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Effective Nuclear Regulatory Systems

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Sustaining Improvements Globally

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Book of Abstracts

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Session 1 – Regulatory Lessons Learned and Actions Taken

Presenter/Member State or Org.	**M. Johnson**		**United States of America**
Session/date/time:	**1**	Tue, 12 April	09:00–09:20
Title of the paper:			
Comparison of Lessons Learned and Regulatory Actions Taken in the United States after the Three Mile Island Accident and the Accident at the Fukushima Daiichi Nuclear Power Plant			

From an historical perspective, the greatest changes to the United States nuclear regulatory system were instituted in the aftermath of the 1979 accident at unit 2 of the Three Mile Island (TMI) Nuclear Power Station in Pennsylvania, USA. For example, after the accident at TMI, the U.S. Nuclear Regulatory Commission (NRC) focused its attention and regulatory oversight on all human aspects of nuclear power operations; it enhanced the analysis and communications of operating experience between the NRC and industry; and it changed its internal processes and practices, including revisions to the emergency response procedures and staffing and to the NRC's inspection and oversight process.

Within days of the accident at the Fukushima Daiichi Nuclear Power Plant site (Fukushima), the NRC convened a Near Term Task Force of experts to review the accident at Fukushima and to make recommendations to enhance reactor safety in the United States. The task force issued its recommendations in July 2011, and the NRC organized a Japan Lessons Learned (Fukushima) Steering Committee and subsequently a Directorate with staff to implement these lessons and lead NRC's efforts to ensure that the U.S. nuclear power plant fleet is adequately prepared to withstand or mitigate an accident scenario similar to what was experienced at Fukushima.

This paper will compare overarching lessons learned from the accident at Fukushima with the overarching lessons learned from the accident TMI and the resulting regulatory actions taken and implemented to date.

Presenter/Member State or Org.	**P. Jamet**		**France**
Session/date/time:	**1**	Tue, 12 April	09:20–09:40
Title of the paper:			
Changes in the French Regulations in the Light of the Lessons Learned from the Fukushima Daiichi Accident			

The international community has drawn widely-shared lessons from the accident of Fukushima Daiichi accident and most of the countries concerned have undertaken the revising of their national nuclear safety regulations. The paper presents the changes in the French regulatory framework in this domain and addresses the French approach in the European context taking into account the additional provisions included in the revised version of the nuclear safety directive published in 2014. Furthermore, a reflection has been undertaken at European level on the harmonisation of the preparedness and response to radiological emergency situations. The paper concludes by setting out a number of major questions raised by the Fukushima Daiichi accident, questions which merit being addressed by the international community so that all the necessary safety improvements can be implemented.

Presenter/Member State or Org.	**G. Schwarz**		**Switzerland**
Session/date/time:	**1**	Tue, 12 April	10:00–10:20
Title of the paper:			
Effectiveness of the Convention on Nuclear Safety			

The Convention on Nuclear Safety (CNS) has been established after the Chernobyl accident with the primary objective of achieving and maintaining a high level of nuclear safety worldwide, through the enhancement of national measures and international cooperation.

The CNS is an incentive convention. It defines the basic safety standard which shall be met by the Contracting Parties. The verification of compliance is based on a self-assessment by the Countries and a Peer Review by the other Contracting Parties.

As of July 2015, there are 78 Contracting Parties. Among the Contracting Parties of the Convention are all countries operating nuclear power plants except the Islamic Republic of Iran and Taiwan, all countries constructing nuclear power plants, all countries having nuclear power plants in long term shutdown and all countries having signed contracts for the construction of nuclear power plants.

The National Reports under the CNS therefore cover almost all nuclear power plants of the world. The peer review of reports, questions and answers that are exchanged in connection with the Review Meetings provided a unique overview of nuclear safety provisions and issues in countries planning or operating nuclear power plants. This is especially important for neighbouring countries to those operating nuclear power plants.

The processes of the CNS have been significantly improved since it came into force. The following improvements to the CNS Guidelines of the last ten years can be highlighted:

- Clear guidance on the content of the National Reports under each Article of the CNS, allowing for better comparability and facilitating the review process;
- Introduction of the secure CNS website for the sharing of information between Contracting Parties;
- Reporting on conducted and planned international review missions;
- Optimization of the conduct of the Country Group Sessions;
- Introduction of a more formalized Country Review Report to increase tractability of the follow up measures on challenges as well as the overall transparency with regard the findings of the peer review.

Although the processes of the CNS have been significantly improved in the last decade by amending its Guidelines, the experience with the Diplomatic Conference has shown that it is nearly impossible to amend the CNS itself, even in the aftermath of a severe nuclear accident.

This fact is in striking contrast to other Conventions and international instruments in other fields of international cooperation, in which a periodic review of international instruments governing international cooperation are planned, executed and lead to improved and up-to-date legally binding international agreements.

The further strengthening of the global nuclear safety regime has therefore to rely on non-legally binding commitments and voluntary measures of the countries operating nuclear power plants.

The Vienna Declaration on Nuclear Safety is an example of such a non-legally binding commitment. It has to be demonstrated during the 7th Review Meeting of the CNS how such commitments can be integrated into the processes of the CNS and can come into force in practice on a voluntary basis. It still remains to be proven, if such commitments lead to sustainable, lasting and strong improvements of nuclear safety worldwide. If this is not the case, the adequacy, relevance, aim and scope of the CNS will be questioned and its thorough implementation put in danger of losing any sort of up-to-datedness with the developments in science and technology as well as with the evolutions in other fields of international cooperation.

Presenter/Member State or Org.	**Y. Shimizu**		**Japan**
Session/date/time:	**1**	Tue, 12 April	11:00–11:20
Title of the paper:			
Lessons Learned from the Fukushima Daiichi Accident, Actions Taken and Challenges Ahead			

On 19 September, 2012, the Nuclear Regulation Authority (NRA) was established in light of lessons learned from the Fukushima Daiichi accident of 11 March 2011, to ensure that such accidents never happen again, to restore public trust in regulator both in Japan and abroad and to rebuild and foster a genuine safety culture by placing the highest priority on public safety. The NRA, an independent administrative commission of the Ministry of the Environment, is organized to separate the regulatory functions from the promotional functions of the use of nuclear energy within the government, and to independently implement its duties from the perspectives of neutrality and fairness based on its expertise. Having learned the lessons from the Fukushima Daiichi accident and with reference to IAEA safety standards, since its establishment, the NRA has endeavored to strengthen the regulatory requirements, in particular, for hazards such as tsunamis and earthquakes which may lead to common cause failures, and countermeasures against severe accidents. Under the new regulatory scheme, a back-fitting system was introduced. Emergency preparedness and response measures for nuclear facilities were also enhanced. As of end of March 2016, five reactors received NRA's permission for changing their reactor installations based on the new regulatory requirements, and two nuclear power reactors have restarted their operations. In January 2016, at the request of Japan, the IAEA sent the IRRS mission team to Japan to assess the regulatory framework for nuclear and radiation safety. Through the self-assessment prior to the mission, the NRA has developed 22 action plans, including a) improvement of regulatory inspection, b) capacity building, and c) strengthening of safety research capability. The mission team has found that Japan's nuclear regulator has demonstrated independence and transparency since it was set up in 2012. The team also noted that the NRA needs to improve the inspection system and to further strengthen its technical competence. The NRA will address these identified challenges seriously and in a timely manner, and with appropriate prioritization.

Presenter/Member State or Org.	**R. Savage**		**United Kingdom**
Session/date/time:	**1**	Tue, 12 April	11:20–11:40
Title of the paper:			
Influence on UK Nuclear Regulation from the Fukushima Daiichi Accident			

This paper provides an overview of the UKs response to the Fukushima Daiichi Accident and highlights the influence that this has had on UK nuclear regulation since March 2011.

Immediately Post the Fukushima Daiichi Accident:

ONR's Incident Suite was staffed from the first day of the accident and remained active on a 24 hours basis for over two weeks. The purpose was to provide advice to the UK government specifically prompt assurance of why this accident couldn't take place in the UK and practical advice in relation to the 17,000 UK nationals in Japan at that time.

In the early phase of the accident ONR took part in international cooperation with the US, Canadian and French regulators in order to determine the actual technical status of the Fukushima Daiichi power plant units.

The UK Secretary of State requested that the ONR Chief Inspector identify any lessons to be learnt by the UK nuclear industry and in doing so cooperate and coordinate with international colleagues. The Interim report was produced (May 2011) this focused on civil NPP's, provided background to radiation, technology and regulations. This report compared the Japan situation with the UK and identified 11 conclusions and 26 recommendations.

At the time of the interim report the evidence was pointing to a design deficiency in terms of flood protection at Fukushima. For ONR this induced close scrutiny of the way in which UK NPPs designed protection, acknowledging of course that the UK and surrounding geology means the events that the UK would have to deal with will be much less challenging than those at Fukushima. ONR were confident that no "equivalent" deficiency was evident and this led to the key conclusion that there was no reason to curtail NPP operation in the UK.

ONR was a committed and active partner in every international initiative aimed at summarising and utilising the lessons learned from the Fukushima Daiichi accident. This included the Fact Finding Mission organised by IAEA (and led by Dr. Mike Weightman, ONR Chief Inspector), various meetings and conferences organised by IAEA and by the European regulatory groups ENSREG and WENRA.

Additionally, on behalf of the UK, ONR participated in the activities related to the European Stress Test (targeted re-evaluation of the safety of nuclear power plants) requested by the European Council and specified by ENSREG.

Lessons learned, recommendations and conclusions offered by the Fact Finding mission, by the Japanese Government and by the US NRC Task Force in their reports were also thoroughly reviewed by ONR and underpinned its analysis and task setting.

Lessons Learnt & Progress Made:

The final report (Japanese earthquake and tsunami: Implications for the UK nuclear industry) for the Secretary of State was produced September 2011. The report was expanded to include all UK nuclear installations – Sellafield probably the most significant of these. The final report identified an additional 6 conclusions and 12 additional recommendations to UK industry. The completion of this report was the continuation of a significant period of work by ONR (on-going today) to ensure that the recommendations and EC Stress Test findings (which ONR also expanded to include all UK nuclear installations) were adequately acted upon by those who they applied.

ONR have particularly influenced resilience to severe accidents which have led to review and improvements across the UK nuclear industry e.g. spent fuel pools safety, emergency response, specifically EDF have increased the capability of their NPP fleet through a combination of purchasing new back-up equipment, enhancing on-site resilience and improving existing emergency arrangements and severe accident management procedures.

For ONR there were a number of conclusions and related recommendations from the final report related to UK regulation, of particular note:

- Design basis - ONR identified that a formal review of the Safety Assessment Principles should be undertaken to determine whether any additional guidance is necessary in the light of the Fukushima accident, particularly for “cliff-edge” effects. This review is now complete (Nov. 14) and the SAPs revised accordingly.
- Legacy ponds - The accident at Fukushima reinforces ONR’s views on the potential vulnerability of older facilities and has encouraged review of ONRs regulatory approach in this area to enable accelerated risk and hazard reduction.
- Periodic Safety Reviews (PSR) – This underpinned the value of mandatory PSRs in the UK and they provide a good means to ensure continuous improvement.
- L2 Probabilistic Safety Assessment (PSA) - ONR identified this as important for 3 reasons: 1) to ensure that the scope of PSA covers external hazards like earthquake, 2) to ensure that the long term nature of potential fault sequences is properly considered and 3) to enhance severe accident management, to inform procedures, training, pre-positioning of emergency equipment and supplies.

ONR is mindful of maintaining its regulatory competence and resources and that a coordinated safety and security culture is pursued. This is also reflected in ONRs commitment to IAEA IRRS Missions. The IAEA IRRS Missions post Fukushima have included a specific Fukushima Module and ONR completed this in the 2013 Mission to the United Kingdom. The IAEA also conducted an Expert Mission in 2014, at the request of ONR and the UK government, to review progress against all existing findings from previous missions.

Importance of ONRs on-going commitment to international cooperation and continuous improvement, e.g. The Vienna Declaration.

Presenter/Member State or Org.	**K.Y. Chung**		**Republic Of Korea**
Session/date/time:	**1**	Tue, 12 April	11:40–12:00
Title of the paper:			
Enhancement of Nuclear Safety in Korea: A Regulatory Perspective			

In the aftermath of Fukushima Daiichi accident in 2011 Korean regulatory body immediately performed special inspections on nuclear power plants (NPPs) and a research reactor in Korea, and issued an enforcement order for the licensees to implement fifty Fukushima action items to address the safety issues identified by the inspections. Subsequently, the licensees have established the implementation plans for resolution of the action items. By the implementation of the action items, the possibility of severe accident due to the extreme hazards has been greatly reduced and the capabilities to mitigate the severe accident, should it occur, have been upgraded. To improve the consistency and predictability of the regulation on severe accidents, Nuclear Safety and Security Commission (NSSC) the regulatory body in Korea, is revising the regulatory framework for severe accidents. The new framework will require the licensee to enhance the capabilities for prevention and mitigation of severe accidents in view of the defence in depth principle, to assess the radiological effects from the severe accidents, and to improve current accident management procedures and guidelines necessary for the prevention and mitigation of severe accidents. This rulemaking also considers the safety principles provided by the IAEA Vienna Declaration in 2015, which require new NPPs to prevent large radioactive releases.

Session 2 – Challenges in Regulating Nuclear Installations

Presenter/Member State or Org.	**P. Tiippana**		**Finland**
Session/date/time:	**2**	Tue, 12 April	14:00–14:20
Title of the paper:			
Challenges in Regulating Ageing			

Finland has recent experience in regulating design, construction, commissioning and operation of nuclear facilities. Also decommissioning is topical as the research reactor will enter a decommissioning phase in the near future. From regulator's point of view, the paper discusses potential challenges related to ageing management at the Finnish nuclear facilities throughout their lifetime. Based on the experience the most important decisions to ensure adequate provisions against adverse effects of various ageing phenomena and mechanisms are made much earlier than operation starts, namely during design, construction and manufacturing of systems, structures and components (SSC). Early consideration of ageing management resulting in good engineering including ageing-proof manufacturing and construction practices is of particular importance for new reactors. Elongated design lifetime of new reactors underlines the need of all available means to minimize progress of ageing beforehand and to create prerequisites for well-established condition monitoring and maintenance up to decommissioning. Furthermore, continuous research and development in order to understand various types of ageing and to detect degradation before SSC's failure is expected as soon as a facility has been put in service. All these activities have to be supported by proper information and knowledge management in each phase of the facility's life span.

Presenter/Member State or Org.	**G. Chai**		**China**
Session/date/time:	**2**	Tue, 12 April	14:20–14:40
Title of the paper:			
Safety enhancement of NPP in China after Fukushima Nuclear Accident			

The paper presents safety enhancement of NPP in China after Fukushima nuclear accident, includes the improvement actions taken for operating NPPs and NPPs under construction, includes the updated safety requirements for new build NPP, especially new safety requirements to achieve the safety object of “practically elimination of large release of radioactive materials”, such as extend the design envelope of NPP, enhance the philosophy of Defence in Depth, etc.

Some design features of new NPP designs in China, such as CAP1400 and Hualong-1, are also presented, and whether these new designs can meet the new requirements is discussed. Finally, it is stated in this paper that, with the concept of “nuclear safety As High As Reasonable Achievable”, deterministic and probabilistic methodologies should be used to identify the safety vulnerabilities in the design of NPPs, and reasonable practicable measures should be taken to minimize the consequence of residual risk.

