Third International Conference on

Nuclear Knowledge Management

Challenges and Approaches

7–11 November 2016, Vienna, Austria

PROGRAMME AND ABSTRACTS

CN-241

IAEA 60 Years
Atoms for Peace and Development

Organized by the:

In cooperation with the:

Third International Conference on

Nuclear Knowledge Management

Challenges and Approaches

7–11 November 2016

Vienna, Austria

Programme & Book of Abstracts

Version: November 4, 2016, web enabled

Scan relevant QR to download the "IAEA conferences and meetings" application.

QR for Android

QR for iPhone

Mobile Conference App for smartphones and tablets

Participants may wish to download the conference application (app) available at Google Play and the iTunes Store. Use the above QR core, or, once in the app store, simply search for "IAEA Conferences and Meetings" by Superevent , and install the app. Once installed and running, search and download the NKM–2016 conference. The application provides a digital, mobile copy of the conference agenda and timetables, venue information, social network updates, and more.

For more information about Superevent please see the official Superevent website: http://www.superevent.com.

Colophon

This book has been assembled from the abstract sources submitted by the contributing authors via the Indico conference management platform. Layout, editing, and typesetting of the book, including customized TEX & LATEX macros, was done by Dr. P. Knowles, LogrusData, Vienna, Austria. The font is TeX Gyre Pagella, a decendent of Hermann Zapf's Palatino.

This book is PDF hyperlinked: activating coloured text will, in general, move you throughout the book, or link to external resources on the web.

Introduction

Appropriate technical expertise and experience, along with a strong safety culture, must be developed and kept available throughout the nuclear technology life cycle. Nuclear equipment, installations and facilities may have long life cycles with changing operational conditions. Advanced and specialized knowledge in nuclear engineering and science is required for the safe and effective design, construction, licensing, commissioning, operation, maintenance, and decommissioning of nuclear technology-based systems. The safe use of licensed nuclear facilities and technologies is reliant on the ongoing availability and maintenance of suitable knowledge and expertise, and an adequate understanding of related safety issues.

The ability of organizations that operate or utilize nuclear technology to take safe decisions and actions can be affected by knowledge gaps or knowledge loss. Appropriate methods and supporting technology are needed to establish and manage nuclear competencies, information and records, work processes, analysis and verification techniques, and the interpretation of data.

Through the presentation and discussion of issues and solutions related to building, collecting, transferring, sharing, maintaining, preserving and utilizing knowledge, the conference will aim to improve awareness of the importance of knowledge management (KM) in the nuclear sector. Member States will have the opportunity to strengthen their capabilities in this area by learning from the experiences of other Member States and other stakeholders.

The conference is a follow-up to the first and second conferences organized by the IAEA on nuclear knowledge management (NKM), held in 2004 in Saclay, France (Proceedings in PDF), and in 2007 in Vienna, Austria (Web Archive), respectively. It also builds on the outcomes of the IAEA organized conferences on human resource development held in 2010 in Abu Dhabi, United Arab Emirates (Proceedings website), and in 2014 in Vienna, Austria (Web Archive).

The conference will provide an opportunity to share experiences and lessons learned in the nuclear sector related to managing nuclear knowledge and to share practical approaches to KM that can be used at the organizational, national, and international levels to develop and maintain a strong nuclear knowledge base. Various issues related to specific human competencies, methodological or process knowledge and technology-related knowledge that are needed to support the safe and sustainable application of nuclear technology will be addressed.

The conference will consist of both plenary and parallel sessions, blending high-level, keynote sessions with more practical sessions. The event will feature exhibitions, forums and panels, as well as tutorials and workshops.

Conference President

Mr Viacheslav A. Pershukov, Russian Federation

Conference Vice Presidents

Mr Yves Fanjas, France
Mr Franklin Osaisai, Nigeria

Conference Rapporteur

Mr Peter Gowin, Germany

Programme Committee

Name✠	Country/International Organization
External Members:	
Helmut Boeck	Austria
Yves Fanjas	France
Juan M. Galan	OECD/NEA
Peter Gowin	Germany
Akira Omoto	Japan
Franklin E. Osaisai	Nigeria
Viacheslav A. Pershukov	Russian Federation
Nawal Prinja	UK
Internal Members:	
Thomas Alfstad	IAEA
Sayed Ashraf	IAEA
Tomas Beas	IAEA
Andrea Borio	IAEA
Frank Bruhn	IAEA
Dobrica Savić	IAEA
Zaven Hakopov	IAEA
João Alberto Osso	IAEA
Benoit Lepouze	IAEA
Shahid Mallick	IAEA
Vladimir Michal	IAEA
Stefano Monti	IAEA
Pekka Pyy	IAEA
Alex Stanculescu	IAEA
Scientific Secretaries:	
John de Grosbois	IAEA
Maria Elena Urso	IAEA

✠Names are listed alphabetically in each section.

IAEA Conference Secretariat

Nuclear Knowledge Management Section (NKMS)
International Atomic Energy Agency
Vienna International Centre, PO Box 100
1400 Vienna, Austria
NKM-Conference@iaea.org

Scientific Secretaries:

Mr John de Grosbois

Ms Maria Elena Urso

Administrative Support:

Ms Anna Amiranda

Mr Alessandro Bellelli

Ms Andrea Kamara

Mr Daniil Popovich

Exhibitions:

Ms Keiko Hanamitsu

Conference Services:

Division of Conference and Document Services (MTCD)
International Atomic Energy Agency
Vienna International Centre, PO Box 100
1400 Vienna, Austria

Conference Coordination:

Ms Karen Morrison

Ms Julie Zellinger

Exhibitions:

Ms Viktorija Joranovska

Working Language & Resolutions

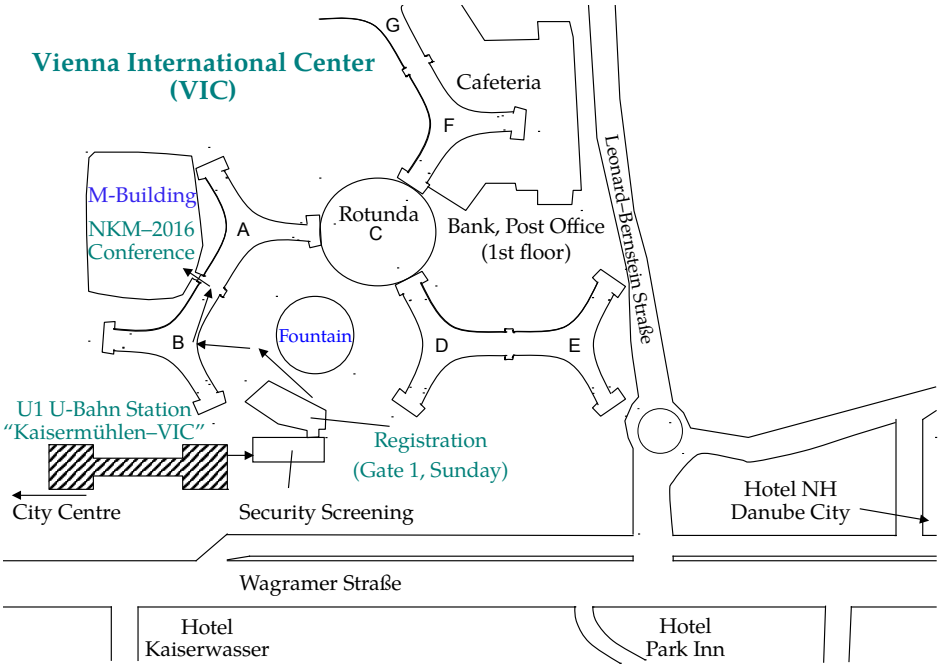
Working Language: English. No simultaneous interpretation will be provided.

Resolutions: No resolutions may be submitted for consideration on any subject; no votes will be taken.

Conference Location

International Atomic Energy Agency (IAEA)
Wagramer Str. 5, 1220 Vienna, Austria

M–Building Conference Rooms: M0E (Ground Floor) Press Room
M01 (First Floor) Board Room B/M1
M01 (First Floor) Room M3
M02 (Upper Floor) Board Room A



Wireless Internet

Public access WiFi is available throughout the IAEA buildings. Select access point WLAN-GUEST and the connection will be automatic: there is no password.

Exhibits

Exhibits will be located in M–Building, on floors M0E, M01, and M02. Participants are encouraged to view the exhibits during the hosted coffee breaks. The following (alphabetically listed) organizations and companies will have information stands during the conference.

- Bay Zoltán Nonprofit Ltd. for Applied Research Engineering Division (BAY-ENG)
- BYG Systems
- CNNC Beijing Research Institute of Uranium Geology (BRIUG)
- CORYS
- East China University of Technology
- European Nuclear Education Network Association (ENEN)
- Harbin Engineering University
- Hitachi-GE Nuclear Energy, Ltd. (HGNE)
- IHS Markit
- International Youth Nuclear Congress (IYNC)
- iUS, Institut für Umwelttechnologien und Strahlenschutz GmbH and Gesinn.it GmbH & Co KG
- Korea, Republic of
- L-3 Communications MAPPS Inc.
- Nuclear Engineering, Ltd. (NEL)
- Nuclear Knowledge Management Institute (NKMI)
- SCK•CEN: Studiecentrum voor Kernenergie / Centre d'Étude de l'énergie Nucléaire
- Shanghai Nuclear Engineering Research and Design Institute (SNERDI)
- SIET S.p.A.
- SkillDict Ltd.
- State Atomic Energy Corporation "ROSATOM"
- TECNATOM
- Thomas Thor Associates
- United Arab Emirates (UAE)
- University of South China
- World Nuclear Association/World Nuclear University (WNA/WNU)

The fact that the IAEA has provided facilities for exhibiting equipment and products at the conference does not imply that it endorses the equipment and products.

Hosted Coffee Breaks

Refreshments will be offered throughout the conference at the designated coffee breaks. Participants are invited not only to enjoy the refreshments, but to profit from the posters, as well as the exhibition stands.

Coffee, tea, and snacks can be purchased at any time from the M–Building Snack Bar.

Conference Proceedings

Conference proceedings will be made available for all participants as soon as possible after the conference. Only papers that are presented at the conference will be included.

Posters

All posters will be displayed for the full duration of the conference in the M–Building, floors M0E and M01. See the list on page 34 for poster details. Authors are asked to be available at their posters for discussions with interested participants at the following times:

Day	Time	Posters
Monday	17:00–18:00	All posters
Tuesday	10:30–11:00 15:00–15:30	Even numbered posters, e.g., Post-02, Post-04, Post-06,· · · , Post-68.
Thursday	10:30–11:00 15:00–15:30	Odd numbered posters, e.g., Post-01, Post-03, Post-05,· · · , Post-69.

Participants are encouraged to view the posters during the hosted coffee breaks.

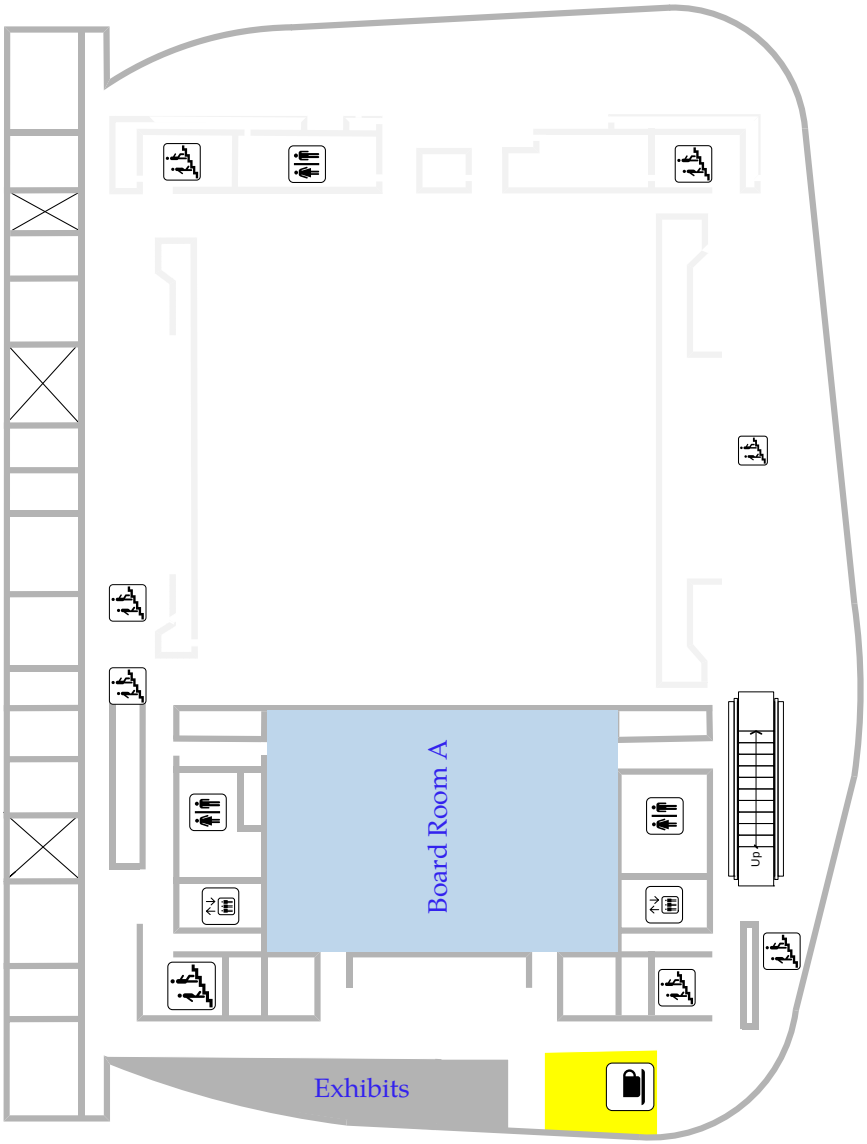
Book of Abstracts

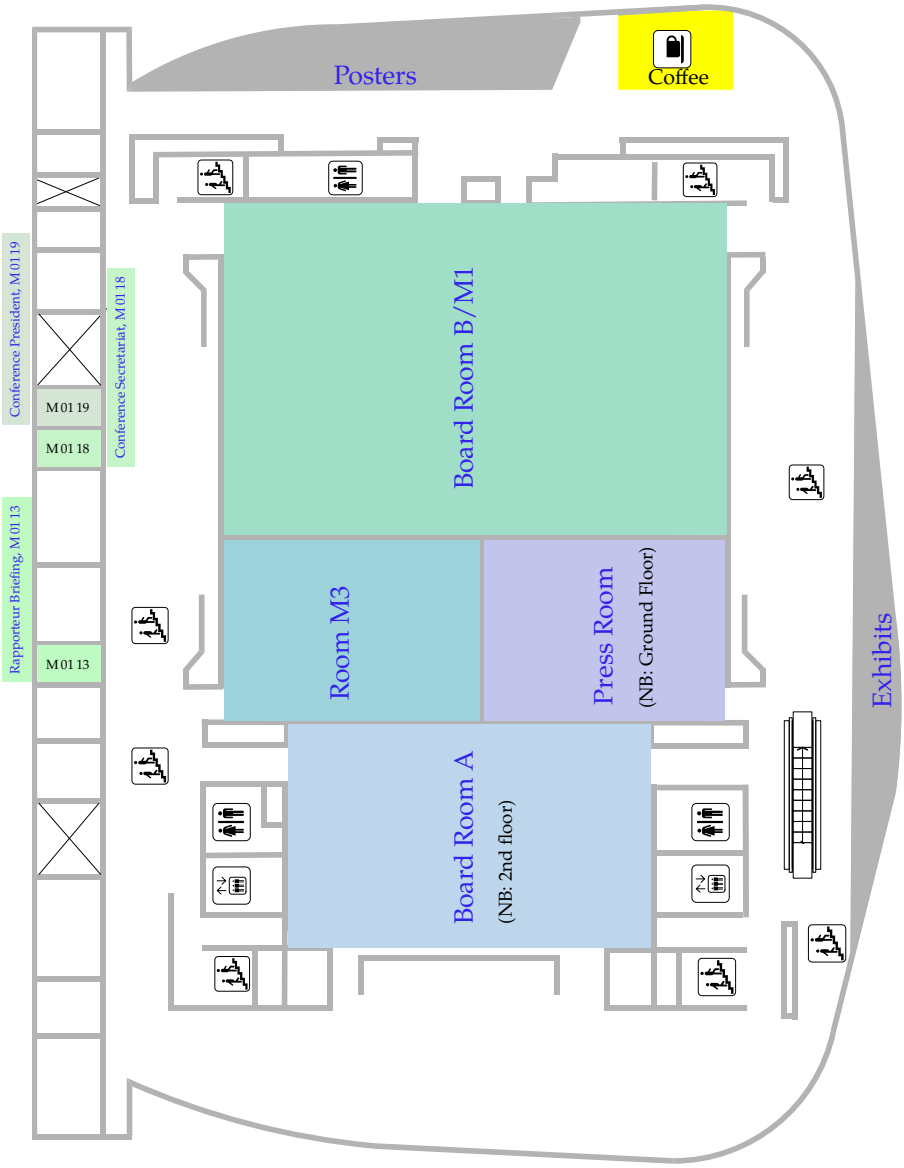
This book contains all contributions and abstracts to be presented at the conference. Abstracts have been edited for IAEA style uniformity (with thanks to Taramati Desai, NKMS). The views expressed remain the responsibility of the named authors. No responsibility is held by the organizers for any material reproduced, or linked, in this book.

Abbreviations

AAEA	Arab Atomic Energy Agency
ANENT	Asian Network for Education in Nuclear Technology
BARC	Bhabha Atomic Research Centre, India
CAEA	China Atomic Energy Authority
CL	Closing Session
CNEN	National Nuclear Energy Commission of Brazil
D&ER	Decommissioning and Environmental Remediation
E&T	Education and Training
EC	European Commission
ENEN	European Nuclear Education Network
EU	European Union
FORATOM	European Atomic Forum, Brussels
HRD	Human Resource Development
IAEA	International Atomic Energy Agency
IMS	Integrated Management System
IUVNEI	International Union of Veterans of Nuclear Energy and Industry
JAEA	Japan Atomic Energy Agency
KAERI	Korea Atomic Energy Research Institute
KM	Knowledge Management
LANENT	Latin American Network for Education in Nuclear Technology
NECSA	South African Nuclear Energy Corporation
NKM	Nuclear Knowledge Management
NKMS	Nuclear Knowledge Management Section, Department of Nuclear Energy, IAEA
OECD	Organisation for Economic Co-operation and Development
OECD/NEA	Organisation for Economic Co-operation and Development/Nuclear Energy Agency
OP	Opening Session
PL	Plenary Session
TCoP	Technical Community of Practice
TS	Technical Session
TSec	Technical Secretary (Assistant to the Session Chair)
WNA	World Nuclear Association
WNU	World Nuclear University


M0E.79
Satellite
Press Room
M0E.69
Briefing
M0E.68
Briefing
M0E.67
Briefing
Exhibits and Posters
Snack Bar
Cloak Room
Registration
&
Information
A–Building
&
Rotunda


Board Room A
Up
Exhibits


Posters
Coffee
Board Room B/M1
Room M3
Press Room
(NB: Ground Floor)
Board Room A
(NB: 2nd floor)
Exhibits
Conference President, M01 19
Conference Secretariat, M01 18
Rapporteur Briefing, M01 13
M01 19
M01 18
M01 13

Day Date	Monday Nov. 7, 2016	Tuesday Nov. 8, 2016	Wednesday Nov. 9, 2016	Thursday Nov. 10, 2016	Friday Nov. 11, 2016
09:00 — 10:30	08:00 Registration 10:00 Opening OP	Parallel Sessions TS01 TS02	Parallel Sessions TS07 TS08	Parallel Sessions TS14 TS13	Keynote Plenary PL07 KM: Looking Forward
		Posters (even)	Coffee, Posters and Exhibits	Posters (odd)	
11:00 — 12:30	Keynote Plenary PL01 Challenges & Approaches	Plenary Session PL04 HRD	Plenary Session PL05 Regulatory Compliance	Plenary Session PL06 Records and Data	Plenary Session PL08 12:00 Closing CL
	Lunch: 12:30–14:00				
14:00 — 15:00	Keynote Plenary PL02 Challenges & Approaches	Parallel Session TS03 TS04 TS05 TS06	Parallel Session TS09 TS10 TS11 TS12	Parallel Session TS15 TS16 TS17 TS18	14:00–17:00 – Satellite Events – Visit to Triga
		Posters (even)	Coffee, Posters and Exhibits	Posters (odd)	
15:30 — 16:30	Plenary Session PL03 Challenges & Approaches	TS03 TS04 TS05 TS06	TS09 TS10 TS11 TS12	TS15 TS16 TS17 TS18	
16:30 — 18:00	17:00 Posters (all)	Satellite Events Posters & Exhibits	Satellite Events Posters & Exhibits	Satellite Events Posters & Exhibits	
18:00 —	17:30 Reception		Social Dinner (Not Hosted)	Vienna Tours	

Mon

REG 08:00–16:00 Conference Registration

Venue: *Entrance M–Building*

OP 10:00–11:00 Opening Plenary

Venue: *Board Room B/M1*

Time	Id	Presenter		
10:00	OP-01	Y. Amano	IAEA	
10:10	OP-02	V. Pershukov	Russian Fed.	
10:20	OP-03	J. Gulliford	OECD/NEA	KM: Problems and Opportunities
10:35	OP-04	H. Alkaabi	UAE	UAE's Experience with Nuclear Knowledge Management

PL01 11:00–12:30 KM Challenges and Approaches

Venue: *Board Room B/M1*

Chair: **Vyacheslav Pershukov (Russian Fed.)**

Time	Id	Presenter		
11:00	PL01-01	J. Silvennoinen	Finland	Knowledge Management of a NPP Project: Olkiluoto 3 Case
11:15	PL01-02	M. Zheng	China, P. R.	Intelligent Digitized Design Systems for the Management of Design Knowledge Related to Nuclear R&D Institutes
11:30	PL01-03	S.-K. Oh	Korea, Rep. of	KINGS Model: Achieving Sustainable Change in Nuclear Engineering Education for the Post-COP21 Era
11:45	PL01-04	C. Wächter	Germany	Learning Organizations in High Reliability Industries
12:00	PL01-05	E. Griffin	Canada	Knowledge Management in the Wider World: Independence or Integration?
12:15		Q&A Session with all Presenters		

Lunch: 12:30–14:00

PL02 14:00–15:00 KM Challenges and Approaches

Venue: *Board Room B/M1*
Chair: **Franklin Osaisai (Nigeria)**

Time	Id	Presenter		
14:00	PL02-01	L. Prusak	USA	The Major Causes for the Failure of Knowledge Management Projects
14:15	PL02-02	H. Goddar	Germany	To Be (Respected) or Not to Be: How German SMEs/Universities Protect their Inventions
14:30	PL02-03	J. Liebowitz	USA	Successes and Failures of Knowledge Management: An Investigation into Knowledge Management Metrics
14:45		Q&A Session with all Presenters		

Break: 15:00–15:30

PL03 15:30–17:00 KM Challenges and Approaches

Venue: *Board Room B/M1*
Chair: **Franklin Osaisai (Nigeria)**

Time	Id	Presenter		
15:30	PL03-01	J. de Grosbois	IAEA	IAEA Perspectives and Programme on Nuclear Knowledge Management
15:45	PL03-02	S. Huffeteau	France	Applying Digital Technologies to Strengthen Nuclear Safety
16:00	PL03-03	A. Sapozhnikov	Russian Fed.	Regulatory Framework for the Maintenance of the Relevant Knowledge in the Atomic Energy Use Sector
16:15	PL03-04	A. Johnson	UK	Innovative Approaches to Knowledge Management in EDF Energy Generation
16:30	PL03-05	Z. Mazi	IAEA	The IAEA's Corporate Knowledge Management System
16:45		Q&A Session with all Presenters		

17:00–18:00 Poster Session

Venue: *M0E & M01*

17:30–19:30 Welcome Reception

Venue: *M0E & M01*

TS01 09:00–10:30 Human Resource Development

Venue: *Board Room B/M1*
Chair: **Mingguang Zheng (China)**
TSec: David Drury (IAEA)

Time	Id	Presenter		
09:00	TS01-01	R. C. Kurwitz	USA	Systems Engineering Initiative: Undergraduate Education Enhancement in a Regional Education Network
09:15	TS01-02	J. de Grosbois	IAEA	International Nuclear Management Academy Requirements for University Master's Programmes in Nuclear Technology Management
09:30	TS01-03	A. Solodov	UAE	Khalifa University Initiatives in Human Resource Development for the UAE Nuclear Energy Program
09:45	TS01-04	F. Ruiz	Spain	Nuclear Knowledge Creation and Transfer in Enriched Learning Environments: A Practical Approach
10:00	TS01-05	J. Blomgren	Sweden	Nuclear Business Acumen Training for Executives

Break: 10:30–11:00

TS02 09:00–10:30 KM for Operating Nuclear Facilities

Venue: *Board Room A*
Chair: **Henri Pelin (WNA)**
TSec: Pekka Pyy (IAEA)

Time	Id	Presenter		
09:00	TS02-01	N. Sekimura	Japan	Roadmap on R&D and Human Resource for Light Water Reactors Safety and Knowledge Management: Status in Japan
09:15	TS02-02	J. Hopwood	Canada	Case Study: Nuclear Knowledge Management Topics Arising from Facility Refurbishment in Canada
09:30	TS02-03	V. Kupriyanov	Russian Fed.	A Semantic-Based Approach for Preserving Operational Experience of Nuclear Installations
09:45	TS02-04	C. M. Valache	Romania	Cernavoda NPP Knowledge Transfer
10:00	TS02-05	V. Sudakov	Slovakia	Aspects of Knowledge Management Programme Implementation into Management System of NPP Operator
10:15		Q&A Session with all Presenters		

Break: 10:30–11:00

PL04 11:00–12:30 Human Resource Development

Venue: *Board Room B/M1*
Chair: **Mingguang Zheng (China)**
TSec: David Drury (IAEA)

Time	Id	Presenter		
11:00	PL04-01	D. Heler	USA	Knowledge Management Impacts on Organizational Proficiency in a Changing Demographic Nuclear Industry
11:15	PL04-02	V. Karezin	Russian Fed.	Tournament of Young Professionals: Knowledge Transfer Environment Built on Technology of Crowdsourcing to Advance Young & Best for the Russian Nuclear Industry
11:30	PL04-03	N. Prinja	UK	Knowledge Management at AMEC Foster Wheeler: A Case Study on Managing 'Age Gap' and 'Skills Gap' in Nuclear Industry
11:45		**Panel Discussion**		***Human Resource Development and Capacity Building***
		Chair: Mingguang Zheng (China)		
		Co-Chair: David Drury (IAEA)		
		Panellists: Jouni Silvennoinen (Finland), Valery Karezin (Russian Fed.), Nawal Prinja (UK), David Heler (USA), Richard Cable Kurwitz (USA)		

Lunch: 12:30–14:00

Tue

TS03 14:00–16:30 Training and Competency Development

Venue: *Board Room B/M1*
Chair: **David Heler (USA)**
TSec: Nawal Prinja (UK)

Time	Id	Presenter		
14:00	TS03-01	J. Hopwood	Canada	Industry–University Collaboration for Research and Education
14:15	TS03-02	C. Thomas	Netherlands	A Case Study of the Global Group for Sharing Knowledge and Efforts in Human Resources within the Nuclear Industry
14:30	TS03-03	V. Gagnon	Canada	Enhancing Nuclear Training with 3D Visualization
14:45		Q&A Session with all Presenters		
		Break: 15:00–15:30		
15:30	TS03-04	T. M. Muguet-Haisman	Brazil	Bridging Nuclear Knowledge to a Brazilian Decree: A Case Study at the National Nuclear Energy Commission (CNEN)
15:45	TS03-05	T. Petrova	Bulgaria	Implementation of CLP4NET in Bulgaria
16:00	TS03-06	S. Gardelliano	Argentina	Sustainable Transformation & Effective Competency Management Practices in Nuclear Organizations
16:15		Q&A Session with all Presenters		

***Satellite Events*: 16:30–18:00**

TS04 14:00–16:30 KM for Operating Nuclear Facilities

Venue: *Board Room A*
Chair: **Michael Marler (USA)**
TSec: Zoltan Pasztory (Hungary)

Time	Id	Presenter		
14:00	TS04-01	M. Gladyshev	IAEA	Plant Information Models: Supporting the Management of Design Knowledge throughout the Nuclear Power Plant Life Cycle
14:15	TS04-02	T. Ihara	Japan	Establishment of Systematic Design Control/Configuration Management Processes to Enhance Engineering Capability
14:30	TS04-03	M. Marler	USA	Knowledge Management and Organizational Proficiency with NPP
14:45	TS04-04	T. Mochida	Japan	Plant Engineering and Construction System with Knowledge Management: A Case Study in NPP Construction in Hitachi-GE NE
		Break: 15:00–15:30		
15:30	TS04-05	H. Pelin	WNA	Design Knowledge and Design Change Management in the Operation of Nuclear Fleets
15:45	TS04-06	T. Gysel	Switzerland	Managing for Excellence
16:00	TS04-07	S. J. Khurshid	Pakistan	Nuclear Knowledge Management: Challenges and Approaches — Pakistan's Scenario
16:15		Q&A Session with all Presenters		

***Satellite Events*: 16:30–18:00**

Tue

TS05 14:00–16:30 KM for Nuclear Regulatory Compliance

Venue: *Room M3*
Chair: **Javier Dies (Spain)**
TSec: Shahid Mallick (IAEA)

Time	Id	Presenter		
14:00	TS05-01	V. Szabó	Slovakia	Implementation of Knowledge Management as Process to Management System of ÚJD SR
14:15	TS05-02	J. Couturier	France	Implementation of a Global Knowledge Management System at IRSN
14:30	TS05-03	S. Al Mansoori	UAE	Establishment and Development of the Nuclear Knowledge Management Program in FANR: Case Study
14:45	TS05-04	E. Volkov	Russian Fed.	Knowledge Management Tools in Application to Regulatory Body Activity
		Break: 15:00–15:30		
15:30	TS05-05	B. Bernard	Belgium	Assessing the Risk of K-loss within the Belgian TSO
15:45	TS05-06	M. Oprisescu	Romania	CNCAN Knowledge Management Process and Tools in Support of Sustainable Development of Regulatory Competences
16:00	TS05-07	Y. H. Nurwidi Astuti	Indonesia	Organizational Learning, Building and Sustaining Core Competencies: Knowledge Management Initiatives on Inspection and Regulatory Enforcement in BAPETEN Indonesia
16:15		Q&A Session with all Presenters		

***Satellite Events*: 16:30–18:00**

TS06 14:00–16:30 KM in Nuclear Technology Research, Development and Innovation

Venue: *Press Room*
Chair: **Roger Garbil (EU)**
TSec: Andrea Borio di Tigliole (IAEA)

Time	Id	Presenter		
14:00	TS06-01	M. Coeck	Belgium	Education and Training Activities of the SCK•CEN Academy for Nuclear Science and Technology
14:15	TS06-02	D. Wootan	USA	Case Study of Lessons Learned from the Operation of the Fast Flux Test Facility
14:30	TS06-03	N. Belenkaya	Russian Fed.	Collaboration in Science and Innovation: IP Considerations
14:45	TS06-04	Y. Nagakoshi	Japan	University Research Collaborations on Nuclear Technology: A Legal Framework
		Break: 15:00–15:30		
15:30	TS06-05	E. Kulikov	Russian Fed.	Experience in Implementation of "Nuclear Knowledge Management" Course at the National Research Nuclear University MEPhI
15:45	TS06-06	R. Mayer	Argentina	Instituto Balseiro Role in Nuclear Knowledge Preservation and Advancement in Argentina
16:00	TS06-07	G. Tikhomirov	Russian Fed.	Strategic Academic Unit as a Synergy between Education, Research and Innovations and Its Position in Knowledge Life Cycle
16:15		Q&A Session with all Presenters		

***Satellite Events*: 16:30–18:00**

TS07 09:00–10:30 KM for D&ER, and Radioactive Waste Management

Venue: *Board Room B/M1*
Chair: **Leonel Lagos (USA)**
TSec: Vladimir Michal (IAEA)

Time	Id	Presenter		
09:00	TS07-01	J. Mokka	Finland	Organizational Challenge of Posiva's Final Disposal Programme: From an R&D Organization to a Project Organization, and Further Towards an Operational Organization
09:15	TS07-02	R. Haddal	USA	Long-Term Information Management (LTIM) of Safeguards Data at Geological Repositories
09:30	TS07-03	F. Borrmann	Germany	A Lifecycle Knowledge Management Approach to Support Decommissioning and Environmental Remediation Projects
09:45	TS07-04	R. Radford	UK	Changing the Focus of Knowledge Management for Nuclear Decommissioning
10:00	TS07-05	E. Kreyßig	Germany	Remediation of a Former Uranium Mining and Milling Area and Its Knowledge Management: An Overview
10:15		Q&A Session with all Presenters		

Break: 10:30–11:00

TS08 09:00–10:30 KM for New Build Projects & Programmes

Venue: *Board Room A*
Chair: **Ron Cain (USA)**
TSec: Benoît Lepouzé (IAEA)

Time	Id	Presenter		
09:00	TS08-01	V. Pershukov	Russian Fed.	Role of Nuclear Knowledge Infrastructure in Building and Developing a Nuclear Industry
09:15	TS08-02	R. Cain	USA	Developing Sustainable Organizations for New Nuclear Power Countries through Knowledge Management
09:30	TS08-03	B. Mougel	France	French Experience in the Area of Knowledge Management for New Nuclear Projects
09:45		**Panel Discussion**		***Newcomer Countries: Transfer of Knowledge from Vendor/Technology Suppliers to Relevant Stakeholders***
	Chair:	Ron Cain (USA)		
	Co-Chair:	Benoît Lepouzé (IAEA)		
	Panellists:	Jouni Silvennoinen (Finland), Bruno Mougel (France), Ioan Rotaru (Romania), Vyacheslav Pershukov (Russian Fed.), Henry Berry (UAE), Melanie Sachar (UK)		

Break: 10:30–11:00

PL05 11:00–12:30 KM for Nuclear Regulatory Compliance

Venue: *Board Room B/M1*
Chair: **Javier Dies (Spain)**
TSec: Shahid Mallick (IAEA)

Time	Id	Presenter		
11:00	PL05-01	F. Castello	Spain	4th ASEM Seminar on Knowledge Management to Enhance Nuclear Safety
11:15	PL05-02	J. Turner	UK	Nuclear Regulator Knowledge Management in a Dynamic Nuclear Industry Environment
11:30	PL05-03	S. Mallick	IAEA	Knowledge Management for Safety Regulators: Cooperation to Achieve a Much Needed Product
11:45		**Panel Discussion**		***Understanding the Importance of KM in Ensuring Nuclear Safety***
	Chair:	Javier Dies (Spain)		
	Co-Chair:	Shahid Mallick (IAEA)		
	Panellists	Benoît Bernard (Belgium), Oszvald Glockler (Hungary), Alexander Sapozhnikov (Russian Fed.), Turky Al Mesmari (UAE), John Turner (UK), Ki-Sig Kang (IAEA)		

Lunch: 12:30–14:00

Wed

TS09 14:00–16:30 Nuclear Education and Outreach

Venue: *Board Room B/M1*
Chair: **Jerry Hopwood (Canada)**
TSec: Won-Jae Park (Korea, Rep. of)

Time	Id	Presenter		
14:00	TS09-01	R. Garbil	EU	EURATOM Success Stories in Facilitating Pan-European E&T Collaborative Efforts
14:15	TS09-02	L. Lagos	USA	The Art of Knowledge Management and Knowledge Transfer to the New Generation of Scientists, Engineers, and Technicians Entering the Workforce
14:30	TS09-03	V. Segovia	USA	Outreach: Key to Sustainable Nuclear Knowledge Management
14:45	TS09-04	S. Ismail	Austria	Initiative for Energy Education at the Level of Secondary Schools: Case Study
		Break: 15:00–15:30		
15:30	TS09-05	Y. Sun	China, P. R.	Nuclear Education and Training at Tsinghua University to Meet the Need of the Rapidly Developing Industry
15:45	TS09-06	P. Kockerols	EU	Education and Training in Decommissioning: Needs, Opportunities and Challenges
16:00	TS09-07	A. Choukri	Morocco	Educational Approach to Maintain a Suitable Knowledge and Expertise in Nuclear Field: Case of Morocco
16:15		Q&A Session with all Presenters		

***Satellite Events*: 16:30–18:00**

TS10 14:00–16:30 KM for New Build Projects & Programmes

Venue: *Board Room A*
Chair: **Ron Cain (USA)**
TSec: Benoît Lepouzé (IAEA)

Time	Id	Presenter		
14:00	TS10-01	C. Bright J.-F. Schifflers	UK Belgium	Laying the Foundations for a Knowledge Management Strategy in the Context of a Nuclear New-Build Project
14:15	TS10-02	M. Sachar	UK	EDF Energy Nuclear New Build: Lessons Learned in Knowledge Management
14:30	TS10-03	M. Kandil	Egypt	Safety Culture for Regulator Competence Management in Embarking States
14:45	TS10-04	P. Gain	France	Contribution of Full-Scope Simulator Development Project to the Dissemination of Nuclear Knowledge within New-Build–Project Teams
		Break: 15:00–15:30		
15:30	TS10-05	E. Bajramovic D. Gupta	Germany Germany	Asset Management as a Precondition for Knowledge Management
15:45	TS10-06	P. Akusu	Nigeria	Strategic Institutionalization of NKM in Newcomer NP Programme: The Nigeria Experience
16:00	TS10-07	A. Cilliers	South Africa	Development of the South African Network for Nuclear Education, Science and Technology
16:15		Q&A Session with all Presenters		

***Satellite Events*: 16:30–18:00**

TS11 14:00–16:30 KM for D&ER, and Radioactive Waste Management

Venue: *Room M3*
Chair: **Franz Borrmann (Germany)**
TSec: Vladimir Michal (IAEA)

Time	Id	Presenter		
14:00	TS11-01	P.-H. de La Codre	OECD/NEA	Key Information File for Radioactive Waste Repositories
14:15	TS11-02	A. Smetnik	Russian Fed.	Application of SAFRAN Tool for Knowledge Management at the Decommissioning Stage of Nuclear Facilities
14:30	TS11-03	D. V. F. M. Rey-Silva	Brazil	KM Actions on the Licensing Process of the Caldas Uranium Mining and Milling Site (Brazil)
14:45	TS11-04	M. Tezuka	Japan	Approaches of Knowledge Management System for the Decommissioning of Nuclear Facilities
		Break: 15:00–15:30		
15:30	TS11-05	V. S. Slugen	Slovakia	European Decommissioning Academy
15:45	TS11-06	T. Inoue	Japan	Knowledge Management Learned from Decommissioning and Environmental Remediation after an Unexpected Radiological Contamination Occurred at Fukushima Dai-ichi NPP Accident
16:00	TS11-07	R. Kritskiy	Russian Fed.	The IAEA Regional Training Courses Implementation: Lessons Learned and Paving the Way Forward
16:15		Q&A Session with all Presenters		

***Satellite Events*: 16:30–18:00**

TS12 14:00–15:00 KM Methodologies and Implementation Approaches

Venue: *Press Room*
Chair: **Yanko Yanev (Austria)**
TSec: Natalya Belenkaya (Russian Fed.)

