |   |
| 33 |                            | COLONRI - -CVR Rez - Czech.docx |   |                              |                       |                |                      |           |                   |                          |   |

## Main menu

Welcome to the area for creating a catalogue on experimental facilities in support of Liquid Metal Cooled Fast Neutron Systems.

 NES Publication - LMFNS Catalogue

## Navigation

### My home

- Site home
- Site pages
- My profile
- ▼ Current course
  - ▼ LMFNS
    - Participants
    - Badges
  - ▼ General
    -  NES Publication - LMFNS Catalogue
    - Communication
    - Meeting materials
    - Catalogue of experimental facilities
    - Useful files and

# NES Publication - LMFNS Catalogue

Nuclear Energy Series (NES) publication (Technical document)

**Experimental Facilities in Support of Liquid Metal-cooled Fast Neutron Systems. A Catalogue.**

**(LMFNS Catalogue)**

- ▼ 
  - 1- Introduction
  -  2.Experimental activities in support of Liquid Metal-cooled Fast Neutron Systems (LMFNS)
  -  3.Catalogue of Experimental Facilities in Support of Liquid Metal-Cooled Fast Neutron Systems (LMFNS)
  -  4.Conclusions and recommendations
  -  5.References
  -  6.Acronyms
  -  7.Contributors to drafting and review
  -  ANNEX I Facilities in suport of SFR
  -  ANNEX II Facilities in support of LFR
  -  ANNEX III Cross-cutting facilities (Dual application)

Edit



# EXAMPLE 2 Research Reactors portal

LMFNS: NES Publication - x Flughafen Wien - Aktuell: x A1 Webmail x Пилоты рухнувшего "Аз: x Китай сигнализирует ОО: x Global Research: Китай с: x Research reactor capabili: x

www.iaea.org/OurWork/ST/NE/NEFW/Technical-Areas/RRS/innovRnD.html

Contact Us | Site Index | News Feeds

Search IAEA.org

Energy Agency

About Us  
Who We Are

Our Work  
What We Do

News Centre  
Latest from IAEA

Publications  
Books and Reports

Nucleus  
Specialized Resources

Nuclear Technology

Nuclear Energy

Nuclear Safety & Security

Nuclear Applications

Safeguards

Technical Coop.

## Research Reactor Section

### Capabilities and Capacities of Research Reactors towards the Deployment of Innovative Nuclear Energy Systems and Technologies

#### Background

The IAEA strives to foster regional and international efforts to ensure wide access to existing research reactors in order to increase their viability and utilization. In this regard, the IAEA is developing a comprehensive catalogue of existing

EN 16:11 2015-03-25

IAEA

- Assurance of supply for nuclear fuel
- Meetings
- Publications
- Information Systems
- Waste Management Networks



#### Research Reactor One-House

- NS-Research Reactor Safety
- NA-Research Reactors
- NA-Accelerators



institutions, academia and other organizations directly involved in the development of materials and fuels for the nuclear energy industry. This activity of the IAEA Research Reactor Section also targets the enhancement of the Research Reactor Database (RRDB) by adding complementary information on research reactors and additional navigation options as well as contributions to the establishment of topical coalitions and Research Reactor International Centres of Excellence.

A limited number of research reactors will be included in the catalogue. The selections were made by the IAEA Secretariat in consultation with international experts. A provisional [table of contents](#) was developed by the IAEA Secretariat in consultation with international experts at two consultancy meetings held in Dec 2012 and June 2013.

A Peaceful Use Initiative project proposal currently under consideration aims to provide extensive opportunities for the IAEA Members States to identify innovative options and for research reactors to deliver benefits in a range of application areas. The proposed project is split into three phases, each of which can be viewed as valuable stand alone activity:

- Phase I:** Development of a Catalogue of research reactor services
- Phase II:** Enhancement of the RRDB and extension of its application
- Phase III:** Capacity building for research reactor utilization

For Phase 1 a detailed action plan was developed and is currently being implemented.

#### Technical Meeting, 10–12 June 2013, IAEA, Vienna

At the aforementioned consultancy meetings experts from the IAEA Member States presented the capabilities and capacities of their related research reactors and associated facilities to perform R&D using major research reactor applications. The most significant requirements for existing and future reactors to bridge experimental capabilities and R&D requirements were broadly presented and discussed by the participants.