Presenter/Member State or Org.	**C. Viktorsson**		**United Arab Emirates**
Session/date/time:	**2**	Tue, 12 April	14:40–15:00
Title of the paper:			
Regulating Nuclear Reactor Construction and Commissioning, and Preparation for Operation – Challenges for a New Regulatory Body			

Following an introduction with a description of the peaceful nuclear energy program in the United Arab Emirates (UAE) and an overview of the regulatory framework for safety, security and safeguards, this paper describes the regulatory approach for oversight of construction and the granting of an Operating Licence for the first nuclear power plant in the UAE. The paper describes the inspection programme set up by the Federal Authority for Nuclear Regulation (FANR) to verify construction and preoperational testing by the licensee. Moreover, it outlines the content of the operating licence application and focus areas for the regulatory review and assessment. Also, the paper describes the basic elements required by FANR for the decision-making regarding the issuance of the Operating Licence including integration of the results of review and assessment and the implementation of a systematic inspection programme to ensure operational readiness to operate and maintain the plant in accordance with FANR regulations. Finally, the paper addresses the preparation for regulatory oversight and the skill-set needed at FANR to ensure an effective and efficient oversight of safety, security of the nuclear energy power in the UAE.

Presenter/Member State or Org.	**M. Johnson**		**United States of America**
Session/date/time:	**2**	Tue, 12 April	15:00–15:20
Title of the paper:			
Long Term Operation in the United States – Subsequent License Renewal for Plant Operation Beyond 60 Years			

To date, renewed operating licenses have been issued for 78 of the operating nuclear power plant units in the United States of America (USA), enabling these plants to operate for up to 60 years. License renewal applications for another 14 units are currently under review. With 38 of these units in the operating period beyond 40 years, there is growing interest by the industry for subsequent license renewal, wherein plants would be relicensed to operate for an additional 20-year period, out to 80 years. The NRC is currently evaluating technical issues for 80 years of plant operation, to enable development of guidance documents such as a Generic Aging Lessons Learned Report and a Standard Review Plan that would apply to subsequent license renewal. This paper describes the status of license renewal in the USA, including the prognosis for plant operation out to 80 years.

Presenter/Member State or Org.	**H. Pelin**		**WNA**
Session/date/time:	**2**	Tue, 12 April	15:20–15:40
Title of the paper:			
Changes to Regulatory Systems for more Efficient Nuclear Energy Deployment: An Industry Viewpoint			

Nuclear energy is required to play a much larger role in the energy mix in most credible energy scenarios that address climate change (680 GW additional capacity by 2050 according to IEA, 1000 GW according to World Nuclear Association).

To reach these ambitious targets, a concerted effort will be required involving industry, governments and regulators. Changes to regulatory systems and processes – including licensing (design, site, operation), export control, security and waste - is one important area that can stimulate faster and more cost effective development of nuclear capacity.

In the past, regulators were mainly concerned with authorizing a limited number of reactors from a limited number of designs under a national standard. Today regulators need resources to assess a wider range of designs, while each licensee needs to complete a thorough safety assessment even if the design has been assessed and approved elsewhere. These developments are the inevitable consequence of globalization and competition within the industry.

This paper examines the current state of nuclear regulation in relation to the main attributes of good regulation as defined by the OECD. It further looks at ongoing efforts among regulators to share experience or harmonize requirements, such as within MDEP, or to agree common safety levels, such as in WENRA, in order to reach common positions and improve their regulatory approaches. Finally, it will assess the work of industry to demonstrate the benefits – both in terms of efficiency as well as safety – of harmonised regulations notably through the activities of the World Nuclear Association/CORDEL Working Group.

Presenter/Member State or Org.	**A. Ferapontov**		**Russian Federation**
Session/date/time:	**2**	Tue, 12 April	16:00–16:20
Title of the paper:			
Contribution of Rostechnadzor in Implementing the State Nuclear Safety Policy			

The report considers major areas of Rostechnadzor activities on implementation of the state policy in the area of nuclear safety, including actions to be implemented.

Ensuring nuclear and radiation safety in the use of atomic energy is one of the most important components of the national security of the Russian Federation. On March 1, 2012, the President of the Russian Federation approved the Basics of State Policy in the Area of Nuclear and Radiation Safety aimed at consistent reduction of risks associated with man-made impact on the public and the environment in using atomic energy, as well as at prevention of emergencies and accidents in nuclear and radiation hazardous facilities.

Rostechnadzor is an authorized body for state safety regulation in the use of atomic energy, which implements functions of regulatory and legal control, licensing of various types of activity and federal state supervision of the atomic energy facilities.

The activity in the area of regulatory and legal control is implemented in compliance with the Concept of Enhancement of Regulatory and Legal Control of Safety and Standardization in the Area of the Use of Atomic Energy and the Plan of Implementation of this Concept, which envisages the completion of reviewing the regulatory and legal documents by 2023.

Corresponding to the Basics of State Policy in the Area of Nuclear and Radiation Safety of the Russian Federation for the Period of 2025, Rostechnadzor successfully implemented the actions of the Federal Target Programme of Nuclear and Radiation Safety up to 2015, creating all conditions for phased reduction of the amounts of nuclear legacy and ensuring radical increase in their level of nuclear and radiation safety. In 2016, Rostechnadzor embarked on implementation of the Federal Target Programme of Nuclear and Radiation Safety up to 2030, with creation of infrastructure facilities for spent fuel and radioactive waste management and definitive response to the challenges of nuclear legacy as the main objectives of the Programme.

The conclusion mentions the current challenges to Rostechnadzor. Responding to these challenges would be an important accomplishment in the state policy in the area of nuclear safety.

Presenter/Member State or Org.	**K. Horvath**		**Hungary**
Session/date/time:	**2**	Tue, 12 April	16:20–16:40
Title of the paper:			
Challenges in the Licensing of New Nuclear Power Plant, Service Life Extension of Operating Ones (Safeguards-Safety-Security Aspects)			

The Hungarian Atomic Energy Authority (HAEA), as the Hungarian nuclear regulator is faced with dual challenges meant by the licensing of the planned construction of two AES-2006 type nuclear power plant units and the licensing of the service life extension of the existing units that have been operating for more than 30 years. The HAEA has full regulatory competence; its mission is to oversee the safety and security of all the peaceful applications of atomic energy. Accordingly, the licensing scope covers safeguards, safety as well as security. The paper shows the current status of the Hungarian nuclear programme and the future plans, as well as summarizes the regulatory approach followed by HAEA.

Presenter/Member State or Org.	**F. Lall**		**India**
Session/date/time:	**2**	Tue, 12 April	16:40–17:00
Title of the paper:			
Regulatory Oversight for New Projects- Challenges and Improvement in Regulation			

From inception, there has been rise in number of Nuclear Power Plants (NPP) even though very few accidents / events led to intermittent setbacks. However these accidents / events have posed challenges towards enhancement of safety and scope of regulation in all phases of NPP such as siting, design, construction, commissioning and decommissioning. It is essential to ensure compliance to these enhanced safety requirements during all phases of NPP. New and evolutionary reactors are under threshold for regulatory consideration world over. The variety of technologies and genres by themselves pose challenges to regulatory bodies. These challenges are to be addressed through systematic enhancement of the regulation including updating of regulatory documents. The paper touches upon some key elements to be considered towards such enhancement of regulation during all stages of NPP. These being; ensuring quality assurance, regulatory oversight especially over supply chain and contractors, counterfeit material specifically in case of international dealings, emergency handling in case of multi-unit site, feedback and associated enhancements from international events, construction experience database and feedback for safety enhancement, qualification and acceptance of first of a kind systems, regulatory enforcement specifically in case of imported reactors and maintaining interface between safety and security. Regulation in present context has become dynamic and Regulatory bodies need to continue enhancement of its current regulation taking into account the technological developments, feedback from construction, operation and accidents in the current fleet of plants. The paper touches upon some of these elements and highlights the challenges and improvements in regulation.

Session 3 – Challenges in Regulating Radiation Sources and Radioactive Waste

Presenter/Member State or Org.	**M.H. Marechal**		**Brazil**
Session/date/time:	**3**	Wed, 13 April	11:00–11:20
Title of the paper:			
Main Activities to Improve the Control of Radioactive Sources and Maintain an Effective Regulatory Nuclear Systems in Brazil			

Since 2006, the Directorate of Nuclear Safety and Security, DRS, of National Nuclear Energy Commission, CNEN, has gone through many improvements. In 2006 CNEN signed the commitment to the recommendations of the Code of Conduct on The Safety and Security of Radioactive Sources and the Guidance on The Import and Export of Radioactive Sources. The DRS is responsible for the licensing and control of nuclear facilities, fuel cycle, waste management and the control of radioactive sources and authorizations of medical and industrial installations. In 2009 the department responsible for the control of radioactive sources and authorizations of medical and industrial installations implemented an “Electronic Management System” in which this System integrates the transport department and waste management department. The Electronic Management System is linked to the register of radioactive sources and facilities and there is an access on line to the Customs, making the control of import and export of radioactive sources robust, efficient and fast. During the period from 2006 until 2015 the most relevant regulations related to the control of radioactive sources and authorizations of medical and industrial installations were reviewed and some were elaborated and issued. These documents were in line with the Categorization of Radioactive Sources and the International Basic Safety Standards, issued in the IAEA Safety Standard Series as General Safety Requirements Part 3 (GSR Part 3). The paper describes all the steps that were adopted in order to implement these systems and the improvements on our Nuclear Regulatory Systems.

Presenter/Member State or Org.	**J. Elee**		**United States of America**
Session/date/time:	**3**	Wed, 13 April	11:20–11:40
Title of the paper:			
U.S. Experiences and Regulatory Challenges with New Medical Technologies			

There are many challenges in regulating new medical technologies in the United States. In the US, there are fifty different state agencies, several local and city agencies, and eleven federal agencies which all delve into some aspects of regulating the use of radiation. It also can take several years to promulgate new regulations for new technologies. Additionally, some technologies are used outside of their original approved/intended use which causes issues for regulators. Finally, many of our regulating agencies have limited resources to learn and train on the new technologies that are on the market. All of these reasons combine to make regulating new technologies and uses of radiation difficult.

Presenter/Member State or Org.	**A. Mastauskas**		**Lithuania**
Session/date/time:	**3**	Wed, 13 April	11:40–12:00
Title of the paper:			
A Strategic Approach to Establishing and Strengthening National Infrastructure for Radiation, Transport and Waste Safety			

In Lithuania, as in the other countries of the world, in various areas, such as medicine, industry, education and training, agriculture the different technologies with the radioactive substances or devices, which generate ionizing radiation, are used. The responsibilities of each party and concern is to ensure the safe use ensure the radiation protection of the population and the environment.

For every IAEA Member State in order to ensure the radiation safety, it is necessary to create the States radiation safety infrastructure: legislation, Regulatory Authority, technical support organizations. The International Atomic Energy Agency (IAEA) develops safety standards and assists Member States to create radiation safety infrastructure according the IAEA safety standards requirements. Noting that many Member States would benefit from bringing their radiation safety infrastructure more in line with IAEA Safety Standards, the Secretariat organized a meeting in May of 2014 of senior radiation safety experts from Africa, Asia & the Pacific, Europe, Latin America and North America, with the aim of developing a model strategic approach to establishing and strengthening national radiation safety infrastructure, with a special focus on Member States receiving assistance from the Agency. This model approach was presented to a wider audience on the margins of the IAEA General Conference in September 2014, where it was well received. This paper describes how the key elements of the model strategic approach were applied in Lithuania. The outcome of which showed that there is an adequate radiation safety infrastructure in place covering more than 50 legal acts, the establishment and empowerment of a Regulatory Authority – Radiation Protection Centre, technical support organizations – metrology and dosimetry services, and training centres. In Lithuania there exists a State registry of sources of ionizing radiation and occupational doses of exposure, a strong system of the authorization and control of the activities with the different sources of ionizing radiation. An annual integrated assessment and prediction of the exposure of the population and the environment are carried out and the actions to prevent and to respond in the case of the radiation emergencies, such as from orphan sources are implemented. In Lithuania, as in the other countries, particular attention is given to medical exposure, radon and its decay products and other natural radionuclides. However, even though the radiation safety infrastructure in the country is adequate, the Radiation Protection Centre of Lithuania is taking advantage of using the national strategic approach to make further improvements in order to become a role model for others.

Presenter/Member State or Org.	**K. Horvath**		**Hungary**
Session/date/time:	**3**	Wed, 13 April	12:00–12:20
Title of the paper:			
Regulatory Oversight of Radioactive Sources through the Integrated Management of Safety and Security			

The Hungarian Atomic Energy Authority (HAEA) has full regulatory competence; its mission is to oversee the safety and security of all the peaceful applications of atomic energy. All the radioactive sources having activity above the exemption level is registered and licensed both from safety and security points of view. The Hungarian central register of radioactive sources contains about 7,000 radioactive sources and 450 license holders. In order to use its limited resources the HAEA has decided to introduce an integrated regulatory oversight programme. Accordingly, during the licensing process and inspection activities the HAEA intends to assess both safety and security aspects at the same time. The article describes the Hungarian the various applications of radioactive materials, and summarizes the preparation activities of the HAEA.

Presenter/Member State or Org.	**N. Rastkhah**		**Iran**
Session/date/time:	**3**	Wed, 13 April	12:20–12:40
Title of the paper:			
Experience and Challenges in the Management of Disused Sources in Medical Application in Iran			

Since discovery of Radioactivity, variety of radioactive sources have been used widely in medical applications. When such radioactive sources loss their efficiency due to their half-life, they are designated as 'disused sources'. Safety and security of such sources are major concerns for regulatory authorities and licensees. In Iran, from late 60’es teletherapy cobalt-60 machines were used in medical centers. There are records of using Ra-226 Needles later for brachytherapy purposes in limited centers as well. Such applications were long before the establishment of National Regulatory Body. So, management of these disused sources was not an easy task where different organizations were involved with different disciplines. Following the ratification the Radiation Protection Act in 1989, continuous efforts made for regulating and managing the application of Radiation Sources at the State level to control, manage the disused sources in the Medical Centers which was a challenging task for the regulatory body. Tangible cooperation has been made between Iran Nuclear Regulatory Authority (INRA) and the stakeholders including Ministry of health, Ministry of Education, private sectors and National Waste Company (IRWA) with the assistance of IAEA in this regard. The paper will cover these efforts.

Presenter/Member State or Org.	**J. Bosnjak**		**Bosnia and Herzegovina**
Session/date/time:	**3**	Wed, 13 April	12:40–13:00
Title of the paper:			
Challenges in Strengthening Regulatory Infrastructure in a Non-Nuclear Country			

The State Regulatory Agency for Radiation and Nuclear Safety (SRARNS) is established as the effectively independent regulatory body for radiation and nuclear safety based on the Law on Radiation and Nuclear Safety in Bosnia and Herzegovina promulgated in November 2007. After its complete reorganization in the last few years, the regulatory system is compatible with relevant IAEA Safety Standards and Guides for safety and security of radioactive sources.

The paper gives an overview of the new regulatory framework in Bosnia and Herzegovina, with special focus on challenges faced by Bosnia and Herzegovina, which are actually typical challenges for regulator in small non-nuclear country in strengthening regulatory infrastructure in regulating radiation sources and radioactive waste.

Presenter/Member State or Org.	**A. Sonawane**		**India**
Session/date/time:	**3**	Wed, 13 April	14:00–14:20
Title of the paper:			
Regulatory Challenges while Harnessing Societal Benefits of Radiation Sources in India			

One of the fundamental principles of safety is the establishment of effective legal and governmental framework for safety, including an independent and sustainable Regulatory Body, as recommended in the International Basic Safety Standards of the International Atomic Energy Agency (IAEA). In India, the Atomic Energy Act enacted in 1962 by the Parliament for development, control, and use of atomic energy for the welfare of people and for other peaceful applications forms the main basis of the regulatory framework. Applications of radiation sources in various fields have registered the phenomenal growth in the country in the last few decades. The need to ensure the radiation safety and physical security of these sources has been recognized for many years in the country for ensuring a high standard of safety and reliability in handling of radiation sources through their careful design by ensuring adequate built-in-safety, safe operation & periodic maintenance procedures, safe transport, secure storage, physical security to radiation sources at all times, availability of emergency response plans & preparedness, and ensuring safe disposal of disused sources. Atomic Energy Regulatory Board (AERB) is the national regulatory body constituted in 1983 to carry out regulatory and safety functions as envisaged in the Atomic Energy Act, 1962. The national regulatory framework is effective in ensuring adequate control over radiation sources throughout their life-cycle, however, some of the regulatory challenges/issues ahead have been identified based on the experience in regulation and by considering the significant growth of radiation facilities for societal benefits in the country. These mainly include the development of regulation to deal with advance emerging radiation technology in applications of radiation in medicine and industry; sustaining continuity in ensuring human resource development programme; physical inspections of category 3 and 4 disused sources & their safe disposal; measures for controlling transboundary movement of radiation sources. The regulatory measures have been contemplated and are being enforced to deal with the above issues.