Time	Id	Presenter		
14:00	TS12-01	S. Konecni	IAEA	Knowledge Management in the IAEA Department of Safeguards
14:15	TS12-02	Z. Pasztory	Hungary	Transfer of Knowledge Management Methods and Tools to and from the Nuclear Industry
14:30	TS12-03	N. Tikhonov	Russian Fed.	Innovative Activities to Ensure Safety: Strategy and Plans to Implement Nuclear Knowledge Management
14:45		Q&A Session with all Presenters		
		Break: 15:00–15:30		
15:30	TS12-04	C. L. Vetere	Argentina	Proposing a Balance Scored Card to Communicate and Follow a NKM Implementation
15:45	TS12-05	S. Barnes	Canada	Aligning People, Process, and Technology in KM
16:00	TS12-06	A. Andrianov	Russian Fed.	Dynamic Modelling of a Knowledge Management System Evolution for a Technological Corporation
16:15		Q&A Session with all Presenters		
		***Satellite Events*: 16:30–18:00**		

TS13 09:00–10:30 KM Methodologies and Implementation Approaches

Venue: *Board Room A*
Chair: **Larry Prusak (USA)**
TSec: Monica Sbaffoni (IAEA)

Time	Id	Presenter		
09:00	TS13-01	J. Sheldon	Switzerland	Nuclear Knowledge Capture and IEC Standards
09:15	TS13-02	Y. Yanev	Austria	Introducing Knowledge Management into the Integrated Management System of Nuclear Organizations
09:30	TS13-03	D. Couvreur	Belgium	How to Support the Integrate Management System through an Enterprise Content Management Platform?
09:45	TS13-04	I. Mitchell	UK	Drive Cost Reduction, Increase Innovation and Mitigate Risk with Advanced Knowledge Discovery Tools Designed to Unlock and Leverage Prior Knowledge
10:00		Q&A Session with all Presenters		

Break: 10:30–11:00

TS14 09:00–10:30 Issues and Approaches for Information, Records and Data Management

Venue: *Board Room B/M1*
Chair: **Timothy Valentine (USA)**
TSec: Dobrica Savić (IAEA)

Time	Id	Presenter		
09:00	TS14-01	Z. Hakopov	IAEA	From Nuclear Information to Knowledge: The Role of INIS
09:15	TS14-02	V. Kuo	Finland	Knowledge, Skills and Competence Modelling in Nuclear Engineering Domain using Singular Value Decomposition (SVD) and Latent Semantic Analysis (LSA)
09:30	TS14-03	V. Kupriyanov	Russian Fed.	Information Seek and Retrieval in Knowledge Management
09:45	TS14-04	L. Costantini	Austria	Exploiting Semantic Search Methodologies to Analyse Fast Nuclear Reactor Nuclear Related Information
10:00	TS14-05	J. M. Galan	OECD/NEA	OECD/NEA Data Bank Activities on Nuclear Knowledge Preservation and Management
10:15		Q&A Session with all Presenters		

Break: 10:30–11:00

PL06 11:00–12:30 Issues and Approaches for Information, Records and Data Management

Venue: *Board Room B/M1*
Chair: **Timothy Valentine (USA)**
TSec: Dobrica Savić (IAEA)

Time	Id	Presenter		
11:00	PL06-01	R. Dasler	Switzerland	CERN Analysis Preservation: A Case Study
11:15	PL06-02	T. Valentine	USA	The Role of the Radiation Safety Information Computational Center (RSICC) in Knowledge Management
11:30	PL06-03	D. Beraha	IAEA	Semantic Technologies for Nuclear Knowledge Modelling and Applications
11:45		**Panel Discussion**		***Innovation on Technologies Supporting KM***
		Chair: Timothy Valentine (USA)		
		Co-Chair: Dobrica Savić (IAEA)		
		Panellists: Emiliano Marmonti (Argentina), Elizabeth Griffin (Canada), David Beraha (IAEA), Habiba Adnan (Malaysia), Gabriella Ivacs (IAEA)		

Lunch: 12:30–14:00

TS15 14:00–16:30 Issues and Approaches for Information, Records and Data Management

Venue: *Board Room B/M1*
Chair: **Elizabeth Griffin (Canada)**
TSec: Zaven Hakopov (IAEA)

Time	Id	Presenter		
14:00	TS15-01	E. Marmonti	Argentina	Digital Repositories of Learning Material as a Support Tool for Knowledge Management and Capacity Building
14:15	TS15-02	R. Jehadeesan	India	IT–Enabled Knowledge Management System for Nuclear R&D Organization
14:30	TS15-03	M. Ciambrella	OECD/NEA	OECD/NEA (Nuclear Energy Agency) RepMet (Radioactive Waste Repository Metadata Management) Initiative
14:45	TS15-04	G. Johnson	USA	Knowledge Management Issues in Research of Historical Severe Accidents
		Break: 15:00–15:30		
15:30	TS15-05	T. Atieh	IAEA	International Nuclear Terminology Repository Platform "INTERP": An Application of Semantic Technologies in the Nuclear Domain
15:45	TS15-06	H. Adnan	Malaysia	Record Management Audit: Nuclear Malaysia's Experience
16:00	TS15-07	V. Jain	India	Content Based Searching for INIS
16:15		Q&A Session with all Presenters		

***Satellite Events*: 16:30–18:00**

TS16 14:00–16:30 KM in Nuclear Technology Research, Development and Innovation

Venue: *Board Room A*
Chair: **Michèle Coeck (Belgium)**
TSec: Stefano Monti (IAEA)

Time	Id	Presenter		
14:00	TS16-01	J. Tanarro Colodron	EU	The Storage of Thermal Reactor Safety Analysis data (STRESA)
14:15	TS16-02	L. Sklenka	Czech Republic	Role of Training Reactor VR-1 in Nuclear Training in National and International Context
14:30	TS16-03	H. Boeck	Austria	Applied Nuclear Knowledge Management in Austria
14:45		Q&A Session with all Presenters		
		Break: 15:00–15:30		
15:30	TS16-04	M. Uesaka	Japan	Staged Introduction of Non-power and Power Nuclear Technologies to Newcomer Countries
15:45	TS16-05	M. D. Hossain	Bangladesh	Nuclear Knowledge Innovations Assimilation: The Impact of Organizational Knowledge Frames and Triple Helix Dynamics of Knowledge Base
16:00	TS16-06	R. Khan	Pakistan	NKM Perspectives of Nuclear Education in Pakistan
16:15		Q&A Session with all Presenters		
		***Satellite Events*: 16:30–18:00**		

TS17 14:00–16:30 KM for Non-power Nuclear Science and Applications

Venue: *Room M3*
Chair: **Roberto Mayer (Argentina)**
TSec: João Osso (IAEA)

Time	Id	Presenter		
14:00	TS17-01	S. Yamashita	Japan	Risk of Thyroid Cancer after the Fukushima Nuclear Power Plant Accident
14:15	TS17-02	P. Bode	Netherlands	An E-learning Tool as Living Book for Knowledge Preservation in Neutron Activation Analysis
14:30	TS17-03	T. Marfak	Morocco	Role of MNRC to Develop Knowledge and Skills in Nuclear Applications
14:45		Q&A Session with all Presenters		
		Break: 15:00–15:30		
15:30	TS17-04	J. M. Rivero Blanco	Cuba	A New Approach for Education and Training of Medical Physicists in Cuba: From University to Clinical Training
15:45	TS17-05	M. Shbaro	Lebanon	Developing Competent Workers through Education and Training: Case Study of the Lebanese Atomic Energy Commission (LAEC)
16:00	TS17-06	A. Botrugno	Italy	Foundations for Knowledge Management Practices for the Fusion Sector
16:15		Q&A Session with all Presenters		

***Satellite Events*: 16:30–18:00**

TS18 14:00–15:00 Networking and Technical Communities of Practice (TCoP)

Venue: *Press Room*
Chair: **Sowagi John (Canada)**
TSec: Valerie Segovia (USA)

Time	Id	Presenter		
14:00	TS18-01	A. Da Silva	Brazil	Development of an Educational Network to Strengthen Education, Training and Outreach in Latin America: LANENT-Latin American Network for Education in Nuclear Technology
14:15	TS18-02	F. Tuomisto	ENEN	The European Nuclear Education Network: Towards Harmonisation of Education, Training, and Transfer of Knowledge
14:30	TS18-03	E. Janisz	FORATOM	ENS and FORATOM Education, Training and Knowledge Management Activities
14:45	TS18-04	Y. Nam	Korea, Rep. of	ANENT Activities for Knowledge Sharing and Dissemination
		Break: 15:00–15:30		
15:30	TS18-05	O. Mignone	Italy	Centers of Excellence Contribution to Knowledge Augmentation
15:45	TS18-06	J. Jesionkowska	Belgium	Collaborative Learning in the Scientific Community of Practice
16:00	TS18-07	H. Zhivitskaya	Belarus	Triangle of Knowledge in the Nuclear Energy
16:15		Q&A Session with all Presenters		

***Satellite Events*: 16:30–18:00**

PL07 09:00–10:30 KM: Looking Forward

Venue: *Board Room B/M1*
Chair: **Vyacheslav Pershukov (Russian Fed.)**

Time	Id	Presenter		
09:00	PL07-01	R. Young	UK	What's Next: The Status of ISO Global KM Standards and the Importance of Managing Knowledge Assets
09:15	PL07-02	A. Jashapara	UK	Challenges for Nuclear Energy Agencies: Maintaining Orthodoxy or Learning from the Most Admired Knowledge Enterprises in the World
09:30	PL07-03	M. Molodchik	Russian Fed.	The Influence of Intellectual Capital on Corporate Performance: Evidence from European Companies over the Period 2004–2014
09:45	PL07-04	J. Sowagi	Canada	Leadership Training for Our Leaders
10:00	PL07-05	M. Lacal	USA	Executive Overview of the Value in Implementing a Knowledge Sharing Culture on Safety and Organizational Effectiveness
10:15		Q&A Session with all Presenters		

Break: 10:30–11:00

PL08 11:00–12:00 KM: Looking Forward

Venue: *Board Room B/M1*
Chair: **Yves Fanjas (France)**

Time	Id	Presenter		
11:00	PL08-01	F. Osaisai	Nigeria	Atomic Energy Commissions as Fulcrums for the Development of National Frameworks for the Building of Pertinent Nuclear Technology Education and Training Programmes: The Nigerian Example
11:15	PL08-02	R. B. Grover	India	Intergenerational Knowledge Transfer
11:30	PL08-03	B. M. Tyobeka	South Africa	Nuclear Knowledge Management as an Essential Enabler for Regulatory Effectiveness and Efficiency
11:45		Q&A Session with all Presenters		

CL 12:00–13:00 Closing Plenary

Venue: *Board Room B/M1*
Chair: **Yves Fanjas (France)**

Time	Id	Presenter		
12:00	CL-01	V. Pershukov	Russian Fed.	Summary of Conference: Findings and Conclusions
12:30	CL-02	DDGs	IAEA	Remarks
12:45	CL-03	M. Chudakov	IAEA	Closing Remarks

Contributed Posters

Venue: *M0E & M01*

All posters will be displayed for the full duration of the conference in the M–Building, floors M0E and M01. Authors are asked to be available at their posters for discussions with interested participants on Monday from 17:00–18:00, and during the coffee breaks on Tuesday (for even-numbered posters) and Thursday (for odd-numbered posters).

Id	Presenter		
Post-01	R. N. Samba	Cameroon	Challenges in Implementing IAEA National Nuclear Safety Knowledge Platforms
Post-02	R. C. Chesori	Kenya	Emerging Challenges in the Development and Management of Nuclear Knowledge in Kenya
Post-03	S. Darmawati	Indonesia	BATAN Activities in Developing Nuclear Knowledge Management
Post-04	S. Barnes	Canada	Knowledge Management: "What If That's Not True?"
Post-05	S. Pleslic	Croatia	How to Develop the Knowledge Management Environment
Post-06	S. Barnes	Canada	Designing a Successful KM Strategy: What You Really Need to Know
Post-07	V. L. Grance Torales	Argentina	Planning and Nuclear Knowledge Management
Post-08	M. S. Sulaiman	Malaysia	Improving Knowledge Preservation Strategy at Organizational Level through Knowledge Loss Risk Assessment (KLRA)
Post-09	J. Tanarro Colodron	EU	The Clearing House on Operating Experience Feedback (CH-OEF)
Post-10	V. Kolomiiets	IAEA	Design Knowledge Management across Nuclear Facility Life-cycle
Post-11	A. Levchenko	Russian Fed.	Transferring Nuclear Knowledge by NPP Simulators Developers
Post-12	U. Ugbor	IAEA	Establishing Sustainable Nuclear Education: Education Capability Assessment and Planning (ECAP) Assist Mission
Post-13	G. L. Pavel	Romania	Building Bridge between End-Users and E&T Organizations, Case Study: Romania
Post-14	U. Ugbor	IAEA	Knowledge Incubation and Collaboration for Science, Technology Adoption, Resourcing and Transfer (KIC-START)
Post-15	S. Bamford	Ghana	Content Development, Presentation and Delivery for eLearning in Nuclear Science and Engineering: Experiences with Emerging Authoring Tools

Id	Presenter		
Post-16	Á. Sánchez-Elvira Paniagua	Spain	Design and Implementation of an Online Course on Nuclear Knowledge Management in Spanish
Post-17	Á. Sánchez-Elvira Paniagua	Spain	Digital Innovation and Nuclear Engineering Education in UNED: Challenges, Trends and Opportunities
Post-18	J. Iqbal	Pakistan	Developing Curriculum of Nuclear Civil Engineering Degree Programme at Graduate Level
Post-19	P. Gao	China, P. R.	Knowledge Transfer and Culture Exchange between HEU and TAMU through a Summer School on Nuclear Power Engineering
Post-20	K. Murakami	Japan	The Role of a Short-Term Education Programme in International Nuclear Human Resource Development and Knowledge Management
Post-21	P. Pengvanich	Thailand	An Approach to Building Capacity for Nuclear Security and Safeguards in Thailand and the Southeast Asian Region
Post-22	A. Dreimanis	Latvia	Human Resource and Nuclear Awareness Development: A Common Synergetic Approach
Post-23	H. Yücel	Turkey	Status of Nuclear Science Education and the Needs for Competency Based Education at the Beginning of Nuclear Power Programme in Turkey
Post-24	K. Yamashita	Japan	Dissemination of National Nuclear-HRD Network for Efficient and Effective N-HRD for NPP-Embarking Countries
Post-25	V. Artisyuk	Russian Fed.	International Cooperation in Nuclear E&T: On the Way to Nuclear Training Harmonization
Post-26			Withdrawn
Post-27	T. T. Nguyen	Vietnam	Nuclear Knowledge Management in Vietnam: Challenges and Approaches
Post-28	V. Gagnon	Canada	Enhancing Nuclear Newcomer Training with 3D Visualization Learning Tools
Post-29	T. K. D. Nguyen	Vietnam	Building a Scientifically Based Knowledge for Operating the Ninh Thuan NPP in Vietnam: Case Study on the Aspects of Water Chemistry
Post-30	M. Imran	Pakistan	Managing Knowledge for Operators of Chashma Nuclear Power Generating Station (CNPGS) at Chashma Centre of Nuclear Training (CHASCENT)
Post-31	F. Kungurov	Uzbekistan	Decommissioning Activities at IIN-3M Reactor of FOTON, Uzbekistan

Id	Presenter		
Post-32	M. Tezuka	Japan	Activities of Knowledge Management for Decommissioning of FUGEN Nuclear Power Station
Post-33	H. S. Park	Korea, Rep. of	Requirement Management between Regulatory Framework and Dismantling Activities for Decommissioning of a Nuclear Facility
Post-34	T. Rakitskaya	Russian Fed.	Knowledge-Based Governance of "Green" Nuclear Energy: the Role of Comprehensive Life-long Models of RW Streams
Post-35	S. Nhleko	South Africa	Case Study: Strategy for the Establishment of the Centre for Nuclear Safety and Security in South Africa
Post-36	E. Volkov	Russian Fed.	Competence Map of Regulatory Body: Personal and Interpersonal Effectiveness Competencies
Post-37	M. Akpanowo	Nigeria	Strategies for Human Capacity Development in Nuclear Safety and Security in the NNRA
Post-38	D. H. Nugroho	Indonesia	Knowledge Management Implementation in P2STPIBN as Internal TSO of BAPETEN
Post-39	N. Saulskaya	Russian Fed.	Knowledge Management in Scientific and Technical Support Organizations for Regulatory Bodies: SEC NRS Experience
Post-40	P. Kohut	USA	Technical Support Organization Knowledge Management for Nuclear Regulatory Support
Post-41	K. Pakdee	Thailand	Initiating Knowledge Management Project in a Regulatory Body in Thailand
Post-42	A. Klepakova	Czech Republic	CORONA ACADEMY, Opportunities for Enhancement of Training Capabilities in VVER Technology
Post-43	A. Sándor	Hungary	Managing Nuclear Knowledge in the Hungarian Atomic Energy Authority
Post-44	A. Apichaibukol	Thailand	Knowledge Management for Enhancing Regulatory Body Capabilities in Thailand
Post-45	P. Ghinea	Romania	Employee Development Capabilities of the Regulatory Authority in the Nuclear Field in Romania
Post-46	Y. H. Nurwidi Astuti	Indonesia	Knowledge Management Implementation In Indonesia Nuclear Energy Regulatory Agency (BAPETEN)
Post-47	M. P. Lopez	Argentina	Selection and Training of Personnel for the New Nuclear Medicine and Radiation Therapy Centre in Bariloche
Post-48	K. Sergieva	Bulgaria	The Academic Curriculum of Medical Radiation Technologists: Continuous Development

Id	Presenter		
Post-49	S. Jovanovic	Montenegro	Knowledge Management for the Application of Radiation Sources in Montenegro
Post-50	M. Coeck	Belgium	Training Activities to Maintain Competences in Nuclear Safety and Security: A Case Study of the Belgian Nuclear Research Centre
Post-51	H. Hwang	Korea, Rep. of	Capacity Building Program for Nuclear R&D Personnel at KAERI
Post-52	H. Lee	Korea, Rep. of	Experience and Know-How Sharing Project at KAERI
Post-53	H. A. Nguyen	Vietnam	Publishing VINATOM Annual Report: A Way for Development, Retention and Sharing of Nuclear Knowledge in the Vietnam Atomic Energy Institute (Case Study)
Post-54	A. Cilliers	South Africa	Improving Industry-Relevant Nuclear-Knowledge Development through Special Partnerships
Post-55	F. Ruiz	Spain	The Spanish CEIDEN Technology Platform: Activities on Knowledge Management
Post-56	F. Reitsma	IAEA	Preservation of the Jülich Research Centre Knowledge in the Field of High Temperature Reactors
Post-57	M. Khoroshev	IAEA	Development of the IAEA's Knowledge Preservation Portals for Fast Reactors and Gas-Cooled Reactors Knowledge Preservation
Post-58	L. Torres	Argentina	Knowledge Management in the Neutronics Group of CAREM Project
Post-59	M. A. Musa	Nigeria	Knowledge Management Initiative at a Nuclear Facility Centre in Nigeria
Post-60	S. Sheik Muhamad	Malaysia	Knowledge Management in Product Development Projects
Post-61	L. Pagano Junior	Brazil	Knowledge Management System in a Nuclear Engineering Organization
Post-62	I. Oviedo Rivero	Cuba	Incorporation of Nuclear Knowledge Management to the Integrated System of Quality and Technological Innovation in CUBAENERGÍA
Post-63	V. Tikhonovsky	Russian Fed.	NPP Information Model as an Innovative Approach to End-to-End Lifecycle Management of the NPP and Nuclear Knowledge Management Proven in Russia
Post-64	M. Yastrebenetsky	Ukraine	Dissemination of Knowledge about NPP Instrumentation and Control Systems
Post-65	T. Atieh	IAEA	Nuclear Knowledge Management Case Studies Catalogue "NKM CSC"

Id	Presenter		
Post-66	L. Dong	China, P. R.	The Information Management Platform on Nuclear Emergency Resources of China
Post-67	T. Atieh	IAEA	Nuclear Accidents Archive Knowledge Organization System Portal "NAAKOS": An Application of Semantic Technologies in the Nuclear Domain
Post-68	Z. Sayfieva	Tajikistan	Activities on Nuclear Knowledge Preservation in Tajikistan
Post-69	S. Mahmoud	Egypt	Confidentiality Enhancement of Highly Sensitive Nuclear Data Using Steganography with Chaotic Encryption over OFDM Channel

Contents

PL: Plenary Sessions

KM: Problems and Opportunities

J. Gulliford[1]

[1]*Organisation for Economic Co-operation and Development, Nuclear Energy Agency (OECD/NEA), 92100 Boulogne-Billancourt, France*

Corresponding Author: J. Gulliford, Jim.Gulliford@oecd.org

The use of nuclear technology and materials for a wide range of industrial, scientific, medical and energy purposes creates a strong need to assure the availability of relevant skills to support their safe and effective use. Whatever the expected future of nuclear power in different countries, there remains a strong need to sustain a high level of nuclear scientific and engineering expertise in order to contribute to and inform a wide variety of policy-making, safety, technological, medical, and industrial activities. The current talent-base in nuclear technology and science has been built in these countries since the 1950s. The pioneering generation is now long retired and the generation they trained during the expansion period of nuclear technology is now also approaching retirement age. While many aspects of the knowledge accumulated during the pioneering period is well preserved through scientific research reports, design documentation and other publications, and reflected in university training programs, there is greater concern about how to sustain the practical science and technology skills and expertise that can only be obtained through challenging activities such as research and advanced technology development projects. The ageing of the general workforce in the nuclear industry, declining student enrolment in science and engineering programs, and the risk of losing accumulated knowledge and experience have drawn attention to the need for better management of nuclear knowledge. Significant effort needs to be made to maintain adequate skilled workforce and attract new employees for long-term sustainability. Addressing these challenges is very difficult for all but the largest and best-funded national programs. Even for these large programs, the opportunities are fleeting and the attractiveness of research project experiences can be mixed. Working together in an international context, countries can achieve a powerful solution to this situation by: 1) providing the unique and exciting opportunity to work as part of a large, multinational, multidisciplinary effort; 2) assuring that research is practical and targeted to solve real-world problems will to help enable emerging scientists and engineers capture state-of-the-art know how; 3) providing diversity of experiences that can be tailored to the personal trajectory of individuals; 4) creating a network of future technical leaders which will be an asset for the international community.

UAE's Experience with Nuclear Knowledge Management

H. Alkaabi[1]

[1] *Ambassador, United Arab Emirates*

Corresponding Author: H. Alkaabi, alkaabi@uae-iaea.org

United Arab Emirates (UAE) has embarked upon a nuclear energy programme as part of the nation's strategy to meet its growing energy demands. At that time, UAE had experience in using radiation-related technologies for medical and industrial purposes, but relatively few citizens were trained in the technologies and management skills needed for an advanced nuclear power sector.

Much effort went into developing relevant strategies and procedures to ensure the success and long-term sustainability of the national program. UAE has committed to an extensive human capacity development and nuclear knowledge management programmes to provide Emiratis with the required nuclear training. Main national nuclear stakeholders in collaboration with domestic and international academic institutions are implementing the national strategy for human resources development. UAE contracted with the Korean suppliers to construct the Barakah nuclear power plant with four advanced nuclear reactors currently under advanced stage of construction, rapidly bringing extensive foreign experience into the country. Today, national nuclear stakeholders have vigorous knowledge management projects designed to maintain and develop capabilities, and to pass on the international experience to a new generation of skilled Emiratis. This paper describes the progress of the UAE's "integrated approach" and outlines future development in the area of nuclear knowledge management.

Knowledge Management of a NPP Project: Olkiluoto 3 Case

J. Silvennoinen[1]

[1]*Teollisuuden Voima Oyj (TVO), Olkiluoto, 27160 Finland*

Corresponding Author: J. Silvennoinen, jouni.silvennoinen@tvo.fi

The Olkiluoto 3 (or OL3) nuclear power plant project in Finland is a multi-billion capital project started in 2004. Despite a number of delays with construction the project is expected to complete commissioning and start-up in the near future. One of the current challenges it faces is to ensure pay-back on the investment, and a key contributing factor will be effective knowledge management (KM) to ensuring the capability to operate, maintain, and if and when necessary, modify the plant. There have been many issues and lessons learned with respect to KM. A good example is the management of the plant's design data during the project. In particular, how to approach the management of design compliance. Understanding the maturity of the design is important, and great care must be taken to assess the scope and impact of design changes. In order to ensure a consistent set of design documentation, great care must be taken to ensure the information content in the design documentation set is clear, concise, consistent, correct, and complete. Information quality is also a challenge. It must be possible to show the design and its implementation are compliant, that the allocation and realization of design requirements is traceable and verifiable. This all requires an intense effort around design document administration, and there is much data and metadata to be properly systematically organized and kept accessible and under configuration control. A prime example would be that of the I&C design compliance management. Another significant KM challenge has been the need to build-up adequate technical competencies to support the plant during start-up and operation. A more critical example is the necessity of having knowledgeable system engineers who understand the functions and safety relevance of the structures, systems and components in detail and can be relied upon to make effective risk-informed decisions as problems are encountered. To achieve this, one of TVO's strategies is building "capability clusters" whereby plant staff are cross-trained and able to act as back-ups for each other. This means a systematic approach to training is targeted at building a cluster of competence. This paper will discuss and highlight these and other key lessons learned with respect to KM on the OL3 new build project.

Intelligent Digitized Design Systems for the Management of Design Knowledge Related to Nuclear R&D Institutes

M. Zheng[1] and W. Minglu[1]

[1] *Shanghai Nuclear Engineering Research and Design Institute (SNERDI), Shanghai 200233, People's Republic of China*

Corresponding Author: M. Zheng, zehngmg@snerdi.con.cn

Nuclear R&D is highly knowledge-intensive. With the rapid advent and development of modern information technology, knowledge management in nuclear industry has been provided with new approaches and possibilities. This article introduces a framework of intelligent digitized design system in nuclear R&D phase and finds answer to knowledge application, internal process optimization, experience feedback and further innovation. This framework utilizing digitalization and informatization finds a way to incorporate the process of the "Socialization, Externalization, Combination, Internalization" (SECI) model which include intelligent design process, integrated design software, smart verification and validation simulation platform, experiment data management platform, online monitoring platform and digital twin nuclear power plant, etc. The following case study gives a clear picture of what and how knowledge management has been performed under this framework. Furthermore, important lessons have been summarized.

KINGS Model: Achieving Sustainable Change in Nuclear Engineering Education for the Post-COP21 Era

S.-K. Oh[1]

[1] *KEPCO International Nuclear Graduate School (KINGS), Ulsan 45014, Republic of Korea*

Corresponding Author: S.-K. Oh, yjkim@konicof.or.kr

In spite of the world nuclear community's systematic and multilateral efforts during the COP21, most of the conference participants were reluctant to acknowledge the value of nuclear as a low-carbon energy source. In fact, the on-going aftermath of the Fukushima nuclear disaster has been overwhelming despite the evidence that there was neither any critical technical flaw nor fatal radiation casualties. This shows that advanced nuclear knowledge failed to resonate with public perception on nuclear energy. In this respect, it is now time to focus on achieving sustainable change in nuclear engineering education for the future.

The KEPCO International Nuclear Graduate School (KINGS) was established to nurture leadership-level nuclear power professionals in the global standard. It affiliates with Korean nuclear industry to achieve three major goals that are also a universal prerequisite for higher education of engineering in the 21st century as follows: "a balance between education and training," "harmony between engineering and managerial skills," and "the application of systems engineering to nuclear power projects." KINGS curriculum requires transdisciplinary coordination among engineering disciplines, engineering specialties, and socioeconomic methods.

Learning Organizations in High Reliability Industries

D. Schwalbe[1] and ***C. Wächter***[1]

[1]*InterPersonis HR Management & Training GmbH, D–65510 Idstein, Germany*

Corresponding Author: D. Schwalbe, d.schwalbe@interpersonis.de

Humans make mistakes. Sometimes we learn from them. In a high reliability organization we have to learn before an error leads to an incident (or even accident). Therefore the "human factor" is most important as most of the time the human is the last line of defense. The "human factor" is more than communication or leadership skills. At the end, it is the personal attitude. This attitude has to be safety minded. And this attitude has to be self-reflected continuously. Moreover, feedback from others is urgently needed to improve one's personal skills daily and learn from our own experience as well as from others.

Knowledge Management in the Wider World: Independence or Integration?

E. Griffin[1]

[1]*Canadian Astronomy Data Centre, NRC Herzberg, Victoria, BC V9E–2E7, Canada*

Corresponding Author: E. Griffin, Elizabeth.Griffin@nrc.cnrc.gc.ca

The management of knowledge is deeply embedded within a complexity of assorted viewpoints, standards, backgrounds, methods, technologies, techniques and objectives. To offer an overview of all that is current in the broad spectrum of global science is therefore a rather tall order. But the place to start is to define what both "we" and "they" mean by the various terminologies, including where they overlap and where they must not overlap. Such differences are a root cause of misunderstandings and mis-statements in any communications between the sciences and how they relate to other fields in the wider world. In this talk we need to begin with knowledge management.

The Major Causes for the Failure of Knowledge Management Projects

L. Prusak[1]

[1]*Lexington, MA 02420, USA*

Corresponding Author: L. Prusak, larryprusak@gmail.com

It is a well-known but disheartening fact that many knowledge management projects either fail outright or do not live up to the expected promises of working with knowledge. Some of the causes of these failed attempts are easy to understand: Macroeconomic changes that can constrain an organization's new project funding; change of ownership or senior management with new ideas and disdain of older projects, and several other forces out of the control of KM managers. However in my experience there are other sources for these failed attempts that are not too difficult to avoid and can make a huge difference in the sustainability and value of knowledge and learning projects. This talk will focus on these—fully aware that there are other disarming factors at work.

To Be (Respected) or Not to Be: How German SMEs/Universities Protect their Inventions

H. Goddar[1]

[1] *Boehmert & Boehmert, Pettenkoferstrasse 22, D-80336 Munich, Germany*

Corresponding Author: H. Goddar, goddar@boehmert.de

The various possibilities to obtain intellectual property rights (IPRs) and in particular patents in certain regions, like Europe, create the chance that an innovator and potential patentee, namely, wishing to protect its technology, e.g., in Europe makes use of various systems in a particularly smart form, as far as cost aspects are concerned. In the following it will be discussed in which way small and medium sized entities (SMEs) in Europe, particularly Germany, as well as universities achieve cost minimization, at the same time guaranteeing the full legal advantages of patent protection in Europe and beyond.

Successes and Failures of Knowledge Management: An Investigation into Knowledge Management Metrics

J. Liebowitz[1]

[1]*Harrisburg University of Science and Technology, Harrisburg, PA 17101, USA*

Corresponding Author: J. Liebowitz, jliebowitz@harrisburgu.edu

In reviewing the literature and industry reports, a number of organizations have approached KM metrics from a balanced scorecard, intellectual capital (e.g., Skandia's intellectual capital navigator), activity-based costing, or other borrowed approaches from the accounting and human resources disciplines. Liebowitz in his edited book, *Making Cents Out of Knowledge Management* (Scarecrow Press, 2008), shows case studies of organizations trying to measure knowledge management success. A few methodologies have examined ways to measure return on knowledge, such as Housel and Bell's knowledge value-added (KVA) methodology (Housel and Bell, 2001). Liebowitz analyzed over 80 publications on knowledge management metrics, whereby KM metrics can be divided into system measures, output measures, and outcome measures.

IAEA Perspectives and Programme on Nuclear Knowledge Management

J. de Grosbois[1]

[1]*International Atomic Energy Agency (IAEA), Vienna, Austria*

Corresponding Author: J. de Grosbois, j.de-grosbois@iaea.org

There are many challenging issues facing Member States with respect to knowledge management. Each country's situation and history with nuclear technology is different and strategic issues and immediate priorities are not the same. Member States recognize nuclear technology is inherently complex and requires advanced specialization and expertise. Maintaining a competent workforce is always of concern, especially in organizations with an aging workforce. Countries making major transitions such as gearing up for new build construction or decommissioning projects face particular challenges. Licensed nuclear facilities operate under a range of different organizational business models. For example, some rely heavily on outsourced and external services, and different approaches are needed to ensure critical knowledge is available and maintained. For countries phasing out nuclear power, critical knowledge must be maintained to ensure decommissioning and environmental remediation of sites is done in a responsible manner. Newcomer countries have the difficult challenge of building up their needed workforce competencies to be ready in time to support construction and commissioning schedules. The capture, preservation, transfer and overall management of design knowledge over the technology lifecycle is another important issue that is needed to ensure both the economics and safety of nuclear facilities over their lifetimes, and is especially important to ensure life extension and refurbishment projects can be implemented cost effectively. This presentation will present an overall perspective of the major knowledge management challenges and issues facing the nuclear sector and provide an overview of the IAEA's nuclear knowledge management programme and initiatives that support Member States in addressing them.

Applying Digital Technologies to Strengthen Nuclear Safety

S. Huffeteau[1] and C. Roy[1]

[1] *Dassault Systèmes, Vélizy-Villacoublay, France*

Corresponding Author: S. Huffeteau, simon.huffeteau@3ds.com

The paper describes how the development of some information technologies can further contribute to the safety of nuclear facilities and their competitiveness. After repositioning the nuclear industry engineering practices in their historical and economic context, the paper describes five engineering practices or use cases widely developed especially in the aerospace industry: requirement management, business process enforcement by digitization of data and processes, facilities configuration management, engineering information unification, and digital licensing.