#### Meeting report

[Preliminary table of contents of the catalogue](#)

[Document Preparation Proposal](#), approved by Department of Nuclear Energy document coordination team in July 2013

#### Presentations:

- A. Carrigan, IAEA, [The Research Reactor Database](#)
- D. Ridikas, IAEA, [Overview of Previous or Ongoing Activities Related to the Consultancy Meeting](#)
- A. Zhukova, IAEA, [Research Reactor Coalitions and Thematic Networks](#)
- A. Borio di Tigliole, IAEA, [International Centres Based on Research Reactors \(ICERR\)](#)
- P. Schuurmans, SCK-CEN, MYRRHA: [A Fast Spectrum Irradiation Facility](#)
- C.J. Haas, NRC, [The High Flux Reactor \(HFR\)](#)
- J.P. Ordoñez, INVAP, [New Research Reactors: A View from Argentina](#)
- T. Shikama, Oarai R&D Center, [Capabilities and Capacities of Joyo towards Deployment of Innovative Nuclear Energy Systems and Technologies](#)
- T. Shikama, Oarai R&D Center, [Current Status of Joyo](#)
- M.S. Cho, KAERI, [HANARO Projects](#)
- C. Bryan, ORNL, [High Flux Isotope Reactor Operation and Capabilities](#)
- H. Gougar, VHTR Technology Development Office, [The Advanced Test Reactor National Scientific User Facility Overview](#)
- N. Arkhangelsky, ROSATOM, [Capabilities and Capacities of RIAR Research Reactors](#)
- R.C. Sharma, BARC, [Research Reactors at Trombay, India](#)
- M. Carta, ENEA, [TRIGA RC-1 and TAPIRO: ENEA Research Reactors](#)
- A. Grigoriev, IAEA, [INPRO Activity on Enhancing Collaboration in Innovations to Support Sustainable NES](#)
- N. Arkhangelsky, ROSATOM, [Nuclear Research Facilities in Russia for Innovative Nuclear Development](#)
- V. Barabash, ITER Project, [Materials for the ITER Vacuum Vessel and In-Vessel Components — Current Status](#)

#### For more information on this project:

- This project has a [SharePoint homepage](#). Users must register via Nucleus.
- Mikhail Khoroshev (M.Khoroshev@iaea.org), +43-1-2600-25880



Research Reactor Section  
Information Portal



Search this site...

## Capabilities of Research Reactors towards Deployment of Innovative Nuclear Energy Systems and Technologies

Capabilities of Research Reactors towards Deployment of Innovative Nuclear Energy Systems and Technologies » Home

### Libraries

Project Documents

### Project Calendar

There are currently no upcoming events. To add a new event, click "Add new event".

[Add new event](#)

### Lists

Announcements

Links

Project Calendar

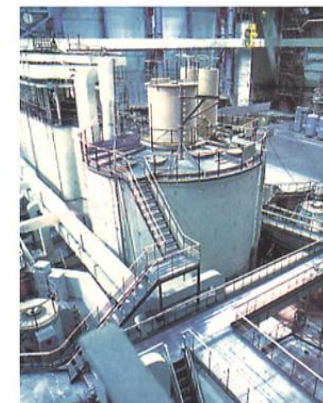
### Discussions

Project Discussion

### Project Documents

| Type | Name                                   | Modified         | Modified By        |
|------|----------------------------------------|------------------|--------------------|
|      | Background                             | 02/12/2013 09:30 | Nathan Daniel PELD |
|      | CS 18-21 March 2014                    | 11/02/2014 17:17 | KHOROSHEV, Mikhail |
|      | CS 2-4 December 2013                   | 02/12/2013 09:38 | Nathan Daniel PELD |
|      | Draft document - NE Series publication | 29/04/2014 19:16 | KHOROSHEV, Mikhail |
|      | Inputs from Member States              | 02/12/2013 09:45 | Nathan Daniel PELD |
|      | Overview                               | 23/01/2014 18:04 | KHOROSHEV, Mikhail |
|      | Presentations                          | 16/04/2014 20:51 | KHOROSHEV, Mikhail |
|      | How to Use SharePoint and RRDB         | 12/02/2014 11:18 | Nathan Daniel PELD |

[Add document](#)



### Getting Started

- Give people permissions to this site
- Set a site icon

### Links

- [IAEA RRS Infrastructure page](#)
- [IAEA Research Reactor Database \(RRDB\)](#)

[Add new link](#)

### Project Discussion

| Subject                                                                                            | Created By       | Replies | Last Updated     |
|----------------------------------------------------------------------------------------------------|------------------|---------|------------------|
| Chalanges and constrains potentially limiting the existing RR ability to provide long term support | Marin CIOCANESCU | 0       | 16/03/2014 18:48 |

[Add new discussion](#)

# Actions required in cooperation with MS

- Review the fast reactor taxonomy (eventually, **enhance it with GCR taxonomy if needed**)
  - Provide documents and upload (IAEA and MS)
  - Indicate content sources of documents and information (within MS, external databases etc.) which should be searchable through the portal
  - Design the structure of the portal
  - Define the content on the portal pages
- 
- IAEA has set up a SharePoint framework which for the moment is empty but can be filled with content any time.
  - IAEA and MS should cooperatively provide the content and the design of the portal.

# Thanks for your Attention!



**Mikhail KHOROSHEV**

Nuclear Power Technology Development Section

Department of Nuclear Energy

International Atomic Energy Agency

Vienna International Centre, PO Box 100, 1400 Vienna, Austria

Email: [M.Khoroshev@iaea.org](mailto:M.Khoroshev@iaea.org)

Tel: (+43-1) 2600-22850