Presenter/Member State or Org.	**P. Johnston**		**IAEA**
Session/date/time:	**3**	Wed, 13 April	14:20–14:40
Title of the paper:			
Assisting IAEA Member States to Strengthen Regulatory Control, Particularly in the Medical Area			

As per its Statue and Mandate, IAEA is developing Safety Standards and is also providing assistance for their application in Member States. One target and very large audience of this programme is the community of national regulatory bodies for radiation safety, expected to be established in all 168 Member States. Ionizing radiation is being used throughout the world in medical practices and medical exposure is the most significant manmade source of exposure to the population from ionizing radiation. Radiation accidents involving medical uses have accounted for more injuries and early acute health effects than any other type of radiation accident, including accidents at nuclear facilities. With the constant emerging of new technologies using ionizing radiation for medical diagnostic and treatment, there are on-going challenges for Regulatory bodies.

The presentation will highlight some figures related to the medical exposure worldwide, and then it will introduce the main safety standards and other publications developed specifically for Regulatory Bodies and focusing on medical practices. It will also highlight the most important and recent mechanisms (tools, peer reviews and advisory services, training courses, networks) that the Agency is offering to its Member States in order to cope with the main challenges worldwide, contributing thus to the efficiency and effectiveness of the regulatory oversight of medical facilities and activities.

Presenter/Member State or Org.	**A.R. Hikkaduwa Liyanage**		**Sri Lanka**
Session/date/time:	**3**	Wed, 13 April	14:40–15:00
Title of the paper:			
Challenges in Establishing New Regulatory Body in Sri Lanka			

Sri Lanka's involvement with Nuclear Science and Technology began in 1957 when it became a member of the International Atomic Energy Agency. This was followed by the establishment of the Radioisotope Centre of the University of Colombo in 1962 and the establishment of the Atomic Energy Authority (AEA) in 1969 by the Atomic Energy Authority Act no. 19 of 1969. The Atomic Energy Authority Act delegated two main responsibilities to the AEA, namely, promotion of the utilization of nuclear technology for the benefit of the people of Sri Lanka, and protection of workers engaged in using radiation and radioisotopes and the public from harmful effects of ionizing radiation.

Until 2014, the Atomic Energy Authority functioned as the national regulatory authority on use of radiation and radioisotopes, the national organization responsible for facilitating the use of nuclear technology in medical, industrial and agricultural sectors and as the focal point of the International Atomic Energy Agency in Sri Lanka. With the expansion of uses of radiation in Sri Lanka and commencement of use of high activity sources by the AEA for development and business activities, the need for an independent regulatory authority was realized. The importance of establishment of independent regulatory body for Sri Lanka was also emphasized by the IAEA in several advisory missions conducted in Sri Lanka and as results; a new Act on Atomic Energy was promulgated.

The Sri Lanka Atomic Energy Act No. 40 of 2014 enacted in October 2014 created two new organizations, namely the Sri Lanka Atomic Energy Regulatory Council (SLAERC) and the Sri Lanka Atomic Energy Board (SLAEB) which came into existence on the 1st of January 2015. This Act of Parliament delegates the responsibility of implementing regulatory activity to the SLAERC and the responsibility of facilitating the use of nuclear technology to the SLAEB. With the formation of the SLAERC and the SLAEB the AEA ceased to exist.

Drafting and promulgation of the new Act took more than ten years even after realization of importance of independent regulatory authority for Sri Lanka due to lack of personnel with commitment for initiating this activity and resistance of staff and policy makers in changing the existing system to which people have adopted. It was also the opinion of the staff and policy makers that the existing Act had some provisions for control over use of radiation in Sri Lanka. The drafting process of the Act was delayed due to the above reasons

However, maintaining a sustained dialogue with the policy makers and convincing the management of the AEA of the need for an independent regulatory body made it possible for promulgation of the new Act.

After establishing the new authority, much effort had to be made for obtaining funds for the day to day function of the authority and purchasing necessary furniture for regulatory staff. Due to lack of adequate staff and limited no .of trained persons with new regulatory authority, establishment of

licensing and inspection system was rather delayed. Recruitment of new staff is still to be completed. Non availability of services of trained and knowledgeable persons in drafting of laws for some new areas introduced by the Act has delayed in implementing requirements of such areas. It is envisaged to overcome these challenges with constant consultation with the decision makers.

Presenter/Member State or Org.	**R. Severa**		**Zimbabwe**
Session/date/time:	**3**	Wed, 13 April	15:00–15:20
Title of the paper:			
Improvement of Radiation Safety in Radiotherapy Facilities: Catering for Neutrons Outside Short Mazes in 10MV Linear Accelerators			

It has been demonstrated that neutron leakage cannot be neglected at 10MV when direct access doors are used or when short mazes, typically less than 7 metres in length, are employed. The majority of radiotherapy facilities in Africa have Co-60 machines installed that are now being replaced by linear accelerators. The in-coming linear accelerators are being installed in the same bunkers that were designed for Co-60 energy ranges albeit with some shielding modifications. The modifications do not alter the length of the maze and where the maze length is less than 7 metres, neutron leakage will occur in 10MV linear accelerators. There is lack of capacity within the regulatory bodies in Africa to handle this changeover from a technical and equipment perspective.

The justification of medical exposures ensures that the benefits to the patients substantially outweigh any risks that the patient may incur. As such, the justification process needs to be implemented through the effective use of evidence-based referral guidelines and clinical audits. In the case of most African countries, medical diagnostic exposures of patients are not underpinned by an effective justification system. This, coupled with the scenario where physicians own outpatient diagnostic centres to which they refer patients (self-referral) increases the conflict of physicians due to dual roles as professionals and businessmen, further compromising on patient protection.

Nuclear security is the responsibility of the Member State and requires that a number of key stakeholders work closely together. In the case of research reactors and nuclear power plants, this cooperation is evident and functional. However, this does not extend to the use of high-activity radioactive sources in medicine (category 1&2) where in most cases the regulators seem to be the only authority having oversight on the security of these sources without the benefit of direct input and collaboration of other key security stakeholders.

This paper is motivated by Radiation Protection Authority of Zimbabwe's experiences in dealing with a 10MV linear accelerator installed in a bunker with a short maze, observed unjustified cases of medical exposure and the need to upgrade the physical protection infrastructure of brachytherapy facilities with the involvement of other key security stakeholders.

Presenter/Member State or Org.	**R. Ramirez Quijada**		**Peru**
Session/date/time:	**3**	Wed, 13 April	16:00–16:20
Title of the paper:			
Emergency Response to Radiological Accidents and International Medical Assistance in Peru			

Radiological accidents occur despite having implemented safety and protection measures for preventing them. Taking this fact into account the radiological accidents that have occurred in the country were faced through the National Radiological Emergency Plan which was designed for responding to several accidental scenarios. The organization and means for response are included in the plan as well as provisions for international assistance. The emergency plan was applied in four of the radiological accidents with health consequences that have occurred in 20 years of using radioactive sources. Three of these radiological accidents were supported by international assistance in the framework of Convention for Assistance. This assistance was provided mainly in the medical field for treatment of patients but also for dosimetry. As learned from experience, an effective assistance depends on address the real needs of support to put the international efforts in what concern. The paper describes the emergency plan for response to radiological accidents and also a summary of the four radiological accidents happened in Peru is provided as well as some recommendations for applying to international assistance from IAEA.

Presenter/Member State or Org.	**E. Buglova**		**IAEA**
Session/date/time:	**3**	Wed, 13 April	16:20–16:40
Title of the paper:			
Responding to Radiological Emergencies: Preparedness as Key			

Radiological emergencies arise when there is a hazard due to radiation exposure from a source. Preparedness for such emergencies is vital to ensure effective response and mitigation of harm to the public and the environment.

The International Atomic Energy Agency's Incident and Emergency Centre (IEC) is the global focal point for emergency preparedness and response for nuclear and radiological safety or security related emergencies. By providing a 24/7 operational system, the IEC shares with Member States and International Organizations clear, factually correct, objective and easily understandable information, performs assessment of this information, and provides international assistance for emergencies, upon request, with involvement of the IAEA Response and Assistance Network (RANET).

To ensure effective preparedness, the IEC works with Member States in their national level exercises to practice the conduct and sharing of assessment and prognosis during an event, to learn lessons regarding the difficulties generating such harmonized messages and to improve this process. This preparation is vital for the IAEA to maintain a suitably robust capability and adaptability for the wide range of emergencies that can arise from radioactive sources.

Session 4 – Strengthening International Cooperation

Presenter/Member State or Org.	**Y. Stockmann**		**EC/EU**
Session/date/time:	**4**	Thurs, 14 April	09:00–09:20
Title of the paper:			
European Union International Cooperation to Improve Regulatory Effectiveness in Nuclear Safety			

The European Union (EU) promotes a high level of nuclear safety worldwide, through the "Instrument for Nuclear Safety Cooperation" (INSC) since 2007. The INSC builds on the experience gained under the completed "Technical Assistance to the Commonwealth of Independent States" Programme (TACIS) from 1991. Development and strengthening of national Regulatory Authorities' capabilities is a key activity in achieving the INSC goals, in particular in countries with or embarking on nuclear power. Specific partner countries under INSC include countries of all types of maturity in the nuclear technology, with mature countries such as Brazil, Mexico and Ukraine, countries with waste and mining issues, but no direct intention of embarking on nuclear power such as Georgia, Mongolia, Tajikistan, Kyrgyzstan and Tanzania and countries planning to embark on nuclear power such as Belarus, Egypt, Jordan and Vietnam. For new projects, the main focus is on the neighbourhood of the EU.

The EU cooperation within INSC encompasses measures to support the promotion of high standards in radiation protection, radioactive waste management, decommissioning, remediation of contaminated sites, and efficient and effective safeguards of nuclear material. The INSC regulatory support is aimed at continuous assistance to Nuclear Regulatory Authorities (NRAs), including their technical support organisations (TSOs), in order to reinforce the regulatory framework, notably concerning licensing activities.

The European Union values and supports the work of the IAEA in international networks and has supported the GNSSN (Global Nuclear Safety and Security Network) for many years and is actively involved in the activities of the Regulatory Cooperation Forum.

The European Commission (EC) places a high value on the importance of strong independent regulators and the EC reflected this in the Nuclear Safety Directive and the Radioactive Waste and Spent Fuel Directive, applicable in its Member States.

More than 25 regulatory organisations from EU Member States, NRAs, TSOs and other expert organisations are involved within the EU INSC projects for regulatory cooperation. This cooperation is based on three main pillars: a first pillar of regulatory development, a second pillar of "2+2" and a third pillar of training and tutoring of regulatory experts.

An overview of the approved planned projects and their project purpose will show the actual activities of the EU and how the lessons from the past are implemented and will be implemented in the present INSC 2014-2020 period, which has a total budget of 225M€.

For 2015 the support to approved projects was up to almost 60 M€ and included the following regulatory projects:

"Enhancing the capabilities of the Armenian Nuclear Regulatory Authority in preparedness for and response to a nuclear or radiological emergency", "Support and assistance to strengthen the capabilities of the Belarusian Nuclear Regulatory Authority MES/Gosatomnadzor in the field of Nuclear Emergency Preparedness and Response", "Enhancing the capacity and regulatory capabilities of the Chinese National Nuclear Safety Administration in the areas of waste management, emergency preparedness and response, transport and national R Base", "Support to the Regulatory Body of Morocco for capacity building and for enhancing the regulatory framework for nuclear and radiation safety", "Strengthening of State Nuclear Regulatory Inspectorate of Ukraine (SNRIU) capabilities relevant for the regulation of nuclear activities", and also a specific contribution to the IAEA.

Examples of recent successful INSC projects, bilateral and multilateral will be presented, including lessons learned.

Presenter/Member State or Org.	**S. Magnusson**		**Iceland**
Session/date/time:	**4**	Thurs, 14 April	09:20–09:40
Title of the paper:			
Experience in Strengthening Cooperation Between Radiation Safety Regulators in Europe			

HERCA

HERCA is a voluntary association in which the Heads of Radiation Protection Authorities in Europe work together in order to develop common regulatory approaches in terms of practical implementation.

HERCA addresses topics generally covered by provisions of the EURATOM Treaty and its work program is based on significant regulatory issues of common interest.

HERCA was established in 2007 and brings together 51 radiation protection Authorities from 31 European countries.

Terms of Reference and complementary policies

The initial Terms of reference approved in 2007 were based on the voluntary contribution of its members in all HERCA activities. Mechanisms were limited and simple allowing for a greater flexibility in HERCA activities, avoiding procedural constraints and maximizing exchanges. Importance was given to the decision-making capacity of the Board and to the high-level competences of experts participating in HERCA activities.

As a more mature association, HERCA updated its terms of reference in 2014 and developed complementary policies considering its experience and stressing the effective cooperation established.

Working efficiently on a limited number of topics

HERCA work is carried out in Working Groups (WG), Task Forces (TF) or Networks (NT) composed of experts, nominated by HERCA members. WG/TF Chairs and vice-Chairs are tasked with organizing the work of the WG/TF and reporting to the Board.

HERCA policies provide the WG/TF/NT with flexibility for organizing their work. This approach enabled several successful outcomes such as common positions, statements and approaches on emergency preparedness, the control of occupational, public and medical exposures as well as the justification of certain practices.

The current HERCA work program focuses on Medical and Veterinary Applications, Emergency Preparedness and Response, Non-Medical Sources and Practices, Radon and Euratom BSS Transposition as well as Education and Training.

Interaction with relevant stakeholders

HERCA is actively interacting with relevant stakeholders in order to address topics of common interest and to issue comprehensive and realistic position papers or guidance. For example, the working group on medical applications interacts in a frequent manner with medical societies, equipment manufacturers and relevant international organizations regarding justification and optimization in the medical field.

The Board of HERCA

The Board of HERCA meets twice a year in order to discuss regulatory issues of common interest, the work carried out and approve outcomes and future activities. Board members are the Heads of their organizations or senior managers, able to make decisions on behalf of their organization.

The Board meetings provide the WG/TF with an adequate pace for approving the outcomes of their work and further steps to be taken.

HERCA Policy for external communication

For maintaining the voluntary involvement, the trust and the framework for an effective cooperation between the regulatory authorities, HERCA has established a comprehensive policy of communication.

HERCA draft documents and activities are considered confidential until their approval by the Board. Once approved, they can be released on HERCA public website (ww.herca.org) and sent to the relevant stakeholders. All HERCA communications on the public website are subject to prior approval by the HERCA Chair, preceded if necessary by consultation of the relevant WG/TF.

Furthermore, any HERCA representative (except the Chair of HERCA) who participates in an activity undertaken at stakeholder's initiative will primarily have an informative role: he/she cannot engage HERCA unless explicitly mandated by the HERCA Chair or Board.

A technical secretariat: a focal point tasked with coordinating all HERCA entities and activities

The HERCA Technical Secretariat ensures the overall coordination and facilitation of all HERCA activities including administrative aspects. In particular, it ensures the organization and follow-up of the Board meetings and follows-up the HERCA WGs/TFs/NTs activities. It also coordinates and ensures the follow-up of HERCA relations with stakeholders and is involved in the majority of HERCA events.