Information technology (IT) plays a mandatory role for driving this change since IT is now mature enough to handle the level of complexity the nuclear industry requires. While the detailed evaluation of the expecting gains in cost decrease or safety increase can be difficult to quantify, the paper presents illustrative benefits reachable by a development of these practices.

Regulatory Framework for the Maintenance of the Relevant Knowledge in the Atomic Energy Use Sector

A. Sapozhnikov[1]

[1] *Federal Service for Ecological, Technological and Nuclear Supervision "Rostechnadzor", Russian Federation*

Corresponding Author: A. Sapozhnikov, a.sapozhnikov@gosnadzor.ru

In accordance with the Atomic Act of the Russian Federation the employees and workers (personnel) of nuclear industry organisations, who occupy certain positions or perform specific activities in the field of atomic energy use can start to fulfil their duties only after getting a special permit issued by the state safety regulatory authority. Rostechnadzor issues permits for the specified kinds of activities to personal of nuclear facilities, organizations engaged in transportation of nuclear and radioactive materials, and enterprises performing physical protection and account of nuclear materials and radioactive substances. To enforce the provisions of the Atomic Act Rostechnadzor has developed a regulatory system (requirements, procedures and methodology) for continued supervision over the maintenance of the required level of knowledge and adequate understanding of the nuclear safety requirements by the nuclear personnel, depending on the nature of their job duties and work in the sphere of nuclear energy use. The report presents a long-term experience of Rostechnadzor in implementing an effective regulatory system for maintaining an adequate level of knowledge and expertise of personnel of nuclear industry organisations and ensuring a competent workforce in the nuclear energy sector.

Innovative Approaches to Knowledge Management in EDF Energy Generation

A. Johnson[1], P. Robinson[1], and A. Roberts[1]

[1]*EDF Energy, UK*

Corresponding Author: A. Johnson, anthony.johnson@edf-energy.com

Organizational learning is a key discipline in the safe, sustainable operation of civil nuclear fleet. In order to have an effective organizational learning culture a free flow of information is required. To facilitate this free flow of information and ideas EDF Energy Nuclear Generation created the concept of the Organizational Learning Portal (OLP). The OLP was created to remove existing barriers to knowledge sharing and allow easy exchange of information and ideas. To transfer existing data from legacy systems onto the OLP required a considerable effort, to ensure that information and knowledge was preserved and available to recall easily for future use.

The OLP, was designed using the latest 'App' design to promote accessibility, in line with contemporary information portals and applications sites to ensure a positive and intuitive user journey. A key operational use of the OLP is for accelerated learning, after significant events, e.g., reactor Trips or SCRAM. Additional functionality within the OLP allows implementation of video OPEX and cataloguing of information sources. The OLP was recognized in the 2015 Operational and Safety Assessment Readiness Team as a Best Practice.

The IAEA's Corporate Knowledge Management System

Z. Mazi[1]

[1] *International Atomic Energy Agency (IAEA), Vienna, Austria*

Corresponding Author: Z. Mazi, zef.mazi@iaea.org

The International Atomic Energy Agency (IAEA), as the major international organization in the nuclear area, is also a knowledge organization. In order to support Member States in a wide area of activities related to the peaceful uses of nuclear applications, the IAEA works effectively and efficiently and manages the organization's knowledge through a systematic approach to corporate knowledge management (CKM).

During the last decades, several knowledge management mechanisms and tools, which constitute the IAEA's CKM System, have been established and used to manage knowledge at the IAEA. The CKM System aims at providing a coordinated, one-house approach to CKM and its related activities, ensuring that they remain part of results based and quality management activities in the Secretariat, and ultimately enhance the effectiveness and efficiency of programme delivery.

This paper describes the IAEA's CKM System, including the CKM Policy, the CKM Guidelines and the CKM Plan, as well as the main outcomes of the CKM.

Knowledge Management Impacts on Organizational Proficiency in a Changing Demographic Nuclear Industry

D. Heler[1], J. A. Marco[2]

[1]*Nuclear Human Resources Group (NHRG), Phoenix, AZ, USA*
[2]*Palo Verde Nuclear, Arizona Public Service Company, Tonopah, AZ 85354, USA*

Corresponding Author: D. Heler, david@hrc4hr.com

The US nuclear energy industry has focused on workforce development and planning efforts over the past decade in anticipation of a large number of retirements taking place. Efforts by the US nuclear industry to replace retiring workers with younger staff to close the knowledge gap and improve organizational proficiency have started. This is resulting in a bimodal workforce distribution, which means that the industry has two workforce peaks. The 2015 Nuclear Energy Institute (NEI) Workforce Pipeline Survey results illustrate a significant number of experienced and young professionals, with fewer employees in the mid-career age group. This workforce distribution can pose a challenge for US nuclear industry to ensure it has effectively implemented knowledge management elements (People, Process, and Technology) to improve organizational proficiency and maintain critical skill sets. This technical brief will examine how one US nuclear plant performance dropped, which in part was a result of a significant demographic shift in their organizations. In addition, the paper will explore the challenge organizations may have as they undergo demographic changes without proper knowledge management programmes in place.

Tournament of Young Professionals: Knowledge Transfer Environment Built on Technology of Crowdsourcing to Advance Young & Best for the Russian Nuclear Industry

V. Karezin[1], I. Bronnikova[1], and T. Terentyeva[1]

[1]*ROSATOM State Atomic Energy Corporation, Moscow, Russian Federation*

Corresponding Author: V. Karezin, vvkarezin@rosatom.ru

Rosatom being the flagman of the Russian nuclear industry has succession planning as one of the crucial strategic HR objectives. Therefore, it builds different approaches to assure attraction and development of the best and most promising specialists including recent and future graduates. Tournament of young professionals (TEMP) is the corner-stone initiative to select best young professionals in frames of crowdsourcing environment where participants raise the level of professional knowledge, learn to better understand the attitudes of work in the nuclear power industry, compete under the essential tasks of real production value while stakeholders build the culture of knowledge sharing. And the entire scheme rests upon knowledge transfer from the nuclear industry experts to potential hiring pool, applied knowledge accumulation, deep industry involvement and modern Web 2.0 technology capabilities.

Knowledge Management at AMEC Foster Wheeler: A Case Study on Managing 'Age Gap' and 'Skills Gap' in Nuclear Industry

N. Prinja[1]

[1] *AMEC Foster Wheeler, UK*

Corresponding Author: N. Prinja, nawal.prinja@amec.com

This document describes the knowledge management (KM) process that has been developed at the Clean Energy business of AMEC Foster Wheeler plc to address the challenges of the "skills gap" and "age gap" that the nuclear industry is facing and to address the challenge of effectively managing the corporate knowledge within the organization and growing this to maintain class leading competencies.

4th ASEM Seminar on Knowledge Management to Enhance Nuclear Safety

F. Castello[1], A. de los Reyes[1], M. P. Mohd Sobari[2], J. E. Istiyanto[3], P. Faross[4], and A. Delarosa[5]

[1]*Consejo De Seguridad Nuclear, 28040 Madrid, Spain*
[2]*Atomic Energy Licensing Board (AELB), 43800 Dengkil, Selangor, Malaysia*
[3]*Nuclear Energy Regulatory Agency of Indonesia (BAPETEN), Jakarta, Indonesia*
[4]*K&S Consultants AG, 6340 Baar, Switzerland*
[5]*Philippine Nuclear Research Institute (PNRI), Quezon City, Philippines*

Corresponding Author: F. Castello, rpj@csn.es

The 4th Asia-Europe Meeting (ASEM) Seminar on Nuclear Safety was convened in Madrid, Spain on 29th–30th October 2015, hosted by the Spanish Nuclear Safety Council. The seminar's theme was "Knowledge management to enhance nuclear safety", which aimed to continue discussing on nuclear safety to foster Asia-Europe capacity-building and co-operation in nuclear safety. The seminar was attended by representatives from national governments, nuclear regulators, energy companies, radiation protection and nuclear safety authorities, research institutes and universities.

According to such model, proposed by the IAEA, the national capacity building requires an integrated approach based on four pillars: human resources development, education and training, knowledge management and knowledge networking. In this context, Nuclear Knowledge Management (KM) has become a high priority in many countries and international organizations and it has been taken into account to develop and implement specific strategies in ensuring safe and sustainable operation of nuclear facilities.

At national level, a sustainable approach should include the necessary Nuclear Knowledge Management actions to ensure that every actor having a significant role in the national nuclear programmes infrastructure acquires, preserves and improves its corporate and individual knowledge.

Nuclear Regulator Knowledge Management in a Dynamic Nuclear Industry Environment

J. Turner[1]

[1]*Office for Nuclear Regulation, Redgrave Court, Bootle L20 7HS, UK*

Corresponding Author: J. Turner, john.turner@onr.gsi.gov.uk

The paper outlines the experiences to date in developing mature knowledge management within the UK's nuclear regulatory body The Office for Nuclear Regulation (ONR). In 2010 concerns over the loss of knowledge due to the age profile within the organization instigated a review of knowledge management and the development of a knowledge management initiative. Initially activities focused on knowledge capture but in order to move to through life knowledge transfer, knowledge management was then aligned with organizational resilience initiatives. A review of progress highlighted the need to better engage the whole organization to achieve the desired level of maturity for knowledge management. Knowledge management activities now cover organizational culture and environment and all aspects of organizational resilience. Benefits to date include clear understanding of core knowledge requirements, better specifications for recruitment and training and the ability to deploy new regulatory approaches.

During the period of implementing the knowledge management programme ONR undertook several organizational changes in moving to become a separate statutory body. The UK nuclear industry was in a period of increased activity including the planning of new nuclear reactors. This dynamic environment caused challenges for embedding knowledge management within ONR which are discussed in the paper.

Knowledge Management for Safety Regulators: Cooperation to Achieve a Much Needed Product

S. Mallick[1]

[1] *International Atomic Energy Agency (IAEA), Vienna, Austria*

Corresponding Author: S. Mallick, S.Mallick@iaea.org

Knowledge management (KM) has been identified by a number of IAEA documents as one of the key factors that can contribute to the safe and efficient operation of nuclear facilities in Member States. The IAEA Strategic Approaches to Education and Training in Nuclear and Radiation, Transport and Waste Safety identify and underline KM as an important line of action for effective national and organizational strategies in education and training. The capacity building "umbrella concept", developed within the Action Plan in Nuclear Safety, also recognizes KM as one of the main four pillars (Education and Training, Human Resource Development, Knowledge Management and Knowledge Networks) of capacity building.

Within existing IAEA publications, there is currently no specific practical guidance on how to develop and implement KM programmes for regulators. As such, in 2014, the IAEA Steering Committee on Regulatory Capacity Building and Knowledge Management requested the IAEA to develop a publication providing such practical guidance.

The objective of the publication is to provide practical guidance to Member States on how to plan, establish and maintain an effective safety KM programme for regulators of facilities and activities. The report will identify benefits and uses of KM by regulators and will describe how a regulator could use KM in support of its functions.

This presentation will provide an overview of the Knowledge Management for Safety Regulators document while highlighting the cross-departmental cooperation (i.e., NS and NE) used in its development. Furthermore, this presentation will provide insight into the challenges currently being faced by safety regulators vis-à-vis KM programmes and present potential paths forward with respect to the definition of efficient and effective KM indicators.

CERN Analysis Preservation: A Case Study

R. Dasler[1], X. Chen[1], S. Dallmeier-Tiessen[1], A. Dani[1], J. Delgado Fernandez[1], P. Fokianos[1], P. Herterich[1], and T. Simko[1]

[1]*European Organization for Nuclear Research (CERN), Meyrin, Geneva, Switzerland*

Corresponding Author: R. Dasler, robin.dasler@cern.ch

CERN is developing a new service to manage and preserve high-energy physics experimental analysis packages in support of Open Science. This is an ambitious new service that relies heavily on direct engagement with users in each of CERN's experimental groups.

The Role of the Radiation Safety Information Computational Center (RSICC) in Knowledge Management

T. Valentine[1]

[1]*Oak Ridge National Laboratory (ORNL), Oak Ridge, TN 37831, USA*

Corresponding Author: T. Valentine, valentinete@ornl.gov

The Radiation Safety Information Computational Center (RSICC) is an information analysis center that collects, archives, evaluates, synthesizes and distributes information, data and codes that are used in various nuclear technology applications. RSICC retains more than 2,000 packages that have been provided by contributors from various agencies. RSICC's customers obtain access to such computing codes (source and/or executable versions) and processed nuclear data files to promote on-going research, to help ensure nuclear and radiological safety, and to advance nuclear technology. The role of such information analysis centers is critical for supporting and sustaining nuclear education and training programmes both domestically and internationally, as the majority of RSICC's customers are students attending U.S. universities. RSICC also supports and promotes workshops and seminars in nuclear science and technology to further the use and/or development of computational tools and data. Additionally, RSICC operates a secure CLOUD computing system to provide access to sensitive export-controlled modeling and simulation (M&S) tools that support both domestic and international activities. This presentation will provide a general review of RSICC's activities, services, and systems that support knowledge management and education and training in the nuclear field.

Semantic Technologies for Nuclear Knowledge Modelling and Applications

D. Beraha[1], M. Gladyshev[1]

[1]*International Atomic Energy Agency (IAEA), Vienna, Austria*

Corresponding Author: D. Beraha, d.beraha@iaea.org

The IAEA has been engaged in working with Member States to preserve and enhance nuclear knowledge, and in supporting wide dissemination of safety related technical and technological information enhancing nuclear safety. The knowledge organization systems (ontologies, taxonomies, thesauri, etc.) provide one of the means to model and structure a given knowledge domain. The significance of knowledge organization systems (KOS) has been greatly enhanced by the evolution of the semantic technologies, enabling machines to "understand" the concepts described in a KOS, and to use them in a variety of applications. Over recent years semantic technologies have emerged as efficient means to improve access to information and knowledge. The Semantic Web Standards play an important role in creating an infrastructure of interoperable data sources based on principles of Linked Data. The status of utilizing semantic technologies in the nuclear domain is shortly reviewed, noting that such technologies are in their early stage of adoption, and considering some aspects which are specific to nuclear knowledge management. Several areas are described where semantic technologies are already deployed, and other areas are indicated where applications based on semantic technologies will have a strong impact on nuclear knowledge management in the near future.

What's Next: The Status of ISO Global KM Standards and the Importance of Managing Knowledge Assets

R. Young[1]

[1] *Knowledge Associates, Cowley Road, Cambridge, CB4 0WS, UK*

Corresponding Author: R. Young, ronyoung@knowledge-associates.com

Ron Young, CEO of Knowledge Associates International, based in Cambridge UK, is Chair of the BSI KM Standards Committee KMS/1, member of the BSI Asset Management Committee AMS/1 working with ISO 55000, and member of the ISO 30401 workgroup developing a global KM Standard. He will present the benefits, challenges and implications of a global KM standard, from his perspective, and give an update on the ISO/BSI standard development. He will also provide insights into the latest developments with knowledge asset management.

Challenges for Nuclear Energy Agencies: Maintaining Orthodoxy or Learning from the Most Admired Knowledge Enterprises in the World

A. Jashapara[1]

[1]*Royal Holloway, University of London, Surrey, TW20 0EX, UK*

Corresponding Author: A. Jashapara, ashok.jashapara@rhul.ac.uk

Governments recognize that their economic productivity and growth is driven by knowledge, technology and learning; namely the knowledge economy. There are no blueprints on how to best to manage knowledge enterprises and knowledge workers in this new context. This paper examines the knowledge management practices of some international firms to assess how they manage their intangible assets. The firms chosen have all won the Most Admired Knowledge Enterprises (MAKE) awards. They include Ernst&Young (US), Toyota (Japan), World Bank, Infosys (India), Unilever (UK/Netherlands), Honda (Japan), Royal Dutch Shell (UK/Netherlands) and Tata Consultancy Services (India). The focus of the paper is on the practices and real issues encountered by these firms rather than whether they support or challenge current knowledge management theory or orthodoxy. The paper concludes by exploring key lessons learned by these firms and their application to challenges among nuclear energy agencies.

The Influence of Intellectual Capital on Corporate Performance: Evidence from European Companies over the Period 2004–2014

M. Molodchik[1]

[1]*National Research University Higher School of Economics, Moscow 101000, Russian Federation*

Corresponding Author: M. Molodchik, mmolodchik@hse.ru

The paper overviews the findings of 5-year research project of International Laboratory of Intangible driven Economy (ID LAB). The main research question of project concerns the strategic decision making with regard to intangibles and consequences of these decisions; in other words, the impact of intangibles on corporate performance. The unique dataset collected by ID LAB includes financial and non-financial indicators of more than 1700 public European companies over the period 2004–2014. The methodology uses indicators for six types of intellectual resources: human resources, management capability, innovation capability, business processes capability, clients' loyalty and networking capability. For hypotheses estimations different econometric tools such as structural equation modelling, panel data analysis and dummy variable regression are applied. The most important and insightful findings are as follows. Firstly, intellectual resources have simultaneous impact on company outperforming (measured by Economic Value Added) and investor expectations (measured by Market Value Added), meanwhile managers tend to accumulate intellectual resources that are positively recognized by investors. Secondly, two knowledge-intensive profiles of European companies were found. Thirdly, accumulation of intangibles during economic crisis have positive influence on future performance, as well as better endowment of intangibles allows acceleration effect when recovering after the crisis. Fourthly, SMEs gain more from intellectual resources than large companies do.

Leadership Training for Our Leaders

J. Sowagi[1]

[1]*Candu Owners Group Inc., 655 Bay St., Toronto, ON M5G–2K4, Canada*

Corresponding Author: J. Sowagi, john.sowagi@candu.org

Leadership development is key to business success. Organizations that invest in leadership development programmes realize improved business results and respond rapidly to changing conditions. This session will examine how the CANDU Owners Group members have engaged in Leadership training development programmes and what impact it has made on the individual, the team and the organization. The focus of these programmes are to build lasting organizational changes through individual growth, effective communication, motivational coaching and team building.

Executive Overview of the Value in Implementing a Knowledge Sharing Culture on Safety and Organizational Effectiveness

M. Lacal[1]

[1] *Palo Verde Nuclear Generating Station, Tonopah, AZ 85354, USA*

Corresponding Author: M. Lacal, Maria.Lacal@aps.com

Abstract forthcoming.

Atomic Energy Commissions as Fulcrums for the Development of National Frameworks for the Building of Pertinent Nuclear Technology Education and Training Programmes: The Nigerian Example

F. Osaisai[1]

[1]*Nigeria Atomic Energy Commission (NAEC), Abuja FCT, Nigeria*

Corresponding Author: F. Osaisai, dgnaec@nigatom.org.ng

Nuclear technology development is human capital intensive. Consequently, the successful and effective deployment of nuclear technology for multifarious applications to benefit human society in a sustainable, safe and secure manner is critically hinged on the availability of a competent, robust and experienced human resource base. Many countries use nuclear and isotopic techniques to promote sustainable development objectives in energy and power, food and agriculture, human health and water resource management, as well as in the marine environment and industrial applications, amongst others. For many developing countries with limited educational training infrastructure in nuclear science and engineering, building the requisite manpower and national capacity, as well as management and retention of knowledge, to optimally reap the benefits of nuclear technology in the various sectors may be challenging. While the responsibility for growing the critical sectoral manpower in the areas of applications may rest with the mandated national institutions, the respective national atomic energy commissions (AECs) could play a catalytic role. This paper highlights the central coordinating role, that an AEC, as the national focal agency for atomic energy development, as in the case of Nigeria, could play in setting out the national agenda and strategy, and laying the foundation for the building of the critical human resource base for successful and sustainable programme implementation.

Intergenerational Knowledge Transfer

R. B. Grover[1]

[1]*Homi Bhabha National Institute, Mumbai, Maharashtra, India*

Corresponding Author: R. B. Grover, rbgrover@hbni.ac.in

Institutions of higher education and universities have been at the forefront of intergenerational knowledge transfer. Their role has gone through evolution and several ideas of the university co-exist. Factors like the squeeze on public funding of higher education across nations, exhortation by governments to value work-based learning as a part of higher education and demand for graduates ready to start working immediately on joining a workplace, are making it necessary to further evolve the classical approach towards intergenerational knowledge transfer. The paper presents a framework that has been evolved in India to meet the requirements of intergenerational knowledge transfer. It essentially integrates a workplace and a university in a single entity similar to the practice in medical education.

Nuclear Knowledge Management as an Essential Enabler for Regulatory Effectiveness and Efficiency

B. M. Tyobeka[1]

[1]*National Nuclear Regulator (NNR), Cape Town, 7441, Republic of South Africa*

Corresponding Author: B. M. Tyobeka, BMTyobeka@nnr.co.za

Regulatory bodies must maintain the highest levels of competence to provide regulatory oversight to the operating organizations. In building up that competency, regulators amongst others develop safety regulations and authorization processes, review and assess the safety and design documentation provided by the operating organization and inspect the facility, the vendors and manufacturers of safety related components. Over the years, regulators have seen an exodus of skills due to several reasons such as natural attrition, poaching by industry due to new nuclear build opportunities, etc. Regulatory knowledge and experience loss becomes the biggest risk to many regulators. Intervention strategies must be devised to mitigate this risk, and knowledge management is one of them. The presentation will highlight and conjecture ways and means by which nuclear knowledge management can enable a regulator to be both effective and efficient.

TS: Technical Sessions

Systems Engineering Initiative: Undergraduate Education Enhancement in a Regional Education Network

R. C. Kurwitz[1], K. Peddicord[1], H. Bostanci[2], J. Poston[1], and X. Yang[1]

[1]*Texas A&M University, College Station, TX 77840, USA*
[2]*University of North Texas, Denton, TX 76203, USA*

Corresponding Author: R. C. Kurwitz, kurwitz@tamu.edu

The Systems Engineering Initiative (SEI) is an experience based education enhancement programme that forms teams of undergraduate students with faculty and industry mentors to solve problems of interest to industry. This model of innovation creates a new learning paradigm that is outside the traditional classroom based model and fits more of the Master-apprentice model as applied to engineering teams. The SEI programme is currently administered by the Nuclear Power Institute (NPI), a regional nuclear education network, and is being carried out at three partner universities.

Previous nuclear related projects have benefited industry and are of high technical quality with publications in peer-reviewed journals and awards for presentations in various forums. Students within the programme have benefited through development of soft skills outside the traditional curriculum, understanding of how their knowledge fits into a nuclear organization, and exposure to career opportunities. Industry and other NPI stakeholders benefit from the development of capable engineers and technicians, positive outreach to the community, and most importantly, knowledge transfer to the next generation of nuclear professionals.

International Nuclear Management Academy Requirements for University Master's Programmes in Nuclear Technology Management

J. de Grosbois[1], H. Hirose[1], F. Adachi[1], A. Kosilov[2], J. Roberts[3], L. Liu[1], and K. Hanamitsu[1]

[1]*International Atomic Energy Agency (IAEA), Vienna, Austria*
[2]*National Research Nuclear University "MEPhI", Moscow, Russian Federation*
[3]*University of Manchester, Manchester, UK*

Corresponding Author: J. de Grosbois, j.de-grosbois@iaea.org

The development of any national nuclear energy programme is dependent on the successful development of qualified human resources, through a sustainable nuclear education and training programmes supported by government and industry. Among the broad range of specialists needed for the continued safe and economic utilization of nuclear technology for peaceful purposes, are a most vital component—managers. The International Nuclear Management Academy (INMA) is an IAEA facilitated collaboration framework in which universities provide master's degree programmes focusing on the management aspect for the nuclear sector. INMA master's programmes in Nuclear Technology Management (NTM) specify a common set of competency requirements that graduates should acquire to prepare them to become competent managers. This paper presents an overview of the INMA collaboration framework and the requirements for partner universities to implement master's programmes in Nuclear Technology Management.

Khalifa University Initiatives in Human Resource Development for the UAE Nuclear Energy Program

A. Solodov[1], P. Beeley[1]

[1] *Khalifa University, Abu Dhabi, United Arab Emirates*

Corresponding Author: A. Solodov, alexander.solodov@kustar.ac.ae

In December 2009 the United Arab Emirates (UAE) signed agreements with the Republic of Korea that will lead to the construction, operation and maintenance of four APR 1400 PWR reactors to support the UAE's Economic Plan. Khalifa University (KU) has undertaken several important initiatives in the areas of human capacity development and nuclear knowledge management to contribute to the continued success, stable development and indigenization of the UAE nuclear program. These initiatives include the creation of the Nuclear Engineering Department, which now offers MSc and PhD degrees along with a nuclear minor for the BSc in Mechanical and Electrical Engineering. Additionally, in collaboration with Sandia National Laboratories and Texas A&M University, KU formed the Gulf Nuclear Energy Infrastructure Institute (GNEII). This paper describes the progress of KU programs to date and outlines the plans for the future.

Nuclear Knowledge Creation and Transfer in Enriched Learning Environments: A Practical Approach

F. Ruiz[1], J. Gonzalez[1], and J. L. Delgado[1]

[1]*Tecnatom, S.A., 28703 San Sebastián de los Reyes, Madrid, Spain*

Corresponding Author: F. Ruiz, fjruiz@tecnatom.es

Technology, the social nature of learning and the generational learning style are conforming new models of training that are changing the roles of the instructors, the channels of communication and the proper learning content of the knowledge to be transferred. New training methodologies are being using in the primary and secondary education and "Vintage" classroom learning does not meet the educational requirements of these methodologies; therefore, it's necessary to incorporate them in the Knowledge Management processes used in the nuclear industry. This paper describes a practical approach of an enriched learning environment with the purpose of creating and transferring nuclear knowledge.

Nuclear Business Acumen Training for Executives

J. Blomgren[1]

[1]*INBEx, Bälinge, Sweden*

Corresponding Author: J. Blomgren, jan.blomgren@inbex.se

Few business leaders have Nuclear Knowledge Management at the top of their priority list. NKM is often intuitively realized to be important, but often there are difficulties to translate it into real actions. Like in so many human activities, proper training seems to be the way forward. We have developed a methodology for scenario training of nuclear business acumen for executives. This training is based on groups addressing realistic simulated challenges, typical for the executive management team of a nuclear power plant, in which knowledge management forms a natural ingredient. Recently, we have extended this methodology to train regulators, aiming at giving regulators a deeper insight into industrial management, and to reflect on how this improved understanding can be utilized in regulatory work.

Roadmap on R&D and Human Resource for Light Water Reactors Safety and Knowledge Management: Status in Japan

N. Sekimura[1]

[1] *University of Tokyo, Tokyo, Japan*

Corresponding Author: N. Sekimura, sekimura@n.t.u-tokyo.ac.jp

The roadmap for light water reactor safety technology and human resource has been constructed by the Special Committee on Nuclear Safety Research Roadmap in the Atomic Energy Society of Japan (AESJ). Based upon the lessons learned from the Fukushima Daiichi accident, effective planning of research activities to improve safety can also contribute to enhance human resource and management of accumulated knowledge-base in the future domestic and international community.

Case Study: Nuclear Knowledge Management Topics Arising from Facility Refurbishment in Canada

J. Hopwood[1]

[1]*University Network of Excellence in Nuclear Engineering (UNENE), c/o McMaster University, Hamilton, ON L8S–4L7, Canada*

Corresponding Author: J. Hopwood, jerry.hopwood1@gmail.com

This paper discusses aspects of Nuclear Knowledge Management that have shown particular importance in the activities to refurbish and life extend nuclear power reactors in Canada. In particular, the discussion notes the importance of proactive knowledge management steps, both industry-wide, and specific to the facility operator, that have supported the individual life-extension projects. Canadian life-extension projects for CANDU power reactors involve extensive activities including equipment replacement and upgrades, re-commissioning, license renewal, and workforce renewal.The operating utility needs to be supported by an effective industry KM capability to succeed in a life-extension initiative. The role of the overall national institutional base including the facility operator, regulator, owners' group, R&D organizations and universities, all playing a part, in meeting the knowledge management challenge, is summarized.

A Semantic-Based Approach for Preserving Operational Experience of Nuclear Installations

V. Kupriyanov[1], A. Kossilov[2], I. Kupriyanova[3], and N. Maximov[2]

[1]*ROSATOM State Atomic Energy Corporation, Moscow, Russian Federation*
[2]*National Research Nuclear University "MEPhI", Moscow, Russian Federation*
[3]*NPO "Typhoon", Russian Federation*

Corresponding Author: V. Kupriyanov, rus.inis@yandex.ru

The paper discusses the experience in development of the tools necessary for the first phase of automation of description of explicit technological knowledge—the thematic categorization of text documents on nuclear facility life cycle. In the study the existing thematic index, IAEA INIS was used as a target index due to its fullest provision at the moment by such means for Russian texts, thanks to the Russian multilingual thesaurus INIS as there is a lack of similar tools in Russian national index GRNTI.

It is proposed to increase the stability of categorization procedures by using a simple ontological model to establish complex links between the presence of the words. The communication model using simplified standard ISO 15926 concepts is proposed to separate descriptors and their relationship to two types: "intelligent concept" and "physical property". Experience has shown that to build such a model, it is necessary that the indexing experts marked out manually all descriptors according to their belonging to each category.

Based on the experience in implementation of this approach the paper argues that for its implementation, it is necessary to train a new type of specialists, knowledge workers, with new competencies including the concepts described above.

Cernavoda NPP Knowledge Transfer

C. M. Valache[1]

[1]*Cernavoda Nuclear Power Plant, Cernavodă 905200, Romania*

Corresponding Author: C. M. Valache, cvalache@cne.ro

The paper presents a description of the Knowledge Transfer (KT) process implemented at Cernavoda NPP, its designing and implementation.

It is underlined that applying a KT approach should improve the value of existing processes of the organization through:

- Identifying business, operational and safety risks due to knowledge gaps,
- Transfer of knowledge from the ageing workforce to the peers and/or the organization,
- Continually learning from successes and failures of individual or teams,
- Convert tacit knowledge to explicit knowledge,
- Improving operational and safety performance through creating both new knowledge and better access to existing knowledge.

Aspects of Knowledge Management Programme Implementation into Management System of NPP Operator

V. Sudakov[1]

[1] *Slovenské elektrárne, 821 09 Bratislava, Slovakia*

Corresponding Author: V. Sudakov, vladimir.sudakov@enel.com

The paper deals with the implementation of KM tools and approaches in NPPs of Slovenské elektrárne. The case study emphasizes the importance of KM programme introduction into the existing management system of the company taking into account sustainability and successful of the programme and demonstrates some practical examples.

Industry–University Collaboration for Research and Education

B. Shalaby[1], ***J. Hopwood***[1]

[1] *University Network of Excellence in Nuclear Engineering (UNENE), c/o McMaster University, Hamilton, ON L8S–4L7, Canada*

Corresponding Author: B. Shalaby, basma.shalaby@rogers.com

A joint partnership UNENE between industry and 12 universities was established in 2002 in anticipation of a large number of nuclear staff retiring starting 2010 and beyond. The focus of UNENE was to support nuclear related research in univerisities in support of the operating Candu nuclear plants, establish an M.Eng/Diploma degree to transfer the knowldge of design and licensing of the operating plants and as such ensure a sustainable supply of highly qualified personnel (HQP) for deployment by industry. This paper will address the benefits of such partnership as of 2016 in details in the area of research, education and supply of HQP to industry.

A Case Study of the Global Group for Sharing Knowledge and Efforts in Human Resources within the Nuclear Industry

C. Thomas[1]

[1]*Thomas Thor Associates, Keizersgracht 268, 1016 EV Amsterdam, Netherlands*

Corresponding Author: C. Thomas, c.thomas@thomas-thor.com

One of the main conclusions from the IAEA's HRD Conference in 2014 was that people and organisations in the global nuclear industry could cooperate more in sharing information and efforts. This was an inspiring conclusion, and there seemed an especially great opportunity for such sharing of information and efforts related to the attraction, recruitment, development and retention of people within the nuclear workforce.

Founding members include people from the IAEA, WNA, WANO, EDF and OPG amongst others, the global working group for Human Resource matters aimed at "Building and Sustaining a Competent Nuclear Workforce" was established.

This global working group is free to join and is open to anyone concerned with Building and Sustaining a Competent Nuclear Workforce. The objectives of the group are to share useful information, find others with similar objectives to cooperate with, ask questions, share opinions and crucially to avoid unnecessary duplication of efforts. The group already has 160 members from more than 15 countries and is currently hosted as a group on the LinkedIn website. The vision for the group is that it will become an invaluable resource for people across the world in the nuclear industry for sharing information and efforts.

Enhancing Nuclear Training with 3D Visualization

V. Gagnon[1], B. Gagnon[1]

[1] *L-3 Communications MAPPS Inc., St-Laurent, QC H4T–1G5, Canada*

Corresponding Author: V. Gagnon, vincent.gagnon@l-3com.com

While the nuclear power industry is trying to reinforce its safety and regain public support post-Fukushima, it is also faced with a very real challenge that affects its day-to-day activities: a rapidly aging workforce. Statistics show that close to 40% of the current nuclear power industry workforce will retire within the next five years. For newcomer countries, the challenge is even greater, having to develop a completely new workforce.

The workforce replacement effort introduces nuclear newcomers of a new generation with different backgrounds and affinities. Major lifestyle differences between the two generations of workers result, amongst other things, in different learning habits and needs for this new breed of learners. Interactivity, high visual content and quick access to information are now necessary to achieve a high level of retention.

To enhance existing training programmes or to support the establishment of new training programmes for newcomer countries, L-3 MAPPS has devised learning tools to enhance these training programmes focused on the "Practice-by-Doing" principle. L-3 MAPPS has coupled 3D computer visualization with high-fidelity simulation to bring real-time, simulation-driven animated components and systems allowing immersive and participatory, individual or classroom learning.

Bridging Nuclear Knowledge to a Brazilian Decree: A Case Study at the National Nuclear Energy Commission (CNEN)

T. M. Muguet-Haisman[1]

[1] *Brazilian Nuclear Energy Commission (CNEN), Rio de Janeiro, Brazil*

Corresponding Author: T. M. Muguet-Haisman, tmuguet@cnen.gov.br

Since the term "knowledge management" was coined, it has gained more and more attention in an effort to re-structure organizations. A good deal of effort has been done in order to better implement a knowledge management culture in organizations throughout all the work sectors. The Brazilian Federal Government through the Decree no.5.707, dated February 23, 2006, democratically created a national policy for human development. This initiative made equally available additional education opportunities for all staff in order to form a competent workforce which included official recognition of work-related skills. In the field of nuclear energy, the National Nuclear Energy Commission is a Brazilian governmental authority which has long served as the leader in the matter. In this respect, and in the light of the International Atomic Energy Agency (IAEA) nuclear knowledge management role and the perspective of the first and third dimensions, the aim of this paper is to share the outcome of the Government programme in the National Nuclear Energy Commission.

Implementation of CLP4NET in Bulgaria

I. Naydenova[1,2], L. Pironkov[1,3], A. Filipov[1], ***T. Petrova***[1], G. Tsochev[1], and I. Ganev[1]

[1]*College of Energy and Electronics (CEE), Sofia Technical University, Sofia, Bulgaria*
[2]*Department of International Cooperation, Nuclear Regulatory Agency, Sofia, Bulgaria*
[3]*Kozloduy Nuclear Power Plant, Kozloduy, Bulgaria*

Corresponding Author: I. Naydenova, inaydenova@tu-sofia.bg

Networking solutions (networks of excellence, communities of practice, knowledge portals, etc.) are recognized as effective tools for nuclear training and education services, transfer of good practices, knowledge and programmes, and knowledge management. In addition, the e-learning is recommended as a state of the art and cost effective approach for supplementing the traditional face to face training and education programmes. Thus, the Cyber Learning Platform for Nuclear Education and Training (CLP4NET) was implemented into the Kozloduy Nuclear Power Plant (KNPP) Training System. Based on the experience of KNPP, the CLP4NET was implemented also at the College of Energy and Electronics (CEE), Technical University of Sofia (TU-Sofia), providing an appropriate tool for further establishment of a National Nuclear Network of Competency. The current study is focused mainly on specific issues and lessons learned during the installation of CLP4NET at the CEE, TU-Sofia.

Sustainable Transformation & Effective Competency Management Practices in Nuclear Organizations

S. Gardelliano[1]

[1] *International Consultancy and Learning Facilitation, Italy*

Corresponding Author: S. Gardelliano, S.Gardelliano@gmail.com

Managing essential knowledge as a strategic organizational asset is a factor of upmost relevance in today's nuclear organizations. The author considers evident that competencies are critical carriers of knowledge. As such the use of an appropriate competency model could be the most effective way to capture the present reservoir of explicit and tacit Knowledge of specific functions or organizational areas. Besides, we could use them for new or other redesigned functions or determine the needs of specific competencies for future positions. Therefore, appropriate competency models or systems have to be developed or updated in each nuclear organization since these are fundamental for managing more effectively and efficiently the present nuclear human capital and to forecast the evolving competence required in management, technical, scientific and safety areas to continuously ensure a highly competent nuclear workforce. On the other hand, competency based management models or systems would not achieve the expected results if they are not fully designed and integrated within the strategic organizational infrastructure of the related nuclear organization. This paper is expected to provide a wider view and practical reflections on organizational transformation issues and the benefits of using an integrative competency model in the nuclear industry. Particularly, the paper give an insight of an empiric model for strategic organizational transformation processes and integrative management practices, and on how to realign strategic issues with top management processes and build organizational capacity through effective competency based management for the sustainable transformation of nuclear organizations.

Plant Information Models: Supporting the Management of Design Knowledge throughout the Nuclear Power Plant Life Cycle

R. Adams[1], J. de Grosbois[2], and ***M. Gladyshev***[2]

[1]*Nuclear Industry Consultant, International Atomic Energy Agency (IAEA), Vienna, Austria*
[2]*International Atomic Energy Agency (IAEA), Vienna, Austria*

Corresponding Author: R. Adams, russell.h.adams@gmail.com

In 2014, the IAEA's Department of Nuclear Energy launched a new initiative aimed at strengthening design knowledge management throughout the life cycle of nuclear facilities, and as a part of this initiative, set out to publish a series of IAEA technical reports and guidance on information modelling of nuclear facilities, and to develop a generic prototype plant information model (PIM) for demonstration purposes.

New nuclear facilities are being designed and constructed using modern computer-aided design and engineering systems, multidimensional modelling and design information sources such as data, databases, and electronic documents. As a result, new facilities can be delivered with a computer-based information environment that is able to be transferred, integrated and interoperable with the computer-based information environments of the organizations that own and operate them. The opportunity exists to radically improve knowledge capture, integration and transfer between stakeholders, however, these computer-based information environments typically consist of one or more plant information models with minimal standardization and information interoperability between them. A Knowledge-centric plant information model could be developed and leveraged to better support, manage and enable seamless exchange and transfer of sustainable design and design knowledge information throughout the nuclear facility life cycle.

Establishment of Systematic Design Control/Configuration Management Processes to Enhance Engineering Capability

T. Inagaki[1], T. Hamada[1], and ***T. Ihara***[1]

[1]*Tokyo Electric Power Company (TEPCO), Tokyo, Japan*

Corresponding Author: T. Inagaki, inagaki.takeyuki@tepco.co.jp

After the accident of Fukushima Daiichi Nuclear Power Plant in 2011, Tokyo Electric Power Company (TEPCO) launched various measures to enhance plant safety and safety culture of its employees. One of the important aspects of these measures is to enhance engineering capability and TEPCO is conducting actions to establish systematic design control and configuration management processes as an important foundation of such engineering capability. This paper describes how TEPCO is establishing systematic configuration management processes from three aspects, i.e., design requirement and bases management, facility configuration control, and configuration change management. It also provides brief information of the IT systems that are being introduced and will support the systematic design control and configuration management processes.

Knowledge Management and Organizational Proficiency with NPP

M. Marler[1]

[1]*Marler Consulting Inc, USA*

Corresponding Author: M. Marler, michael.marler32@gmail.com

The pace of new NPP construction, startup, and operation is straining the supply of proficient operators, technicians, and engineers. This technical brief explains an approach implemented by a US nuclear utility to capture and transfer knowledge possessed by proficient workers to new workers using the VISION learning content management system. This approach could also be used to accelerate worker proficiency in new NPP organizations.

Plant Engineering and Construction System with Knowledge Management: A Case Study in NPP Construction in Hitachi-GE NE

T. Mochida[1], M. Hamamoto[1], and N. Nakamitsu[1]
[1]*Hitachi-GE Nuclear Energy Ltd., Japan*

Corresponding Author: T. Mochida, takaaki.mochida.qx@hitachi.com

Hitachi-GE Nuclear Energy, Ltd. (HGNE) has more than 40 years BWR plants construction experience. The company continues to develop plant engineering system and plant construction systems based on the experience and the lessons learned. Currently, these systems are integrated in a variety of knowledge bases using the latest information technology (IT). Their performance is continuously validated in the recent NPP constructions. Typical examples are shown as case studies for knowledge management. These plant engineering and construction management systems are essential to achieve the on-time and on-budget-goals in NPP construction projects.

Design Knowledge and Design Change Management in the Operation of Nuclear Fleets

H. Pelin[1]

[1] *World Nuclear Association (WNA), 10 Southampton Street, London WC2E 7HA, UK*

Corresponding Author: H. Pelin, henri.pelin@world-nuclear.org

The operating lifetime of a nuclear plant spans several decades. During this time, the plant may undergo design changes resulting from experience feedback, new knowledge or requirements, and safety reviews. To ensure that safety remains optimized, these changes must be carried out with a full understanding of and without compromising the design intent.

The licensee holds prime responsibility for the safety of the plant, and fully responsible for design change management. It fulfils this responsibility by establishing a formal system for ensuring the safety of the plant design throughout its lifetime, which includes establishing a formally designated entity within its management system, referred to as the Design Authority.

The establishment of a Design Authority may be challenging for many operators. Therefore the licensee may allocate tasks to external organizations—the original designers—that have a specialized knowledge of specific parts of the plant, including vendors and equipment suppliers.

Utilities operating plants of similar design should take advantage of this similarity to manage their knowledge through an international fleet-wide approach, facilitating sharing of experience and enabling similar solutions to be adopted for design changes. Opportunities for exchanges brought by owners' groups, and other operators' groups should be fully developed.

Managing for Excellence

T. Gysel[1]

[1]*Privat Consultant, Switzerland*

Corresponding Author: T. Gysel, gysel.thomas@bluewin.ch

Nuclear organizations now wishing to become much more effective as an organization require further advice and specific guidance, drawn from validated international best practices in the development and implementation of Knowledge Management in the context of the organization's management system. Therefore the IAEA Nuclear Knowledge Management Section is developing an approach for implementing Knowledge Management in the context of a management system. What looks like excellence today, may not be tomorrow. Best-in-class competitors, technology, and management paradigms all evolve. Second, true Operational Excellence manifests itself through integrated performance across revenue, cost, and risk.

Nuclear Knowledge Management: Challenges and Approaches — Pakistan's Scenario

S. J. Khurshid[1]

[1] *Pakistan Nuclear Society (PNS), Islamabad, Pakistan*

Corresponding Author: S. J. Khurshid, sjavaidk@gmail.com

Nuclear knowledge management has become very important for the nuclear sector of Pakistan in the current scenario. Pakistan Atomic Energy came into being in 1956 and large scale recruitment was done in 1957 and in 1973 to implement the program. The scientists and engineers hired then and trained from the best laboratories of USA and UK have retired leaving a knowledge gap. On the other side the Civil Nuclear Program of Pakistan is expanding tremendously and PAEC has to fulfill its first target of 8800 MW of energy by 2030 and of 40,000 MW by 2050. Besides having three power reactors, Pakistan is building two 325 MW, five 1000 MW reactors at Karachi, Muzfargrah and Chashma. This increasing development programme requires skilled and trained manpower for the whole nuclear cycle, the management of ageing nuclear installations and their safe decommissioning. There is a dire need of effective and efficient institutional memory for these new power projects, their efficient operation, environmental remediation around them and implementation of nuclear safety regulations. Pakistan Nuclear Society feels that it has to manage and disseminate nuclear knowledge in the scientific community, politicians and public to develop confidence in the practices and safety procedures of the nuclear program.

Implementation of Knowledge Management as Process to Management System of ÚJD SR

V. Szabó[1]

[1]*Nuclear Regulatory Authority of the Slovak Republic (ÚJD SR), Bajkalská 27, 82007 Bratislava, Slovakia*

Corresponding Author: V. Szabó, viktor.szabo@ujd.gov.sk

This presentation provides basic information about the development of staff's knowledge management of Nuclear Regulatory Authority of Slovak Republic. It is a case study about implementation of knowledge management as process to the integrated management system for Slovak regulatory body

Implementation of a Global Knowledge Management System at IRSN

J. Couturier[1], M. Jorel[1]

[1]*Institut Radioprotection Sûreté Nucléaire (IRSN), Fontenay-aux-Roses, France*

Corresponding Author: J. Couturier, jean.couturier@irsn.fr

This paper presents the objectives, tools and main actions of a global Knowledge Management system at IRSN, the French Technical Safety Organization (TSO).

Establishment and Development of the Nuclear Knowledge Management Program in FANR: Case Study

S. Al Mansoori[1], A. Al Khadouri[1]

[1]*Federal Authority for Nuclear Regulation, Abu Dhabi, United Arab Emirates*

Corresponding Author: S. Al Mansoori, shaima.almansoori@fanr.gov.ae

In 2011, FANR officially started the establishment and development of a nuclear knowledge management (NKM) program. During the past period, the program went through different challenges, obstacles and successes. Some of current FANR NKM initiatives and practices considered as new solutions in the field of KM practices. For example, using knowledge resource matrix, KM process integration and others. However, applying new practices and tools does not mean that FANR NKM found solutions for all the challenges that can be faced by similar KM programs, challenges like preparing for identifying critical knowledge required in the operation phase period, or identifying and capturing the establishment phase and construction knowledge. FANR management are aware of those challenges and are working as one team with internal and external stakeholders to solve them on a priority basis through open discussions, direct directives, collaboration and benchmarking, as well as strategic planning and supporting innovative solutions. The methodologies and practices that it will share in the conference might change some NKM programs' implementation approaches, however, it is certain that something new related to NKM implementation philosophy will be picked up from this case study.

Knowledge Management Tools in Application to Regulatory Body Activity

E. Volkov[1]

[1] *Rosatom Central Institute for Continuing Education and Training (CICET), Obninsk, Russian Federation*

Corresponding Author: E. Volkov, edvolkov@gmail.com

The paper presents the application of knowledge management tools to regulatory authority activity. Knowledge management tools are considered a means for improving the efficiency of regulator activities.

Three case studies are considered:

1. a knowledge management audit procedure in the regulator (tools for knowledge management audit application, results and the audit outcomes);
2. the development of a guide to identify causes of discrepancies and shortcomings revealed during inspections in NPP maintenance (ontologies of factors influencing on a maintenance quality and causes of discrepancies and shortcoming development);
3. the development of a knowledge portal for regulator (regulator needs which could be covered by the portal, definition and basic function of the portal, it's functioning principles, development goals and tasks, common model, development stages).

Assessing the Risk of K-loss within the Belgian TSO

B. Bernard[1]

[1] *Bel V, 1070 Anderlecht, Belgium*

Corresponding Author: B. Bernard, benoit.bernard@belv.be

Organisations lose knowledge. Considering knowledge as a valuable asset, attention must be paid to the risk of losing it. The contribution of this paper is to propose a model—the knowledge critical grid (KCG)—that aims at assessing the risk of knowledge loss. Applied within the Belgian TSO, this model focuses on community-of-practices and network issues. Grounded on five knowledge issues, the KCG intends to assess the knowledge volatility and vulnerability levels of an organisation and define the best relevant knowledge management actions.

CNCAN Knowledge Management Process and Tools in Support of Sustainable Development of Regulatory Competences

M. Tronea[1], C. Ciurea[1], ***M. Oprisescu***[1], C. Liutiev[1], and P. Ghinea[1]

[1]*National Commission for Nuclear Activities Control (CNCAN), Bucharest, Romania*

Corresponding Author: M. Tronea, madalina.tronea@cncan.ro

The paper presents the knowledge management process and the knowledge management portal developed by CNCAN, in the framework of the Regional Excellence Project on Regulatory Capacity Building in Nuclear and Radiological Safety, Emergency Preparedness and Response in Romania. The activities of this project started in 2014. The general process for knowledge management is presented, together with its sub-processes: identification of the necessary knowledge; identification of the risk of knowledge loss; acquisition and/or creation of knowledge; knowledge retention (capture, collect, store and organize knowledge); knowledge utilization; review of the effectiveness of the knowledge management process; identification of opportunities for improving the knowledge management process. The paper also presents a set of indicators of the effectiveness of the knowledge management process and the artifacts, espoused values and basic assumptions supporting an effective knowledge management process. The necessary knowledge has been identified using the IAEA recommendations on managing regulatory body competence and the SARCoN methodology. The knowledge management process has been developed based on the IAEA publications on knowledge management in the nuclear industry and in regulatory bodies. The implementation of the process and the development of the portal are ongoing, with more than 20% of the staff using the portal.

Organizational Learning, Building and Sustaining Core Competencies: Knowledge Management Initiatives on Inspection and Regulatory Enforcement in BAPETEN Indonesia

W. P. Daeng Beta[1], ***Y. H. Nurwidi Astuti***[1], A. S. Hermawan[1], and S. Syaifulloh[1]

[1]*Nuclear Energy Regulatory Agency of Indonesia (BAPETEN), Jakarta, Indonesia*

Corresponding Author: W. P. Daeng Beta, putradaeng@yahoo.com

Regulatory inspection and law enforcement are among the core competencies of the Indonesia Nuclear Energy Regulatory Agency (BAPETEN). Knowledge management (KM) initiatives are based on strategic planning of BAPETEN. KM in BAPETEN is in its early stage, it is realized since 2015–2016, although its elements have stayed in service for 18 years. Its architecture and performance-information are: to conduct risk based inspection for medical, industrial and research facilities; to plan, monitor and evaluate of effective inspection, including standard operating procedures (SOPs); to utilize inspectors for safety-security of radiation sources along with coordination with related stakeholders; to enforce the safety and security facilities report to users; to optimize reliable data communication, processing and information technology (B@LIS); to perform regulatory enforcement along with other related stakeholders. KM processes are performed through the "Socialization, Externalization, Combination, Internalization" (SECI) model. Technical knowledge for inspectors are based on the IAEA–TECDOC–1526 plus supporting knowledge. With KM, innovation products can easily be used, because they are documented, distributed in a KM portal, knowledge is shared through the BAPETEN website, B@LIS database and others. Our challenge is that KM initiatives still need a tremendous effort, not only internally, but also externally, especially in coordination and collaboration. Information access brings about not only positive but also negative impacts. Innovations in regulatory inspection and law enforcement in BAPETEN are planned innovations, sustained, and systematically performed.

Education and Training Activities of the SCK•CEN Academy for Nuclear Science and Technology

M. Coeck[1], N. Kesteloot[1], and T. Clarijs[1]

[1] *SCK•CEN, Belgian Nuclear Research Centre, 2400 Mol, Belgium*

Corresponding Author: M. Coeck, mcoeck@sckcen.be

In 2012, The Belgian Nuclear Research Centre SCK•CEN officially launched its "Academy for Nuclear Science and Technology". Thanks to its thorough experience in the field of nuclear science and technology, its innovative research and the availability of large and unique nuclear facilities, SCK•CEN is not only a renowned nuclear research institution, but also an important partner for nuclear education and training in Belgium as well as at international level.

Within the SCK•CEN Academy, more than 60 years of nuclear expertise and experience gained from our different research projects is collected and transferred. In order to maintain and extend a competent workforce in nuclear industry, healthcare, research, and governmental organizations, and to transfer this nuclear knowledge to the next generations, the mission of the SCK•CEN Academy comprises four main tasks: (i) providing guidance to young scientists, (ii) organizing of courses, (iii) providing policy support and (iv) caring for critical-intellectual capacities.

Case Study of Lessons Learned from the Operation of the Fast Flux Test Facility

D. Wootan[1], R. Omberg[1], and C. Grandy[2]

[1]*Pacific Northwest National Laboratory (PNNL), Richland, WA 99354, USA*
[2]*Argonne National Laboratory (ANL), Argonne, IL 60439, USA*

Corresponding Author: D. Wootan, david.wootan@pnnl.gov

The lessons learned approach being followed at the Fast Flux Test Facility is to have domain experts in each subject area develop a short write-up or report on each lesson learned. Each lesson learned write-up is on the order of 4–6 pages. Longer reports can be developed as needed. Each lessons learned summary discusses the problem and the resolution method employed to address the problem, and also tries to capture the essential "tacit knowledge" associated with each topic in a focused manner. All lessons learned write-ups are supported by more detailed documents. For example, references of more detailed reports are generally included, where available. Topics are selected as those most likely to apply to future design or operating problems. This lessons learned approach has been successful in capturing essential tacit knowledge about key events in FFTF history and providing a context for interpreting the existing data and references.

Collaboration in Science and Innovation: IP Considerations

N. Belenkaya[1]

[1] *ROSATOM State Atomic Energy Corporation, Moscow, Russian Federation*

Corresponding Author: N. Belenkaya, nvbelenkaya@rosatom.ru

In today's highly competitive market, organizations gain competitive advantage by collaborating on innovations. However, in general, before a successful partnership can start, organizations will have to negotiate ownership and access to the intellectual property produced as a result of the joint effort. While some collaborative projects are not created to pursue commercial gains, outputs of collaboration may have commercial application. Experience shows that the framework for the collaboration should be determined through an agreement that describes the project and the future ownership, management and exploitation of the intellectual property. The attractiveness of a collaborative project is increased if such framework can be negotiated timely. It is important that the partners agree on the allocation of ownership, transfer, and access to intellectual property before the project starts. This is done to reduce uncertainties and to protect the rights of the partners. Partners should agree not only on the owners of the future intellectual property but also on the ways for subsequent commercial exploitation of the results of the collaboration. A timely negotiated and successfully finalized framework for IP ownership and management plays a key role in protecting partner investments and ensuring the successful exploitation of the results of the collaboration.

University Research Collaborations on Nuclear Technology: A Legal Framework

Y. Nagakoshi[1]

[1]*Research Associate, Japan*

Corresponding Author: Y. Nagakoshi, yuzuki16@live.jp

International nuclear research collaborations are becoming increasingly important as the need for environmentally sound and safe energy technology grows. Despite having its risk, the benefits of using nuclear energy cannot be overlooked considering the energy crisis the world is facing. In order to maximize the safety of existing technology and promoting safe ways of taking advantage of nuclear energy, collaborative efforts of all who are involved in nuclear technology is necessary, regardless of national borders or affiliation. Non-conventional use of nuclear energy shall also be sought after in order to reduce greenhouse gas emission and to overcome the energy crisis the world is facing. It is therefore important that international collaborations among research institutes are promoted.

Collaboration amongst universities poses a series of legal questions on how to form the framework, how to protect individual and communal inventions and how to share the fruits of the invention. This paper proposes a possible framework of collaboration and elaborates on possible legal issues and solutions.

Experience in Implementation of "Nuclear Knowledge Management" Course at the National Research Nuclear University MEPhI

N. Geraskin[1], A. Kossilov[1], and ***E. Kulikov***[1]

[1]*National Research Nuclear University "MEPhI", Moscow, Russian Federation*

Corresponding Author: N. Geraskin, nigeraskin@mephi.ru

The present paper describes the experience of teaching "Nuclear Knowledge Management" course at National Research Nuclear University MEPhI (NRNU MEPhI). Currently, the course is implemented both in engineer's and master's of science degree programmes and is attended by over 50 students. Goal, objectives and syllabus of the course are discussed in detail. A special attention is paid to practical exercises and final examination options in the case of small and large student groups. The course is supported by the Cyber Learning Platform for Nuclear Education and Training (CLP4NET), developed by the IAEA.

The experience of NRNU MEPhI lecturers assisting in conducting the International School of Nuclear Knowledge Management, held annually in Trieste (Italy), is described with a special attention to the fact, that the course has passed the certification process at Academical Council of NRNU MEPhI. In 2014 and 2015 the course has been recognized as one of the best ones in NRNU MEPhI. Finally, perspectives of "Nuclear Knowledge Management" course are considered. They include increase of the course duration, introduction of the course into the learning process of other departments and institutions of the university, and transferring the course to other members of the Association "Consortium of ROSATOM supporting universities".

Instituto Balseiro Role in Nuclear Knowledge Preservation and Advancement in Argentina

R. Mayer[1]

[1]*Comisión Nacional de Energía Atómica, (CNEA), Buenos Aires, Argentina*

Corresponding Author: R. Mayer, mayer@cab.cnea.gov.ar

The experience in nuclear technological knowledge preservation and development in the Argentine Republic has been the responsibility of many actors due to many factors. Among these, a key role was played by an academic institution which started teaching physics at university level in 1955 and, later, in 1977 started training young minds in nuclear engineering, the Instituto Balseiro. This work briefly presents the nuclear background within the country which has in part shaped the character of the institute and, also, provided the requirements that contributed to orient its evolution. In these pages a short description is made of the path chosen to preserve and develop the relevant knowledge, of the initial challenges, of how knowledge survived a decade where the "nuclear plan" was literally abandoned and, finally, some lessons learned and the outcome of this effort in the very brief description of the case of finishing the design and starting the most recent nuclear power plant in the country.

Strategic Academic Unit as a Synergy between Education, Research and Innovations and Its Position in Knowledge Life Cycle

A. Pryakhin[1], ***G. Tikhomirov***[1]

[1]*National Research Nuclear University "MEPhI", Moscow, Russian Federation*

Corresponding Author: A. Pryakhin, aspryakhin@mephi.ru

The strategic goal of MEPhI is to become a global leader in education, science and innovations. Influence of the world development and current trends imply flexibility of the university to respond to today's challenges and ability to introduce new forms and organizational structures for effective and efficient education. Strategic Academic Unit (SAE) is a new academic and scientific entity engaging nuclear industry partners in processes related to knowledge breeding, handling, and transfer through education and experience. The new SAE is titled as Institute of Nuclear Physics and Engineering (INPhE). SAE comprises objects belonging to three kinds or classes: education, research, and innovations. Education objects are education programs, teachers, students. Research objects are scientific teams and related mega-science laboratories working for fundamental and applied research. Innovations are typically knowledge assets created in research groups together with industrial partners and customers, recognized by the market, and used by all involved players for the next generations in the knowledge breeding chains. The key elements representing capacity of the SAE and maturity of the university are knowledge assets which are outputs of the intellectual activity and intellectual property itself, that they create.

Organizational Challenge of Posiva's Final Disposal Programme: From an R&D Organization to a Project Organization, and Further Towards an Operational Organization

J. Mokka[1]

[1] *Posiva Oy, Olkiluoto, FI-27160 Eurajoki, Finland*

Corresponding Author: J. Mokka, janne.mokka@posiva.fi

Posiva Oy is an expert organization established in 1995 and responsible for the final disposal of the spent nuclear fuel of its owners. Posiva currently employs around 100 people and has a turnover of some €63 million (2015). The company headquarters are located in Olkiluoto in the municipality of Eurajoki, Finland. Posiva is owned by two Finnish NPP operators Teollisuuden Voima Oyj (60%) (TVO) and Fortum Power & Heat Oy (40%), both of which are responsible for their costs of nuclear waste management.

The Finnish final disposal programme has a long history. When NPP unit Olkiluoto 1 renewed its operating licence for the first time in 1983, TVO presented a programme showing final disposal to commence in the 2020s. In the 1980s and 1990s, the programme concentrated on concept development and site selection activities. After 2003, when Posiva received the decision in principle from the Finnish Government, a new phase began in the programme.

Since 2004, Posiva Oy has constructed an underground rock characterization facility on the repository site in Olkiluoto, in western Finland. This facility, called ONKALO, has provided an opportunity to carry out further site investigations, develop construction techniques, and test and demonstrate the engineered barrier system in an actual repository environment. As a result of these investigations and development efforts, the application for a licence to construct the encapsulation plant and the geological repository was submitted in 2012. The Radiation and Nuclear Safety Authority in Finland (STUK) first gave a positive review on the safety of the facility, and consequently the Finnish Government granted the construction licence in November 2015.

After receiving the construction licence as the first disposal programme in the world, the next phase in the program will be the construction project of the final disposal facilities required for the disposal operations. A significant first-of-a-kind construction project like this includes many activities requiring a considerable amount of knowledge, such as meticulous design work, construction, procurement, licensing, installation of equipment and commissioning of the encapsulation plant and the underground repository panel.

In addition to construction activities, the research, technical design and development activities conducted by Posiva with numerous Finnish and foreign expert organizations in a multitude of fields still continues, aiming at the submission of the application for the operating licence and for the development of the necessary equipment for the operation of the repository. One important activity at the next phase is also to build up an industrial supply chain for the unique main barrier components of the repository, e.g., the bentonite blocks and the copper canister.

Continued…

After the significant construction project, the next phase in the final disposal programme comprises the operations. Operations should be industrial actions executed according to regulations under the oversight of the safety authority. This operational phase again requires different competences than the previous R&D phase or the ongoing construction project phase. Also, during the about 100-year long operational phase, the management of the knowledge of the design basis is necessary to ensure safe operations.

To manage these organizational and knowledge management challenges, Posiva has carried out many actions. One of the most significant ones has been the establishment of a subsidiary company, Posiva Solutions Oy. It will focus on the preserving the know-how accumulated from the design, research and development efforts in the final disposal of spent nuclear fuel, as well as on associated consulting services.

Long-Term Information Management (LTIM) of Safeguards Data at Geological Repositories

R. Haddal[1], R. Finch[1], and G. Baldwin[1]

[1] *Sandia National Laboratories (SNL), Albuquerque, NM 87185, USA*

Corresponding Author: R. Haddal, rhaddal@sandia.gov

The International Atomic Energy Agency (IAEA) has noted that long-term information management (LTIM) of safeguards data at geological repositories will be a significant challenge in the future as information and records management systems evolve and permanent disposal of nuclear materials becomes a high-priority in many countries. Identifying approaches to how information on buried high-level nuclear waste will be managed, handled, organized, archived, read, interpreted, and secured for the long-term (1000 years after repository closure and beyond) will be key to safeguards at repositories). The purpose of this study is to explore various long-term information management systems and how they may or may not be adapted for geological repositories for high-level waste. The study will also examine what types of safeguards-related data should be included in such a system. The study will also consider hypotheses about future needs and analyze the pros and cons of very long-term information management.

A Lifecycle Knowledge Management Approach to Support Decommissioning and Environmental Remediation Projects

F. Borrmann[1], P. Booth[2]

[1]*iUS Institut für Umwelttechnologien und Strahlenschutz GmbH, 63743 Aschaffenburg, Germany*
[2]*Hylton Environmental, UK*

Corresponding Author: F. Borrmann, borrmann@ius-online.eu

KM is a discipline that has a long tradition in nuclear. Nevertheless, the necessity for and the specifics of KM in decommissioning and environmental remediation have come into focus but quite recently. On one hand driven by major decommissioning programs like the NDA approach in UK or the phase-out decision in Germany, on the other hand as a request from decommissioning practitioners. In this paper we would like to emphasize the necessity to develop lifecycle wide KM approaches and specific tools for KM in decommissioning and environmental remediation. Additionally, KM approaches must be adapted to the phases of the facilities lifecycle. Especially decommissioning and environmental remediation require different KM systems to cope with a quickly changing environment.

Changing the Focus of Knowledge Management for Nuclear Decommissioning

R. Radford[1]

[1]*Magnox Ltd., Berkeley, Gloucestershire, UK*

Corresponding Author: R. Radford, bob.m.radford@magnoxsites.com

Knowledge Management (KM) has long been a recognized tool for improving the safety, efficiency and effectiveness of nuclear facilities. However, the objectives, tools and mechanisms utilized are often focused on steady-state maintenance of established knowledge and on incremental improvements to current practice.

When nuclear facilities transition from routine operations to project-based decommissioning activities there is a need to reconsider the knowledge objectives, methodologies and tools to ensure that KM practices are relevant to the new activities being carried out and provide solutions to the new challenges posed in decommissioning. It is important that the changes required in preparation for and during the decommissioning phase are factored in to knowledge planning to ensure that KM activities are efficient and effective. This transition requires a change in the KM mind-set and a different way of setting new KM objectives.

Remediation of a Former Uranium Mining and Milling Area and Its Knowledge Management: An Overview

E. Kreyßig[1], A. Hiller[1], and P. Schmidt[1]

[1]*Wismut GmbH, Jagdschänkenstraße 29, 09117 Chemnitz, Germany*

Corresponding Author: E. Kreyßig, e.kreyszig@wismut.de

For 25 years now, the federally-owned Wismut GmbH has been remediating the legacies left behind by former uranium ore mining and processing operations in Eastern Germany. In that area, the former Soviet-German stock company SDAG WISMUT had produced a total of 216'000 tonnes of uranium during a period of more than forty years. It had evolved into the world's fourth largest uranium producer at that time. The large number of sites (7) and individual objects (> 400) and the long period, needed for the following complex remediation process, forced the establishment of a comprehensive data, information and knowledge management system. The present paper describes the WISMUT KM system and its implementation in current activities. A technical data base named AL.VIS/W serves as platform for the storage, search and exchange of data and information. It also provides information required to fulfil post-remedial long-term tasks including institutional control. Case studies are given to illustrate the efficiency of the tools developed by Wismut GmbH and its partners. In detail, the environmental data base and its operational features are described. Further, the experience in developing and implementing the object-related remediation documentations is presented.

Role of Nuclear Knowledge Infrastructure in Building and Developing a Nuclear Industry

V. Pershukov[1]

[1]*ROSATOM State Atomic Energy Corporation, Moscow, Russian Federation*

Corresponding Author: V. Pershukov, nvbelenkaya@rosatom.ru

Current level of development of nuclear technology pushes future owners and users to address several important challenges at the very beginning of preparation for introduction of nuclear power programme including development of national expertise and technical competence for safe and secure use of nuclear technology and creation of national scientific and research infrastructure. However, many times national stakeholders involved into the development of nuclear power programmes act in separate information environments. This creates confusion and may result in delays of execution of a nuclear power programmes. A common environment in this case is important to ensure information exchange and collaborative work on nuclear power programme development. A common environment facilitates transfer, preservation and spread of nuclear knowledge to all stakeholders involved in a national nuclear power programme. Due to the long life cycle of nuclear power plants, strengthening and maintaining the effective management of knowledge and information over the entire life cycle for licensed nuclear facilities is imperative. This covers areas including design, construction, commissioning, operation and decommissioning, especially in newcomer countries and new builds. Nuclear knowledge infrastructure assumes this role and helps countries deciding to develop nuclear programmes ensure the safe and secure use of its nuclear power for national development.

Developing Sustainable Organizations for New Nuclear Power Countries through Knowledge Management

R. Cain[1], M. Einwechter[2], D. Kovacic[1], J. Reed[3], and I. Therios[3]

[1]*Oak Ridge National Laboratory (ORNL), Oak Ridge, TN 37831, USA*
[2]*National Nuclear Security Administration (NNSA), Washington, DC, USA*
[3]*Argonne National Laboratory (ANL), Argonne, IL 60439, USA*

Corresponding Author: R. Cain, cainra@ornl.gov

Countries with emerging nuclear power programmes face unique challenges with respect to building competent and sustainable organizations. By nature, such organizations are dynamic and evolving, energetic, and feel a sense of mission. They are also typically preoccupied with near and mid-term objectives, may be resource–constrained, can incur high staff turnover rate, and encounter difficulties in obtaining experienced, qualified personnel. Such conditions can make it difficult to think about, much less implement, a knowledge management (KM)-based culture. The result can be missed opportunities if a KM system is not in place to collect institutional knowledge leveraged to advance the organization's mission. Nevertheless, knowledge is perishable, and the best time to capture it is as it is being created, not at the end of a career.

This paper explores some of the resource–efficient methods for knowledge capture applicable to programs/organizations early in their formation and which might be constrained in some way from instituting larger KM initiatives. The emphasis is on tools, techniques, and methods that integrate well with the day-to-day processes of the organization, reduce single points of failure, and transfer/preserve knowledge early in the lifecycle.

French Experience in the Area of Knowledge Management for New Nuclear Projects

B. Mougel[1]

[1] *Électricité de France (EDF), Paris, France*

Corresponding Author: B. Mougel, bruno.mougel@edf.fr

Capturing knowledge from the beginning of the project is essential, as well as keeping it available, updated, and preserved for the benefit of the different generations of workers that will operate the facilities. This presentation exposes the French experience in the area of knowledge management throughout the life cycle of a nuclear project. Organisations, processes and tools implemented by EDF will be illustrated in the presentation.

EURATOM Success Stories in Facilitating Pan-European E&T Collaborative Efforts

R. Garbil[1]

[1] *DG Research and Innovation, Euratom Fission, European Commission, B-1049 Brussels, Belgium*

Corresponding Author: R. Garbil, Roger.Garbil@ec.europa.eu

The European Atomic Energy Community (Euratom) Research and Training framework programmes are benefitting from a consistent success in pursuing excellence in research and facilitating Pan-European collaborative efforts across a broad range of nuclear science and technologies, nuclear fission and radiation protection. To fulfil Euratom R&D programmes keys objectives of maintaining high levels of nuclear knowledge and building a more dynamic and competitive European industry, promotion of Pan-European mobility of researchers are implemented by co-financing transnational access to research infrastructures and joint research activities through to research and innovation and coordination and support actions funding schemes. Establishment by the research community of European technology platforms are being capitalized. Mapping of research infrastructures and E&T capabilities is allowing a closer cooperation within the European Union and beyond, benefiting from multilateral international agreements and from closer cooperation between Euratom, OECD/NEA and IAEA and international fora. "Euratom success stories" in facilitating Pan-European E&T collaborative efforts through research and training framework programmes show the benefits of research efforts in key fields, of building an effective "critical mass", of promoting the creation of "centres of excellence" with an increased support for "open access to key research infrastructures", exploitation of research results, management of knowledge, dissemination and sharing of learning outcomes.

The Art of Knowledge Management and Knowledge Transfer to the New Generation of Scientists, Engineers, and Technicians Entering the Workforce

L. Lagos[1]

[1]*Florida International University, FL 33199, USA*

Corresponding Author: L. Lagos, lagosl@fiu.edu

As a result of an aging workforce at US federal agencies and federal contractors' workforce, it is projected that over 20% of the current workforce will be retiring over the next decade. Typically, the institutional knowledge and technical expertise is possessed by senior staff members approaching retirement. In many instances, this knowledge is lost once the employee retires; therefore, creating a huge gap in knowledge and knowledge transfer to new employees joining the workforce. Companies and federal agencies should develop methods to not only maintain the corporate knowledge and technical expertise, but also a transfer this valuable knowledge to the next generation of scientist, engineer and technicians entering the workforce. For example, Florida International University supports DOE-EM's knowledge transfer through the DOE Fellows STEM programme and the development of international technology platform such as the Knowledge Management Information Tool for nuclear decommissioning (KM-IT). This paper will discuss the knowledge transfer issues faced by federal agencies and federal contractors and innovative tools to capture, store, maintain, and transfer the knowledge to the new generation of scientists, engineers and technicians entering the workplace.

Outreach: Key to Sustainable Nuclear Knowledge Management

V. Segovia[1]

[1]*Nuclear Power Institute, Texas A&M University, College Station, TX 77840, USA*

Corresponding Author: V. Segovia, vsegovia@tamu.edu

With the numerous nuclear power plants being built globally and the prospects for many more, the challenge of the timely availability of a well-prepared, qualified, knowledgeable workforce is a key element in the "critical path" to commissioning these plants. All of these individuals will need quality education and training that is rooted in safety and established in experience. In addition, because many of these new plants are typically being built in developing countries, education, training, recruiting and retaining operations staff can be a significant challenge. Attracting sources of qualified employees for these nuclear power plants in local communities is paramount which implies a strong focus on the science and math education outreach programmes at all levels. This paper will highlight the Nuclear Power Institute's integration of human resource development outreach strategies, education and training systems, and international cooperation to demonstrate how working in particular with the education sector can not only create interest in future careers in nuclear technology and capture valuable knowledge, but can also build community based support for nuclear power programmes with an emphasis of developing competent workers through education and training, mentoring and apprenticeships. Outreach has also become an important element of all nuclear knowledge management endeavours.

Initiative for Energy Education at the Level of Secondary Schools: Case Study

S. Ismail[1]

[1]*Institute of Atomic and Subatomic Physics, Technische Universität Wien, 1020 Vienna, Austria*

Corresponding Author: S. Ismail, ismail@ati.ac.at

The paper illustrates a new initiative, which has been implemented within secondary and technical schools in the Arab World, with the aim of improving the teaching of science, particularly on energy related subjects such as renewable and nuclear energies. Energy education could be the ideal subject to bridge the gap between education and the job markets in many areas of the world now and in the near future. The world is changing energy strategies to meet the challenges of the 21 century for more contribution of renewable and nuclear energy with enormous investments in these sectors. For example, the emerging countries in the Arab world require large efforts and programs for energy efficiency and energy conservation to reduce their investments in the energy sector and that cannot be reached without social energy culture. Schools and teachers are the key success for such efforts. Therefore, it was important to start this initiative which is composed of four main programmes. The first programme is based on establishing and enhancing cooperation between Arab and European teaching institutions. The second addresses the implementation of an Arab–European platform for scientific communities. The third develops outreach projects in order to promote and support social activities between teachers and students. The fourth includes the promotion of teachers and authorities to improve the curricula. The paper will discuss the experience gained from organizing and the related assessment procedures.