The technical secretariat also manages the public and restricted websites. In 2015, the restricted website has been significantly improved and became an effective share point for all HERCA entities, thus improving the experience and information sharing between all HERCA members.

The technical secretariat is hosted by the French nuclear safety Authority (ASN) providing generous financial support to HERCA. Various activities, websites and events are funded by other HERCA members.

A valuable network of experts

Any HERCA member can consult any HERCA entity on specific questions not already addressed in WG/TF/NT and can present the consultation results to the Board. For example, in the framework of the transposition of the EU BSS directive, Spain consulted HERCA members on dispositions related to building materials. This consultation revealed a common interest for HERCA members for this issue and an internal workshop will be organized on this issue in May 2016.

Conclusion

HERCA has contributed to improve radiation protection in Europe and is now a mature association. Thanks to an effective network of experts, HERCA is flexible and competent enough to address, in an efficient manner, any specific issue of common interest for its members.

HERCA has set up active relations with major stakeholders in radiation protection at European and international levels. This framework of cooperation allows for more dialogue and better understanding of regulatory issues.

HERCA has significantly increased the multilateral cooperation between radiation protection regulators in Europe and has obtained results exceeding what any single regulatory authority could achieve.

Presenter/Member State or Org.	**N. Mamish**		**United States of America**
Session/date/time:	**4**	Thurs, 14 April	09:40–10:00
Title of the paper:			
Experience of the United States in Hosting and Supporting IAEA Peer Review Missions			

The International Atomic Energy Agency (IAEA) provides a number of peer review services to its Member States. The United States has strongly supported these peer reviews since their inception. In 2010, the United States hosted an Integrated Regulatory Review Service (IRRS) mission, with a follow-up mission completed in 2014. The missions provided valuable recommendations and suggestions, identified a number of best practices, and acknowledged the prompt and effective actions taken by the NRC following the Fukushima Daiichi accident. Through hosting an International Physical Protection Advisory Service (IPPAS) mission in 2013, the United States benefited both from the insights provided by the team, as well as the U.S. Government's gap analyses and preparatory efforts in advance of the mission. The United States strongly supports the IAEA's Operational Safety Review Team (OSART) program, inviting a peer review mission to a U.S. nuclear power plant every 3 years. Although OSART is an operational, not regulatory, peer review, the NRC provides funding for the mission and gives inspection credit to operators that host them. The United States also contributes significant technical expertise to IAEA peer review missions hosted by other Member States. With the IRRS and IPPAS reaching their 10th and 20th anniversaries respectively, these programs have improved as they have matured. However, it remains critical for Member States to continue to support these programs, and provide feedback to the IAEA Secretariat on their effectiveness and areas where IAEA might enhance them. Doing so will ensure peer reviews remain an effective tool for strengthening nuclear safety and security worldwide.

Presenter/Member State or Org.	**J.L. Lachaume & M. Mamoru**		**France & IAEA**
Session/date/time:	**4**	Thurs, 14 April	10:00–10:20
Title of the paper:			
The Regulatory Cooperation Forum, an Opportunity to Strengthen International Cooperation			

The Regulatory Cooperation Forum (RCF) is a member-driven forum of nuclear power regulators created in 2010 that promotes the sharing of regulatory knowledge and experience through international cooperation and collaboration using the IAEA Safety Standards as its basis.

The RCF involves countries with advanced nuclear power programmes, countries embarking on nuclear power for the first time and countries with smaller programmes considering expansion. The primary objectives of the RCF are:

- To promote collaboration and cooperation among RCF members to improve coordination of support for regulatory infrastructure development;
- To contribute to achieving and sustaining a high level of nuclear safety, consistent with the IAEA Safety Standards and Guidance;
- To optimize resources among RCF members and avoid unnecessary support duplication through improved coordination.

Membership of the RCF is open to all Member States of the IAEA. Participants in RCF activities will normally be senior representatives from regulatory bodies in Member States and from other providers, including the IAEA, European Commission (EC) and the Nuclear Energy Agency (NEA) of the Organization for Economic Co-operation and Development (OECD). So far, more than 30 countries are members of the RCF.

The RCF has developed Action Plans to support Jordan, Vietnam, Belarus and Poland. The IAEA's Nuclear Safety Action Plan urges Member States to strengthen the effectiveness of national regulatory bodies as well as base the development of their nuclear infrastructures on IAEA Safety Standards. The RCF assists Member States in implementing both of these actions for embarking, existing and expanding nuclear programmes.

Presenter/Member State or Org.	**H. Nieh**		**OECD/Nuclear Energy Agency**
Session/date/time:	**4**	Thurs, 14 April	10:20–10:40
Title of the paper:			
The Nuclear Energy Agency: Strengthening Nuclear Safety Technology and Regulation Through Effective International Cooperation			

The NEA provides an effective forum for international co-operation on nuclear safety and regulatory issues in its specific task groups, working parties and expert groups, as well as through joint international safety research projects. In these activities, NEA member countries work together to share and analyse data and experiences, gain consensus and develop approaches that can be applied within each country's governmental processes.

Through effective international co-operation, NEA member countries have worked together to develop actions for improving their regulatory frameworks and nuclear installation safety. As a result of these efforts, safety improvements and further harmonisation have been realized in the areas operating reactors, new reactors, human and organisational factors and nuclear safety research.

At the NEA, technical and programmatic work under the Committee on Nuclear Regulatory Activities (CNRA), the Committee on the Safety of Nuclear Installations (CSNI), joint safety research projects and the Multinational Design Evaluation Programme (MDEP) have helped NEA member countries to ensure a high standard for nuclear safety and to further develop the technical knowledge base.

Presenter/Member State or Org.	**R. Severa**		**South Africa**
Session/date/time:	**4**	Thurs, 14 April	11:00–11:20
Title of the paper:			
Strengthening Regulatory Cooperation in Africa: Lessons Learned from the African Regulatory Network (FNRBA)			

Africa is a continent endowed in mineral resources. Among others, there are vast deposits of gold and uranium in African countries. The by-products of these minerals are in some cases radioactive and therefore exposures must be monitored. Additionally, Africa uses a lot of radioactive sources in different industries and in the health sector. Regulation of these mining activities and facilities handling these radioactive sources becomes extremely important for the protection of people, property and the environment against harmful effects of ionizing radiation. Due to the vast size of the African continent, with inequitable resources, regional cooperation becomes key to capacity-building and knowledge and information sharing. In order to achieve this, African Member States resolved to form a Forum for Nuclear Regulatory Bodies in Africa (FNRBA) in 2009. The paper will present the FNRBA, its activities, achievements and challenges in the quest to bring about effective regulation of nuclear and radiation safety in the continent.

Presenter/Member State or Org.	**G. Rzentkowski**		**IAEA**
Session/date/time:	**4**	Thurs, 14 April	11:20–11:40
Title of the paper:			
Nuclear Installation Safety: General Observations and Trends from IAEA Peer Reviews			

The Safety Review Services (SRSs) for nuclear installations address the needs of Member States at all stages of installations' lifecycle. SRSs are based on the IAEA Safety Standards and are provided on Member States' request to peer review national regulatory frameworks and safety provisions for nuclear installations. They result in recommendations and suggestions to improve national regulations and operational safety, and serve to exert peer pressure to ensure that that every Member State with nuclear installations recognizes its safety responsibility and the need to comply with the IAEA Safety Standards.

This presentation provides an overview of SRSs for Nuclear Installations, including their structure and main subject areas. The presentation also summarizes general findings and trends which clearly demonstrate that there is continuous improvement in regulation of nuclear installations and in safety of their operation. Nevertheless, there is the need to further enhance the efficiency and effectiveness of SRSs through review of the overall governance model and service delivery to better serve the needs of Member States. The presentation points out some areas of improvements which have already been implemented or are being considered for implementation.

Just as important, SRSs are conducted by teams of experts from around the world to strengthening international cooperation, ensure diversity and impartiality, and improve the overall quality of the safety review being conducted. The review team members are also provided with the opportunity for mutual learning and sharing good practices among themselves and with the Member State undergoing the review. As a result, SRAs play an important role in a quest to harmonize regulatory requirements and approaches globally.

Presenter/Member State or Org.	**J. Cameron**		**Canada**
Session/date/time:	**4**	Thurs, 14 April	11:40–12:00
Title of the paper:			
Toward a System of Global Accountability			

Post-Fukushima, the public expects and demands that nuclear regulators and operators worldwide have used lessons learned to identify and implement important actions and measures to prevent a similar event from happening again. Considerable work has been done at the national and international levels to achieve this. However, verifying the adequacy and appropriateness of measures taken in each country requires an enhanced level of global accountability that does not presently exist. The current global nuclear regulatory safety framework is based on the principle of national sovereignty and the result is that the world lacks a forum for publicizing safety concerns, beyond the national regulator, to the highest levels of government within member states. This runs the risk of significant deficiencies or non-compliance with internationally approved practices continuing unchecked even though some parties are aware of them. This also applies to flagging cases of insufficiently independent regulators or identifying inadequately prepared regulators in new nuclear countries. There are many vehicles for enhancing this transparency, e.g., WANO/INPO, regional regulatory fora, and international organizations including the OECD/NEA and IAEA. The world has never been more interconnected and it is time that the nuclear sector leverages this reality and adopts a system of global accountability for nuclear safety.

Session 5 – Strengthening Regulatory Competence

Presenter/Member State or Org.	**K. Huda**		**Indonesia**
Session/date/time:	**5**	Thurs, 14 April	14:00–14:20
Title of the paper:			
Building Nuclear Safety and Security Culture Within Regulatory Body			

To achieve a higher level of nuclear safety and security, it needs to develop the safety and security culture not only in the facility but also in the regulatory body. The regulatory body, especially needs to develop the safety and security culture within the organization, because it has a function to promote and oversee the culture in the facilities. In this sense, the regulatory body should become a role model. Development of the nuclear safety and security culture should be started by properly understanding its concept and awakening the awareness of individual and organization on the importance of nuclear safety and security. For effectiveness of the culture development in the regulatory body, the following steps are suggested to be taken: setting up of the regulatory requirements, self-assessment, independent assessment review, communication with the licensee, oversight of management system implementation, and integration with regulatory activities. The paper discusses those steps in the framework of development of nuclear safety and security culture in the regulatory body, as well as some important elements in building of the culture in the nuclear facilities.

Presenter/Member State or Org.	**P.F. Illizastigui**		**Cuba**
Session/date/time:	**5**	Thurs, 14 April	14:20–14:40
Title of the paper:			
Strengthening Regulatory Competence in a Changing Nuclear Regulatory Environment			

The paper addresses the approach followed by the Cuban National Center for Nuclear Safety for the management of current and new competences of its regulatory staff with the aim of allowing those staff to effectively fulfill their core regulatory functions. The approach is realized through an Integrated System for Competence Building, which is based on the IAEA recommendations, shown to be effective in ensuring the necessary competence in the relevant areas. In the author's opinion, competence of the regulatory staff in the area of human and organizational factors is of paramount importance and needs to be further strengthened in order to be able to assess safety performance at the facilities and detect early signs of deteriorating safety performance. The former is defined by the author as the core regulatory function "Analysis" which covers the entire spectrum of assessment tasks carried out by the regulatory staff to: a) detect declining safety performance, b) diagnose latent weaknesses (root causes) and c) make effective safety culture interventions. The author suggests that competence associated with the fulfillment of the analysis function is distinctly identified and dealt with separately in the current system of managing regulatory competence.

Presenter/Member State or Org.	**K. Smith**		**Ireland**
Session/date/time:	**5**	Thurs, 14 April	14:40–15:00
Title of the paper:			
Using the IRRS to Strengthen Regulatory Competence in Ireland			

In 2015, Ireland underwent an IRRS (Integrated Regulatory Review Service) review mission. The purpose of the mission was to review Ireland's radiation and nuclear safety regulatory framework and activities against the relevant IAEA safety standards, to report on the regulatory effectiveness and to exchange information and experience in the areas covered by the IRRS. The review mission was well-timed as there had been recent changes in the regulatory infrastructure with the merger of the Radiological Protection Institute of Ireland (RPII) and the Environmental Protection Agency (EPA) in 2014, as well as the upcoming implementation of the new Euratom Basic Safety Standards (BSS) Directive. The key objectives of the mission were to enhance the national legal, governmental and regulatory framework for nuclear and radiation safety, and national arrangements for emergency preparedness and response. The agreed scope of the review covered all relevant facilities and activities regulated in Ireland and also included medical exposures and public exposure to radon. In advance of the mission, Ireland completed a process of self-assessment and review. This process identified strengths and weaknesses in the national regulatory framework compared with the international standards. In addition to the value of having Ireland's radiation protection framework peer reviewed by senior international experts, the mission helped to further strengthen links between all the national bodies (government, licensees, regulatory) with a role in the regulation of radiation safety. The findings from the IRRS review team's objective evaluation of Ireland's regulatory infrastructure are being used to prioritise actions for strengthening the regulatory framework, to provide input into the transposition of the Euratom BSS, and to support the revision of the national emergency plan for nuclear accidents. It is planned to have addressed the findings of the IRRS mission in advance of a follow up mission in 2019.

Presenter/Member State or Org.	**M. Sadiq**		**Pakistan**
Session/date/time:	**5**	Thurs, 14 April	15:00–15:20
Title of the paper:			
Strengthening Regulatory Competence in Pakistan			

Capacity building of Pakistan Nuclear Regulatory Authority is considered an essential element in pursuit of its vision to become a world class regulatory body. Since its inception in 2001, PNRA has continuously endeavoured to invest in its people, develop training infrastructure and impart sound knowledge and professional skills with the aim to improve its regulatory effectiveness.

The use of nuclear and radioactive material in Pakistan has increased manifold in recent years, thus induction of more manpower was needed for regulatory oversight. PNRA adopted two pronged approach for meeting the manpower demand (a) employment of university graduates through fast track recruitment drive and (b) induction of graduates by offering fellowships for Master degree programs. Although, the newly employed staff was selected on the basis of their excellent academic qualifications in basic and applied sciences, but they required rigorous knowledge and skills in regulatory perspectives.

In order to implement a structured training program, PNRA conducted Training Needs Assessment (TNA) and identified competency gaps of the regulatory staff in legal, technical, regulatory practice and behavioural domains. PNRA took several initiatives for capacity building which included establishment of a training centre for sustainability of trainings, initiation of a fellowship scheme for Master program, attachment of staff at local institutes for on-the-job training and placement at foreign regulatory bodies and organizations for technical development with the assistance of IAEA.

The above strategies have been very beneficial in competence building of the PNRA staff to perform all regulatory activities indigenously for nuclear power plants, research reactors and radiation facilities. Provision of vibrant technical support to IAEA and Member States in various programs by PNRA is a landmark of these competence development efforts.

This paper summarizes PNRA initiatives and the International Atomic Energy Agency support for capacity building of its staff and other stakeholders who have a role in maintaining nuclear/ radiation safety and security of radiation sources in the country.

Presenter/Member State or Org.	**C.D. Le**		**Vietnam**
Session/date/time:	**5**	Thurs, 14 April	16:00–16:20
Title of the paper:			
Regulatory issues related to new NPPs in Viet Nam			

In 2009, the Viet Nam National Assembly passed the Decision No 41 which approved the Policy for introduction of the first Nuclear Power Plants (NPPs) into Vietnam in Ninh Thuan province. Construction of the first NPP named Ninh Thuan 1 was planned to be started in 2014 for its commissioning in 2020. However, the construction has been delayed due to preparation problems that include regulatory issues. The paper presents the current status and issues associated with building regulatory competence in developing new NPPs in Vietnam.