Nuclear Education and Training at Tsinghua University to Meet the Need of the Rapidly Developing Industry

Y. Sun[1], Y. Han[1], and F. Liu[1]

[1] *Institute of Nuclear and New Energy Technology, Tsinghua University, Haidian, Beijing, People's Republic of China*

Corresponding Author: Y. Sun, sunyl@mail.tsinghua.edu.cn

The Chinese nuclear industry has been expanding rapidly since recent years. Education of highly qualified people with various educational background is an important factor for the efficient and healthy operation of the industry. Tsinghua University is offering various degree programmes for a variety of disciplines including nuclear science, nuclear engineering, nuclear safety, nuclear fuel cycle, nuclear waste treatment, energy policy and management. Degree programmes have been designed and implemented for regular school students who do not have working experience and for people who are already in their career development to better meet the requirement of the rapidly developing nuclear industry. Emphasis has also been given to the internationalization of the education programs. In addition, training programmes on a more practical basis are offered to meet specific purposes. These efforts are briefly described in this paper.

Education and Training in Decommissioning: Needs, Opportunities and Challenges

P. Kockerols[1], H. G. Schneider[1], and M. Freer[2]
[1]*European Commission, Brussels, Belgium*
[2]*University of Birmingham, Birmingham B15 2TT, UK*

Corresponding Author: P. Kockerols, pierre.kockerols@ec.europa.eu

The decommissioning of nuclear facilities is an industrial activity that is growing worldwide, creating job opportunities and requiring skilled workers. European industry has acquired know-how and today Europe can position itself at the top level in the world decommissioning market. However, in view of the expected expansion of the activities, efforts are necessary to share and enhance the underpinning knowledge, skills and competences.

In this perspective, the University of Birmingham in association with the European Commission's Joint Research Centre have organized a joint seminar to address the following questions in relation to education and training in nuclear decommissioning:

- What are the competence needs for the future?
- What are the education and training opportunities?
- How can we stimulate interest and future talent?

In answering these questions a report has been issued giving orientations for stimulating the development, coordination and promotion of adequate education and training programmes at EU level in nuclear decommissioning.

Following the conclusions of the report the JRC and interested partners have launched the initiative to consolidate existing training programmes in decommissioning, in order to facilitate their promotion and the opportunities they can offer

Educational Approach to Maintain a Suitable Knowledge and Expertise in Nuclear Field: Case of Morocco

A. Choukri[1], O. K. Hakam[1]
[1] *University of Ibn Tofail, Kénitra, Morocco*

Corresponding Author: A. Choukri, choukrimajid@yahoo.com

Nuclear knowledge management has become an increasingly important element of the nuclear sector in recent years, resulting from a number of challenges and trends. The development of any national nuclear energy programme is dependent on the successful development of the workforce, through a sustainable nuclear educational and training programme supported by government and industry.

Morocco has continuously provided educational programmes in nuclear field at its universities since 1967. These academic programmes focused on nuclear sciences, nuclear engineering, radiation protection, etc., and were intended to undergraduate and postgraduate students.

Nuclear techniques have known also an increased contribution to medicine, agriculture, industry and research in Morocco. Some educational and training programmes have been elaborated to develop human resources needed in different domains. University of Ibn Tofail, has launched, since september 2010, a national master's programme in the field of nuclear sciences which aims to provide knowledge directly used in the various sectors using nuclear techniques and requiring radiation protection, nuclear safety and security including notions on nuclear knowledge management.

For an effective management of nuclear knowledge, the educational didactic has been improved increasingly. Some new techniques, materiel and styles have been employed such as demonstrations, group exercises, e-learning, visio-conferences

Laying the Foundations for a Knowledge Management Strategy in the Context of a Nuclear New-Build Project

C. Bright[1], ***J.-F. Schifflers***[2]

[1]*Lloyd's Register, United Kingdom*
[2]*NuGeneration Ltd., Piccadilly Place, Manchester, UK*

Corresponding Author: C. Bright, clive.bright@lr.org

This paper outlines NuGen's strategic framework for Knowledge Management that is currently being defined in support of the Moorside nuclear new build project in the United Kingdom. The strategic context is described along with an underpinning KM model, five step knowledge process, and oversight and governance arrangements that in combination seek to deliver integrated and sustainable management of critical knowledge assets throughout the plant's lifecycle.

EDF Energy Nuclear New Build: Lessons Learned in Knowledge Management

M. Sachar[1], G. Borlodan[1]
[1]*EDF Energy, UK*

Corresponding Author: M. Sachar, melanie.sachar@edf-energy.com

EDF Energy Nuclear New Build (NNB) is building two EPR reactors at Hinkley Point C in Somerset in the United Kingdom that will provide reliable, low carbon electricity to meet approximately 7% of the UK's electricity needs. The Hinkley Point C project is well advanced. It has achieved planning consent, design approval for the EPR reactor and a nuclear site license. There is a well-developed supply chain with identified preferred bidders who are already heavily involved in construction planning. Training for needed skills is underway and industrial agreements with trade unions are in place.

NNB has the unique opportunity to set Knowledge Management behaviours, culture, and standards for the Hinkley Point C project from project inception instead of working to change them, such as on an operational site.

Safety Culture for Regulator Competence Management in Embarking States

M. Kandil[1]

[1]*Egyptian Nuclear and Radiological Regulatory Authority (ENRRA), Cairo, Egypt*

Corresponding Author: M. Kandil, magy_kandil@yahoo.com

Safety is based on preventive actions where the ability of a regulatory body to fulfill its responsibilities depends largely on the competence of its staff. Building employees' skills and knowledge is an investment for each employee and in the future of the organization. This building must be the competence of its staff integration with their safety culture, the essential to ensure competent human resources as required in the IAEA safety standards and other documents, in which the need and importance of ensuring regulatory competence is emphasized. As it involves both operational and management issues, safety culture is a sensitive topic for regulators whose role is to ensure compliance with safety requirements and not to intervene in management decisions. A number of embarking States are aspiring to develop nuclear power generation and this means that, among other things, regulatory bodies have to be established and rapidly expanded. This paper reports major considerations on the integration of safety culture with an adequate competence management system for regulators in embarking states.

Contribution of Full-Scope Simulator Development Project to the Dissemination of Nuclear Knowledge within New-Build–Project Teams

P. Gain[1]

[1]*CORYS T.E.S.S., 38024 Grenoble, France*

Corresponding Author: P. Gain, pgain@corys.fr

In a context where few countries recently carried out nuclear new-build projects combined with very strong need for generation renewal, there exists a major stake for the training of the hundreds of engineers who are involved in the design and commissioning teams of this highly complex industrial facility.

The Simulator project, which gives the first opportunity for integration and validation of the whole of the design data, to check their coherence, the good performance with the interface and conformity with the safety and performance requirements, allows a fast and effective competence rise of all the resources involved in its development.

In addition, the phased availability of the whole of data generally results in having several phased versions of the simulator. Each can then be deployed in great number for training drills which also will contribute to share in optimal way knowledge on the reference plant design.

This contexts of broader use of these training modules and use of simulation in support of the engineering activities lead to their use by many teams with varied profiles; and there too, the simulation technologies are of a remarkable effectiveness to share a common and stable knowledge management.

Asset Management as a Precondition for Knowledge Management

E. Bajramovic[1], K. Waedt[1], ***D. Gupta***[1], Y. Gao[1], and M. Parekh[1]

[1]*AREVA GmbH, Henri–Dunat–Str. 50, 91058 Erlangen, Germany*

Corresponding Author: E. Bajramovic, edita.bajramovic@areva.com

Smart sensors and extensively configurable devices are gradually imposed by the automation market. Except for safety systems, they find their way into the next instrumentation and control (I&C) generation. The understanding and handling of these devices require an extensive knowledge management (KM). This will be outlined for security, testing and training.

For legacy systems, security often relates to vetting and access control. For digital devices, a refined asset management is needed, e.g., down to board-level support chipsets. Firmware and system/application software have their own configurations, versions and patch levels. So, here, as a first step of the KM, a user needs to know the firmware configurability. Then, trainings can address when to apply patches, perform regression tests and on what to focus, based on accumulated experience.

While assets are often addressed implicitly, this document justifies an explicit and semiformal representation of primary and supporting assets (the asset portfolio) and the establishment of an asset management system as a basis for a robust knowledge management.

Strategic Institutionalization of NKM in Newcomer NP Programme: The Nigeria Experience

P. Akusu[1], O. Ofodile[1], and E. Agedah[1]

[1]*Nigeria Atomic Energy Commission (NAEC), Abuja FCT, Nigeria*

Corresponding Author: P. Akusu, patrick.akusu@nigatom.org.ng

Nigeria as a newcomer nation is strategically institutionalizing its NKM drive via two facets since it is going into an Inter-governmental Agreement (IGA) to acquire Nuclear Power Plants (NPPs) from foreign technical partners. The NKM implementation strategies include (1) NKM with respect to nuclear research and development activities and (2) NKM with respect to NPP vendor. Some lessons learned in the implementation of the National Nuclear Power Programme (NNPP) are also outlined.

Development of the South African Network for Nuclear Education, Science and Technology

A. Cilliers[1]

[1]*North-West University, South Africa*

Corresponding Author: A. Cilliers, anthonie.cilliers@nwu.ac.za

South Africa has long been regarded as an active country in the nuclear industry with two operating power reactors and a research reactor. In recent years' research and development projects, such as the Pebble Bed Modular Reactor, has established additional expertise in the country situated at various institutions. After the PBMR project was stopped, the expertise became fragmented throughout the country and some experts even left the country. A number of training and research facilities have also completed their research cycle and are in the process of being decommissioned.

With the renewed interest in nuclear technology and the states position to complete the procurement of 9600 MW of nuclear power before the end of the year, nuclear knowledge gap has been identified and the need to capture all nuclear education and research in an educational network as well as to establish new nuclear training and research facilities such as small training reactors and research laboratories to support the national new build programme. This expertise and research facilities were combined into SAN-NEST (South African Network for Nuclear Education, Science and Technology) for South Africa and the African continent, with links to AFRA-NEST. The paper reports on the successes and challenges of the establishment and operation of SAN-NEST.

Key Information File for Radioactive Waste Repositories

P.-H. de La Codre[1]

[1] *Organisation for Economic Co-operation and Development, Nuclear Energy Agency (OECD/NEA), 92100 Boulogne-Billancourt, France*

Corresponding Author: P.-H. de La Codre, pierre-henri.delacodre@oecd.org

Part of the OECD/NEA RK&M initiative, the Key Information File (KIF) is a document designed to provide a summary of the existence, location and content of a radioactive waste repository. Its primary function would be to maintain both awareness of the site and long-term confidence in the effectiveness of the disposal system, so that the likelihood of unnecessary human disturbance is minimized. In order to ensure this document is accessible to a large audience, it would need to be limited in length. A draft format for the KIF has been proposed, and testing is being conducted on two cases, that of the "Centre de stockage de la Manche", the closed French Repository (surface) and that of the planned Swedish Spent Fuel Repository (geological).

Application of SAFRAN Tool for Knowledge Management at the Decommissioning Stage of Nuclear Facilities

A. Smetnik[1], V. Potapov[1], E. Kapralov[1], and D. Murlis[1]

[1]*FSUE VO "Safety", 109147, Moscow, Russian Federation*

Corresponding Author: A. Smetnik, smetnik2000@yahoo.com

As a result of the work performed by specialists of FSUE VO "Safety" under the scope of the CRAFT Project, the IAEA methodology and SAFRAN tool were used for safety assessment of radioactive waste removal from historical near-surface storage of the radon type.

SAFRAN tool can be considered as an effective tool for record keeping, safety assessment and knowledge management at the stage of decommissioning of nuclear facilities. Main advantages of SAFRAN:

- it uses methodologies agreed upon at the international level, namely, by IAEA standards;
- several experts can work more effectively when performing the same safety assessment. SAFRAN makes it easier to exchange experience through sharing projects and data bases;
- it is helpful for systematic and structured safety assessment as per safety standards;
- it manages information and data in the same software environment.

KM Actions on the Licensing Process of the Caldas Uranium Mining and Milling Site (Brazil)

D. V. F. M. Rey-Silva[1], A. P. de Oliveira[1], and N. C. Da Silva[1]

[1]*Brazilian Nuclear Energy Commission (CNEN), Rio de Janeiro, Brazil*

Corresponding Author: D. V. F. M. Rey-Silva, daniela@cnen.gov.br

The closure plan for the Caldas uranium mining and milling site (Brazil) is in its first stages and will involve the licensing and supervision of a big scale environmental remediation project (ERP). During this process, the team from LAPOC/CNEN involved with the licensing of the site has identified the need for professionals from various specialties to conduct the necessary assessments. In this context, this work aims to map the critical knowledge necessary for the challenge presented above and also to identify if the regulator counts with experts who possess such knowledge. Next, to share the knowledge and information needed to carry out assessments, the creation of a Community of Practice (CoP) is suggested.

Approaches of Knowledge Management System for the Decommissioning of Nuclear Facilities

Y. Iguchi[1], S. Yanagihara[1], ***M. Tezuka***[2], Y. Koda[2], and Y. Kato[1]

[1]*Research Institute of Nuclear Engineering, University of Fukui, Japan*
[2]*Japan Atomic Energy Agency (JAEA), Naka, Japan*

Corresponding Author: Y. Iguchi, iguchi-y@u-fukui.ac.jp

The decommissioning of a nuclear facility is a long term project, handling information beginning with design, construction and operation. Moreover, the decommissioning project is likely to be extended because of the lack of the waste disposal site. In this situation, as the transfer of knowledge to the next generation is a crucial issue, approaches of knowledge management (KM) are necessary. For this purpose, the total system of decommissioning knowledge management system (KMS) is proposed. In this system, we should arrange, organize and systematize the data and information of the plant design, maintenance history, trouble events, waste management records etc. The collected data, information and records should be organized by computer support systems. It becomes a base of the explicit knowledge. Moreover, measures of extracting tacit knowledge from retiring employees are necessary. The experience of the retirees should be documented as much as possible through effective questionnaire or interview process. In this way, various KM approaches become an integrated KMS as a whole. The system should be used for daily accumulation of knowledge thorough the planning, implementation and evaluation of decommissioning activities and it will contribute to the transfer of knowledge.

European Decommissioning Academy

V. S. Slugen[1], M. Hornacek[1]

[1]*Slovak University of Technology, 812 43 Bratislava, Slovakia*

Corresponding Author: V. S. Slugen, vladimir.slugen@stuba.sk

Experiences from the first run of the European Decommissioning Academy (EDA) are reported in details. EDA was created at the Slovak University of Technology in Bratislava Slovakia, based on discussion and expressed needs declared at many international meetings including ECED2013. The first run successfully passed 15 participants during 7–26 June 2015. Academy was focused on decommissioning issues via lessons, practical exercises in laboratories, on-site training prepared at NPP V-1 in Jaslovské Bohunice, Slovakia as well as four day technical tour to other European decommissioning facilities in Switzerland and Italy. Detailed information can be found at http://kome.snus.sk/inpe/.

Knowledge Management Learned from Decommissioning and Environmental Remediation after an Unexpected Radiological Contamination Occurred at Fukushima Dai-ichi NPP Accident

T. Inoue[1]

[1]*Central Research Institute of Electric Power Industry (CRIEPI), Japan*

Corresponding Author: T. Inoue, inouet@abox5.so-net.ne.jp

The Fukushima Dai-ichi Nuclear Power Plant (NPP) Accident resulted in severe damage of cores in units 1 to 3, and subsequently entailed not only contamination of facility but also widely-spread radiological contamination in environment due to the release of radioactive nuclides.

Decommissioning activities will require at least 30–40 years with various stages of operation, such as contaminated water treatment, decontamination of reactor buildings, retrieval of spent fuel (SF) from SF pools, inspection of primary containment vessel (PCV) and reactor pressure vessel (RPV), and retrieval and further management of damaged fuel and melted debris. Especially, a water injection for core cooling is a pressing issue to stabilize the melted debris, which leads to produce a large amount of contaminated water. Environmental remediation is a crucial issue to return a normal life for local residents. On-site cleaning and off-site remediation produce various kinds and enormous amount of contaminated material with low to high radioactivity. Knowledge management of on-site and off-site issues over generation are critical to achieve the cleaning and remediation requiring a couple of decades. In addition, knowledge obtained through a long term-operation should be shared globally.

The IAEA Regional Training Courses Implementation: Lessons Learned and Paving the Way Forward

R. Kritskiy[1], V. Artisiuk[1], D. Ulanov[2], and V. Latynov[1]

[1]*Rosatom Central Institute for Continuing Education and Training (CICET), Obninsk, Russian Federation*
[2]*ROSATOM State Atomic Energy Corporation, Moscow, Russian Federation*

Corresponding Author: R. Kritskiy, kritskiy-ro@rosenergoatom.ru

In the light of the growing interest of the international community to the issues of remediation of nuclear and uranium legacy sites, within 2014–2015 the IAEA Regional Project RER 7/006 "Building Capacity for Developing and Implementing Integrated Programmes for Remediation of the Areas Affected by Uranium Mining" was conducted in the framework of the two-years the IAEA Technical Cooperation Programme. The present paper deals with the main lessons learned from the developing and delivering a regional training course and its prospective.

Knowledge Management in the IAEA Department of Safeguards

S. Konecni[1], J. Carrillo de Fischer[1]

[1]*International Atomic Energy Agency (IAEA), Vienna, Austria*

Corresponding Author: S. Konecni, s.konecni@iaea.org

Knowledge Management (KM) is an integral part of the Departmental Quality Management System because knowledge (i.e., the 'know-how', 'know-when', 'know-who', 'know-why', etc.) is needed to produce high quality products and services on a daily basis. The ability to continue providing such products and services is challenged each time an experienced staff member leaves the IAEA due to retirement or end of contract and takes with them important job-related knowledge. The most important assets in the International Atomic Energy Agency (IAEA) Department of Safeguards (SG) are people and their knowledge.

The Department of Safeguards developed a knowledge management (KM) framework and the corresponding approaches as well as specific guidelines for its implementation. Knowledge retention (KR) is part of knowledge management and focusses on eliminating the risk of losing the critical job-related knowledge by putting in place a systematic knowledge retention plan.

Particularly, for knowledge retention, the Safeguards Division of Concepts and Planning (SGCP) developed a model to draw out and capture the critical knowledge and making it available for use by others.

This paper describes the knowledge retention model/approach and lessons learned from implementing the knowledge management programme in SG.

Transfer of Knowledge Management Methods and Tools to and from the Nuclear Industry

Z. Pasztory[1], T. Gyulay[2]

[1]*Pasztory Consulting e.U., Austria*
[2]*KM Expert Kft., 1224 Budapest, Rózsaszirom utca 5., Hungary*

Corresponding Author: Z. Pasztory, zpasztory@gmail.com

The discipline of the knowledge management was firstly introduced in Japan by the leading technology companies like Toyota, Canon, Honda, Mitsubishi, Sharp and others. It means outside the nuclear industry. The nuclear industry organizations including the IAEA started to deal with the knowledge management about ten years later and adapted those approaches, methods and tools developed and used in other industry organizations. After more than fifteen-years of its programmatic existence of the nuclear knowledge management in the IAEA, the trend is turn round in many topics. The nuclear industry organizations have more and more good practices to share with other industries. Meanwhile the world leading companies working in a quickly changing market environment are still developing and using KM practices which can be useful also in the "slowly-changing" nuclear industry environment. In this article we would like to pay attention—through some examples—to the importance of the benchmarking with companies outside the nuclear industry for the further safe and reliable operation of nuclear facilities and to educate and train the next nuclear generation.

Innovative Activities to Ensure Safety: Strategy and Plans to Implement Nuclear Knowledge Management

S. Eremin[1], ***N. Tikhonov***[1], and A. Yuzhakov[1]
[1] *"Rosenergoatom" Concern JSC, Moscow, Russian Federation.*

Corresponding Author: S. Eremin, eremin-s@rosenergoatom.ru

The Russian operating organization Concern Rosenergoatom established a program for a knowledge management (KM) implementation in the organization as part of ROSATOM State Corporation KM activities. The plan includes activities both in the framework of the classic knowledge management cycle: detection, preservation, retention, sharing and transfer, as well as creation of new knowledge such as training programs for the construction of new nuclear power plants. The approach embraces key techniques overviewed in IAEA documents on KM, and ROSATOM's strategical focus on the commercial use of R&D results and corporate knowledge and, thus, contribute to safe, reliable and efficient operation of NPPs.

Proposing a Balance Scored Card to Communicate and Follow a NKM Implementation

C. L. Vetere[1], P. R. Gomiz[1], and D. H. Caballero[1]

[1]*Comisión Nacional de Energía Atómica, (CNEA), Buenos Aires, Argentina*

Corresponding Author: C. L. Vetere, vetere@cnea.gov.ar

The balance scored card (BSC) is a tool developed to link strategies to the organizational key objectives and results, and a useful method to show and communicate the strategy, to follow its development and obtain feedback to learn about the implementation of a nuclear knowledge management domain. This report gives a brief summary of the method adopted for developing a BSC linked to a certain nuclear knowledge domain in the CNEA and it provides an example of its application to the radioactive waste management knowledge area.

Aligning People, Process, and Technology in KM

S. Barnes[1]

[1]*Missing Puzzle Piece Consulting, Berlin, Germany*

Corresponding Author: S. Barnes, stephanie.barnes@missingpuzzlepiececonsulting.eu

This technical brief outlines the importance of aligning people, process, and technology in order to be successful in implementing a knowledge management programme. It also provides a process for achieving that alignment.

Dynamic Modelling of a Knowledge Management System Evolution for a Technological Corporation

V. Pershukov[1], N. Belenkaya[1], I. Kuptsov[2], ***A. Andrianov***[2], S. Sheveleva[1], and G. Fesenko[3]

[1]*ROSATOM State Atomic Energy Corporation, Moscow, Russian Federation*
[2]*National Research Nuclear University "MEPhI", Moscow, Russian Federation*
[3]*International Atomic Energy Agency (IAEA), Vienna, Austria*

Corresponding Author: V. Pershukov, nvbelenkaya@rosatom.ru

The paper describes a dynamic mathematical model of a knowledge management system for a technological corporation. The model consists of three equations for generalized variables which characterize the human capacity, accumulated knowledge and profits interrelated by means of the Cobb–Douglas production function.

The presented model is intended to simulate the system evolution over time including identification of possible catastrophic behavior of the system and can be used to solve various problems of forecasting the development of knowledge management systems in technological corporations, and assess the effectiveness of organizational measures aimed at improving the system efficiency. Using this model, it is possible to simulate the system evolution over time and conduct scenario research in the changing internal and external conditions as well as select the optimal system parameters in order to achieve certain goals and formulate requirements for the system components.

The authors present the results of applying this model in simulating the dynamics of the knowledge management system development in a technological corporation and discuss some methodological issues related to the mathematical modeling of processes and models of knowledge management.

Nuclear Knowledge Capture and IEC Standards

J. Sheldon[1]

[1] *International Electrotechnical Commission, CH–1211 Geneva, Switzerland*

Corresponding Author: J. Sheldon, jrs@iec.ch

An International Standard is a document, established by consensus and approved by a recognized body that provides, for common and repeated use, rules, guidelines or characteristics for activities or their results, aimed at the achievement of the optimum degree of order in a given context. As such, it is a mechanism for sharing knowledge in a particular field. The consensus process used to approve the content of standards ensures that the content is essentially peer-reviewed. This presentation will explain how International Standards are developed and used and their importance in the dissemination of scientific and engineering information. It will also explain the role of the IEC in ensuring that the process for developing standards meets the core principles of the Code of Good Practice of the WTO TBT agreement: transparency, openness, impartiality and consensus, effectiveness and relevance, coherence, and addressing the concerns of developing countries.

Introducing Knowledge Management into the Integrated Management System of Nuclear Organizations

Y. Yanev[1], A. Brandner[1], and A. Kosilov[1]

[1]*Nuclear Knowledge Management Institute (NKMI), Gersthofer Straße 162, Vienna, Austria*

Corresponding Author: Y. Yanev, y.yanev@nuclear-km.org

The analysis for introducing knowledge management into an integrated management system in nuclear organizations, conducted by NKMI, and discussed in a number of meetings in IAEA and other organizations has shown that currently there is no full and comprehensive implementation of KM in IMS. NKMI has suggested and developed a common, systematic approach for introducing Knowledge Management in the IMS of a nuclear regulatory organization, based on the concept of competence, graded approach and continuous improvement.

The approach is based on the concept of integrating an initial review of all knowledge and competence needed for effective and efficient process implementation including a gap analysis and provision of compensatory measures. Knowledge resources are represented as a knowledge resource matrix, which are necessary to complete a given process successfully. The "performance" of the available knowledge resources contribute to an efficient regulatory process is also reviewed at the end of process implementation where relevant decision for enhancement of knowledge and competence are taken, including capturing, preserving, sharing and reuse of new knowledge, gained through the process implementation.

The "knowledge resource matrix" approach is fully based on IAEA recommendation and has already been applied in a number of regulatory processes.

How to Support the Integrate Management System through an Enterprise Content Management Platform?

D. Couvreur[1]

[1] *SCK•CEN, Belgian Nuclear Research Centre, 2400 Mol, Belgium*

Corresponding Author: D. Couvreur, danielle.couvreur@sckcen.be

In 2010 the Belgian Nuclear Research Centre SCK•CEN decided to implement an ECM platform in order to manage its information. The main objectives were to centralize in one place all the right and latest versions of information, to improve the usage of internal information and to enhance the efficiency of our activities by standardization and by supporting document management processes. A programme of document migration for the whole institute was set up per group, running over four years. Steps were foreseen such as the comprehension of the activities of the end users in order to increase their efficiency, the analysis of type of documentation, the technical aspects, the migration of documents itself, the training and the most important steps—communication and supporting people to change. In 2013 SCK•CEN decided to implement an Integrated Management System. The objectives were i) to improve the safety performance of the organisation, ii) to foster, strengthen and support a strong safety and organizational culture through the development and reinforcement of good safety attitudes and behaviour in individuals and teams, iii) to structure, but at the same time simplify and make more transparent all processes of SCK•CEN clearly defining responsibilities and authorities, iv) to automate these processes by workflows and support the information and data flow by relevant databases. Intrinsically, both initiatives have the same end objective being the safety of the installations, of the knowledge and transfer of know-how on processes and projects related to radiation protection, reactor technology, waste and disposal, dismantling. In this paper, we will explain through examples,

Drive Cost Reduction, Increase Innovation and Mitigate Risk with Advanced Knowledge Discovery Tools Designed to Unlock and Leverage Prior Knowledge

I. Mitchell[1]

[1] *IHS Markit, London, United Kingdom*

Corresponding Author: I. Mitchell, ian.mitchell@ihs.com

The nuclear industry is knowledge-intensive and includes a diverse number of stakeholders. Much of this knowledge is at risk as engineers, technicians and project professionals retire, leaving a widening skills and information gap. This knowledge is critical in an increasingly complex environment with information from past projects often buried in decades-old, non-integrated systems enterprise. Engineers can spend 40% or more of their time searching for answers across the enterprise instead of solving problems. The inability to access trusted industry knowledge results in increased risk and expense. Advanced knowledge discovery technologies slash research times by as much as 75% and accelerate innovation and problem solving by giving technical professionals access to the information they need, in the context of the problems they are trying to solve. Unlike traditional knowledge management approaches, knowledge discovery tools powered by semantic search technologies are adept at uncovering answers in unstructured data and require no tagging, organization or moving of data, meaning a smaller IT footprint and faster time-to-knowledge. This session will highlight best-in-class knowledge discovery technologies, content, and strategies to give nuclear industry organizations the ability to leverage the corpus of enterprise knowledge into the future.

From Nuclear Information to Knowledge: The Role of INIS

Z. Hakopov[1]

[1] *International Atomic Energy Agency (IAEA), Vienna, Austria*

Corresponding Author: Z. Hakopov, z.n.hakopov@iaea.org

The International Nuclear Information System (INIS) once created to facilitate information exchange in the broad range of scientific and technical fields related to peaceful applications of nuclear power has evolved into a Knowledge Organization System (KOS) consisting of a digital repository and an advanced multi-language thesaurus. This paper gives a general description of the establishment, evolution and features of INIS not only as a digital repository but as one of the key resources of knowledge organization and preservation in the nuclear field.

Knowledge, Skills and Competence Modelling in Nuclear Engineering Domain using Singular Value Decomposition (SVD) and Latent Semantic Analysis (LSA)

V. Kuo[1]

[1] *Aalto University, Espoo, Finland*

Corresponding Author: V. Kuo, vincent.kuo@aalto.fi

The European Qualifications Framework categorizes learning objectives into three qualifiers "knowledge", "skills", and "competences" (KSCs) to help improve the comparability between different fields and disciplines. However, the management of KSCs remains a great challenge given their semantic fuzziness. Similar texts may describe different concepts and different texts may describe similar concepts among different domains. This is difficult for the indexing, searching and matching of semantically similar KSCs within an information system, to facilitate transfer and mobility of KSCs. We present a working example using a semantic inference method known as Latent Semantic Analysis, employing a matrix operation called Singular Value Decomposition, which have been shown to infer semantic associations within unstructured textual data comparable to that of human interpretations. In our example, a few natural language text passages representing KSCs in the nuclear sector are used to demonstrate the capabilities of the system. It can be shown that LSA is able to infer latent semantic associations between texts, and cluster and match separate text passages semantically based on these associations. We propose this methodology for modelling existing natural language KSCs in the nuclear domain so they can be semantically queried, retrieved and filtered upon request.

Information Seek and Retrieval in Knowledge Management

N. Maximov[1], A. Pryakhin[1], O. Golitsyna[1], and ***V. Kupriyanov***[2]

[1]*National Research Nuclear University "MEPhI", Moscow, Russian Federation*
[2]*ROSATOM State Atomic Energy Corporation, Moscow, Russian Federation*

Corresponding Author: N. Maximov, nv-maks@yandex.ru

Information search is considered as a complex self-consistent process of constructing new knowledge, where knowledge is introduced as information related to context (specific circumstances). Operational space of such environment includes documentary components (implicit knowledge) and conceptual and terminological systems (glossaries, thesauri, and ontologies) as tools of cognitive process and semantic context. In the process of information search, context is injected by using a pre-coordinated linguistic structures (taxonomies, dictionaries of application domain) that is an adequate image for well-defined information, and by a cognitive tree taxonomy for new information needs, that is dynamically formed for each project or point of view in search task. A node of this structure can have as a properties both information (documents, queries, references to associated resources) and meta-information (application domain local dictionaries, corresponding parts of classifications, subject headings, thesauri, ontologies), and,in addition, the results of analytical processing.

Exploiting Semantic Search Methodologies to Analyse Fast Nuclear Reactor Nuclear Related Information

L. Costantini[1]
[1] *Vienna, Austria*

Corresponding Author: L. Costantini, livio.costantini@gmail.com

This paper describes an experiment to evaluate the outcomes of using the semantic search engine together with the entity extraction approach and the visualisation tools in large set of nuclear data related to fast nuclear reactors (FNR) documents originated from INIS database and the IAEA web publication. The INIS database has been used because is the larger collection of nuclear related data and a sub-set of it can be utilised to verify the efficiency and the effectiveness of this approach. In a nutshell, the goal of the study was to: 1) find and monitor documents dealing with FNR; 2) building knowledge base (KB) according to the FNR nuclear components and populate the KB with relevant documents; 3) communicate the conclusion of the analysis by utilising visualisation tools. The semantic search engine used in the case study has the capability to perform what is called evidential reasoning: accruing, weighing and evaluating the evidence to determinate a mathematical score for each article that measures its relevance to the subject of interest. This approach provides a means to differentiate between articles that closely meet the search criteria versus those less relevant articles. Tovek software platform was chosen for this case study.

OECD/NEA Data Bank Activities on Nuclear Knowledge Preservation and Management

J. M. Galan[1], K. Matsumoto[1]

[1]*Organisation for Economic Co-operation and Development, Nuclear Energy Agency (OECD/NEA), 92100 Boulogne-Billancourt, France*

Corresponding Author: J. M. Galan, juan-manuel.galan@oecd.org

The Nuclear Energy Agency (NEA) operates as a special agency of the Organization for Economic Co-operation and Development (OECD), an intergovernmental body based in Paris. The main objective of the NEA is to assist its member countries in maintaining and further developing, through international co-operation, the scientific, technological and legal bases required for a safe, environmentally friendly and economical use of nuclear energy for peaceful purposes.

The NEA Data Bank, created in 1978 by the fusion of the Neutron Data Compilation Centre and the Computer Program Library, deals more specifically with nuclear data and computer programmes covering the whole nuclear fuel cycle and some non-energy applications. The objectives of the data bank are to "act as an international centre of reference for its Member countries with respect to basic nuclear tools, such as computer codes and nuclear data, used for the analysis and prediction of phenomena in the nuclear field, and to provide a direct service to its users by developing, improving and validating these tools and making them available as requested".

Digital Repositories of Learning Material as a Support Tool for Knowledge Management and Capacity Building

E. Marmonti[1]
[1]*Argentina*

Corresponding Author: E. Marmonti, emarmonti@gmail.com

For some years, digital repositories are emerging as a de facto standard service for storing, preserving and disseminate knowledge: academic, scientific information and, more recently, primary research data of institutions. Some of the digital repositories host also collections of material classified as learning objects; some others are created to manage only learning objects (LO), as the Learning Objects Digital Repositories, or were built to function as learning objects aggregators. The term "learning object" itself is involving different types of structures, organization and complexity. This paper will show how digital repositories, metadata standards and semantic web technologies can be valuable tools for managing educational content, which can contribute to build a learning and knowledge driven organization.

IT–Enabled Knowledge Management System for Nuclear R&D Organization

R. Jehadeesan[1]

[1]*Indira Gandhi Centre for Atomic Research, Chennai, Tamil Nadu, India*

Corresponding Author: R. Jehadeesan, jeha@igcar.gov.in

A knowledge management (KM) system for codification, preservation and utilization of all multi-disciplinary knowledge assets accumulated over several decades of nuclear research, development and operation is essential for improved organizational productivity, new insights and high-levels of innovation. IGCAR's Nuclear Knowledge Management System deployed with IT-as-enabler addresses various challenges related to people, process, technology and resources and provides a technology platform to leverage the collective knowledge of the organization. This paper describes the strategic action plan and structured approach followed for building IT-enabled knowledge management system to acquire, store, share and utilize the organizational knowledge assets in the explicit form of publications, technical reports, presentations, projects, activities, facilities etc., along with the tacit knowledge multi-media modules. It highlights the salient features of the in-house-developed advanced KM portal deployed for facilitating the creation, archival, retrieval, sharing and dissemination of knowledge assets originating from diverse domains, in an organized and secured way. The paper also underlines the application of semantic technologies, tools and standards in implementing a robust KM technology infrastructure with enhanced functionalities.

OECD/NEA (Nuclear Energy Agency) RepMet (Radioactive Waste Repository Metadata Management) Initiative

M. Ciambrella[1]

[1] *Organisation for Economic Co-operation and Development, Nuclear Energy Agency (OECD/NEA), 92100 Boulogne-Billancourt, France*

Corresponding Author: M. Ciambrella, massimo.ciambrella@gmail.com

National radioactive waste repository programmes require large amounts of data to demonstrate safety that increase in number, type and quality as these programmes proceed through the successive stages of final repository development, i.e., siting, characterization, construction, operations and closure. As a repository takes decades to develop, long-term data management is a critical aspect for guaranteeing that future generations will be able to understand the decisions carried out today. Metadata, "data about data", are a fundamental tool of modern data management. They are used to search information in data records; to store the context with data; and to support their archiving and preservation. The OECD/NEA RepMet is an initiative devoted to bringing about a better understanding of the identification and administration of metadata to support national programmes in managing their radioactive waste repository data in a way that is both harmonized internationally and suitable for long-term management and use. After exploring several metadata concepts and their application in non-nuclear fields (e.g., geospatial, records management), the RepMet group started developing data and metadata libraries for topics relevant to radioactive waste repositories. RepMet is currently working on a library for waste packages ready for disposal in repository.

Knowledge Management Issues in Research of Historical Severe Accidents

G. Johnson[1]
[1]*Retired, USA*

Corresponding Author: G. Johnson, kg6un@me.com

After the accidents at the Fukushima Daiichi sites an attempt was made to identify and analyze previous severe accidents at nuclear reactors. Nineteen severe accidents were found an evaluated. This paper describes the efforts made to obtain the knowledge sources for this work, discusses use of IAEA knowledge management tools, and identifies other sources that are useful for finding information about previous accidents. No complete and credible list of severe accident was found. The work described in this paper is believed to have identified most, but not all, severe accidents that have occurred in the United States, Canada, the European Union, and Japan. It is possible, however, that there may have been other severe accidents that are not yet mentioned in English language literature.

International Nuclear Terminology Repository Platform "INTERP": An Application of Semantic Technologies in the Nuclear Domain

T. Atieh[1]

[1]*International Atomic Energy Agency (IAEA), Vienna, Austria*

Corresponding Author: T. Atieh, t.atieh@iaea.org

Many nuclear glossaries of technical terms, along with their formal definitions, have been produced by standards development organizations, IAEA, and other national and international nuclear organizations. The formal definitions of these technical terms in the different glossaries are not always consistent, but provide multiple and different definitions to many of the terms used in the nuclear field, and sometimes with very different meanings. These technical terms are used in licensing documents, contracts, specifications, design documents, etc. Therefore, significant problems are encountered in interpreting and applying these terms.

The IAEA NKM Section has launched the "International Nuclear Terminology Repository Platform (INTERP)" project which is aimed at providing one single access point to credible nuclear glossaries presenting the multiple definitions of terms, with traceability of the sources and related information. While, and at the same time, offering a forum for glossary owners to exchange information and discuss concepts. The overall objective is to eliminate inconsistency in the interpretations of standards and licensing documents, etc., which would assist Member States to ensure safety and the related economic consequence.

Record Management Audit: Nuclear Malaysia's Experience

H. Adnan[1], M. H. Yusof[1], N. Ngadiron[1], and R. M. Ismail[1]

[1]*Malaysian Nuclear Agency, Bangi, 43000 Kajang, Selangor, Malaysia*

Corresponding Author: H. Adnan, habibah@nuclearmalaysia.gov.my

The Malaysian Nuclear Agency (Nuclear Malaysia) is heavily reliant on information in order to accomplish its strategic research and development, and commercialization (R&D&C) outcomes. Since its beginning in 1972, the activity of Information Management (IM) – Records Management (RM) is always integrated in the process of knowledge repository. The Division of Information Management (DIM) is the custodian for the agency's knowledge repository and also responsible to ensure its compliance with the National Archive of Malaysian Act 2003 (Act 629), as well as to address the needs of 3s: Safety, Security and Safeguards outlined by IAEA.

In 2013, Nuclear Malaysia has launched KM Nuclear Policy which includes KM audit committee, to oversee and provide checks and balances for KM initiative programmes. The first KM audit conducted was the Record Management Audit (RMA), started in 2014. The journey faced some challenges from people, process and technology and later completed in 2015 with accumulation of new knowledge derived for the KM improvement. RMA is a unique process which needs to be shared with others because it offers example and experience from the perspective of nuclear R&D agency.

Content Based Searching for INIS

V. Jain[1,2], R. K. Jain[2]

[1]*ICLE's Motilal Jhunjhunwala College of Science, Arts and Commerce, Navi Mumbai, India*
[2]*La Vastu labh Pvt. Ltd., India*
[2]*Bhabha Atomic Research Centre (BARC), Mumbai, India*

Corresponding Author: V. Jain, vidhijain75@gmail.com

Whatever a user wants is available on the internet, but to retrieve the information efficiently, a multilingual and most-relevant document search engine is a must. Most current search engines are word based or pattern based. They do not consider the meaning of the query posed to them; purely based on the keywords of the query; no support of multilingual query and and dismissal of nonrelevant results. Current information-retrieval techniques either rely on an encoding process, using a certain perspective or classification scheme, to describe a given item, or perform a full-text analysis, searching for user-specified words. Neither case guarantees content matching because an encoded description might reflect only part of the content and the mere occurrence of a word does not necessarily reflect the document's content. For general documents, there doesn't yet seem to be a much better option than lazy full-text analysis, by manually going through those endless results pages. In contrast to this, new search engine should extract the meaning of the query and then perform the search based on this extracted meaning. New search engine should also employ Interlingua based machine translation technology to present information in the language of choice of the user.

The Storage of Thermal Reactor Safety Analysis data (STRESA)

J. Tanarro Colodron[1]

[1]*European Commission, Brussels, Belgium*

Corresponding Author: J. Tanarro Colodron, jorge.tanarro-colodron@ec.europa.eu

Storage of Thermal Reactor Safety Analysis data (STRESA) is an online information system that contains three technical databases: 1) European Nuclear Research Facilities, open to all online visitors; 2) Nuclear Experiments, available only to registered users; 3) Results Data, being the core content of the information system, its availability depends on the role and organisation of each user.

Its main purpose is to facilitate the exchange of experimental data produced by large Euratom funded scientific projects addressing severe accidents, providing at the same time a secure repository for this information. Due to its purpose and architecture, it has become an important asset for networks of excellence as SARNET or NUGENIA.

The Severe Accident Research Network of Excellence (SARNET) was set up in 2004 under the aegis of the research Euratom Framework Programmes to study severe accidents in water-cooled nuclear power plants. Coordinated by the IRSN, SARNET unites 43 organizations involved in research on nuclear reactor safety in 18 European countries plus the USA, Canada, South Korea and India. In 2013, SARNET became fully integrated in the Technical Area N°2(TA2), named “Severe accidents” of NUGENIA association, devoted to R&D on fission technology of Generation II and III.

Role of Training Reactor VR-1 in Nuclear Training in National and International Context

L. Sklenka[1], J. Rataj[1], and J. Frybort[1]

[1]*Czech Technical University, Prague, Czech Republic*

Corresponding Author: L. Sklenka, lubomir.sklenka@fjfi.cvut.cz

The VR-1 reactor is the key facility in the field of nuclear educational and training in the Czech Republic. The reactor is equipped with several specific educational and training experimental devices and four training laboratories belonging to the reactor laboratory for neutron interactions studies, laboratory for neutron activation analysis, radiation protection and environmental studies laboratory, and I&C laboratory. Educational and training activities at the reactor were step-by-step extended from domestic activities through the national and international levels up to regional multilateral activities. Future reactor operators and reactor physicists of Czech nuclear power plants have been trained at the reactor since 1992, also reactor physicists from nuclear power plants in Slovakia have been trained since 2002, and trainees from various nuclear developing countries have been also trained at the reactor since 2006. An effective procedure for implementing new experiments and new experimental devices has been developed during more than 25 years of the VR-1 reactor operation. Over 25 experiments can be carried out at the reactor at three levels: demonstration, standard, and advanced.

Applied Nuclear Knowledge Management in Austria

H. Boeck[1], R. Bergmann[1], and M. Villa[1]

[1]*Institute of Atomic and Subatomic Physics, Technische Universität Wien, 1040 Vienna, Austria*

Corresponding Author: H. Boeck, boeck@ati.ac.at

The Technical University Vienna operates one 250 kW TRIGA research reactor at the Atominstitut for academic education and research. This reactor has the privilege to be the closest nuclear facility to the International Atomic Energy Agency which results in close cooperation especially in educational and training courses in selected nuclear fields such as

- reactor physics and kinetics,
- reactor instrumentation and control,
- radiation protection,
- safeguards,
- nuclear security.

These specialized courses are attended not only by students from Austrian universities during their academic curriculum but there is also high interest from international customers.

The available courses are carried out in small groups of maximum eight participants and are composed of a combination of theoretical lectures and hands-on training in the areas mentioned above either in German or English language. As the courses are structured in individual modules the content of the courses can easily be adapted to the particular needs and interests of the target groups.

The submitted paper describes the experience through 40 years of educational and training course for national and international organisations in view of keeping nuclear knowledge alive and offering advice to potential nuclear newcomer countries in their education and training efforts.

Staged Introduction of Non-power and Power Nuclear Technologies to Newcomer Countries

M. Uesaka[1]

[1] *University of Tokyo, Nuclear Professional School, Japan*

Corresponding Author: M. Uesaka, uesaka@nuclear.jp

Staged introduction of non-power and power nuclear technologies to new comer countries and related knowledge management are presented. Contribution and benefit of radiation technology to medicine and society are very important before nuclear power plants are introduced. Recently, not only new nuclear power technologies but also compact and high-performance accelerators for medicine and industrial/social infrastructure maintenance have been developed and used. Such staged introduction with respect to technology, education and economy contributes to enhancement of PA (Public Acceptance). Organized education, knowledge management and network should be associated

Nuclear Knowledge Innovations Assimilation: The Impact of Organizational Knowledge Frames and Triple Helix Dynamics of Knowledge Base

M. D. Hossain[1], T. Sultana[2]

[1]*Bangladesh Atomic Energy Commission (BAEC), Dhaka, Bangladesh*
[2]*Institute of Science & Technology, National University of Bangladesh (IST, NUB), Dhaka, Bangladesh*

Corresponding Author: M. D. Hossain, edhossain@baec.gov.bd

Previous research did not investigate the impact of the TH dynamics of knowledge innovations on the nuclear knowledge innovations adoption/assimilation in the organizational context. Hence, the recommendation of R&D policy reformulation seems too broad. These gaps are the prime motivators for the research. In the organizational context, we posit that TH dynamics of knowledge base innovation serves as complements to managers' knowledge frames related to a technology innovation. We examine interactions between three knowledge frames—integration frame, opportunism frame, and policy knowledge frame, and two TH dynamics of knowledge innovations—bilateral TH dynamics of knowledge innovations and trilateral TH dynamics of knowledge innovations, and their relationship with the assimilation of nuclear knowledge innovations. We aim to research on the issues of the dynamics of knowledge base of innovations involving TH collaborations (university, industry and government) in Bangladesh as a new build nuclear project. As a result, we can find out the impact of TH collaborations on organizational nuclear knowledge innovations management as well as core institutional problems of the knowledge base of innovation systems in terms of R&D policy. Finally, findings identify lack in production of nuclear knowledge innovations and concrete recommendation of R&D policy reformulation.

NKM Perspectives of Nuclear Education in Pakistan

R. Khan[1,2], G. Jaffar[3,2], S. M. Z. Haq[4,2], and S. U. Khosa[2,1]

[1]*Pakistan Institute of Engineering and Applied Sciences (PIEAS), Islamabad, Pakistan*
[2]*Pakistan Atomic Energy Commission (PAEC), Islamabad, Pakistan*
[3]*CHASNUPP Center for Nuclear Training (CHASCENT), Pakistan*
[4]*Karachi Institute of Power Engineering (KINPOE), Karachi 75400, Pakistan*

Corresponding Author: R. Khan, rustam_pieas@yahoo.com

Pakistan Institute of Engineering and Applied Sciences (PIEAS), Karachi Institute of Power Engineering (KINPOE) and CHASNUPP Centre for Nuclear Training (CHASCENT) are the main institutes providing for the nuclear skilled man power demands of the country's nuclear technology program. The PIEAS is a public sector university and offers M.Sc. and Ph.D. programmes in nuclear science and technology. The CHASCENT is the training institute which focuses on the training programmes for nuclear power, while the KINPOE offers Master programme in nuclear power engineering, post graduate training programme (PGTP) and Post Diploma Training Program (PDTP) related to nuclear power engineering and technology. The nuclear education programmes and other relevant NKM activities at PIEAS, KINPOE and CHASCENT play a key role in the information management, human resource and competence management. This paper presents the NKM perspective of nuclear education in Pakistan, its continuation and enhancement for the expanding nuclear power programme to meet the country's energy demands.

Risk of Thyroid Cancer after the Fukushima Nuclear Power Plant Accident

S. Yamashita[1,2]

[1]*Radiation Medical Science Center, Fukushima Medical University, Fukushima, Japan*
[2]*Department of Radiation Medical Sciences, Atomic Bomb Disease Institute, Nagasaki University, Nagasaki, Japan*

Corresponding Author: S. Yamashita, shun@nagasaki-u.ac.jp

A sound scientific understanding about the relationship between radiation dose and health risk is needed to apply any countermeasure against radiological and nuclear accidents. Since the Great East Japan earthquake and the Fukushima Daiichi Nuclear Power Plant accident in Japan, Fukushima Prefecture has started the Fukushima Health Management Survey Project since June 2011 for the purpose of long-term health care administration for the prefectural residents. There are considerable differences between Chernobyl and Fukushima regarding radiation dose to the public, however, it is still difficult to estimate retrospectively accurate internal exposure dose individually from the short-lived radioactive iodines. Another difficult challenge is to how to manage non-radiation–related health effects, such as post-disaster mental impact and lifestyle changes. As we support residents in their recovery and return to their homes, understanding each individual's state with respect to radiation and regular monitoring of their health conditions contribute to the region's rebirth and restoration. Therefore, as one of the tools of risk communication, the necessity of thyroid ultrasound examination in Fukushima and the intermediate results of this survey targeting children will be reviewed and discussed in order to avoid any misunderstanding or misinterpretation of the high detection rate of childhood and adolescent thyroid cancer by mass screening.

An E-learning Tool as Living Book for Knowledge Preservation in Neutron Activation Analysis

P. Bode[1], S. Landsberger[2], D. Ridikas[3], and A. Iunikova[4]

[1]*NUQAM Consultancy, The Netherlands*
[2]*Texas A&M University, College Station, TX 77840, USA*
[3]*International Atomic Energy Agency (IAEA), Vienna, Austria*
[4]*Rosatom Central Institute for Continuing Education and Training (CICET), Obninsk, Russian Federation*

Corresponding Author: P. Bode, peter.bode@ymail.com

Neutron activation analysis (NAA) is one of the most common activities in research reactors, irrespective of their power size. Although being a well-established technique, it has been observed that retirement and/or departure of experienced staff often results in gaps in knowledge of methodological principles and metrological aspects of the NAA technique employed, both within the remaining NAA team and for new recruits. Existing books are apparently not sufficient to timely transfer the knowledge on the practice of NAA. As such, the IAEA has launched a project resulting in an E-learning tool for NAA, consisting of lecture noes, animations, practical exercises and self-assessments. The tool includes more than 30 modules and has been reviewed and tested during an IAEA workshop by experienced and new coming practitioners. It is expected that the tool will be developed as a 'living book' which can be permanently updated and extended and serve as an archive, fostering unpublished experimental experiences.

Role of MNRC to Develop Knowledge and Skills in Nuclear Applications

T. Marfak[1], H. Krafes[1]

[1]*Centre National de l'Energie des Sciences et Techniques Nucléaires (CNESTEN), B.P. 1382 R.P. 10001, Rabat, Morocco*

Corresponding Author: T. Marfak, marfak@cnesten.org.ma

Since 2003, CNESTEN is operating Maamora Nuclear Research Center MNRC which is including a 2 MW nuclear reactor and a dozen of specialized nuclear techniques laboratories dedicated to earth sciences, human health, industry, safety and security, radioactive waste management, and so on. Preparing the required qualified human resources needed investment in terms of identification of necessary competencies, training and expertise development. Human Resources and Communication Department established a strategy to lead with the CNESTEN overall vision and strategic objectives.

As a result, modern HR tools were established such as: competencies repository, systematic approach for training SAT, multi-annual training program, evaluation system, etc. This paper will present all the HR projects identified and developed targeting the CNESTEN scientific and technical staff. The objective is to sustain the CNESTEN activities by qualifying its human resources, developing knowledgeand expertise at both the individual and collective levels. Furthermore, CNESTEN is playing a major role in the transfer of nuclear techniques applications knowledge to several African countries. This experience will be presented in this paper as well.

A New Approach for Education and Training of Medical Physicists in Cuba: From University to Clinical Training

R. Alfonso-Laguardia[1], ***J. M. Rivero Blanco***[1]

[1]*High Institute for Applied Technologies and Sciences (InSTEC), Havana, Cuba*

Corresponding Author: R. Alfonso-Laguardia, rodocub@yahoo.com

According to the international recommendations of IAEA and the International Organization for Medical Physics (IOMP), the education and training of clinically qualified medical physicists (CQMP) should include three main academic and professional elements: a university level education, a postgraduate education specific in medical physics (MP) and a supervised clinical training. In Cuba, most of the medical physicists working in radiation oncology (RO) or nuclear medicine (NM) services have graduated from nuclear related programmes of the High Institute on Applied Technologies and Sciences (InSTEC), who further perform a postgraduate study in medical physics (MP), at the level of a so-called Diploma course or a Master in Sciences. Nevertheless, the third level of education, namely the supervised clinical training has not yet been established, due to the lack of official recognition of the profession of MP by the health authorities. A new approach for comprehensive training of CQMP is presented, where, by maintaining the three elements of education, the process is optimized so that a medical physicist is prepared with the highest level of theoretical and clinical training, in agreement with the current demand of the advanced technologies put in service in Cuban hospitals.

Developing Competent Workers through Education and Training: Case Study of the Lebanese Atomic Energy Commission (LAEC)

M. Shbaro[1]

[1]*Lebanese Atomic Energy Commission (LAEC), Beirut, Lebanon*

Corresponding Author: M. Shbaro, mona.shebaro@gmail.com

Education and Training is at the center of interest of the Lebanese Atomic Energy Commission (LAEC) to spread safety and security culture and to enhance and help facilities to use nuclear and related analytical techniques in key socioeconomic development areas. It is an essential component to combat the decline in expertise and to ensure the continuation of the high level of radiation protection knowledge in Lebanon. Education is a key component of knowledge management. Education and training with experience is used to develop competence. This paper will present the educational programmes launched by LAEC in collaboration with scientific universities, training programmes provided to staff and users, tools of training at LAEC, EduTA mission conducted by IAEA experts and the recommendations.

Foundations for Knowledge Management Practices for the Fusion Sector

A. Botrugno[1]

[1] *Agenzia nazionale per le nuove tecnologie, l'energia e lo sviluppo economico sostenibile (ENEA), Rome, Italy*

Corresponding Author: A. Botrugno, antonio.botrugno@enea.it

This paper intends to overview the status of fusion activities and to present emerging issues related to the management of resources and knowledge in fusion projects; they can be better addressed by looking at appropriate methodologies and tools in the thematic areas of knowledge management. After a short introduction outlining the present transition phase of the worldwide fusion activity, I will present a preliminary analysis of emerging requirements and challenges, which creates the foundations for knowledge management practices for the fusion sector. Differences between the fusion and the nuclear sector will be also discussed, and appropriate practices for some selected challenges will be proposed and analyzed.

Development of an Educational Network to Strengthen Education, Training and Outreach in Latin America: LANENT-Latin American Network for Education in Nuclear Technology

A. Da Silva[1]

[1]*Latin American Network for Education in Nuclear Technology (LANENT)*

Corresponding Author: A. Da Silva, aucyone@ird.gov.br

In the current century, networks have played an important role in the dissemination of experiences, information exchange and training of human resources for different area of expertise. The IAEA has encouraged in regions, through its member states, the creation of educational networks to meet rapidly and efficiently the dissemination and exchange of knowledge between professionals and students in the nuclear area. With this vision, the Latin American Network for Education in Nuclear Technology (LANENT) was established to contribute to preserving, promoting and sharing nuclear knowledge as well as fostering nuclear knowledge transfer in the Latin American region. LANENT seeks to increase technical and scientific cooperation among its members in so far as to promote the benefits of nuclear technology and foster the progress and development of nuclear technology in areas such as education, health, the industry, the government, the environment, the mining industry, among others. By means of LANENT, the participating institutions of this network, devoted to education and training of professionals and technicians in the Latin American region, may have access to major information on nuclear technology so as to make their human resources broaden their nuclear knowledge. Moreover, this network seeks to communicate the benefits of nuclear technology to the public with the aim of arousing interest in nuclear technology of the younger generations. This paper will present and analyze results and initiatives developed by LANENT in Latin America.

The European Nuclear Education Network: Towards Harmonisation of Education, Training, and Transfer of Knowledge

F. Tuomisto[1], L. Cizelj[2], and P. Dieguez Porras[3]

[1]*Aalto University, Espoo, Finland*
[2]*Jožef Stefan Institute, 1000 Ljubljana, Slovenia*
[3]*European Nuclear Education Network Association (ENEN), Scalay, France*

Corresponding Author: F. Tuomisto, filip.tuomisto@aalto.fi

The European Nuclear Education Network (ENEN) Association strives to develop a more harmonized approach for education in the nuclear sciences and nuclear engineering in Europe and to integrate European education and training in nuclear safety and radiation protection. Improved co-operation and sharing of academic resources and capabilities at the national and international level is an important long-term objective. With respect to stakeholders, such as nuclear industries, research centers, regulatory bodies and other nuclear infrastructures, the primary objectives of ENEN are to create a secure basis of skills and knowledge of value to the EU, and to maintain a high-quality supply of qualified human resources for design, construction, operation and maintenance of nuclear infrastructures, industries and power plants. ENEN supports activities aimed at maintaining the necessary competence and expertise for the continued safe use of nuclear energy and applications of radiation and nuclear techniques in agriculture, industry and medicine. In this technical brief we describe selected activities pursued to reach these goals.

ENS and FORATOM Education, Training and Knowledge Management Activities

E. Janisz[1]

[1]*FORATOM, Avenue des Arts 56, 1000 Bruxelles, Belgium*

Corresponding Author: E. Janisz, emilia.janisz@foratom.org

The European Atomic Forum (FORATOM) and the European Nuclear Society (ENS) established in 2013 a joint Task Force dedicated to education, training and knowledge management (ETKM) issues in nuclear. The main purpose of the Task Force is to strengthen the link between the industry, research institutes and education and training stakeholders on the European level. Further to inform the European political institutions about the nuclear education and training activities undertaken by various stakeholders. The role of this paper is to present number of activities done in the framework of FORATOM and ENS Task Force and present the recommendations given by the E&T experts. The TF combines the expertise of Human Resources, Training and Education provided by the industry as well as universities and research institutes.

The Task Force aims to play a role of a gateway for collaboration between different key players of the nuclear education, training and knowledge management field. Further TF is aiming as well to inform the European institutions about the actions and roles undertaken by ENS and FORATOM members in the area of education and training.

ANENT Activities for Knowledge Sharing and Dissemination

Y. Nam[1], S. Rho[1], S. Chanyota[2], and K. Hanamitsu[3]

[1]*Korea Atomic Energy Research Institute (KAERI), Daejeon, Republic of Korea*
[2]*Chulalongkorn University, Bangkok, Thailand*
[3]*International Atomic Energy Agency (IAEA), Vienna, Austria*

Corresponding Author: Y. Nam, ymnam@kaeri.re.kr

This paper describes the main activities and achievement of the Asian Network for Education in Nuclear Technology (ANENT) related to knowledge sharing and dissemination in the Asia and Pacific region, and how it has strengthened its networks. Since the establishment of ANENT in 2004, the basic framework and infrastructure of collaboration among universities, R&D organizations, and training institutes have been established and improved. The ANENT web-portal was opened in 2004 to share, exchange, and disseminate information and experiences of interest for the educational communities in the region. A regional learning management system (LMS) was installed in the Korean server as an innovative tool for facilitating and promoting e-Learning. Using this LMS, six e-Training courses and five Train the Trainer (TTT) courses were implemented. In 2016, a newly launched four-year IAEA Technical Cooperation project will facilitate ANENT activities to strengthen the nuclear knowledge management (NKM), develop the human resources and enhance young nuclear scientists' and public understanding of nuclear science and technology. Internet technology will help implement these activities by providing effective and efficient methods and tools and use the regional scientific infrastructures such as research reactors for nuclear education and training through regional LMS.

Centers of Excellence Contribution to Knowledge Augmentation

O. Mignone[1]

[1] *Politecnico di Milano, 20133 Milano, Italy*

Corresponding Author: O. Mignone, oscaragostino.mignone@outlook.com

Knowledge management is a key need of the nuclear industry to cope with the knowledge limited augmentation and the risks of knowledge loss due to a number of reasons, such as: staff attrition, organizational changes, upgraded technologies, new projects implementation, and the nuclear power evolution in recent years (i.e., post-Fukushima upgrades). This document describes the contribution of nuclear centers of excellence to knowledge augmentation. The effective implementation of nuclear centers of excellence is a key success factor for the knowledge management programme of nuclear organizations. This document, is based on a real example of operating organization approach in launching such initiative for staff knowledge augmentation and performance improvement. Eventually, any type of organizations in the nuclear sector could apply the proposed technique to reach better knowledge usage. The nuclear centers of excellence are a key knowledge management initiative for the learning organizations that are caring about organizational intellectual capital and striving for performance improvement. The nuclear centers of excellence can be realized as a forum to exchange ideas, knowledge, information, experiences; to collect lessons learned; and to identify areas for improvement where further organizational competence building is needed. Usual realization of this initiative is going through an active staff involvement in knowledge sharing in a form of different technical communities of practice focusing on specific knowledge domains.

Collaborative Learning in the Scientific Community of Practice

J. Jesionkowska[1]

[1]*European Commission, Joint Research Centre (EC–JRC), EU*

Corresponding Author: J. Jesionkowska, joannajesionkowska@gmail.com

The paper describes research done in the scope of doctoral project. The aim of the study is to discover how to improve the process of collaborative learning in the community of scientists by the development of a community of practice. A mixed methods approach was used combining data from content analysis, interviews and questionnaires. Results show that such community helps to build relationships and network with others, it motivates to share work-related knowledge, represents an area of common interest for organization, but also that it is mainly driven by the willingness of members and is lacking instruments to share ideas.

Triangle of Knowledge in the Nuclear Energy

H. Zhivitskaya[1]

[1] *Belarusian State University of Informatics and Radioelectronics (BSUIR), Minsk, Belarus*

Corresponding Author: H. Zhivitskaya, jivitskaya@bsuir.by

The methodology of the knowledge triangle in nuclear energy is the subject of discussion. The necessity of creation of the nuclear knowledge triangle is proved; an abstract scheme, approaches to implementation, the basic problems and generalized requirements for the functioning of the nuclear knowledge triangle are presented.

Post: Contributed Posters

All posters will be displayed for the full duration of the conference in the M–Building, floors M0E, M01, and M02. See the list on page 34 for poster details. Authors are asked to be available at their posters for discussions with interested participants at the following times:

Day	*Time*	*Posters*
Monday	*17:00–18:00*	*All Posters*
Tuesday	*10:30–11:00*	*Even numbered Posters*
	15:00–15:30	*e.g., Post-02, Post-04, · · · , Post-68.*
Thursday	*10:30–11:00*	*Odd numbered posters*
	15:00–15:30	*e.g., Post-01, Post-03, · · · , Post-69.*

Participants are encouraged to view the posters during the hosted coffee breaks.

Challenges in Implementing IAEA National Nuclear Safety Knowledge Platforms

R. N. Samba[1], A. Simo[1]

[1]*National Radiation Protection Agency of Cameroon (NRPA), Yaounde, Cameroon*

Corresponding Author: R. N. Samba, samba_ndi@yahoo.co.uk

Integrated Management Systems and human resource development of nuclear knowledge have always been a challenge for developing countries. NRPA staff when trained by IAEA return and restitute with all colleagues the themes acquired in nuclear knowledge. NRPA became a member of Forum for Nuclear Regulatory Bodies in Africa (FNRBA) in 2009. FNRBA organized with IAEA a workshop from 14th to 18th October 2013 in Nairobi, Kenya on Knowledge Safety Network. NRPA of Cameroon created the first National Nuclear Portail under FNRBA. This was linked to other national websites. During the IAEA review missions, most counterparts took opportunity from the thermatic site to share information and develop advance reference materials. The IAEA Integrated Regulatory Review Service (IRRS) team also shared materials that could not be transferred through email with national counterparts using the Global Nuclear Safety and Security Network (GNSSN) sharepoint website due to large file sizes.The regulatory documents have been uploaded on the platform and can be accessed through FNRBA and NRPA website (www.anrp.cm). UN organizations implementing projects in Cameroon are also linked to the platform. The action plans and progress reports for IAEA/AFRA projects are also available. Moreover, NRPA regulatory activities and licensing sources are available on this platform.

Emerging Challenges in the Development and Management of Nuclear Knowledge in Kenya

R. C. Chesori[1], P. K. Kilavi[2], and C. Omondi[3]

[1]*Institute of Nuclear Science & Technology, University of Nairobi: P.O Box 30197, 00100 Nairobi, Kenya, Kenya*
[2]*Department of physics & Space Science, Technical University of Kenya: P.O Box 52428, 00200 Nairobi, Kenya*
[3]*Secondary Standard Dosimetry Laboratory, Kenya Bureau of Standards: P.O Box 54974, 00200 Nairobi, Kenya*

Corresponding Author: R. C. Chesori, rachemoi@gmail.com

Nuclear knowledge remains a crucial asset in the nuclear industry. Establishment of new nuclear builds, operations, maintenance and the decommissioning of nuclear power plants (NPPs) essentially are knowledge intensive endeavors that require a lot of technical expertise. The expertise is defined by knowledgeable and competent personnel that range from nuclear engineers to nuclear economists, nuclear lawyers, and environmentalists among others. The technological challenge facing the industry currently is the aging experts that have created a huge knowledge gap that threatens the future of the industry. This realization has caused an alarm and has led to concerted efforts aimed at facilitating knowledge transfer to younger generations at a global scale especially in countries with established nuclear industry. This effort has led to development of nuclear knowledge management best practices models by knowledge experts at IAEA that seeks to assist member states in coping with the present day challenges in the industry.

BATAN Activities in Developing Nuclear Knowledge Management

S. Darmawati[1]

[1]*National Nuclear Energy Agency (BATAN), Jakarta, Indonesia*

Corresponding Author: S. Darmawati, sdarmawati@batan.go.id

BATAN (National Atomic Energy Agency of Indonesia) was established in 1964, and after the issuance of Law 10 of 1997 it become National Nuclear Energy Agency. During the last seven years, BATAN has suffered the loss of many of its valuable human resources due to the zero-growth policy of the government in recruiting new staffs. The uncertain future of nuclear power programme in Indonesia has also reduced the interest of young generation to study nuclear related subjects, resulting in the closing of several departments in universities that once offered nuclear sciences as subject of studies. These situations triggered management of BATAN to develop various efforts to keep nuclear knowledge exist and disseminate among BATAN itself, university students, and public as a whole. BATAN has in recent years established higher school of nuclear technology and organized various nuclear related training programmes, and also in cooperation with other governmental organizations establish nuclear zones, nuclear information centres and nuclear corners in public as well as in high school areas throughout Indonesia. All these efforts are aimed to transfer and preserve nuclear knowledge for the better future of the applications of nuclear science and technology in Indonesia.

Knowledge Management: "What If That's Not True?"

S. Barnes[1]

[1]*Missing Puzzle Piece Consulting, Berlin, Germany*

Corresponding Author: S. Barnes, stephanie.barnes@missingpuzzlepiececonsulting.eu

Knowledge management, critical thinking, creativity, and innovation would seem to be different ideas and disciplines, but in fact they can and do enable and enrich each other as in the process of addressing the question: what if that's not true.

This technical brief explores the connections between critical thinking, creativity, innovation, and knowledge management. The result of this interconnectedness is observed in efficiency and effectiveness, competitive advantage as well as in risk informed decision making.

How to Develop the Knowledge Management Environment

S. Pleslic[1]

[1]*Faculty of Electrical Engineering and Computing, University of Zagreb, Croatia*

Corresponding Author: S. Pleslic, sanda.pleslic@fer.hr

Knowledge as the most valuable asset in organization should be managed properly and carefully. When we are trying to manage knowledge, we should not intent to create big knowledge repositories that will capture everything that anybody ever knew. It is better to follow people who have knowledge and to develop culture and technology that will help them to share knowledge and experience. The key elements for successful knowledge management are: people, processes and technology. Technology should be standard and reliable to facilitate knowledge sharing. KM processes should be defined to simplify creation, sharing and use of knowledge. People are the most valuable resource of organizational knowledge because they can create new knowledge, share knowledge around the organization and use that knowledge to achieve the best performance. Technology and processes are powerful together, but without the people there is a high risk that efforts to change something in organization will not be successful. People are such factor that can break or make any KM initiatives. It is even more critical situation in nuclear knowledge management. How to develop organizational culture and individual behavior in nuclear field will be described.

Designing a Successful KM Strategy: What You Really Need to Know

S. Barnes[1]

[1]*Missing Puzzle Piece Consulting, Berlin, Germany*

Corresponding Author: S. Barnes, stephanie.barnes@missingpuzzlepiececonsulting.eu

This technical brief outlines the steps to follow to create a knowledge management strategy that will facilitate the utilization of knowledge management (KM) techniques and activities within the organization. Ultimately aiding the organization to meet its goals and objectives.

Planning and Nuclear Knowledge Management

V. L. Grance Torales[1], L. Lira[1]

[1]*Comisión Nacional de Energía Atómica, (CNEA), Buenos Aires, Argentina*

Corresponding Author: V. L. Grance Torales, vgrance@cnea.gov.ar

The present case aims to share the experience of the Intellectual Capital Section (ICS), part of Planning, Coordination and Control Department of the Argentine Atomic Energy Commission (CNEA) in its search for a sustainable knowledge management. Among the strategic objectives included in CNEA's Strategic Plan (SP), is the development, preservation and transference of knowledge and experience.

Under this framework, the role initially assumed by the ICS, consisted on the observation and diagnosis of the situation of the Institutional Human Capital (HC), through the study of the main characteristics of the staff of CNEA. The second stage of SP (2015–2025), which consisted of updating the HC data, the incorporation of the concept of "knowledge management" was approved by the authorities of the Institution.

Based on this background, in 2016 the objectives of the ICS are aimed at organizing and coordinating a network of knowledge management that involves the entire organization. This new phase implies, among other things, the proposal of a knowledge management policy, interaction with other sectors of CNEA for implementation, analysis of the tools to be used, in order to determine a way and work style that suits the culture and structure of the organization.

Improving Knowledge Preservation Strategy at Organizational Level through Knowledge Loss Risk Assessment (KLRA)

M. S. Sulaiman[1], A. Nordin[2], N. L. Md Noor[2], and A. M. Abdul Rahman[1]
[1]*Malaysian Nuclear Agency, Bangi, 43000 Kajang, Selangor, Malaysia*
[2]*Universiti Teknologi MARA (UiTM), 40450 Shah Alam, Selangor, Malaysia*

Corresponding Author: M. S. Sulaiman, safuan@nuclearmalaysia.gov.my

Identification of critical knowledge is one of the important steps before any knowledge preservation activities can take place. Preserving all information including less priority knowledge materials is an ineffective way of doing it. By determining critical knowledge at the very beginning will eliminate such unnecessary waste of resources. It is suggested that knowledge loss risk assessment (KLRA) tool be used to determine the critical knowledge area of an organization before performing any knowledge retention activities. KLRA techniques were used in a nuclear research institute in Malaysia to assess the knowledge loss as part of its knowledge preservation program. Coincidently, it was found that the tool or techniques could also be used to assist in the mapping process of critical knowledge areas. This paper describes the experience of implementing KLRA in a nuclear organization by illustrating how KLRA can assists in the mapping process of critical knowledge areas at the organizational level. The paper also discusses issues and challenges of implementing KLRA.

The Clearing House on Operating Experience Feedback (CH-OEF)

J. Tanarro Colodron[1]

[1] *European Commission, Brussels, Belgium*

Corresponding Author: J. Tanarro Colodron, jorge.tanarro-colodron@ec.europa.eu

The Clearing House on Operating Experience Feedback (CH-OEF) is an online information system that contains three technical databases available only to registered users: 1) Operating Experience Feedback (OEF) records, containing information about events occurred at Nuclear Power Plants; 2) Nuclear Power Plant (NPP) records, containing technical details about NPPs; 3) Documents about operating experience, such as the Topical Operating Experience Reports (TOERs) and the quarterly reports on nuclear power plant events. The main objective of the information system is to develop communication, cooperation and sharing of operating experience amongst the national nuclear regulatory authorities participating in EU Clearinghouse network.

The CH-OEF is essential for the preparation and dissemination of the quarterly reports on NPP events. These reports are published every three months and are intended to be complementary to other international reporting systems, containing mainly recent information publicly available.

Only events that are considered to be likely to have lessons applicable to EU NPPs or with a real or potential impact on nuclear safety are addressed in the reports. The CH-OEF is a fundamental tool for their preparation, providing specific features for a more efficient sharing of information as well as for facilitating the related discussion and decision making.