Presenter/Member State or Org.	**L. Hu**		**China**
Session/date/time:	**5**	Thurs, 14 April	16:20–16:40
Title of the paper:			
The Competence Promoting by NNSA for Keeping High Level Nuclear Safety: The Corner Stone of the Nuclear Safety Regulation Edifice			

Facing the fast development of the nuclear power industry and the application of radioactive sources, The MEP(NNSA) is endeavoured to promoting its competency, including: complementing the law system, training and recruiting staff to keep a capable team, constructing the R&D base to keep the basic capability, promoting safety culture both for the industry and the regulator.

After the Fukushima nuclear accident, the MEP(NNSA) planned to construct R&D base, in which the Platform Nuclear Safety Monitoring and Emergency Responding, the Platform of Safety Technology of PWR Testing, the Laboratory of Safety Management Technology of Nuclear Waste Verification, the Laboratory of Environmental Radiation Monitoring and the Center of International Cooperation are included. On the other hand, the MEP(NNSA) issued Chinese nuclear safety culture policy declaration in 2014, and carried out a large scale Specialized Action for Nuclear Safety Promotion to promote the nuclear safety culture both for the industry and herself.

For the nuclear regulator, It is essential to conduct the competence promoting by both “hardware” and “software”, the former is the material foundation of regulation authority, which will be effectively functioning under the facilitating of the latter.

Presenter/Member State or Org.	**S. Kuchibhotla**		**India**
Session/date/time:	**5**	Thurs, 14 April	16:40–17:00
Title of the paper:			
Strengthening Regulatory Competence through Techno-managerial Knowledge Integration: Indian Experience			

Competence development is the process of identifying the competencies required to perform a given job, role or set of tasks successfully at workplace. Strengthening regulatory competence, for the nuclear regulator, is essential to ensure skilled and competent human resources for performing the functions of the Regulatory Body. The strengthening of existing competence level for the Indian nuclear regulator, takes into account the understanding of the elements such as legal basis and regulatory processes governing operations of regulatory body, technological competences for performing regulatory functions, competences pertinent to regulatory practices, and competences related to personal and interpersonal effectiveness within the organization.

Competency data from AERB divisions was compiled to identify gaps at various positions with recommendations for making specialized training modules and modifications to basic and refresher training modules. The exercise is aimed at providing continual improvement in skills and knowledge of human resources at AERB in a phased manner.

Presenter/Member State or Org.	**P. Meschenmoser**		**IAEA**
Session/date/time:	**5**	Thurs, 14 April	17:00–17:20
Title of the paper:			
Lost in Interpretation – Communicating Risk to the Public			

Communicating radiation incidents and emergencies to the public always has been challenging. No other type of emergency is related to such disproportional risk perception, so little public knowledge about the subject matter and so many contradicting expert analyses when it comes to public communications.

The rise of social media and citizen journalism resulted in a dramatic acceleration of global communications and widespread misinformation. News does not break on television anymore but on Twitter, Facebook & Co. As a consequence, professional communicators not only have to take initiative considerably faster than in the past and deal with rumours. Their message has to be brief and on the point and is sometimes limited to just some 140 characters, the maximum length of a Tweet.

More than ever it is essential to timely communicate in plain language and to clearly tell what needs to be done to be safe and to remain safe. Otherwise, the public will be lost in interpretation.

Posters

Display of Posters: Posters will be displayed outside Board Room A (M-Building, 2nd Floor) on Tuesday, 12 April and Wednesday, 13 April.

Poster authors are requested to be at their posters on these days during Coffee Breaks.

Topic 1 – Regulatory Lessons Learned and Actions Taken

Presenter/Member State or Org.:	C. Morin		Canada
No. of Paper IAEA-CN-236:	2	***Topic:***	1
Title of the paper:			
Lessons learned from the Fukushima Daiichi Accident and their implications on the Canadian Nuclear Regulatory Framework			

In Canada, the Fukushima Daiichi accident triggered not only a review of the safety of existing Nuclear Power Plants (NPPs), but also a review of the Canadian regulatory framework of NPPs. To that effect, in addition to the action plan to improve the safety of NPPs following Fukushima accident, a comprehensive review of the regulatory framework was initiated.

Beginning from the Canadian Nuclear Safety Commission Task Force Report, this paper will review the lessons learned from the event with respect to the regulatory framework. The paper will also provide the status and rationale for the improvements in regulatory requirements, such as improvements in severe accident management, emergency management, deterministic safety analysis and probabilistic safety assessment, design requirements for new NPP and periodic safety review requirements. The paper will also highlight issues and challenges facing Canadian industry during the implementation of these regulatory improvements. The topic of multi-unit probabilistic site assessments, as well as the development of Safety Goals will be discussed. The impact of all these improvements and their relation to the Vienna Declaration of Nuclear Safety will also be presented.

Presenter/Member State or Org.:	R. Solanki		India
No. of Paper IAEA-CN-236:	4	***Topic:***	1
Title of the paper:			
Strengthening Regulatory Effectiveness in India – Lessons Learnt from Fukushima Accident			

Following the Fukushima Daiichi accident in Japan, one of the most important lessons learnt, among other things, was the issue of strengthening the effectiveness of the regulatory bodies.

Immediately after the Fukushima accident, National level safety audits were conducted on all operating NPPs in India to review safety of NPPs in India.

A national action plan has been prepared to implement the identified short term, midterm and long term measures. The assessment indicates that national response to the Fukushima Accident for safety assessment of NPPs and subsequent actions and initiatives taken for safety enhancement of the NPPs in India are in-line with the objectives of the IAEA Action plan.

This paper highlights the actions taken by India in the light of Fukushima Daiichi accident in order to strengthen the regulatory effectiveness through improvements in the existing core processes, challenges faced, Insights gained from the recent initiatives on safety performance indicators and assessment of safety culture, relevant observations of IRRS mission report and Indian perspectives on the further cooperation among the member states for enhancing the regulatory effectiveness for nuclear oversight of regulated organizations.

Presenter/Member State or Org.:	A. Sapozhnikov		Russian Federation
No. of Paper IAEA-CN-236:	14	***Topic***	1
Title of the paper:			
Experience Transformed into Nuclear Regulatory Improvements in Russia			

The third International Conference on Effective Nuclear Regulatory Systems (Canada, 2013) identified the main action items that should be addressed, implemented and followed up. The key technical and organizational areas important to strengthening reactor and spent fuel safety have been determined as following:

- Regulatory lessons learned and actions taken (since the accident at the Fukushima Daiichi NPP);
- Waste management and spent fuel safety;
- Emergency management;
- Emerging programmes;
- Human and organizational factors, safety and security culture.

Over time many activities based on results of the IAEA Integrated Regulatory Review Service in the Russian Federation, 2019, and post-mission, 2013, have been implemented. At present there is progress for the national action plan on nuclear safety, preparation and conducting of long term spent fuel management, complementary reviews for nuclear facilities other than Nuclear Power Plants, emergency exercises with the regulatory body participation, improving communication, development of national regulations and improvement of regulatory system in the whole. The regulatory body ensures assistance in development of national regulatory infrastructure, safety culture to the countries planning to construct Russian design facilities (NPPs, RRs). The report outlines the results and future actions to improve nuclear regulation based on systematic approach to safety and particularly reflects the specificity of taking measures for the research reactors.

Presenter/Member State or Org.:	M. Tronea		Romania
No. of Paper IAEA-CN-236:	28	***Topic:***	1
Title of the paper:			
Use Of Operational Experience Feedback For Improving The Nuclear Regulatory Framework In Romania			

The paper presents the latest developments of the nuclear safety regulatory framework in Romania, based on the use of lessons learned from operational and regulatory experience feedback. Significant improvements of the regulatory framework after the Fukushima Daiichi accident, using lessons learned from this event as well as updates of the international standards, include the issuance of a National Strategy for Nuclear Safety and Security and new regulations on: - the nuclear power plants response to transients, accidents and emergency situations;

- The protection of nuclear installations against external events of natural origin;
- The nuclear safety policy and the independent nuclear safety oversight for nuclear installations;
- The operational limits and conditions for nuclear installations.

Presenter/Member State or Org.:	K. Debbabi		Tunisia
No. of Paper IAEA-CN-236:	41	***Topic:***	1
Title of the paper:			
Effective Nuclear Regulatory Systems Facing Safety and Security Challenges			

Nuclear regulators should not actively take part in issues concerning nuclear energy policy. Their essential function is to contribute as effectively as possible to nuclear safety. The principal focus will be on the application of this concept since the Fukushima Daiichi nuclear accident. By using a comparative approach, this paper will address the measures taken by various countries to ensure the independence of their respective nuclear regulator, especially in light of the recent nuclear accident.

Presenter/Member State or Org.:	J. Lavarenne		France
No. of Paper IAEA-CN-236:	43	***Topic:***	1
Title of the paper:			
Accountability Feedback Assessments for Improving Efficiency of Nuclear Regulatory Institutions			

The Fukushima-Daiichi Disaster demonstrated the need of assessing and strengthening institutions involved in nuclear safety, including the accountability of nuclear regulators. There are a few problems hindering the path towards a greater understanding of systems of accountability, the ensemble of mechanisms holding to account the nuclear regulator on behalf of the public. There is no consensus on what it should deliver and no systematic method of assessment exists. This poster proposes a definition of an effective accountability system and a method of assessment of institutions based on defence in depth concepts and inspired from risk-assessment techniques used in the nuclear industry. Finally it presents a simple Monte-Carlo simulation that illustrates the inner workings of the method of assessment and shows the kind of results it will be able to supply.

Topic 2 – Challenges in Regulating Nuclear Installations

Presenter/Member State or Org.:	K. Alm-Lytz		Finland
No. of Paper IAEA-CN-236:	0	***Topic:***	2
Title of the paper:			
New NPP Construction Experience in Finland			

The paper discusses the experiences of the new nuclear power plant construction projects. The topics include the licensing and regulatory oversight process, completion of the design prior to construction, experience and know-how of the participating organisations, quality management in a nuclear construction project, safety culture aspects in a nuclear construction project, and the role and importance of regulator's oversight. Finland has recent experience of new nuclear power plant construction, one plant unit being under construction close to commissioning phase and one plant unit in construction license phase.

Each nation is solely responsible for the safety of its nuclear installations. Therefore, there are also national practices how nuclear power plants are licensed and how the safety and quality of these plants are verified during construction and operation.

Differences in licensing, regulations and regulatory practices may have an impact on the design of the plant. There may be differences in how the detailed design has to be documented and how and when it needs to be submitted for approval to the regulator. To avoid surprises due to differences, it is beneficial for the owner and plant vendor to familiarize themselves early enough on the national practices and regulations to ensure that regulatory expectations and processes can be taken into account in the project implementation. In addition, the owner and the plant vendor have to understand what are the national safety goals and safety requirements that the plant has to fulfil, and what they mean to the detailed design of the plant. These have to be clarified and explicitly defined by the owner in terms of design criteria in the bidding documentation to avoid difficulties in the future steps of the project.

One of the most important factors that can affect the new NPP construction projects is the status of detailed design of the plant and its' systems, structures and components at the time when civil construction is to be started. If the design is not complete enough prior to construction, it risks the timely start and continuous progress of construction. This may result in construction and manufacturing delays, difficulties in contracting and managing subcontractors, challenges in the design configuration management, redesign and rework on site due to a need to change already completed civil works. In this context, the management of the design process becomes very important. This is needed to ensure a once through review and approval of the design and working documentation, i.e. to avoid rotation of documents between the involved parties.

Both the use of subcontractors and the global nature of vendor organisations highlight the importance of proper design management processes. This includes written a description of design configuration and change management processes, together with a transparent and traceable

requirement management. Explicit requirements will ensure that the design of structures and components meet the requirements set by the system and the plant level.

Licensee's and vendor's key persons shall have experience in nuclear power construction or operation. Right experience ensures that nuclear specific issues are known and timely identified and right amount of attention, resources and time is allocated to the important areas. Regulator should verify that the licensee has adequate human resources for the project from the beginning. Resources should include e.g. staff needed to oversee the activities of the vendor and staff needed to review and approve of the plant's design. Licensee's need of resources varies during the project and hence it should conduct staff planning covering the entire project.

The subcontractor selection criteria and approval process should be clearly defined and agreed between the vendor and the licensee. In addition, requirements for the quality assurance and quality control shall be commonly understood throughout the project (e.g. regulator, licensee, vendor and its subcontractors). This means for example that quality requirements to be applied in different safety classes are clearly defined and agreed before subcontracting and procurement starts so that they can be clearly written in contracts and specifications.

Construction of a nuclear power plant does not differ from an operating nuclear power plant from safety culture point of view. Safety and quality must have higher priority than costs and schedule. This message has to be very clear and transmitted from the licensee and vendor management to all participating organisations and to all levels of the organisations. Management's acts and decisions in the project have to be consistent with the message. Everyone has to understand the safety significance of the work one is responsible for. This is a challenge in a construction project where thousands of people are involved and many of them have no previous experience or knowledge on nuclear power plants.

Finnish construction experience has shown the importance of stringent regulatory approach and inspections. These are needed to verify that the performance of the licensee, the vendor and the subcontractors meet the expectations and that the equipment and structures meet the specifications set by the design. There are some cases where Quality Control inspectors of manufacturer, vendor, and licensee may have not been strong enough to enforce stopping of work and making necessary timely corrections. These may have something to do with a turn key contract together with cost and schedule pressure caused by a stop of work. In such situation, an intervention by a regulatory inspector has been needed. Prerequisite is that regulatory body is competent, independent, has strong powers and enforcement tools.

Presenter/Member State or Org.:	D. Taufiq		Indonesia
No. of Paper IAEA-CN-236:	7	***Topic:***	2
Title of the paper:			
Natural Disaster As A Reason To Annul The Nuclear Liability: From National And International Law's Perspective			

One serious issue that deserves more attention from Indonesia before constructing its first NPP, regarding its "ring of fire" geological position, is the natural disaster as a reason to annul the nuclear liability.

Article 32 of Act No 10 Year 1997 on Nuclear Energy stipulates that " nuclear installation operator shall not be responsible for the damage caused by a nuclear accident that occurred as a direct impact of a domestic or international armed conflict or natural disaster that exceeded the design limits and acceptance criteria set by the regulatory body. " In its explanation natural disaster includes earthquakes.

This article adopts the provision of article IV paragraph 3b 1963 Vienna Convention on Civil Liability for Nuclear Damage. But, in 1997 Amendment Protocol, this provision has been deleted. Natural disasters often referred to as an "act of god" because it occurs outside the control of the human. Nevertheless, not all natural disasters could cause the operator to annul its civil liability. The most important question is: "has the operator taken all necessary preventive actions to prevent accidents, before and during the natural disaster?"

In practice, an accident can occur due to a combination of natural disasters and negligence. For example is the 2011 Fukushima Daiichi disaster. The tsunami that occurred on the east coast of Japan was the direct cause of the accident. However, there was also the human error factor. For example, the decision to build a nuclear plant on the east coast of Japan that is highly vulnerable to tsunamis is questionable. In addition the design of a nuclear installation is not flood resistant, therefore all the batteries and emergency power facilities were directly flooded while the tsunami came.

The big question is whether "natural disaster" can be a reason to annul the nuclear liability. There are some conventions that can be used as the references. In the 1960s, there were three conventions referred to the nuclear compensation. First, the Organisation for Economic Co-operation and Development Nuclear Energy Agency Convention on Third Party Liability in the Field of Nuclear Energy of 29 July 1960 ("the Paris Convention"). Second, the Brussels Supplementary Convention to the Paris Convention on Third Party Liability in the Field of Nuclear Energy of 31 January 1963 ("the Brussels Convention").

Third, the IAEA Vienna Convention on Civil Liability for Nuclear Damage of 21 May 1963 ("the Vienna Convention"). The Paris Convention and the Brussels Convention are generally entered into force for Western Europe states, whilst the Vienna Convention is applied more globally.

Some common characteristics between the three conventions are: strict liability, exclusive channelling of liability to nuclear operators, limitation of the liability in amount and in time, and a compulsory financial security.