Design Knowledge Management across Nuclear Facility Life-cycle

V. Kolomiiets[1]

[1]*International Atomic Energy Agency (IAEA), Vienna, Austria*

Corresponding Author: V. Kolomiiets, v.kolomiiets@iaea.org

Design knowledge (DK) of any nuclear technology system starts to develop as soon as a design organization and/or research organizations begin the conceptual design of a new plant, and continues throughout the design process. From the very beginning of the project life cycle, it is essential to highlight the importance of various stakeholder organizations (probably these need to be listed) and their different perspectives, needs and involvement in managing design knowledge. It is also important to recognize their respective roles and responsibilities in the various and necessary processes of design knowledge generation, capture, transfer, retention, and utilization. During the phases of design, licensing, manufacturing, construction, commissioning and throughout operations, refurbishment and decommissioning, design knowledge must be maintained and managed such that it is accessible and available and can be utilized to support organizational needs as and when required.. Design knowledge encompasses a wide scope and a tremendous amount of detail. It is multi-disciplinary, complex, and highly inter-dependent. It includes knowledge of the original design assumptions, constraints, rationale, and requirements

Transferring Nuclear Knowledge by NPP Simulators Developers

A. Levchenko[1], O. Duginov[1], and V. Levchenko[1]

[1] *Experimental Scientific-Research and Methodology Center "Simulation Systems" (SSL)., 133, Lenin Str., Kaluga Reg., Obninsk 249035, Russian Federation*

Corresponding Author: A. Levchenko, leva@ssl.obninsk.ru

In relation to nuclear power, safety is closely linked with the human factor. Knowledge and skills of staff should more closely match the needs of the industry and employers. This can be achieved through more efficient training using simulators. Such simulators must be available at all stages of study and cover the needs of trainees with different levels of knowledge. Simulator developers can solve this problem by implement knowledge management in the using of simulators for practical training. Due to the nature of their activities, they have everything needed for this. This paper describes the solutions of Simulation Systems Ltd Company for nuclear power plants, universities and other parties.

Establishing Sustainable Nuclear Education: Education Capability Assessment and Planning (ECAP) Assist Mission

U. Ugbor[1], K. Peddicord[2], J. Dies[3], B. Philip[4], and V. Artisyuk[5]

[1]*International Atomic Energy Agency (IAEA), Vienna, Austria*
[2]*Nuclear Power Institute, Texas A&M University, College Station, TX 77840, USA*
[3]*Consejo De Seguridad Nuclear, 28040 Madrid, Spain*
[4]*Khalifa University, Abu Dhabi, United Arab Emirates*
[5]*Rosatom Central Institute for Continuing Education and Training (CICET), Obninsk, Russian Federation*

Corresponding Author: U. Ugbor, u.ugbor@iaea.org

The development of nuclear education, science and technology programmes is affected by the national context including national needs and capacities. The role and expectations for nuclear education and training might be different in technically matured countries, from countries where the technology is emerging.

In this regard, particularly in developing countries, there is a need to balance nuclear education and training between immediate critical issues of radiation safety or human health and longer-term priorities in agriculture or industry. These priorities may or may not include the nuclear energy option.

This paper shows how the Education Capability Assessment and Planning (ECAP) Assist Mission can contribute towards establishing sustainable nuclear education, including highlighting the various activities of each phase of the ECAP Process.

Building Bridge between End-Users and E&T Organizations, Case Study: Romania

G. L. Pavel[1], P. Ghitescu[1]

[1] *Politehnica University of Bucharest, Bucharest, Romania*

Corresponding Author: G. L. Pavel, gabriel.pavel@gmail.com

Over the last decade a constant concern of both E&T providers and end-users was formalizing and shaping the content of transmitted knowledge in order to fit most the industry needs. The EU Member States were invited to relate their national qualifications systems and to use an approach based on learning outcomes when defining and describing qualifications, and promoting the validation of non-formal and informal learning. This approach is the European Credit System for Vocational Education and Training together with the implementation of already existing in industry Systematic Approach to Training. Nevertheless a gap between the provided education and industry expectations still exists and the purpose of the case study was to build a bridge between E&T providers and end-users regarding exchange of information, needs, methodologies and tools, with the expected outcome of shaping the curriculum according to actual industry needs. University Politehnica Bucharest together with partners from industry (Energonuclear-Romania), research (Jožef Stefan Institute, Slovenia) and training (Tecnatom-Spain) developed a project aimed at filling this gap. Following the analysis of specific personnel needs based on a new proposed methodology, the partners evaluated the learning outcomes and proposed correction of curricula by new learning activities.

Knowledge Incubation and Collaboration for Science, Technology Adoption, Resourcing and Transfer (KIC-START)

U. Ugbor[1], A. Cilliers[2], and R. C. Kurwitz[3]

[1]*International Atomic Energy Agency (IAEA), Vienna, Austria*
[2]*North-West University, South Africa*
[3]*Nuclear Power Institute, Texas A&M University, College Station, TX 77840, USA*

Corresponding Author: U. Ugbor, u.ugbor@iaea.org

In order to address the effectiveness of national networks in Member States, and to implement regional and national strategies, it is important to understand the necessary conditions that ensure successful creation and sharing of knowledge, including, effective policy and programme incentives, promoting collaboration, innovation and networking.

Furthermore, Member States with aspirations to develop their nuclear programmes (power and non-power applications in agriculture, industry and health sector), need to develop their own capabilities if they are to fully benefit from the social and economic opportunities from nuclear science and technology. Ultimately nuclear innovation programmes that take into account the role of universities, education and industry would lead to a robust nuclear programme that maximizes social and economic benefit.

This paper a presents an initiative for capturing best practices in the areas of university collaboration and innovation, which are driven by learning, research and entrepreneurship. The initiative covers Knowledge (creation), Innovation and Collaboration for Science and Technology Adoption, Resourcing and Transfer (KIC-START).

Content Development, Presentation and Delivery for eLearning in Nuclear Science and Engineering: Experiences with Emerging Authoring Tools

S. Bamford[1], P. Afriyie[1], and E. Comlan[2]

[1]*Ghana Atomic Energy Commission (GAEC), Legon-Accra, Ghana*
[2]*ScienceSoft Ghana*

Corresponding Author: S. Bamford, bamford_s@yahoo.com

Transference of explicit knowledge starts from content development, and proceeds with packaging and delivery. A comparative study of some selected authoring tools for knowledge creation in Nuclear Sciences and Engineering education is being carried out at the School of Nuclear and Allied Sciences in Accra, Ghana. These authoring tools include commercial software (Macromedia Suite CS6, Learning 6.0) as well as freeware software (Xerte, eXe). A course, X-ray Fluorescence Spectrometry (NSAP 603), at the postgraduate School of Nuclear and Allied Sciences (SNAS), has been selected for migration onto an eLearning platform. Different authoring tools have been employed to create some ICT-based modules for teaching and learning. This paper therefore shares the experiences realized in moving from course syllabus to digitized modules, integrating pedagogical considerations, the strengths and weakness of the selected authoring tools, user-interactivity and usability of the modules produced. The need and the basis for the adoption of an appropriate authoring tool for creation of scientific, mathematical, and engineering documents and learning materials has also been discussed. Leveraging on ICT to produce pedagogically sound learning materials for eLearning platforms promotes interests of students in nuclear sciences, and ensures continuity in producing qualified professionals.

Design and Implementation of an Online Course on Nuclear Knowledge Management in Spanish

M. Alonso-Ramos[1], ***Á. Sánchez-Elvira Paniagua***[1], C. Merino Moreno[2], and N. González Aure[2]

[1]*National University of Distance Education (UNED), 28040 Madrid, Spain*
[2]*ICA2 Innovación y Tecnología, 28760 Tres Cantos, Madrid, Spain*

Corresponding Author: M. Alonso-Ramos, malonso@ind.uned.es

This course aims the development of competencies in Nuclear Knowledge Management, both from the view of strategy and from that of the specific operation, within the organizations of the nuclear sector. It is an online course in Spanish, including didactic multimedia material specifically developed for the objectives of the course, having virtual tutoring activities in each thematic module. Active and collaborative learning is encouraged by means of forums for the interchange of opinions and experiences, as well as an exercise of converting the learning experience into initiatives that may be implemented within the organizations of the participants. A final questionnaire allows the evaluation of the main facts of the contents of the course.

The experience has run very successfully in this first edition, and mechanisms for the evaluation of this initiative have been implemented, using learning analytics philosophy and retrieving data from activities proposed as surveys. We can highlight in this case the impressive networking achieved by the interaction of participants from different nuclear stakeholders, and the learning experience that sharing personal experiences in each course member organization has enabled. Lessons learned are also explained in order to implement them in next editions of the course.

Digital Innovation and Nuclear Engineering Education in UNED: Challenges, Trends and Opportunities

M. Alonso-Ramos[1], ***Á. Sánchez-Elvira Paniagua***[1], S. Martín[1], M. Castro Gil[1], and J. Sanz Gozalo[1]

[1]*National University of Distance Education (UNED), 28040 Madrid, Spain*

Corresponding Author: M. Alonso-Ramos, malonso@ind.uned.es

Innovation in nuclear engineering education should reflect the current challenges, trends and opportunities that digital technologies are promoting in the whole educational field. The European Commission has recently stressed that technology and open educational resources represent clear opportunities to reshape EU education, contributing to the necessary modernization of higher education in order to give response to XXI century challenges. In this paper, the innovations that the Spanish National Distance Education University (UNED) are making in the digital education domain, including open educational resources (OER) and massive open online courses (MOOCs) developments applied to science, technology, engineering and mathematics (STEM) and the nuclear engineering field, are presented.

Developing Curriculum of Nuclear Civil Engineering Degree Programme at Graduate Level

J. Iqbal[1]

[1] *Pakistan Atomic Energy Commission (PAEC), Islamabad, Pakistan*

Corresponding Author: J. Iqbal, dr.javediqbal@paec.gov.pk

The paper suggests the introduction of a new degree, namely nuclear civil engineering at graduate level for better utilization of civil engineers in nuclear power plant (NPP) design and construction. At present, both nuclear engineering and civil engineering degrees are offered at undergraduate and graduate levels in numerous renowned universities of the world. However, when a civil engineer, even after completion of nuclear engineering at postgraduate level, undertakes an assignment related to NPP design, he comes across various problems which are not covered in the present curricula. For instance, NPPs' siting issues, design of pre-stressed concrete containment against loads of loss of coolant accident (LOCA), various impulsive and impactive loads (e.g., detonations, aircraft crash analysis, etc.) and shielding calculations are some of the core issues during nuclear power plant design. The paper highlights the importance of introduction of nuclear civil engineering degree at the graduate level. Besides, the contents of the proposed course work have also been discussed. Keeping in view the fact that, currently, no such degree is offered in any university of the world, the paper explores useful avenues to human resource development for introducing and expanding nuclear power programmes.

Knowledge Transfer and Culture Exchange between HEU and TAMU through a Summer School on Nuclear Power Engineering

P. Gao[1], R. C. Kurwitz[2], Z. Zhang[1], and L. Shao[2]

[1]*Harbin Engineering University, Harbin, Heilongjiang, People's Republic of China*
[2]*Texas A&M University, College Station, TX 77840, USA*

Corresponding Author: P. Gao, gaopuzhen@sina.com

Since 2012, Harbin Engineering University (HEU) and Texas A&M University (TAMU) hold an annual Summer School on Nuclear Engineering. By now, the activity has been held four times. Each year, 15–20 students are selected from their respective institutions and paired with a counterpart to form partners. They study lectures in the first week at HEU and tour three nuclear power plants (NPP) in the second week, visit the NPP simulators, and learn the nuclear safety culture. This activity expands the scale of international nuclear educational exchange, provide a platform for the students from different countries to communicate and exchange insights into their respective culture.

The Role of a Short-Term Education Programme in International Nuclear Human Resource Development and Knowledge Management

K. Murakami[1], M. Uesaka[1]

[1]*Nuclear Professional School, University of Tokyo, Tokai-mura, Ibaraki, 319-1188, Japan*

Corresponding Author: K. Murakami, murakami@tokai.t.u-tokyo.ac.jp

The Nuclear Energy Management School is proposed as a good tool to structure the experiences of industries. The importance of a short-term international education programme for gathering knowledge regarding nuclear embarkation projects is discussed in this paper. The results of evaluating education efficiency from 2013 to 2016 will also be introduced in this presentation (or poster).

An Approach to Building Capacity for Nuclear Security and Safeguards in Thailand and the Southeast Asian Region

P. Pengvanich[1], S. Chanyotha[1], and S. Nilsuwankosit[1]

[1]*Chulalongkorn University, Bangkok, Thailand*

Corresponding Author: P. Pengvanich, phongphaeth.p@chula.ac.th

A master's degree programme in nuclear security and safeguards has been developed and offered at Chulalongkorn University for the first time in 2013 in order to develop necessary human resources in the fields of nuclear security and safeguards who can continue to work, conduct research, or serve as educators in these fields in Thailand and the Southeast Asian region. The first group of 20 students joined the programme in 2013 and recently graduated. The programme was one-of-its-kind, as there have not been many similar specialized programmes in nuclear security and safeguards in the past. In this paper, challenges and lessons learned throughout the programme are reported. Experience from the pilot programme will be used to improve the next round of the programme which is expected to start in 2017. With this program, more nuclear knowledge can be shared and maintained among the Association of South East Asian Nations (ASEAN) countries to ensure the peaceful utilization of nuclear technology in the region.

Human Resource and Nuclear Awareness Development: A Common Synergetic Approach

A. Dreimanis[1]

[1] *Radiation Safety Centre of the State Environment Service, Riga, Latvia*

Corresponding Author: A. Dreimanis, andrejs.dreimanis@rdc.vvd.gov.lv

The nuclear education problem is treated as societal optimization task of nuclear energy management, with the key parameter of optimization—stakeholder awareness level. As the key principles of optimisation are chosen: a self-organization concept, the principle of the requisite variety, where as a primary source of growth of internal variety is information and knowledge. We have shown: public education, social learning and the use of mass media are efficient self-organization mechanisms, thereby forming a knowledge-creating community. Such a created knowledge could facilitate solution of key issues: a) public acceptance of novel nuclear objects, b) promotion of adequate risk perception, and c) fostering of interest to nuclear energy. Comprehensive knowledge management and informational support firstly is needed in: a) for increasing general nuclear awareness and confidence level to nuclear activities, b) personnel education and training, c) reliable staff renascence, d) public education and involvement of all stakeholder categories in decision making, e) risk management. A common approach to nuclear education should include also comprehensive research activities, thereby joining knowledge acquisition with the generation of novel advanced knowledge.

Status of Nuclear Science Education and the Needs for Competency Based Education at the Beginning of Nuclear Power Programme in Turkey

H. Yücel[1]

[1] *Institute of Nuclear Sciences, Ankara University, Ankara, Turkey*

Corresponding Author: H. Yücel, haluk.yucel@ankara.edu.tr

In Turkey, in recent years, public opinion is mostly positive towards the establishment of NPPs because electricity demand is ever-increasing with a growing population and developing economy. For peaceful nuclear energy use, Turkey ratified the NPT in 1979 and has had a safeguards agreement, and its Additional Protocol since 2001. However, Turkey has not accumulated the essential nuclear knowledge and experience until now. The present nuclear education and training programmes are not focused on nuclear safety and power technology. There is lack of competencies concerned with measuring and monitoring, instrumentation and control for a safe operation of a reactor, and other specific nuclear equipment and facilities on site. The urgent needs should be determined to commence a competency based education in which the younger generations will instill confidence to nuclear technology. In nuclear training and education programs, it should be given a priority to nuclear safety and security culture. This should be a key requirement for newcomers to nuclear technology.

In this presentation, the present status of nuclear science education in Turkey is discussed briefly and the fundamental arguments are dealt to focus on competency based nuclear education. Within international community, Turkey can seek collaborations and can consider the new challenges to tackle with the present difficulties in nuclear education programmes as a newcomer country.

Dissemination of National Nuclear-HRD Network for Efficient and Effective N-HRD for NPP-Embarking Countries

K. Yamashita[1], H. Hirose[2], Y. Ikuta[3], A. Toba[1], K. Ueda[4], T. Kita[4], T. Sawai[3], and A. Takahashi[3]

[1]*JAIF International Cooperation Center (JICC), Chiyoda-ku, Tokyo 100-0011 Japan*
[2]*International Atomic Energy Agency (IAEA), Vienna, Austria*
[3]*Japan Atomic Energy Agency (JAEA), Naka, Japan*
[4]*Japan Atomic Industrial Forum (JAIF), Minato-ku, Tokyo 105-8605, Japan*

Corresponding Author: K. Yamashita, yamashita-k@jaif-icc.co

Close mutual cooperation among nuclear-related organizations, such as government, industry and academia is extremely useful to promote nuclear human resources development (HRD). National HRD network has already been established in Japan since Nov. 2010. The network has promoted the following five discussions: 1) elementary to high school education, 2) nuclear education at universities and colleges, 3) HRD for working engineers, 4) HRD to internationalize national human resources, and 5) supportive HRD activities to newly NPP introducing countries successfully. Through the establishment of the network, the communication has been strongly improved so that the Japan–IAEA joint Nuclear Energy Management School can be held successfully every year. Based on the good experience with the network, Japan would like to recommend the introduction of national nuclear HRD (N-HRD)-network to the NPP-embarking countries. We are interested in cooperation with IAEA for establishment of national N-HRD network for efficient and effective N-HRD.

International Cooperation in Nuclear E&T: On the Way to Nuclear Training Harmonization

I. Filipev[1], F. Karmanov[1], ***V. Artisyuk***[1], V. Karezin[2], and P. Sushkov[2]

[1]*Rosatom Central Institute for Continuing Education and Training (CICET), Obninsk, Russian Federation*
[2]*ROSATOM State Atomic Energy Corporation, Moscow, Russian Federation*

Corresponding Author: I. Filipev, isfilipyev@rosatom-cipk.ru

Global use of nuclear power is likely to continue to grow in the coming decades. Some countries have chosen to invite multiple vendors for NPP technology supply.

The worldwide expansion of nuclear power use and the multi-vendor paradigm inevitably lead to the need of harmonized approaches towards safety and the initial step here is harmonization of education and training (E&T) efforts between recipient and vendor countries and between vendors as well. Establishing international and regional E&T networks is the vital mechanism of the harmonization.

The present paper gives an example of collaboration between Russia and the EU through achievements of ENEN-RU projects aimed at harmonization of E&T efforts in nuclear field. One of the goals of this activity is to introduce double-degree programmes in nuclear engineering in Russian and EU universities. To support this initiative ROSATOM-CICE&T is currently developing multimedia-based fundamental educational courses in Russian and English languages. The courses will be also used as the backbone for new nuclear engineering programmes in the universities of newcomer states. To provide a harmonized development of operating personnel career trajectories in these countries an applied bachelor programme for operating personnel has been developed.

Nuclear Knowledge Management in Vietnam: Challenges and Approaches

T. T. Nguyen[1]

[1] *Vietnam Agency for Radiation and Nuclear Safety, Hanoi, Vietnam*

Corresponding Author: T. T. Nguyen, nttinh@varans.vn

In Vietnam, nuclear knowledge in general, and in particular in relation to nuclear power remains weak, since training and human resource development in this area have not received adequate attention. In August 18, 2010 the Prime Minister issued the decision 1558 approving the scheme for "Training and development of human resources in the field of atomic energy". Then, on 10/15/2015 The Prime Minister issued the decision 1756 approving a Plan for the training and retraining of state management personnel, research and development, and technical support to serve nuclear power development till 2020.

To implement the training and development of human resources, the organization in the field of atomic energy has planned to conduct recruitment, training and development of human resources. Thus Vietnam has a policy and plan for the development of nuclear knowledge. However, knowledge management has yet to be thoroughly implemented. At Government level there are no specific policy decisions on knowledge management. Level implementation units have not implemented the scientific step, the switch serving the knowledge management. This is one of the main reasons why the development of human resources in the field of atomic energy has been slow.

Enhancing Nuclear Newcomer Training with 3D Visualization Learning Tools

V. Gagnon[1]

[1] *L-3 Communications MAPPS Inc., St-Laurent, QC H4T–1G5, Canada*

Corresponding Author: V. Gagnon, vincent.gagnon@l-3com.com

While the nuclear power industry is trying to reinforce its safety and regain public support post-Fukushima, it is also faced with a very real challenge that affects its day-to-day activities: a rapidly aging workforce. Statistics show that close to 40% of the current nuclear power industry workforce will retire within the next five years. For newcomer countries, the challenge is even greater, having to develop a completely new workforce.

The workforce replacement effort introduces nuclear newcomers of a new generation with different backgrounds and affinities. Major lifestyle differences between the two generations of workers result, amongst other things, in different learning habits and needs for this new breed of learners. Interactivity, high visual content and quick access to information are now necessary to achieve a high level of retention.

To enhance existing training programmes or to support the establishment of new training programmes for newcomer countries, L-3 MAPPS has devised learning tools to enhance these training programmes focused on the "Practice-by-Doing" principle. L-3 MAPPS has coupled 3D computer visualization with high-fidelity simulation to bring real-time, simulation-driven animated components and systems allowing immersive and participatory, individual or classroom learning.

Building a Scientifically Based Knowledge for Operating the Ninh Thuan NPP in Vietnam: Case Study on the Aspects of Water Chemistry

T. K. D. Nguyen[1]

[1]*ITRRE, Vietnam Atomic Energy Institute (VINATOM), Hanoi, Vietnam*

Corresponding Author: T. K. D. Nguyen, nguyentkdz@yahoo.com

In preparing for the first nuclear power plant in Vietnam, as part of the quality assurance, it is important to educate and train the staff of the plant beforehand. Such training includes, amongst other important subjects, the scientific background on the complex processes, the operational safety, use of the instruments for reading and controlling parameters, evaluation of these data, the quality management system, and staff responsibilities and interactions during routine and non-routine activities.

This paper refers to the one aspect of operating a nuclear power plant: the water chemistry. Various important parameters of the plant, such as reactivity, corrosion rate, dose rate, material stress, interreaction and/or behaviour between water coolant and materials, filter lifetime, and heat exchanger efficiency can be influenced and/or controlled in terms of water composition, radionuclides arising during starting stage,during operation and in shutdown stage, its pH, additives, water management and purification. Also, ecologic considerations play an essential role. We report here about a project to establish such education and training as one of the missions of our institute in terms of support for the new nuclear power plants in Vietnam.

Managing Knowledge for Operators of Chashma Nuclear Power Generating Station (CNPGS) at Chashma Centre of Nuclear Training (CHASCENT)

M. Imran[1]

[1]*Pakistan Atomic Energy Commission (PAEC), Islamabad, Pakistan*

Corresponding Author: M. Imran, imran912000@yahoo.com

It is important for a developing country with expanding nuclear power programme to acquire the ability for the safe and efficient operation of nuclear facilities such as nuclear power plants. Nuclear knowledge and its effective management are key drivers of both performance and safe operations of NPPs and educational establishments. Nuclear facilities operate over very long timescales, during which operational conditions and technologies change. Appropriate knowledge for decision-making is vital especially for operators involved in decision making because their wrong actions may affect nuclear safety due to lack of knowledge. Effective knowledge management supports safe operation as well as decision making process for both operators and decision makers throughout their carrier to take right actions with right knowledge. This paper focuses on people, processes and technology to manage knowledge, skills and ability of NPP operators to use, critically review and discuss the MCR logbook, integrating related operating experience (OE) in lesson plans, acquiring tacit knowledge from subject matter experts (SMEs) and lessons learned from training activities and reports at the organization level.

Decommissioning Activities at IIN-3M Reactor of FOTON, Uzbekistan

F. Kungurov[1], N. Maksumov[1], and S. Baytelesov[1]

[1]*Institute of Nuclear Physics AS RU, Tashkent, Uzbekistan*

Corresponding Author: F. Kungurov, fkungurov@inp.uz

In September 2015 HEU liquid spent fuel of "Foton" IIN-3M research reactor, Tashkent, was shipped to the Russian Federation for reprocessing. After fuel shipment the decommissioning process has been started.

Activities of Knowledge Management for Decommissioning of FUGEN Nuclear Power Station

M. Tezuka[1], Y. Iguchi[1], Y. Koda[1], Y. Kato[1], and S. Yanagihara[2]

[1]*Japan Atomic Energy Agency (JAEA), Naka, Japan*
[2]*University of Fukui, Bunkyo, Fukui, Japan*

Corresponding Author: M. Tezuka, tezuka.masashi@jaea.go.jp

The Fugen nuclear power station is a heavy–water moderated, light–water cooled, pressure–tube type reactor. After ca. 25 year operation, Fugen started decommissioning activities after the final shutdown in 2003 and the decommissioning project will last at least until 2034. In this situation, as the transfer of knowledge and education to the next generation is a crucial issue, integration and implementation of a system for knowledge management is necessary to solve it. For this purpose, a total of knowledge management system (KMS) for decommissioning was proposed. In this system, we have to arrange, organize and systematize the data and information of the plant design, maintenance history, waste management records etc. The collected data, information and records should be organized by computer support system, e.g., data base system, as well as advanced information technologies such as 3D-CAD (Computer Aided Design), VR (Virtual Reality) and AR (Augmented Reality). It will become a base of the explicit knowledge.

Moreover, measures for extracting tacit knowledge from retiring employees are necessary. The experience of the retirees should be documented as much as possible through effective questionnaire or interview process. The integrated knowledge mentioned above should be used for the planning, implementation of dismantlement or education for the future generation.

Requirement Management between Regulatory Framework and Dismantling Activities for Decommissioning of a Nuclear Facility

H. S. Park[1], H. G. Jin[1], Y. J. Hong[1], J. W. Choi[1], and S. Park[1]

[1]*Korea Atomic Energy Research Institute (KAERI), Daejeon, Republic of Korea*

Corresponding Author: H. S. Park, parkhs@kaeri.re.kr

The decommissioning and environmental remediation (D&ER) projects require stepwise long-term research and development (R&D) such as a shutdown, transition, decontamination and decommissioning (D&D) activities, radioactive waste management, and site restoration. During each step of the D&ER projects, a significant amount of information and knowledge such as experimental data, databases, design drawings, technical reports, guidelines, operation manuals, and modeling and simulation reports are produced. Knowledge based on experiences by staff members participating in each step of the D&ER project are also very important. Such knowledge based on experiences may disappear with the retirement of staff members if there are no effective and systematic approaches for its acquisition and storage. Therefore, to perform the D&ER project successfully, it is necessary to preserve written theses and experiences systematically. The integrated knowledge management system (KMS) for the D&ER projects have never been developed. Therefore, the establishment of an integrated KMS is necessary for the effective performance of D&ER projects. This study introduces a decommissioning procedure requirement management system as a part of the KMS related to the D&ER projects.

Knowledge-Based Governance of "Green" Nuclear Energy: the Role of Comprehensive Life-long Models of RW Streams

T. Rakitskaya[1], P. Malinovskii[1]

[1] *ROSATOM State Atomic Energy Corporation, Moscow, Russian Federation*

Corresponding Author: T. Rakitskaya, tgrakitskaya@rosatom.ru

The global competitiveness of nuclear power depends on the transition to a new generation of high technologies—High blend (convergent, hybrid, additive and so on) which provide a synthesis of the results of previous generations of technology—High tech, High hume, High touch.

Implementation of "green" projects of nuclear power depends not only on the solution to the problems with the choice of types of fast (breed) reactors generation IV for transition to closed (partial or complete) nuclear fuel cycle (High tech), but while ensuring safe and effective long-term of radioactive waste management with the participation of all key stakeholders (High hume). The generation High touch technologies creates additional competitive advantages of nuclear power, associated with the use of open innovations 2.0.

Post

In Russia in the year 2011 the Federal Act N°190-FZ was adopted, which establishes the principle of compulsory final disposal of all radioactive wastes and the cost-effectiveness of their burial. From this time the new technology practice are build in Russia: Knowledge-based governance in the radioactive waste management with the use of the comprehensive life-long models of radioactive waste streams.

Case Study: Strategy for the Establishment of the Centre for Nuclear Safety and Security in South Africa

S. Nhleko[1], B. M. Tyobeka[1]

[1]*National Nuclear Regulator (NNR), Cape Town, 7441, Republic of South Africa*

Corresponding Author: S. Nhleko, snhleko@nnr.co.za

The establishment of a dedicated nuclear safety centre as part of nuclear industry infrastructure is a common practice among nuclear countries that is also recognized and recommended by the International Atomic Energy Agency (see, for instance, IAEA GSR Part 1). However, South Africa currently does not have such a centre. This paper presents a strategy that has been developed for the establishment of a nuclear safety centre that will support the nuclear knowledge management infrastructure of the National Nuclear Regulator of South Africa. After a brief introduction, the challenges faced by the Regulator are presented. Next, the minimum requirements for addressing the challenges are summarized by providing an outline of strategic objectives to be fulfilled. This is followed by the description of the strategy developed to fulfil the objectives, including key programmes that will be implemented. A qualitative evaluation of benefits that will result from the implementation of the strategy is also presented. Additional provisions which are required in the national legislation to facilitate successful implementation of the strategy are highlighted based on lessons learned from other regulators. Finally, lessons learned during the execution of this project are summarized in order to provide guidelines for similar projects.

Competence Map of Regulatory Body: Personal and Interpersonal Effectiveness Competencies

E. Volkov[1]

[1]*Rosatom Central Institute for Continuing Education and Training (CICET), Obninsk, Russian Federation*

Corresponding Author: E. Volkov, edvolkov@gmail.com

The paper presents implementation stages and outcomes of the project "Nuclear Facility Competences" fulfilled in JSC "Rosenergoatom" and outcomes of the project "Knowledge Management, Training and Staff Retention" fulfilled for Romania regulatory authority. The goal of the project was a development of competence profiles for nuclear power plant and corporate inspectorate key job positions. The paper is focused on personal and interpersonal effectiveness competencies for inspectorate job positions which are a part of well-known 4-Quadrant Competence Model. Each competence is described by one or two behavior scales. One can consider those competencies like common ones for organizations implementing inspection activity and could be used in human resource management processes like personnel selection, job assessment, career planning, training, mentoring.

Strategies for Human Capacity Development in Nuclear Safety and Security in the NNRA

M. Akpanowo[1], E. Iwuala[1]

[1]*Nigerian Nuclear Regulatory Authority (NNRA), Abuja FCT, Nigeria*

Corresponding Author: M. Akpanowo, mbethermos@yahoo.com

The Nigerian Nuclear Regulatory Authority (NNRA) is charged with the responsibility for nuclear safety and radiological protection regulation. With Nigeria as one of the nuclear power states, NNRA has since 2010 intensified efforts in developing capacity to license the first set of nuclear power plants in Nigeria. The NNRA has employed several strategies in developing building and strengthening the human capacity to fulfill its statutory functions. This paper describes available human capacity development programmes and the strategies for implementing them including, knowledge retention and management strategy. The strategy commences with the recruitment process, initial training and education and continuous training. As a technical support arm of the NNRA, the National Institute for Radiation Protection and Research offers postgraduate diploma and masters programmes in radiation protection, where many NNRA officers have been trained. The NNRA also leverages on its collaboration with different international organizations for the training of its manpower in the area of nuclear safety and security. NNRA Officers participate in various IAEA organized programmes including fellowship for postgraduate diploma and master programmes, training course, workshops, seminars, conferences, scientific visits and on-the-job-training (OJT). Collaborations with other international organizations are also presented.

Knowledge Management Implementation in P2STPIBN as Internal TSO of BAPETEN

D. H. Nugroho[1]

[1]*Nuclear Energy Regulatory Agency of Indonesia (BAPETEN), Jakarta, Indonesia*

Corresponding Author: D. H. Nugroho, d.harinugroho@bapeten.go.id

Awareness of the importance of knowledge management impementation is growing since the launching in 2014 of BAPETEN's (Nuclear Energy Regulatory Agency of Indonesia) vision to become a world-class nuclear energy regulatory agency. BAPETEN's prime challenge arises since most of its human resources are still lacking experience, and many senior proffesionals have retired or are approaching retirement age. These challenges made P2STPIBN (Center for Regulatory Assessment on the Science and Technology of Nuclear Installation and Material) as an internal technical support organization (TSO) in BAPETEN aware that knowledge management should be implemented in advance. Following the BAPETEN Knowledge Management Guideline which was launched at the end of 2015, P2STPIBN, as part of BAPETEN, activated the knowledge management programme by creating a roadmap and programmes, such as a knowledge map and taxonomy, and a portal for knowledge repository (in progress). In the first quarter of FY of 2016 we started to build CoPs (community of practices) for the Nuclear Reactor Analysis, Nuclear Cyber Security and Nuclear Safety Culture based-on consideration of the needs on the most urgent knowledge. The CoP programme has run from the 2nd week of March 2016. The estimated challenges and anticipations are also discussed.

Knowledge Management in Scientific and Technical Support Organizations for Regulatory Bodies: SEC NRS Experience

N. Saulskaya[1]

[1] *Scientific and Engineering Centre for Nuclear and Radiation Safety (SEC NRS), Moscow, Russian Federation*

Corresponding Author: N. Saulskaya, saulskaya@secnrs.ru

Nuclear industry, similar to other high-tech industries, is based on knowledge and to a great extent depends on personnel qualification, their skills and abilities. Knowledge management processes were recognized of the utmost importance for the IAEA. The IAEA GA adopted a number of resolutions on nuclear knowledge. In this context, knowledge management is considered as an integrated, systematic approach to the process of assessment, obtaining, development, distribution, use, transfer and maintenance of knowledge related to achievement of strategic targets of organization development. KM makes it possible to learn lessons from its own experience. The report presents a long-term experience of SEC NRS in knowledge management and capacity building, which is critically important for SEC NRS as scientific and technical support organization for Rostechnadzor. KM in SEC NRS is performed through the HRM, primarily through HRD, assessment, motivation of the labor activity, and regulation of social-psychological processes. The practice of implementation of NKM through the functions of human resources management is of particular interest for embarking countries. The best practices will be reflected in the IAEA Safety Report "Knowledge Management for Regulatory Bodies and TSO", which is currently being developed by a team of the IAEA experts.

Technical Support Organization Knowledge Management for Nuclear Regulatory Support

P. Kohut[1], J. Ramsey[2], and S. Katsenelenbogen[3]

[1]*Brookhaven National Laboratory (BNL), Upton, NY 11973, USA*
[2]*U.S. Nuclear Regulatory Commission (NRC), Washington, DC 20555, USA*
[3]*Advanced Systems Technology & Management Inc. (AdSTM), Vienna, VA 22182, USA*

Corresponding Author: P. Kohut, kohut@bnl.gov

Knowledge management awareness has increased through the nuclear industrial and regulatory community leading to better understanding of the handling of critical information. Utilizing, managing and regulating the application of nuclear power require an extensive system of expertise and associated research through established organizations. The long-term maintenance of the specific expertise is only viable by using scientific knowledge management principles all through the national nuclear infrastructure involving regulatory, industrial, academic and other research institutions. National governments in countries operating or planning to establish nuclear facilities have instituted regulatory regimes on the use of nuclear materials and facilities to insure a high level of operational safety.

Initiating Knowledge Management Project in a Regulatory Body in Thailand

K. Pakdee[1], A. Apichaibukol[1]

[1]*Office of Atoms for Peace (OAP), Chatuchak district, Bangkok, Thailand*

Corresponding Author: K. Pakdee, justwantu2no@hotmail.com

Thailand is one of countries that have adopted the use of nuclear technology in various applications such as medical, agricultural, industrial and research applications. Recognizing this enormous potential in many applications, the Office of Atoms for Peace (OAP) as a regulatory body under the Ministry of Science and Technology, carries out a variety of activities to disseminate and promote youth, entrepreneurs and public on the awareness of the atomic energy in Thailand. In recent years, "knowledge management" is one of the key factors that contribute to safe, secure and efficient operation of nuclear activities and facilities but also for the regulatory processes as well. In this regards, the OAP is aware and recognize of the importance of studying and initiating nuclear knowledge and human resource development programme in the regulatory body. Even though, the OAP has been initiating the project on nuclear knowledge and human resources for several years but the present status of the projects still remain in primarily stage of the initiating. This paper describes the initiating of nuclear knowledge in the past and present status for knowledge management project in regulatory body in Thailand.

CORONA ACADEMY, Opportunities for Enhancement of Training Capabilities in VVER Technology

M. Ilieva[1], P. Dieguez Porras[2], and ***A. Klepakova***[3]

[1]*Risk Engineering Ltd, Sofia, Bulgaria*
[2]*European Nuclear Education Network (ENEN), Paris, France*
[3]*Research Center Řež (CVR), Řež, Czech Republic*

Corresponding Author: M. Ilieva, Marinela.Ilieva@RiskEng.bg

The general objective of the project CORONA II is to enhance the safety of nuclear installations through further improvement of the training capabilities for providing the necessary personnel competencies in VVER area. More specific objective of the project is to continue the development of a state-of-the-art regional training network for VVER competence called CORONA Academia. The project aims at continuation of the European cooperation and support in this area for preservation and further development of expertise in the nuclear field by improvement of higher education and training. The consortium is focusing its effort on using the most advanced ways of providing training to the trainees, saving cost and time–distance learning and e-learning approaches which will be tested in CORONA II Project. The knowledge management portal will integrate the information on VVER web into a single communication system and develop and implement a semantic web structure to achieve mutual recognition of authentication information with other databases. That will enable the partners to share the materials available in each specific training center.

Managing Nuclear Knowledge in the Hungarian Atomic Energy Authority

A. Sándor[1]

[1]*Hungarian Atomic Energy Authority (HAEA), Budapest, Hungary*

Corresponding Author: A. Sándor, sandor@haea.gov.hu

This paper describes the background and status of the knowledge management system (KMS) of the Hungarian Atomic Energy Authority (HAEA). The KMS is dedicated to identifying, preserving, acquiring, developing, sharing, using and evaluating knowledge in a consistent way. A KMS is an essential tool for maintain the state of the art knowledge in our authority. This paper presents the project that was created to establish a KMS in the HAEA. After describing the project, it presents elements of the KMS, and the future development ideas related to the KMS.

Knowledge Management for Enhancing Regulatory Body Capabilities in Thailand

A. Apichaibukol[1], K. Pakdee[1]

[1]*Office of Atoms for Peace (OAP), Chatuchak district, Bangkok, Thailand*

Corresponding Author: A. Apichaibukol, ampika.a@oap.go.th

In order to be a learning organization, the Office of Atoms for Peace (OAP) has appointed a knowledge-management team in an attempt to manage internal knowledge, both tacit knowledge and explicit knowledge, systematically. In principle, the seven steps of knowledge management will be applied for OAP KM, namely;

1. Knowledge identification including the knowledge required of the Regulatory Body.
2. Knowledge creation and acquisition including knowledge sharing, transfer and how to maintain knowledge external factors such as a customers, stakeholder, etc.
3. Knowledge organization based on knowledge structure is needed for a systematic knowledge retention in the future.
4. Knowledge refinement with ISO standards in document storage.
5. Knowledge access for example, using information technology management through web board.
6. Knowledge sharing, OAP staff through numerous methods designed to transfer implicit and tacit knowledge such as formal classroom and on-the-job training, informal Communities of Practice, mentoring.
7. Learning is OAP group continually enhancing their capabilities and making decisions, solving problems and improving the organization.

OAP staff could apply knowledge for organization development and planning for a supporting guideline.

Employee Development Capabilities of the Regulatory Authority in the Nuclear Field in Romania

P. Ghinea[1]

[1]*National Commission for Nuclear Activities Control (CNCAN), Bucharest, Romania*

Corresponding Author: P. Ghinea, petruta.ghinea@cncan.ro

The paper provides information about CNCAN (general presentation of CNCAN responsibilities as a regulatory body) and about the general human resources management within our institution regarding the following: legal framework regarding resources; knowledge management; staff employment financial resources continuous focus on improvement of staff performances through dedicated training programmes. The process to develop and maintain the necessary competence and skills of staff of the regulatory body, as an element of knowledge management. Training for CNCAN staff is provided either in-house or through technical cooperation programmes with the IAEA. CNCAN has made arrangements for specific staff training using training courses and programmes provided by international organizations. The specific training is provided predominantly with the economic support from outside of the country.

CNCAN has a process to develop and maintain the necessary competence and skills of staff of the regulatory body, as an element of knowledge management. To maintain an appropriate competence level, an annual plan for staff training is in place and each staff member has an individual training plan.

Project supports CNCAN in the development of knowledge management and capacity building frameworks to secure long-term availability of regulatory competency.

Knowledge Management Implementation In Indonesia Nuclear Energy Regulatory Agency (BAPETEN)

Y. H. Nurwidi Astuti[1]

[1]*Nuclear Energy Regulatory Agency of Indonesia (BAPETEN), Jakarta, Indonesia*

Corresponding Author: Y. H. Nurwidi Astuti, y.heni@bapeten.go.id

Indonesian Nuclear Energy Regulatory Agency (BAPETEN) acquires the task and function to control the safety, security and safeguards in the field of nuclear energy through the development of legislation, licensing services, inspection and enforcement. Which is supported by review and asessment, emergency preparedness. Knowledge Management (KM) is importance for BAPETEN to achive the Regulatory body effectiveness and product innovation. The Chairman of BAPETEN has set policies statement for KM implementation. To implement a knowledge management program, BAPETEN creates KM guidelines that includes blueprint and roadmap KM programme based on a KM readiness survey. The KM readiness survey involves 20% of staff who represent each unit and discussions with the senior manager of BAPETEN, and the result of readiness survey produce 13 KM BAPETEN initiatives strategic. After the initiative strategic has been obtained, BAPETEN creates the Roadmap of BAPETEN Knowledge Management for 2015–2019 programme for KM People with the activity sozialization of KM Guidebook, workshop SMART knowledge worker, nurture Community of practices (COP) and develop social network analysis (SNE). KM Process with activity focus group discussion, KM Readyness survey, KM Statement, KM Bapeten Guidebook, knowledge mapping, knowledge harvesting. KM Technology with activity develop knowledge system or portal, e-learning.

Selection and Training of Personnel for the New Nuclear Medicine and Radiation Therapy Centre in Bariloche

M. P. Lopez[1]

[1]*Comisión Nacional de Energía Atómica, (CNEA), Buenos Aires, Argentina*

Corresponding Author: M. P. Lopez, mplopez@live.com.ar

A basic strategy for the development of a new organization is the selection of personnel, especially if it is an institute that offers a technological and professional innovation. This work aims to define specific profiles for the Centre for Nuclear Medicine and Radiation Therapy, Bariloche, and to design a plan for selecting and training professionals.

The Academic Curriculum of Medical Radiation Technologists: Continuous Development

K. Sergieva[1], P. Gagova[2], and N. Bonninska[2]

[1]*Queen Giovanna University Hospital, Sofia, Bulgaria*
[2]*Medical College "Jordanka Filaretova", Sofia, Bulgaria*

Corresponding Author: K. Sergieva, sergievakm@abv.bg

The purpose is to present the activities of Department of Radiation technologists at Medical College Sofia in knowledge management (KM) in human health applications and namely: continuous development of academic curriculum (AC) for medical radiation technologists (MRT) in sense of the conference motto "Nuclear Knowledge Management: Challenges and Approaches". Our challenge is to realize, in practice, the important role of MRT professionals in healthcare. They are the front line in the patient safety and the last person with the patient before exposure.

The existing AC has been periodically peer-reviewed: in 2011, 2014, and ongoing reviews, with the aim to guarantee that we are providing knowledge, skills and competencies that meet modern requirements for the training of radiation technologists. The AC compromises both academic and clinical education. The clinical component occurs throughout the academic course, accenting the role of MRT in radiology, radiotherapy and nuclear medicine. The approach of continuously developing the AC will meet the stringent requirements recently published by IAEA, with the goal that radiological medical practitioners, medical physicists, medical radiation technologists and other health professionals with specific duties in relation to protection and safety for patients in a given radiological procedure are specialized in the appropriate area.

Knowledge Management for the Application of Radiation Sources in Montenegro

S. Jovanovic[1]

[1]*Centre for Nuclear Competence and Knowledge Management (UCNC), University of Montenegro, Podgorica, Montenegro*

Corresponding Author: S. Jovanovic, bobo_jovanovic@yahoo.co.uk

Successful implementation of international norms on the effective utilization of radiation sources requires a number of prerequisites at the State level—provision of adequate legal, institutional, financial, technical and human resources. Among these, it is often taken for granted that necessary knowledge and competence do exist per se. However, this is not always the case, just the contrary—time, efforts and resources are frequently wasted because these fundaments are not built solid from inception. Montenegro is a small "non-nuclear" country, with the use of radiation sources being limited to mainly medical applications. Experiences with KM are outlined, with the state university having the central role. The role of networking and international cooperation, particularly with IAEA and EU (the latter in light of the current Montenegro accession process), is emphasized.

Training Activities to Maintain Competences in Nuclear Safety and Security: A Case Study of the Belgian Nuclear Research Centre

N. Kesteloot[1], T. Clarijs[1], ***M. Coeck***[1], and F. Vermeersch[1]

[1]*SCK•CEN, Belgian Nuclear Research Centre, 2400 Mol, Belgium*

Corresponding Author: N. Kesteloot, nele.kesteloot@sckcen.be

The Belgian Nuclear Research Centre, SCK•CEN, is one of the largest research centers in Belgium. More than 700 employees advance research into nuclear energy and ionizing radiation for civilian use, and develop nuclear technologies for socially valuable purposes. Next to independent fundamental and applied research SCK•CEN provides advice, training, services and products.

This paper describes the general approach towards the continuous professional development of all SCK•CEN personnel. The objective of these training activities is to maintain and increase the required competences, in order to optimize the output and the wellbeing on the work floor. Given the nature of the SCK•CEN activities, special attention is given to themes like radiation protection, security and industrial safety. A combination of classical face-to-face training, e-learning and on-the-job training is offered during the onboarding and further career path of an SCK•CEN employee.

Capacity Building Program for Nuclear R&D Personnel at KAERI

H. Hwang[1], Y. Jin[1], E. Song[1], H. Ko[1], E. Lee[1], E. Jang[1], and S. Lee[1]

[1]*Korea Atomic Energy Research Institute (KAERI), Daejeon, Republic of Korea*

Corresponding Author: H. Hwang, hyeseon@kaeri.re.kr

The Nuclear Training and Education Center (NTC) at the Korea Atomic Energy Research Institute (KAERI) has established a capacity-based education and training system for research and development (R&D) personnel and offers more than 40 training programmes a year. This paper introduces KAERI's capacity-based education and training system, and shares experiences gained from the operating cycle. In addition, it describes the development of the professional capacity building program, which incorporates the institute's key technological strengths. KAERI, which conducts comprehensive research in nuclear technology, consists of professionals in various fields, with R&D personnel accounting for 82% of its employees. In consideration of this unique feature, the institute has developed a capacity building programme for nuclear R&D personnel. To reflect the organizational diversity and interdisciplinary requirements of each division and department, the various fields of nuclear R&D were divided into 16 modules, each of which was developed into a training course. This module-based training programme can be integrated into domestic training programmes for industrial technology personnel and international training courses for nuclear-related professionals in developing countries.

Experience and Know-How Sharing Project at KAERI

H. Lee[1], J. Oh[1], and Y. Lee[1]

[1]*Korea Atomic Energy Research Institute (KAERI), Daejeon, Republic of Korea*

Corresponding Author: H. Lee, leehw@kaeri.re.kr

With its long history of over 50 years, KAERI (Korea Atomic Energy Research Institute) has produced a large amount of information and explicit knowledge such as experiment data, database, design data, report, instructions, and operation data at each stage of its research and development process as it has performed various researches since its establishment. Also, a lot of tacit knowledge has been produced both knowingly and unknowingly based on the experience of researchers who have participated in many projects. However, in the research environment in Korea where they focus overly on the output, tacit knowledge has not been managed properly compared to explicit knowledge. This tacit knowledge is an asset as important as explicit knowledge for an effective research and development. Moreover, as the first generation of atomic energy and research manpower retire, their accumulated experience and knowledge are in danger of disappearing. Therefore, in this study, we sought how to take a whole view and to document atomic energy technology researched and developed by KAERI, from the background to achievement of each field of the technology.

Publishing VINATOM Annual Report: A Way for Development, Retention and Sharing of Nuclear Knowledge in the Vietnam Atomic Energy Institute (Case Study)

H. A. Nguyen[1]

[1] *Vietnam Atomic Energy Institute (VINATOM), Hanoi, Vietnam*

Corresponding Author: H. A. Nguyen, hoanganh_ohayo@yahoo.com

Paper describes the role of publishing VINATOM Annual Report in development, retention and sharing of nuclear knowledge in the Vietnam Atomic Energy Institute and in Vietnam. Activities and experience in process of publishing and distribution of VINATOM Annual Report to advance the publication quality is presented.

Improving Industry-Relevant Nuclear-Knowledge Development through Special Partnerships

A. Cilliers[1]

[1]*North-West University, South Africa*

Corresponding Author: A. Cilliers, anthonie.cilliers@nwu.ac.za

South African Network for Nuclear Education Science and Technology (SAN NEST) has the objective to develop the nuclear education system in South Africa to a point where suitably qualified and experienced nuclear personnel employed by nuclear science and technology programmes in South Africa are predominantly produced by the South African education system. This is done to strengthen the nuclear science and technology education programmes to better meet future demands in terms of quality, capacity and relevance.

To ensure sustainable relevance, it is important to develop special partnerships with industry. This paper describes unique partnerships that were developed with nuclear industry partners. The success of these partnerships has ensured more industry partners to embrace the model which has proven to develop relevant knowledge, support research and provide innovative solutions for industry.

The Spanish CEIDEN Technology Platform: Activities on Knowledge Management

R. Velasco[1], ***F. Ruiz***[2], P. Leon[3], and A. Montero[1]
[1]*Consejo De Seguridad Nuclear, 28040 Madrid, Spain*
[2]*Tecnatom, S.A., 28703 San Sebastián de los Reyes, Madrid, Spain*
[3]*Endesa S.A., Madrid, Spain*

Corresponding Author: R. Velasco, rvg@csn.es

CEIDEN is a Spanish organization for the coordination of the needs and efforts on nuclear fission research and development (R&D). It was created in 1999 and since 2007 has the status of technology platform. The main functions of CEIDEN are to define and develop joint R&D projects, and to present a common position for national and international commitments and proposals in the nuclear fission R&D field. With around one hundred of Spanish members and a significant number of foreign collaborative entities, CEIDEN groups all sectors involved in this field.

In 2011 the CEIDEN F+ permanent group was created to cope with the E&T issues. The main objectives of F+ are to promote the coordination of E&T programmes in a national level and to support the Spanish participation in international networks, programmes and projects in this field.

Knowledge management is more and more a paramount issue that conditions the future of the Spanish nuclear sector, especially all the related to the generational replacement. In response to this challenge, a nuclear knowledge management group has been created recently in CEIDEN with the target of start coordinated initiatives in the Spanish nuclear sector, in this field.

Preservation of the Jülich Research Centre Knowledge in the Field of High Temperature Reactors

F. Reitsma[1], H.-J. Allelein[2], K. Verfondern[2], S. Kasselmann[2], A. Stanculescu[1], M. Gladyshev[1], T. Karseka[1], D. Beraha[1], J. de Grosbois[1], and M. Khoroshev[1]

[1]*International Atomic Energy Agency (IAEA), Vienna, Austria*
[2]*Forschungszentrum Jülich, Jülich, Germany*

Corresponding Author: F. Reitsma, f.reitsma@iaea.org

The imminent risk that important research knowledge in the field of high temperature reactors (HTR) may be lost at the Jülich Research Centre (FZJ) in Germany came to the attention of the IAEA. The knowledge includes HTR documentation and the software codes developed over many decades. The IAEA has both an interest and the experience to work with its Member States to preserve and share information and knowledge on specific reactor technologies. An initiative has been launched in 2015 to preserve the knowledge and to make it available to IAEA member states. Two consultancy meetings have taken place, the second as an assist visit at the FZJ site to gather first-hand knowledge on the scope of knowledge records. Formal reports, but also internal reports, experimental data sheets and other records may be transferred to the IAEA. The software codes with its installation packages and associated documents, manuals and test cases were also identified. Without the support of the HTR experts the knowledge preservation will not be possible so the plan includes initiatives to make these experts available to support the IAEA and its member states through contributions to Technical Cooperation expert missions and knowledge management activities.

Development of the IAEA's Knowledge Preservation Portals for Fast Reactors and Gas-Cooled Reactors Knowledge Preservation

C. Batra[1], D. Beraha Menahem[1], V. Kriventsev[1], S. Monti[1], F. Reitsma[1], J. de Grosbois[1], ***M. Khoroshev***[1], and M. Gladyshev[1]

[1]*International Atomic Energy Agency (IAEA), Vienna, Austria*

Corresponding Author: C. Batra, c.batra@iaea.org

The IAEA has been carrying out a dedicated initiative on fast reactor knowledge preservation since 2003. The main objectives of the Fast Reactor Knowledge Portal (FRKP) initiative are to, a) halt the on-going loss of information related to fast reactors (FR), and b) collect, retrieve, preserve and make accessible existing data and information on FR. This portal will help in knowledge sharing, development, search and discovery, collaboration and communication of fast reactor related information. On similar lines a Gas Cooled Fast Reactor Knowledge Preservation portal project also started in 2013.

Knowledge portals are capable to control and manage both publicly available as well as controlled information. The portals will not only incorporate existing set of knowledge and information, but will also provide a systemic platform for further preservation of new developments. It will include fast reactor and gas cooled reactor document repositories, project workspaces for the IAEA's Coordinated Research Projects (CRPs), Technical Meetings (TMs), forums for discussion, etc. The portal will also integrate a taxonomy based search tool, which will help using new semantic search capabilities for improved conceptual retrieve of documents. The taxonomy complies with international web standards as defined by the W3C (World Wide Web Consortium).

Knowledge Management in the Neutronics Group of CAREM Project

L. Torres[1], E. Lopasso[2]

[1]*Comisión Nacional de Energía Atómica, (CNEA), Buenos Aires, Argentina*
[2]*Instituto Balseiro (IB), Centro Atómico Bariloche, Bariloche, Río Negro, Argentina*

Corresponding Author: L. Torres, torresl@cab.cnea.gov.ar

An analysis of the Neutronics Group of CAREM25 project was performed in order to plan for the gradual implementation of knowledge management. The group structure, performed tasks and the way these tasks are linked together were studied. Staff functions within the group, profiles of each position and the training and education of human resources were also analyzed.

Knowledge Management Initiative at a Nuclear Facility Centre in Nigeria

M. A. Musa[1], Y. A. Ahmed[1], and A. S. Abdullahi[1]

[1]*Centre for Energy Research and Training (CERT), Ahmadu Bello University, Zaria, Nigeria*

Corresponding Author: M. A. Musa, mamyola@yahoo.com

The Centre for Energy Research and Training (CERT), Zaria, is one of the designated institutions saddled with responsibility of education and training in nuclear science and engineering to support Nigeria's nuclear program. The Centre houses a research reactor, radioactive waste management facility as well as other radioactive sources that are designed and operated based on national and international regulations and safety standards. Being a university-based nuclear centre, knowledge management (KM) is one of the cardinal elements of the management policy. Since commissioning of Nigerian Research Reactor-1 (NIRR-1) that went critical on 3rd February, 2004, basic aspects of KM processes have been integrated into the Centre's management system and strategic plan. This paper presents an overview of KM activities at CERT with focus on NIRR-1 facility.

Knowledge Management in Product Development Projects

S. Sheik Muhamad[1]

[1] *Malaysian Nuclear Agency, Bangi, 43000 Kajang, Selangor, Malaysia*

Corresponding Author: S. Sheik Muhamad, shalina@nm.gov.my

Product data management system (PDM) solutions control vast quantities of information generated by engineers during the product development process. They provide vaulting capabilities to control access to shared data, workflow to distribute it, and configured product structures to relate it to product components. Nuclear Malaysia has the desire to have a proper CAD management system and this is achieved with the use of PDM system to manage all their designs throughout the product lifecycle, i.e., for drawing distribution and design change. The type of documents that Nuclear Malaysia manages are CAD files (as generated by CATIA, AUTOCAD), engineering files, reports, project files, documents (WORD, PDF), spreadsheet (EXCEL), bills of material, manufacturing processes and drawings. Besides managing drawings, we also want to control and manage engineering changes (ECO & ECR) in electronic format.

Knowledge Management System in a Nuclear Engineering Organization

L. Pagano Junior[1], J. R. C. Piqueira[2]

[1]*Amazônia Azul Tecnologias de Defesa S.A (Amazul), Brazil*
[2]*University of São Paulo, São Paulo, Brazil*

Corresponding Author: L. Pagano Junior, lepagano@gmail.com

A knowledge management system has been developed in a nuclear engineering company with 1,700 employees. As a first trial, the system was tested in the conversion pilot plant and the nuclear fuel lab, where the workforce adds up to a hundred people. The system has five main steps:

1. Identification of the knowledge and expertise necessary to the organization;
2. Their contribution to the organization objectives;
3. Identification of the employee expertise;
4. Evaluation of the risk of knowledge loss; and
5. Critical evaluation of each expertise for the organization objectives.

As a result, the system identifies which expertise requires most urgent actions in order to be preserved or acquired. The results, so far, indicate that the system might work well and should be extended for the whole organization.

Incorporation of Nuclear Knowledge Management to the Integrated System of Quality and Technological Innovation in Cubaenergía

I. Oviedo Rivero[1], M. Contreras[2], L. L. Elías Hardy[3], J. M. Rivero Blanco[3], A. López Núñez[2], A. Peña Tornet[4], A. González García[1], M. Amado Picasso[1], N. Quintana Castillo[5], B. Yera López[1], and B. García Rodríguez[2]

[1]*Centro de Gestión y Desarrollo de la Energía (Cubaenergía), Playa, La Habana, Cuba*
[2]*Agencia de Energía Nuclear y Tecnologías de Avanzada (AENTA), Playa, La Habana, Cuba*
[2]*Agencia de Energía Nuclear y Tecnologías de Avanzada (AENTA), Playa, La Habana, Cuba*
[3]*High Institute for Applied Technologies and Sciences (InSTEC), Havana, Cuba*
[4]*Centro de Isótopos (CENTIS), Guanabacoa, Ciudad de La Habana, Cuba*
[5]*Centro de Aplicaciones Tecnológicas y Desarrollo Nuclear (CEADEN), Havana, Cuba*

Corresponding Author: I. Oviedo Rivero, irayda@cubaenergia.cu

Technical knowledge management and innovation become important tools for organizations to meet the needs and expectations of the market and society in general; especially those related to the peaceful use of nuclear energy. Since 2011 Cubaenergía, under the model of the UNE 166002, integrated process management Scientific and Technological Innovation to the requirements of NC-ISO 9001, compliance with national regulations applicable to the sector. In September 2015 the new ISO 9001 includes a clause that makes explicit mention knowledge. Although this clause is not a standard for knowledge management nor does it imply its obligatory; Cubaenergía decided to expand its integrated management system to include the Nuclear Knowledge Management system. In this article the conceptual framework for the integration of these three systems, diagnosis in the organization and the proposed design and implementation plan of management knowledge management integrated analyzes R&D and the quality management system in Cubaenergía

NPP Information Model as an Innovative Approach to End-to-End Lifecycle Management of the NPP and Nuclear Knowledge Management Proven in Russia

V. Tikhonovsky[1], A. Kanischev[1], V. Kononov[1], N. Salnikov[1], A. Shkarin[1], and D. Dorobin[1]

[1]*JSC "NEOLANT", Moscow, 105062, Russian Federation*

Corresponding Author: V. Tikhonovsky, tikhonovsky@neolant.ru

Managing engineering data for an industrial facility, including integration and maintenance of all engineering and technical data, ensuring fast and convenient access to that information and its analysis, proves to be necessary in order to perform the following tasks: 1) to increase economic efficiency of the plant during its lifecycle, including the decommissioning stage; 2) to ensure strict adherence to industrial safety requirements, radiation safety requirements (in case of nuclear facilities) and environmental safety requirements during operation (including refurbishment and restoration projects) and decommissioning.

While performing tasks 1) and 2), one faces a range of challenges:

1. A huge amount of information describing the plant configuration.
2. Complexity of engineering procedures, step-by-step commissioning and significant geographical distribution of industrial infrastructure.
3. High importance of plant refurbishment projects.
4. The need to ensure comprehensive knowledge transfer between different generations of operational personnel and, which is especially important for the nuclear energy industry, between the commissioning personnel generations.

NPP information model is an innovative method of NPP knowledge management throughout the whole plant lifecycle. It is an integrated database with all NPP technical engineering information (design, construction, operation, diagnosing, maintenance, refurbishment).

Dissemination of Knowledge about NPP Instrumentation and Control Systems

M. Yastrebenetsky[1]

[1] *State Scientific and Technical Center for Nuclear and Radiation Safety (SSTC NRS),Kyiv, Ukraine*

Corresponding Author: M. Yastrebenetsky, ma_yastreb@mail.ru

Instrumentation and control (I&C) systems are the most variable part in the nuclear power plants (NPP) comparatively with any other NPP systems. This statement is connected with the wide use of computers, rapid changes in information technologies, with the appearance of new computer complex electronic components, e.g., field programmable gate arrays (FPGA) and with appropriate point of their insertion into NPP I&C life cycle. The changes in NPP I&C systems require the dissemination of the knowledge about these systems. Lessons after Fukushima accident increase necessity of these actions. The elaboration and following dissemination of this knowledge took place in different directions:

- Writing and issue of three new books about NPP I&C systems for specialists and for students which were issued in Ukrainian and USA public houses (the last book was issued in 2014);
- Organization of five international scientific technical conferences, devoted to NPP I&C safety problems;
- Elaboration of national (Ukrainian) standards and regulations pertaining to safety important NPP I&C systems (the last standard was issued in 2015) and participation in elaboration of international standards;
- Lecturing for university students, NPP specialists and I&C designers.

These actions in all directions are added to IAEA activity in the area NPP I&C systems (e.g., IAEA NP-T-3.12 “Core Knowledge on I&C systems in NPP”).

Nuclear Knowledge Management Case Studies Catalogue "NKM CSC"

T. Atieh[1]

[1] *International Atomic Energy Agency (IAEA), Vienna, Austria*

Corresponding Author: T. Atieh, t.atieh@iaea.org

Over the past several years, many nuclear organizations in IAEA's Member States have accumulated considerable experiences and achievements in the development and application of nuclear knowledge management (NKM) methodology and tools to improve their organizational performance.

The IAEA NKM Section has initiated a project entitled "NKM Case Studies Catalogue (NKM CSC)" to capture and document, as well as preserve NKM experience and facilitate its sharing among NKM practitioners and experts. This is done through collection and preservation of information of relevant experiential knowledge in "case study" format. The catalogue will therefore support community of practice mechanisms.

An input template is currently under development and will be used to help contributors in Member States who are providing concise set of information about their respective case studies. This information will be made searchable and easily retrievable through a platform that supports collaboration among NKM practitioners and experts.

It is planned to launch the Nuclear Knowledge Management Case Studies Catalogue "NKM CSC" at the occasion of the "Third International Conference on Nuclear Knowledge Management—Challenges and Approaches, 7-–11 November 2016, Vienna, Austria", and to include the accepted case studies submitted to this Conference.

The Information Management Platform on Nuclear Emergency Resources of China

L. Dong[1]

[1]*China National Nuclear Emergency Response Office (NNERO), CAEA, People's Republic of China*

Corresponding Author: L. Dong, dongli@caea.gov.cn

The Chinese government has always attached great importance to nuclear emergency work, and has invested to form lots of nuclear emergency resources. Meanwhile, there also exist some management problems such as repeated investment, fragmented inventory list, inefficient management, etc. To achieve integrated management on the nuclear emergency resources of China, the Chinese government initiated the project "The Information Management Platform on Nuclear Emergency Resources of China". The goal of the project is to support a timely, managed, controlled, coordinated and effective response while the resources managing process remains economically efficient. The project team firstly completed the nuclear emergency resources classification and encoding. Based on these, the nuclear emergency resources information management software system was developed. The pilot operation in the system was carried out both in Guangxi and Liaoning Province at the same time. Nuclear emergency resources survey was done as the relevant information was put into the database in these regions. The evaluation result on the pilot operation showed that, the information management platform on emergency resources would apparently improve efficiency of nuclear emergency preparedness and response, and it also would increase economical efficiency on inventory list, information management and invest decision.

Nuclear Accidents Archive Knowledge Organization System Portal "NAAKOS": An Application of Semantic Technologies in the Nuclear Domain

T. Atieh[1]

[1]*International Atomic Energy Agency (IAEA), Vienna, Austria*

Corresponding Author: T. Atieh, t.atieh@iaea.org

In line with the IAEA Action Plan on Nuclear Safety, the IAEA was requested to assist Member States enhancing transparency and effectiveness of communication among operators, regulators and various international organizations, and supporting wide dissemination of safety related technical information on nuclear safety. In this context, the IAEA was further asked to analyse and preserve lessons learned from the Fukushima Daiichi NPP accident, as well as from past major incidents and radiological events.

The IAEA NKM Section has launched the Nuclear Accidents Repository Portal Knowledge Organization System "NAAKOS" initiative which aims at collecting and preserving data, information, and knowledge related to nuclear accidents and making this knowledge available through one single access point, while ensuring their long term preservation. The NKM Section has developed the Nuclear Accidents Taxonomy which will be used, along other nuclear taxonomies, to enhance information retrieval. It would also include the use of semantic technologies, data mining and linked data to support users beyond the traditional search facilities.

The overall objective is to assist to find predefined measures in a timely manner that could prevent, or at least minimize the adverse effects of incidents.

Activities on Nuclear Knowledge Preservation in Tajikistan

Z. Sayfieva[1], I. Mirsaidov[1]

[1]*Nuclear and Radiation Safety Agency of the Republic of Tajikistan, 734003 Dushanbe Tajikistan*

Corresponding Author: Z. Sayfieva, zarrinasayfieva@mail.ru

The availability of nuclear knowledge is the result of the past and present conditions of organizations of knowledge in the field of atomic and nuclear physics in Tajikistan. It is shown, that despite today's weak material resources, with the support of IAEA and other intergovernmental contracts and the international funds, and also presence of rich intellectual fund of the republic, it is possible to preserve nuclear knowledge in Tajikistan.

Confidentiality Enhancement of Highly Sensitive Nuclear Data Using Steganography with Chaotic Encryption over OFDM Channel

S. Mahmoud[1], N. Ayad[1], F. Elsayed[2], and M. Elbendary[3]

[1]*Atomic Energy Authority of Egypt, Nasr City, Cairo Governorate 11787, Egypt*
[2]*Faculty of Electronic Engineering, Menoufia University, Menouf, 32952, Egypt*
[3]*Faculty of Industrial Education, Helwan University, Egypt*

Corresponding Author: S. Mahmoud, sabrynassar39@gmail.com

Due to the widespread usage of the internet and other wired and wireless communication methods, the security of the transmitted data has become a major requirement. Nuclear knowledge is mainly built upon the exchange of nuclear information which is considered highly sensitive information, so its security has to be enhanced by using high level security mechanisms. Data confidentiality is concerned with the achievement of higher protection for confidential information from unauthorized disclosure or access. Cryptography and steganography are famous and widely used techniques that process information in order to achieve its confidentiality, but sometimes, when used individually, they don't satisfy a required level of security for highly sensitive data. In this paper, cryptography is accompanied with steganography for constituting a multilayer security techniques that can strengthen the level of security of highly confidential nuclear data that are archived or transmitted through different channel types and noise conditions.

Indexes

Abstracts by Paper Number

Contributions by Indico Submission Number

Contributor Index

— J —

— K —

— L —

— M —

— S —

— T —

— U —

— V —

— W —

— Y —

— Z —

IAEA Publications

All IAEA publications may be ordered from the Sales and Promotion Unit,
International Atomic Energy Agency,
P.O. Box 100, A-1400 Vienna, Austria
Fax: +43 1 2600-29302
sales.publications@iaea.org
www.iaea.org/Publications/index.html

IAEA Publications Related to this Conference

2016 **Nuclear Accident Knowledge Taxonomy**
IAEA Nuclear Energy Series No. NG-T-6.8

2016 **Knowledge Management and Its Implementation in Nuclear Organizations**
IAEA Nuclear Energy Series No. NG-T-6.10

2014 **Nuclear Engineering Education: A Competence-based Approach in Curricula Development**
IAEA Nuclear Energy Series No. NG-T-6.4

2013 **The Impact of Knowledge Management Practices on NPP Organizational Performance – Results of a Global Survey**
IAEA TECDOC No. 1711

2012 **Knowledge Management for Nuclear Research and Development Organizations**
IAEA TECDOC No. 1675

2011 **Comparative Analysis of Methods and Tools for Nuclear Knowledge Preservation**
IAEA Nuclear Energy Series No. NG-T-6.7

2011 **Workforce Planning for New Nuclear Power Programmes**
IAEA Nuclear Energy Series No. NG-T-3.10

2011 **Status and Trends in Nuclear Education**
IAEA Nuclear Energy Series No. NG-T-6.1

2008 **Fast Reactor Knowledge Preservation System: Taxonomy and Basic Requirements**
IAEA Nuclear Energy Series No. NG-T-6.3

2008 **Planning and Execution of Knowledge Management Assist Missions for Nuclear Organizations**
IAEA TECDOC No. 1586

2008 **Development of Knowledge Portals for Nuclear Power Plants**
IAEA Nuclear Energy Series No. NG-T-6.2

2008 **Web Harvesting for Nuclear Knowledge Preservation**
IAEA Nuclear Energy Series No. NG-T-6.6

2007 **Liquid Metal Cooled Reactors: Experience in Design and Operation**
IAEA TECDOC CD Series No. 1569

2007 **The World Nuclear University: New Partnership in Nuclear Education**
IAEA–WNU

2007 **Asian Network for Education in Nuclear Technology (ANENT): IAEA Activities and International Coordination**
IAEA–ANENT

2006 **Fast Reactor Database 2006 Update**
IAEA TECDOC No. 1531

2006 **Managing Nuclear Knowledge: Proceedings of a Workshop held in Trieste, Italy 22–26 August 2005**
IAEA Proceedings Series

2006 **Knowledge Management for Nuclear Industry Operating Organizations**
IAEA TECDOC No. 1510

2006 **Risk Management of Knowledge Loss in Nuclear Industry Organizations**
IAEA Publications STI/PUB/1248

2006 **International Conference on Managing Nuclear Knowledge: Strategies and Human Resources Development. Summary of an International Conference held in Saclay, France, 7–10 September 2004**
IAEA Proceedings Series

Participation in an IAEA Scientific Meeting

Governments of Member States and those organizations whose activities are relevant to the meeting subject matter are invited to designate participants in the IAEA scientific conferences and symposia. In addition, the IAEA itself may invite a limited number of scientists as invited speakers. Only participants designated or invited in this way are entitled to present papers and take part in the discussions.

Representatives of the press, radio, television or other information media and members of the public, the latter as "observers", may also be authorized to attend, but without the right to take part in the proceedings.

Scientists interested in participating in any of the IAEA meetings should request information from the Government authorities of their own countries, in most cases the Ministry of Foreign Affairs or national atomic energy authority.

Upcoming IAEA Meetings

2016, 21–25 November *Vienna, Austria*	International Conference on the Safety of Radioactive Waste Management
2016, 5–9 December *Vienna, Austria*	International Conference on Nuclear Security: Commitments and Actions
2017, 24–28 April *Vienna, Austria*	International Conference on Applications of Radiation Science and Technology (ICARST-2017)
2017, 22–26 May *Vienna, Austria*	3rd FAO/IAEA International Conference on Area-wide Management of Insect Pests: Integrating the Sterile Insect and Related Nuclear and Other Techniques
2017, 30 May–1 June *Vienna, Austria*	International Conference on the IAEA Technical Cooperation Programme: Sixty Years and Beyond - Contributing to Development
2017, 6–9 June *Vienna, Austria*	International Conference on Topical Issues in Nuclear Installation Safety: Safety Demonstration of Advanced Water Cooled NPPs
2017, 20–23 June *Vienna, Austria*	Second International Conference on Advances in Radiation Oncology (ICARO-2)
2017, 26–29 June *Yekaterinburg, Russian Fed.*	International Conference on Fast Reactors and Related Fuel Cycles (FR17)
2017, 23–27 October *Lyon, France*	Fourth International Conference on Nuclear Power Plant Life Management (PLiM)
2017, 30 Oct.– 1 Nov. *Abu Dhabi, UAE*	Ministerial Conference on Nuclear Power in the 21st Century
2017, 13–17 November *Vienna, Austria*	International Conference on Physical Protection of Nuclear Material and Nuclear Facilities
2017, 11–15 December *Vienna, Austria*	International Conference on Radiation Protection in Medicine: Achieving Change in Practice