The Paris Convention introduced the concept of "absolute liability". In this term, the operator is responsible for the material and immaterial loss due to the nuclear accident in a nuclear installation or as a result of nuclear material derived from the installation, which does not need to prove its fault before implementing its liability. This term is regarded as "absolute liability" because some of the things that generally exclude civil liability (including force majeure, natural disasters, or the result of a third party) can no longer be applied. The only exceptions are political matters, such as the armed conflict, war, or rebellion. In addition there are also exceptions for the grave natural disasters of exceptional character

The Vienna Convention in principle provided similar regulation to the Paris Convention. However, in the Vienna Convention, it is possible for the operator to be free from its liability if the operator can prove that the accident occurred from gross negligence or act of omission of the victim. This convention got the urge to amend , especially when the 1986 Chernobyl incident occurred, which raised the latest generation of the liability conventions.

In the case to annul the nuclear liability, in recent conventions, natural disasters could no longer be used as the reason. The only exception is armed conflict, war, or rebellion. Since the 9/11 incident in 2001, there were discussions to include acts of terrorism as the reason to annul the liability, but up to now, such reason has not been stipulated in any conventions.

Learning from the Fukushima Daiichi disaster, the nuclear liability system in Japan can be used as a comparison to Indonesia. Even though, its volcanic activities are higher than those in Indonesia, Japan is very brave for using about 20% of the overall domestic energy coming from nuclear energy.

In principle, based on Japan Law, not all natural disasters can be used as the reason to annul the nuclear liability, it is only for the grave natural disaster of exceptional character. Beside that, the operator is still responsible. For example through the indemnity agreement, which the operator will pay indemnity to the government.

Presenter/Member State or Org.:	B. Srimok		Thailand
No. of Paper IAEA-CN-236:	47	***Topic:***	2
Title of the paper:			
Determination Of Probabilistic Inspection Frequency Of Structures, Systems And Components Of Thai Research Reactor 1-Modification 1 (Trr-1/M1)			

In this work, the probabilistic inspection frequencies of selected Structures, Systems and Components (SSCs) for TRR-1/M1 reactor were determined using Monte Carlo simulations technique. This research assumed that (a) IAEA safety classification is somewhat comparable to the safety integrity level referenced in ISO standards number 13849-1 [5] and (b) the probability of failure of SSCs per hour is constant over time. The failure data was obtained from the IAEA reliability database for research reactor and assumed to be a Chi-Square distribution with degree of freedom equal to number of actual failure components. The results from this research will be used as guidelines for evaluating the TRR-1/M1 operator's inspection and maintenance plan.

Topic 3 – Challenges in Regulating Radiation Sources and Radioactive Waste

Presenter/Member State or Org.:	K. Hämäläinen		Finland
No. of Paper IAEA-CN-236:	1	***Topic:***	3
Title of the paper:			
Regulatory Experiences from Effective Step-wise Implementation of the SNF Disposal in Finland			

Finland is one of the foremost countries in the world in developing a disposal solution for spent nuclear fuel (SNF). The Construction License Application (CLA) for the Olkiluoto SNF encapsulation and disposal facility was submitted by Posiva, the implementer, to the authorities at the end of 2012 and the Government is expected to decide about the license during autumn 2015.

In 1983 the Government made a strategy decision on the objectives and target time schedule for the research, development and technical planning of nuclear waste management. Decision included the milestones for site selection, submittal of construction license and start of disposal operations.

The licensing procedure for a disposal facility has several steps that are similar to all nuclear facilities in Finland and are defined in Nuclear Energy Act and Degree. These licensing steps are:

- Decision-in-Principle (DiP) is required for a nuclear facility having considerable general significance. This is essentially a political decision: the government decides if the planned project is in line with the overall good of society. The decision can be applied for one or more sites, the host municipality has a veto right and the parliament has the choice of ratifying or not ratifying the decision.
- Construction License is granted by the Government and authorizes the construction of the facility. The actual construction is regulated by STUK and includes several review and approval steps, hold points and viewpoints.
- Operating License is granted by the Government and authorizes the operation of the facility for a certain period. The operating license is needed for example before nuclear waste can be introduced in encapsulation plant or disposal facility.

The Government issued in 2000 a DiP deciding that Olkiluoto will be the site for the SNF repository and that Posiva was allowed to proceed by constructing there the underground rock characterization facility, Onkalo. The disposal concept was decided to be KBS-3 and the disposal facility was planned to be located at a depth of 400-700 meters. DiP was preceded by regulatory review of safety cases prepared during site characterization and screening process.

After DiP STUK has developed regulatory oversight approach for underground facilities that has been used in oversight of Onkalo construction. STUK also decided to review preliminary safety case parts developed by Posiva during the pre-license phase. This regulatory involvement was seen as a key importance for successful construction license application review and acceptance. During the pre-license phase the safety case parts were first reviewed by using bottom-up approach. Based on the experiences STUK developed for CLA review and assessment more safety oriented approach.

Posiva submitted the construction license application and supporting documentation to the authorities at the end of 2012. The CLA and STUK's review cover aspects of safety, security and nuclear safeguards. The scope of application covers both operational safety of the facilities and post-closure safety of the disposal. STUK started the review and assessment with an initial review in early 2013. The thorough review and assessment of the license application included several requests for additional information from Posiva. STUK finalized the review and assessment and submitted statement of safety to the Government in February 2015.

STUK's main conclusion was that planned encapsulation plant and disposal facility can be built to be safe. There is sufficient reliability that there will be no detrimental radiation effects to the public or environment. In the statement to the government and separate decisions to Posiva, STUK has raised areas that need further development before specific construction step or before submittal of operating license application.

In pre-CLA phase STUK carried out comprehensive process of preparations, which included resource and competence build-up, preparation of internal review plan and review of Posiva's draft CLA documentation. In parallel with CLA review process STUK has implemented inspection program focusing on applicant's management system and readiness for construction. To support regulatory decision making, STUK has used a wide range of national and international experts in the CLA review process.

Based on the Finnish experience a key factor for successful progress in SNF disposal is a strong political commitment and local municipality support for the project. From regulatory side this has been supported with clear regulatory roles, early and continuous involvement to the SNF disposal program and active communication with stakeholders.

The paper will highlight key aspects of regulatory oversight and experiences from detailed site characterization, safety case development phase and review and assessment of the construction license application for Olkiluoto SNF encapsulation and disposal facility.

Presenter/Member State or Org.:	W. P. Daeng Beta		Indonesia
No. of Paper IAEA-CN-236:	3	***Topic:***	3
Title of the paper:			
Towards Regulatory Effectiveness of Inspection and Enforcement on Safety and Security of Radioactive Sources in BAPETEN Indonesia			

According to Law No 10 of 1997, nuclear regulatory is implemented through rulemaking, licensing and inspection. Inspection is one of nuclear regulatory elements that has to be carried out by BAPETEN inspectors to ensure compliance of the nuclear regulation (GR No. 33 of 2007). While according to IAEA TECDOC 1526, enforcement is an action taken for ensuring compliance with regulatory requirements. So, inspection and enforcement have similar goals. They have to go hand in hand.

The achievement and maintenance of a high level of safety and security in the use of radiation sources depends on there being a sound legal and governmental infrastructure, including a national regulatory body such as BAPETEN with well-defined responsibilities and functions. These responsibilities and functions include establishing and implementing a system for carrying out regulatory inspections, and taking necessary enforcement actions in an effective manner.

Objectives: to overview regulatory effectiveness of inspection and enforcement on safety and security of radioactive sources in BAPETEN Indonesia

Results:

Regulatory effectiveness itself means “to do the right work” whereas regulatory efficiency means “to do the work right”. This has been stated in PDRP-4, Assessment of Regulatory Effectiveness. PDRP-4 also elaborates that given the necessary authority and resources as prerequisites, the regulatory body is effective when it:

- Ensures that an acceptable level of safety is being maintained by the regulated operating organizations;
- Takes appropriate actions to prevent degradation of safety and to promote safety improvements;
- Performs its regulatory functions in a timely and cost effective manner as well as in a manner that ensures the confidence of the operating organizations, the general public and the government;
- Strives for continuous improvements to its performance.

The monitoring and evaluation system (Monev) within the BAPETEN is based on strategic performance indicators similar to the one described in PDRP-4. The BAPETEN has been striving to achieve the above goals ever since its establishment. However, it should be kept in mind that regulatory effectiveness cannot be enhanced beyond a certain point without international cooperation.

It is observed that the IRRS Mission, RASSIMS, Open-Ended Experts Meeting on implementation of the Code of Conduct on Safety and Security of Radioactive Sources which refer to the IAEA standards along with the development and use of procedures and standard review plans (i.e. checklists) for inspection and enforcement as the basis for their review help in enhancing regulatory effectiveness. These review teams and/or missions comprise of experts drawn from various countries and reflect international experience and practices. The BAPETEN has used this experience and the IAEA standards to increase its regulatory performance.

Conclusions:

Regulatory effectiveness of inspection and enforcement on safety and security of radioactive sources still strives for continuous improvements to its performance in BAPETEN Indonesia.

Presenter/Member State or Org.:	F. Ilizastigui Pérez		Cuba
No. of Paper IAEA-CN-236:	5	***Topic:***	3
Title of the paper:			
Bowtie Risk Management methodology and Modern Nuclear Safety Reports			

The Safety Report (SR) plays a crucial role within the nuclear licensing regime as the principal means for demonstrating the adequacy of safety analysis for a nuclear facility to ensure that it can be constructed, operated, maintained, shut down, and decommissioned safely and in compliance with applicable laws and regulations. It serves as the basis for granting authorizations for the commencement of the main stages of the facility's life cycle as well as decision-making processes related to safety.

Historically, the majority of nuclear safety reports have operated under rather prescriptive regimes, with emphasis placed on demonstrations of the robustness of the facility's design (design safety) against prescriptive technical requirements set by the regulatory body, and less attention paid to demonstrating the adequacy and effectiveness of Operator's management system for managing risks to daily operation.

Analysis of underlying causes of accidents in the nuclear industry (TMI, Chernobyl, Davis-Besse) increasingly shows that their origin is not in the failure of the front line technical & human control systems but in the safety management practices which are supposed to keep them in place. Yet recently, the accident at the Fukushima Daiichi NPP showed once again that, in order to better identify plant vulnerabilities, it is necessary to take an integrated approach that takes account of the complex interactions between people, organizations and technology.

All of the above is motivating a shift in regulatory approaches towards the adoption of less prescriptive (technical based) regimes in favour of more performance-based, goal-setting approaches. Thus, if the earlier 'prescriptive' regime specified technical details, the most recent approaches specify how safety is to be managed by the Operator, reinforcing that it is the Operator who has prime responsibility for ensuring the safety of facilities and reinforcing the role of the safety management system in ensuring safe operation and managing day-to-day risks to safe operation.

For an operating facility this means that, apart from "making the case for safety", there is also a need to demonstrate in the SR the "ability" of the operating organization to actively manage safety risks through its safety management system, coupled with an in-depth risk assessment. The SR must be "fit-for-purpose" by being a practical reference for the use of operations management in their day-to-day operations and must be a living document conveying their commitment to safe operation.

As the UK Nuclear Safety Case Forum stated in their recently issued guide Right First Time Safety Cases: How to Write a Usable Safety Case, nuclear Safety Cases are rigorous, in-depth and complex thus largely reducing their visibility and understanding by operation and maintenance personnel, who exercise direct control of the hazards and risks; as well as management, who have direct responsibility for ensuring safe operation.

If SRs are used to support a new regulatory approach, they must: a) be the outcome of a robust safety case production process (the process is as important as the final product), b) account for human and organizational factors, c) focus on risk management as opposite to risk assessment, d) allow for active workforce involvement and participation, e) be maintained as current, live documents) and d) govern the process of continuous improvement in safety.

Aspects addressed above are of the utmost importance for nuclear power plants but are even more challenging for the emerging technologies in industrial and medical applications. The present paper explores the possibilities that the Bowtie risk management methodology offers for the creation of modern Safety Reports, by increasing their use as an effective tool for managing and communicating risks during facilities' operation.

Specific examples are given, which demonstrate the means by which the methodology may increase the 'usability' of an existing operational Safety Report for a radioisotope production facility.

Overall, the paper aims to show how the Bowtie methodology may help in providing necessary evidence s within the Safety Report on how the safety of the facility is being managed by the facility owner, in areas such as safety accountabilities, risk assessment and mitigation process, safety performance monitoring, measurement and review, management of change, training and education and risk communication.

This may contribute to the demonstration of the effectiveness of the management system for supporting the integrity of the barriers which are critically important for ensuring safe operation.

Finally, a road map is suggested for the production of a Safety Report for a non-reactor facility, using the bowtie methodology as part of the process of Safety Assessment which constitutes the main part of the Safety Report.

Presenter/Member State or Org.:	N. Al-Tameemi		Iraq
No. of Paper IAEA-CN-236:	8	***Topic:***	3
Title of the paper:			
Challenges in Regulating Disused Radioactive Sources and Radioactive Waste in Iraq			

Due to absence of disposal facility, a huge number of unconditioned radioactive waste and disused radioactive sealed sources from all Iraqi territory are temporally placed and stored at centralized storage facilities in Al-Tuwaitha nuclear site (20 km south of Baghdad), pending final disposal when a disposal facility for radioactive waste established. Some storage facilities in Al-Tuwaitha nuclear site have never been licensed; those that have been licensed were often non-compliant with internationally accepted principles, and in most cases there were no environmental impact assessment for these facilities. Huge amounts of radioactive waste in storage facilities are not conditioned. Since the safety and security conditions of these waste is uncertain, needs to evaluate the regulatory infrastructure become priority in Iraq especially after 2003.

However, over the last decade, Iraq has successfully implemented measures and programs to enhance its regulatory oversight of radioactive waste and declared spent/disused radioactive sources to fully meet the provisions of the IAEA Code of Conduct on the Safety and Security of Radioactive waste. In Iraq, there are currently three entities which conduct regulatory functions for nuclear facilities and activities, namely:

- Ministry of Health and Environment/Radiation Protection Center (MoHEN/RPC): The MoHEN/RPC is the primary governmental agency responsible for establishing regulatory programs that protect the public health and safety regarding nuclear energy, radiation, and radioactive materials;
- Iraqi Radioactive Sources Regulatory Authority (IRSRA) is regulatory authority responsible for management of sealed radiation sources;
- Ministry of Higher Education and Scientific Researches/Radiation And Nuclear Safety Directorate (RNSD), which is an internal regulatory body responsible for performing regulatory oversight for all nuclear facilities and activities inside Al-Tuwaitha site;

The findings of this study indicate that national regulatory system peculiarities in Iraq can be summarized as below:-

- National regulatory bodies in Iraq are totally independent;
- There is an adequate system of authorization, licensing, or registration process for radioactive sources for government owned and non-government owned radioactive sources;
- There is an adequate system of inspection, monitoring, follow-up and record keeping for all declared disused/spent radioactive sources during the interim storage period.

However, deficiencies regarding national regulatory work in Iraq include:

- Currently, there are draft laws and regulations governing radioactive waste management and control in Iraq. These draft regulations have not been approved yet by Iraqi parliament;

- Iraq do not give high enough priority to the radioactive waste problem because there are larger or more urgent issues demanding all of the available resources (such as security threats);
- Limitations on the storage capacity will be prepared in the near future;
- Recent governmental mendings make radioactive waste management facilities more susceptible to being forgotten or ignored, which increases the risk of an accident;
- The current regulatory system and regulatory programs do not promote prompt reuse or recycle of disused radioactive sources. Rather, the regulatory environment promotes the acquisition of new sources and the storage of disused radioactive sources, thereby increasing the inventory and perpetuating the problem;
- The inventory of radioactive waste (including spent/disused radioactive sources) in storage facilities is infrequently accounted;
- All radioactive waste given the same amount of work regardless of their potential hazard;
- IRSRA and MoHEN/RPC share responsibilities for different activities or stages in the radioactive source life cycle;
- Accurate data on lost radioactive sources are not available (several orphan sources are found in the last years, which indicates that there are others).

Presenter/Member State or Org.:	C. Ngwakwe		Nigeria
No. of Paper IAEA-CN-236:	10	***Topic:***	3
Title of the paper:			
Challenges In Regulating Radiation Sources And Radioactive Waste In Nigeria			

Identifying challenges that hamper the efficiency and efficacy of Regulatory Infrastructure (People and Processes) as regards ensuring safety & security of radiation sources and radioactive waste is a major step towards planning for improvement. In a world constantly motivated by technological advancements, there has been considerable increase in the use of new technologies incorporating radioactive sources in both medical and industrial applications due to its perceived benefits, hence changing the dynamics of regulation. This paper brings to the fore, contemporary challenges experienced by regulators in the course of regulating radiation sources and radioactive waste in Nigeria. These challenges encountered in the business of regulating radiation sources and radioactive waste in Nigeria amongst others include; knowledge gap in the use of novel technologies for industrial applications (e.g. radiotracers in oil & gas and wastewater management), inadequate collaboration with operators to ensure transparency in their operations, inadequate cooperation from other government agencies using ionizing radiation sources, lack of synergy between relevant government agencies, difficulty in establishing standard radioactive waste management facility for orphan & disused sources, and inadequate control of NORMS encountered in industrial activities (e.g. well logging, mining) . Nigerian Nuclear Regulatory Authority (NNRA), the body saddled with the responsibility of regulating the use of ionizing radiation sources in Nigeria is empowered by the Nuclear Safety and Radiation Protection Act to ensure the protection of life, property, and the environment from the harmful effects of ionizing radiation, hence are not immune to the aforementioned challenges.

Presenter/Member State or Org.:	A. Borras		Philippines
No. of Paper IAEA-CN-236:	19	***Topic:***	3
Title of the paper:			
The Philippine National Progress Report on IAEA Project RAS/09/062: Promoting and Maintaining Regulatory Infrastructure for the Control of Radiation Sources			

In line with the report of the Director General on "Measures to Strengthen International Cooperation in Nuclear, Radiation, Transport and Waste Safety" during the 2014 IAEA General Conference [1], this report aims to share the accomplishments and achievements of the above-mentioned project and its impact to the effectiveness and efficiency of NRD-PNRI on delivering their regulatory functions in the country translating to the fulfilment of the PNRI's mandate. Also, it aims to project the perceive challenges of a regulator with the emerging state of the art industrial and medical nuclear technologies in the country. This could possibly serve as model processes for other countries especially in the Asia and the Pacific Region or globally as a whole. A regional comparative report under the framework of the project could emanate from this report.

The introduction of the report will briefly describe the existing legal and regulatory infrastructure at the national context in the Philippines. It will enumerate the radiation facilities and activities indicating the last five-year current status and trends [2]. The body of the report will show the comprehensive regulatory infrastructure of NRD-PNRI based on the IAEA Safety Guide GS-G-1.5 [3]. This section of the report will cover the current core regulatory and support functions, among others. Moreover, the report will have a comprehensive illustration of the national outputs and outcomes attained with the implementation of the action plans/activities using the project matrix with its objectives and outcomes . This illustration will describe the national outputs and indicators corresponding to the project activities and input targeted by the IAEA under the project together with the shortcomings and problems encountered in achieving the targets as planned. The summarized report will also indicate the participation of the Philippines in the IAEA activities. Furthermore, it will discuss on the results of a Strength-Weakness-Opportunities-Threats (SWOT) analysis as a result of project implementation. Lastly, the report will showcase the 2016-2020 NRD-PNRI Strategic Plan indicating the mission, vision, core values, goals, objectives, key activities and performance indicators, among others.

The objectives of the report will be the following:

1. To introduce the governmental, legal and regulatory infrastructure on nuclear and radiation safety in the country.
2. To describe the last five-year current status and trends on the use of radioactive sources based on the licensed facilities and activities.
3. To illustrate the NRD-PNRI regulatory infrastructure based on IAEA Safety Guide GS-G-1.5.
4. To describe the accomplishments and achievements of the project based on the national activities and outputs against the project matrix action plan/activities and inputs and its impact to the NRD-PNRI effectiveness and efficiency as a regulator. and
5. To showcase 2016-2020 NRD-PNRI Strategic Plan as a result of the SWOT analysis.

The conclusion and recommendations will be the effective implementation of knowledge, skills and ideas gained from the project, i.e., to develop a strategic plan on the following:

1. The best strategy to expedite the enactment of the Philippine House of Representative House Bill 147 through a well developed communication strategy and plan involving the relevant government agencies and rightful decision makers, e.g. ensure that creation of "An Effectively Independent Nuclear/Radiation Regulatory Authority" is embedded in ratified treaties and conventions, e.g. in Convention on Nuclear Safety (CNS).
2. Prioritize the conduct of SARIS through IAEA TC Project and/or expert mission as pre-requisite for a future IRRS Mission involving the government and using its results as basis for the national policy decision on national nuclear safety infrastructure (financial and human resources), Make SARIS as part of IMS based IAEA GS-R-3.
3. Envision the "Journey to Excellence" by aiming to achieve the Philippine Quality Award (PQA) using the IMS roadmap and an effective communication plan,
4. Development and implementation of strong safety culture and act as role model in its promotion,
5. Continual active participation in the global network, ANSN, Control of Sources Network (CSN) website on the RegNet/GNSSN platform, RCF and ASEANTOM, among others.
6. Develop a structured training program to strengthening the competence building activities starting from TNA, SARCoN and Knowledge Management (KM),
7. Implementation of a fully operational RAIS (identify weaknesses and needs), including regaining control of orphan sources and management of disused sources and radioactive wastes.
8. Updated RASIMS, and
9. Strong and consistent leadership and management commitments, among others.

Note:

In 2012, the major author was designated as the national project coordinator of the project which is successfully coordinated by the National Liaison Officer (NLO). This report was conceptualized after another International Atomic Energy Agency (IAEA) RAS project, introduced a way of reporting scheme in the evaluation of the project's effectiveness and efficiency vis-à-vis the national regulatory activities. Although, prior to this, said author has already developed and implemented an accomplishment's monitoring tool using the IAEA project matrix [4] which was also used as the national project strategic plan [5].

Presenter/Member State or Org.:	E. Mursa		Rep. of Moldova
No. of Paper IAEA-CN-236:	20	***Topic:***	3
Title of the paper:			
Maintaining the National Regulatory Control of Spent Radioactive Sources			

In order to fulfilling the obligations connected to the international conventions to which Republic of Moldova is a part, to implement the provisions of the Code of Conduct on the Safety and Security of Radioactive Sources and after the focusing of the international community on the importance of maintaining strong control over radiation sources during the last years, our country continue to improve its regulatory system in the field.

The regulatory control of spent radiation sources can be conducted only in comprehensive mode with their normal use. Also, the poor management of spent radiation sources could lead to their illicit trafficking, other criminal acts and radiological accidents.

The main location in the country where the most of spent radioactive sources are located is radioactive waste storage - the State Enterprises of Special Purpose "Special Objects nr.5101, 5102". The inventory contains the spent sources used in medicine, industry, agriculture and science.

The paper reflects: the Regulatory infrastructure of management of spent radioactive sources in the country; the Current status and storage of spent high activity sources, registration and accounting; Physical protection and monitoring at the disposal facilities in the country; the National and regional challenges associated with spent radioactive sources; and some achieved Good practices.

Presenter/Member State or Org.:	A. Shehzad		Pakistan
No. of Paper IAEA-CN-236:	23	***Topic:***	3
Title of the paper:			
Challenges in Regulating Radiation Sources and Associated Waste Management			

Radiation sources are widely used in the fields of medical, industry, agriculture, research, etc. Owing to the inherent risk of exposure to ionizing radiations while using the radiation sources and management of associated waste, safety measures are of utmost importance including robust regulatory control. Pakistan Nuclear Regulatory Authority (PNRA) is responsible for supervising all matters pertaining to nuclear safety and radiation protection in the country. Since its inception, PNRA has made rigorous efforts to regulate the radiation facilities for which regulatory framework was further strengthened by taking into account international norms/practices and implemented afterwards. However, due to vibrant use of these facilities, there are numerous challenges being faced while implementing the regulatory framework. These challenges pertains to shielding design of some facilities, control over service provider for QC/repair maintenance of radiation equipment, assessment of patient doses, and establishment of national diagnostic reference levels for radiological procedures.

Further, the regulatory framework also delineate requirements to minimize the generation of associated radioactive waste as low as practicable. The requirements also necessitates that certain sealed radioactive sources (SRS) are returned to the supplier upon completion of their useful life, while other radioactive sources are required to be transported for storage at designated radioactive waste storage facilities in the country, which requires commitment from the licensee.

This paper will briefly describe the challenges in regulating the radiation sources and issues related to the waste management associated with these facilities.

Presenter/Member State or Org.:	I. Lázár		Hungary
No. of Paper IAEA-CN-236:	37	***Topic:***	3
Title of the paper:			
Initial Experience and Challenges in Establishing and Strengthening a New Regulatory Infrastructure Concerning Radioactive Waste Management			

In 2013; HAEA was designated to take over the task of regulatory oversight of the radioactive waste repositories.

The new task of HAEA includes; licensing and inspection of site selection, design, construction, operation, modification and closure; and approval of emergency response plans. The new Govt. Decree 155/2014. Korm. on the safety requirements of interim storage and final disposal facilities of radioactive waste and the related regulatory activities (Decree) was promulgated on 30 June 2014.

The HAEA has begun the on-site inspections soon after the takeover and has taken several measures with the aim to determine and improve the current level of the safety of repositories and to verify the compliance of on-site processes with the relevant legal requirements.

According to the Council Directive 2009/71/Euratom, the HAEA initiated at the IAEA hosting the mission of Integrated Regulatory Review Service(May 11-22, 2015). The mission observed among others the following main items:

- Human factors
- Guidelines

Topic 4 – Strengthening International Cooperation

Presenter/Member State or Org.:	H. Mattsson		Norway
No. of Paper IAEA-CN-236:	9	***Topic:***	4
Title of the paper:			
Regulatory Capacity Building in Romania – an International Nuclear Safety Cooperation between Norway, Romania and the IAEA 2013-2017			

Introduction

The Romanian National Commission for Nuclear Activities Control (CNCAN), the Norwegian Radiation Protection Authority (NRPA), and the International Atomic Energy Agency (IAEA) is cooperating on a project named "Regional Excellence Project on Regulatory Capacity Building in Nuclear and Radiological Safety, Emergency Preparedness and Response in Romania". The project started in the end of 2013 and will be completed in 2017.

The project has a budget of 4.2 million euros, where 85% is covered by Norway Grants and 15% covered by Romania. Norway Grants is the contribution of Norway to reducing economical and social disparities and strengthening bilateral relations with 16 EU countries in Central and Southern Europe. The entire project is organised through an IAEA extra-budgetary programme.

This project is a continuation of a similar project with the same partners that was successfully implemented in the period 2009-2011.

Background

During the period 2009-2012 Romania experienced a substantial economic and political crisis which resulted into significant budget and salary cuts in the majority of governmental organizations. During the past years, the budget of CNCAN has been reduced and the experts' salaries decreased, resulting in many of the staff leaving for better employment. The remaining CNCAN experts are underpaid, overworked, and have difficulties in a timely manner to update the existing regulatory documents, or creating new ones. CNCAN employees have been unable to receive proper training or acquire/maintain proper software, hardware, and other tools needed to improve their working infrastructure to keep up to date with the challenges of increasing international and European expectations and standards for nuclear regulatory authorities.

Goals and objectives of the Project

The project was designed to address the above challenges. The goal of the project is to improve the regulatory competence of the Romanian regulatory authority CNCAN in the eight areas: nuclear safety, integrated management systems and knowledge management, oversight and inspections, safety of the transport of radioactive materials, emergency preparedness, control of radiation sources, radioactive waste, spent nuclear fuel and decommissioning, and safeguards. Other target groups in Romania includes the operators of nuclear power plant, research reactor facilities,

radioactive waste facilities, users of radiation sources, and organizations that transport radioactive sources and radioactive waste.

Another important objective of the project is to share experience and best practices developed in the project to the international nuclear community through the active involvement of the IAEA.

Results

As the project is now more than halfway, substantial results many results have already been achieved. Around 250 different activities are planned. Some of the results that is, or will be, achieved throughout the project:

- 14 of 46 planned Romanian regulations and procedures have been developed or updated.
- 5 of 18 planned workshops have been held.
- A total of 131 Romanians have been trained on computer codes, inspection activities, safeguards and safety culture.
- 4 of 13 planned documents have been developed and published by IAEA, and made available to the member states of IAEA.
- Equipment has been purchased, e.g. mobile communication devices for emergency response, software and hardware.
- A number of recommendations from the IRRS mission to Romania in 2011 have been integrated into this project. So far, 13 of 26 IRRS recommendations have been implemented.
- Planning is on-going for a major emergency response exercise, which will be held in Romania in October 2016.

Project partners and their role in the project

CNCAN is the Romanian competent authority responsible for the regulation, licensing and control of nuclear activities, ensuring the peaceful use of nuclear energy and the protection of public and workers from the harmful effects of ionizing radiation. Within the project, CNCAN is responsible for achieving the objectives of the project. In addition, CNCAN coordinates activities with project partners, communication with project stakeholders, and is responsible for the project reporting, financial resources and publication of results.

NRPA is the Norwegian competent authority in areas of nuclear safety, all uses of radiation, natural radiation and radioactive contamination of the environment. In the project, NRPA is especially involved in the areas of nuclear safety, inspections, radioactive waste, spent nuclear fuel and decommissioning activities.

IAEA is an international UN organization with 164 Member States focusing on the safe use of nuclear energy. IAEA assists CNCAN in updating regulations, standards, methods and procedures, and development of new documents. IAEA's involvement guarantees the implementation of project activities in accordance with international standards and with the participation of international experts with special expertise in these areas.

Presenter/Member State or Org.:	V. Da Silva Simões		Brazil
No. of Paper IAEA-CN-236:	17	***Topic:***	4
Title of the paper:			
A Comparative Analysis of the Impact of the IAEA Cooperation Instruments in the Field of Nuclear Safety to Deal with the Fukushima Daiichi Accident vis-a-vis the Chernobyl Accident			

On 26 April 1986, an explosion at Unit 4 at the Chernobyl nuclear power plant released a very large amount of radioactive material into the atmosphere. According to the conclusions raised at the "International Forum on Chernobyl´s Nuclear Safety Aspects" held in Vienna from 1 to 3 April 1996, two important causes of the accident were that: "there were significant deficiencies in the design of the reactor – in particular of its shutdown system – and operating procedures were severely violated at the time of the accident" and "there was a lack of safety culture in the organizations responsible for operation and for control: important safety weaknesses had been recognized long before the accident occurred but were not remedied." Only thanks to the discovery of an increase in environmental radioactivity in Nordic countries the international community was informed about the accident.

On 11 March 2011, as one of the consequences of the tsunami waves generated by the Great East Japan Earthquake off the Pacific coast of Japan, the Fukushima Daiichi nuclear power plant accident took place.

In his statement to the "International Conference on Chernobyl: Twenty-Five Years On - Safety for the Future" the International Atomic Energy Agency Director General, Mr. Yukiya Amano, pointed out "Chernobyl led to a great step forward in international cooperation in the field of nuclear safety. We now have four safety conventions, two Codes of Conduct, fundamental safety principles and a body of globally recognised IAEA Safety Standards." [ ] "An international coordinated response system, with the IAEA's Incident and Emergency Centre at its heart, is now in place." [ ] "We also have an IAEA peer review system, based on the Agency's Safety Standards." But Mr. Amano also recognized that "despite the great progress made in the last 25 years, more needs to be done to ensure that a "Safety First" approach becomes fully entrenched among nuclear power plant operators, governments and regulators."

This work intends to make a comparative analysis of the impact of the IAEA cooperation instruments in the field of nuclear safety to deal with the Fukushima Daiichi accident vis-a-vis the Chernobyl accident.

Presenter/Member State or Org.:	P. Kohut		United States of America
No. of Paper IAEA-CN-236:	21	***Topic:***	4
Title of the paper:			
Support of International Cooperation and Nuclear Regulatory Assistance The US Nuclear Regulatory Commission's International Programs			

Nuclear energy offers long-term economic and environmental benefits providing a reliable energy source with significant environmental. 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. The national regulatory agencies fully recognize the potential risk involved in operating nuclear facilities and the additional risk that could extend beyond national boundaries. This unique feature of the risk in operating nuclear facilities require international cooperation among nation states regardless whether they actually operate any nuclear facility. International cooperation allows addressing safety problems going beyond national regulatory regimes and offers the potential for cooperation and promotion of common nuclear standards through international regulatory coordination.

The US Nuclear Regulatory Commission supports the international safe and secure use of nuclear materials and actively participates in various international organizations. It supports and actively provides assistance to international organizations and foreign countries with the aim of developing effective regulatory organizations and safety standards. Many of these activities are carried out in direct cooperation with the International Atomic Energy Agency (IAEA), the Nuclear Energy Agency (NEA), and also directly interacting with counterpart nuclear regulatory agencies under bilateral regulatory and research cooperation agreements.

The NRC through the Office of International Programs (OIP) supports an international nuclear regulatory assistance program that provides critical training and technical knowledge of regulatory personnel using US technical experts based at NRC, Department of Energy (DOE) laboratories such as Brookhaven National Laboratory (BNL) and various industrial partners with expertise in specific technical areas.

The OIP's international assistance, training, and technical support include wide ranging regulatory and technical areas through cooperative training programs, workshops, and joint projects. The main benefit of the regulatory and technical cooperation is the improvement in regulatory and technical capabilities both at the nuclear regulatory agencies and the respective Technical Support Organizations (TSOs). The cooperative regulatory and technical assistance program improves the capabilities of the regulatory agencies and TSOs in the licensing process allowing improved reviews and confirmation of technical approaches selected by the licensees and insuring that adequate safety is maintained. The paper will further explore the history and various components, which are used to transfer technologies and establish cooperative projects.

The nuclear regulatory agencies need to expand their developmental horizons for potential future needs based on industry initiatives or general research directions. The technical cooperation and assistance program must respond to not only the regulatory needs of each country, but also provide

support in developing regulatory capabilities in wide-ranging technical areas that may serve future research and/or regulatory methodologies. Regulatory reviews require certain capabilities that provide the basis for selecting experts and organizations supporting nuclear regulatory requirements, such as a) technical competency in reviewing licensee's methodology and proposed actions, b) capability of carrying out plant specific analysis, and c) have analytical capabilities, computer codes, and sufficient plant operating experience.

This paper will review the challenges, development, and successes in the strengthening the regulatory and technical capabilities of the foreign nuclear regulatory organizations under the NRC international regulatory support program that has expanded beyond its original scope encompassing many countries with operating or planned nuclear facilities.

The program also contains a significant infrastructure component providing improvement in analytical hardware, dosimeter equipment, networking capabilities, and communication infrastructure. The paper will further explain the various components, which are used to transfer technologies and establish cooperative projects.

Presenter/Member State or Org.:	L. S. Setianingsih		Indonesia
No. of Paper IAEA-CN-236:	26	***Topic:***	4
Title of the paper:			
Enhancing BAPETEN Regulatory System through Strengthened International and Regional Cooperation in Safety, Security and Safeguard Aspects			

Nuclear energy development in implementation is currently in speedy progress. Researches and developments in national level should always be in line with international trends and paradigms. In term or regulatory system of which the role is borne by the regulatory agency, the dynamics of standards and guidance set by international agencies or any world-wide associations as well as by other advanced countries shall provide the various nuances in national regulatory system application. Further published results of research and publications released by the counterparts are utilized as references in drafting new regulations and amending several other old regulations that need to be revised. International collaborations can technically support and enhance the effectiveness in regulatory system as the beneficial shared knowledge and best practices. Several countries may have more advanced experiences in regulatory process for their nuclear energy implementations, such condition can be taken as advantages for other emerging countries in nuclear plans.

Presenter/Member State or Org.:	M. Heitsch		European Commission – Joint Research Centre
No. of Paper IAEA-CN-236:	42	***Topic:***	4
Title of the paper:			
Contributions of the European Operating Experience Feedback Project to Support Regulatory Bodies			

Operating Experience Feedback (OEF) is one of the ways of improving the nuclear safety of operating nuclear power plants. The EC-Clearinghouse initiative was set up in 2008 to support nuclear regulatory authorities of EU Member States, but also Technical Support Organizations, international organizations and the broader nuclear community, to enhance nuclear safety.

The differing regulatory regimes in the EU member countries and a significant diversity of the nuclear power plant (NPP) designs have been a challenge in the establishment of the European Clearinghouse.

The European Clearinghouse is organized as a Network operated by a Central Office located at the Institute for Energy and Transport (IET) which is part of Joint Research Centre (JRC) of the European Commission. It gathers 17 European regulatory authorities and 3 major European Technical Support organizations (TSO).

The Clearinghouse aims at providing lessons learned, recommendations and best practices from operational experience of NPPs based on support and commitment from the EU nuclear regulatory authorities. One of the objectives of the European Clearinghouse is to establish European best-practices for the assessment of unusual events in NPPs.

The paper will present the main activities of the European Clearinghouse. These include:

- Topical studies providing in-depth assessment of selected topics important for the safe operation of NPPs. Statistical tools help to identify interesting subjects for these studies;
- Quarterly reports on operating experience;
- Training courses in the field of root cause analysis and event investigation;
- Development, maintenance and population of a database for storage of operating experience related information;
- Collaboration with international organizations such as IAEA and OECD/NEA on all aspects of OEF.

All activities of the Clearinghouse initiative focus on providing an added value for nuclear regulation.

Presenter/Member State or Org.:	A. Simo		Rep. of Cameroon
No. of Paper IAEA-CN-236:	44	***Topic:***	4
Title of the paper:			
Lessons Learned from Implementing National Nuclear Safety Knowledge Platforms			

Background: The Integrated Nuclear Security Advisory Services (INSServ) took place in Cameroon from 21st to 25th April 2014 and the Integrated Regulatory Review Service (IRRS) from 12th to 21st October 2014. This was after the government requested the Director General of International Atomic Energy Agency (IAEA) through an official correspondence on 11th June 2013, for these missions. The main objective was to further improve the effectiveness of the Cameroon governmental, legal and regulatory framework for safety and security.

Objectives: Share experiences and learn from each other through discussions and through Global Nuclear Safety and Security Network (GNSSN) Website at national and regional levels.

Methodology: National Radiation Protection Agency (NRPA) of Cameroon activities started with inventory program in 2009, decree to control radiation (Decree 250/2002) and nuclear material exist and currently in the process for its enhancement to a Comprehensive Nuclear Law. Existing laws that were sufficient to provide basis for respecting the current IAEA standards and requirements require further consultation among their designated authority for effective implementation. National coordination to address the following areas like existing legislation, identifying gaps in legislation, identifying capabilities, defining responsibilities, identifying contact points with definition of communication lines with identified lead authorities commenced in December 2010. 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 thematic site to share information and develop advance reference materials. The IAEA IRRS team also shared materials that could not be transferred through email with national counterparts using the GNSSN SharePoint website due to large file sizes.

Results: Revision of the legal and regulatory framework so that all international safety and security standards are addressed in laws and statutes have been done with documents downloaded from Nuclear portal sites found in GNSSN. Establishment and implementation of integrated management systems by NRPA is being done with documentation under the National Nuclear Portal with lessons learned from the IAEA review missions. 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.

Conclusions: NRPA as a regulatory body has learned a lot on how to share knowledge and information through the National Nuclear Safety Knowledge Platforms. NRPA is continuously

developing the National platform as an instrument in enhancing networking at national and regional levels. The platform is part of Integrated Quality Management System which was recommended by the IRRS mission of October 2014. Other developing countries not having a management system yet can learn from this practice.

Presenter/Member State or Org.:	A. Simo		Rep. of Cameroon
No. of Paper IAEA-CN-236:	48	***Topic:***	4
Title of the paper:			
Forum of Nuclear Regulatory Bodies in Africa (FNRBA) Strategy to Sustain Improvement of Regulatory Systems			

The first five-year term of FNRBA, 2009-2014, was concentrated in the increase of membership and the number of operational national regulatory bodies for control of radiation sources in Africa. Networking of regulatory bodies was launched and the Forum gained credibility outside the continent. FNRBA objectives for its second five-year term, 2016-2021, are to strengthen the regional networking, enhance capacity building, implement self-assessment and address common regional issues.

This communication presents the following five strategic priorities identified for implementation during the target period to achieve these objectives:

1. “Create awareness of, and coordinating activities amongst political and policy makers and other regional forums and organizations;
2. Establish an efficient and effective network of human resources supported by an IT platform to ensure sustainable regional cooperation and to align national strategies for capacity building with IAEA methodologies;
3. Ensure understanding, develop, promote and implement high standards of radiation protection, nuclear safety and security in Members States;
4. Implement capacity building activities at the national and regional level in radiation protection, nuclear safety and security regulatory infrastructure and framework and promoting and supporting sustainable regional cooperation in developing needed human resources;
5. Harmonize national plans for emergency preparedness and response, transport and security in line with international requirements to facilitate exchange of information and sharing of experience”.

Topic 5 – Strengthening Regulatory Competence

Presenter/Member State or Org.:	A. Mastauskas		Lithuania
No. of Paper IAEA-CN-236:	13	***Topic:***	5
Title of the paper:			
Quality Management System Improves Effectiveness And Quality Of Activities Of Radiation Protection Regulatory Body In Lithuania			

Processes of creation of quality management system (QMS) in regulatory body in radiation protection field – Radiation Protection Centre (RPC) and the benefit of this system to ensure the quality of the performance of functions are described.

RPC QMS compliant with ISO 9001:2008 standard and in line with the requirements of the IAEA GS-R-3 document. It allowed achieving a new quality of works carried out by RPC. Because creation and introduction of the QMS is a continuous process, the QMS of RPC is continually renewed and new procedures are developed.

Introduction

The Lithuania governmental and regulatory frameworks for safety and legal framework are in line with international standards. Lithuania has developed good radiation protection infrastructure as well. During the preparation of the quality manual (QM) and process description and working procedures the international ISO standards (ISO 9000:2007; ISO 9001:2008; ISO/TR 10013:2003; ISO/IEC 17025:2006; ISO 19011:2003), IAEA-standards and best practices from other institutions were used.

Ensuring radiation protection of Lithuanian population is a continuous process requiring routine and high-qualified work of specialists of the RPC. RPC prioritizes performance effectiveness and openness to the public at large. Since its establishment, RPC focuses on coordination of its activities, performance quality and productivity when discharging its functions: state supervision and control of radiation protection, assessment and expertise of public exposure.

Establishment of quality management system

For assuring consistent and focused quality of the exercised functions, particular attention appointed to the improvement of the quality of activities. For that, RPC has established QMS. QMS of RPC is compliant with the ISO 9001 standard and covers all regulatory body activity areas. Senior management of RPC has appointed members of the staff for all the processes and functions (managing, executive and supportive). They made an analysis of the IAEA-standards, EU directives and regulations and national legislative acts concerning their process or functions and described their function in policy documents, processes descriptions and working instructions. The senior management reviewed and authorized all the QMS documents before approving.

The scope of QMS is maintenance of the State Register of Sources of Ionizing Radiation and Occupational Exposure, authorization of the activities with sources, state radiation protection

supervision and control, emergency preparedness and response to radiological accidents, expertise and assessment of public and occupation exposure, environmental monitoring and training on radiation protection.

QMS documents consist of different level documents: QM, procedures, which regulate the activity of RPC, and working instructions, where whole information how consistently to perform activities and processes are described. The quality policy includes the aim of RPC, the main tasks, which should help to implement the aim, leadership obligations. QM describes QMS processes sequences and interactions, the responsibility of the leadership obligations and the control management of resources. Criteria of monitoring analysis and the abilities of improvement are provided as well.

All the staff have recognized the benefits of the QMS. Constant improvement of QMS ensure implementation of the new quality objectives raised every year. Internal and external audits are among the key tools to improve it, as they allow disclosure of strengths and weaknesses in work organization and performance, and planning for improvement directions, based on the QMS. External and internal auditors monitor how RPC ensures incoming, in-house developed and electronically stored document handling and security, in which way the staff in the routine work process follow documents approved by QMS. Every year documents of QMS are reviewed and in case of necessity updated by responsible staff with help of quality manager. This all improves performance effectiveness, the quality of activities and contributes to developing a positive public attitude to regulatory body activities.

Success factors of QMS – the positive approach of the management and all employees to the QMS and its constant updating. Nevertheless day by day monitoring of the activities based on knowledge and transparent responsibilities allows RSC to be pellucid and fluent institution.

Results

Within creation of QMS following documents were prepared: the QM describing sequences and interoperability of QMS processes, management responsibilities and resource management, including monitoring analysis criteria and improvement opportunities, quality policy and its goals, 29 procedures describing activities of RSC structural units and main processes and 67 working instructions to do specific works.

Safety culture of QMS at RPC is realized due to clearly described processes and formats of products, due to continuous training of staff for common understanding, due to supporting the individuals and groups of the staff for safety and qualified performance of duties. Described QMS improve effectiveness and quality of activities, the quality of provision of public services, and contributes to the development a positive public attitude to the Government authorities.

Conclusions

Described QMS obliges RPC to improve continuously the quality of discharging functions delegated to it and meet the ever increasing society needs. Management system maintains the efficiency and effectiveness of the RPC performing its functions and corresponds to responsibilities. This includes the promotion of enhancements in safety, and the fulfilment of its obligations in an appropriate, timely and cost effective manner to build confidence. Quality performance of RPC is crucial to ensure public and environment radiation protection in Lithuania.

Presenter/Member State or Org.:	S. Kumar		India
No. of Paper IAEA-CN-236:	15	***Topic:***	5
Title of the paper:			
Sustaining Nuclear Safety: Upholding the Core Regulatory Values			

Nuclear Energy and management of safety therein, has a somewhat distinct streak in that from its early days it has had the privilege of being shaped and supervised by the eminent scientists and engineers, in fact it owes its very origin to them. This unique engagement has resulted in culmination of the several safety elements like defence-in-depth in the form of multiple safety layers, redundancy, diversity and physical separation of components, protection against single failures as well as common cause failures right at the beginning of designing a nuclear reactor.

The fundamental principles followed by regulators across the globe have many similarities such as, creation of an organization which has a conflict-free primary responsibility of safety supervision, laying down the safety criteria and requirements for the respective industry and developing and using various tools and regulatory methodology to ensure adherence to the laid down regulatory requirements. Yet the regulatory regimes in different States have evolved differently and therefore, has certain attributes which are unique to these and confer on them their identity.

In India, the legal structure providing for activities pertaining use of atomic energy itself, evolved in close collaboration with scientists and engineers involved in the activities of use of atomic energy and methodologies developed in this regard were inherited into the present-day system and form the basis of safety regulation. This paper introduces the principal tenets of regulatory philosophy of Indian regulatory regime which have assisted it in realizing its full potential. The central idea of the discussion is to bring out those distinct attributes of Indian nuclear regulatory regime which, has helped AERB in continual improvement of safety in Indian NPPs. The paper further corroborates the premise that a systematic adherence to fundamental values together with the conscious efforts to do away with any form of complacency can significantly benefit any nuclear safety regulator, as has been observed around the globe. As a result of this, rather few areas were identified for further safety augmentation in the various India carried out several review exercises in post Fukushima scenario. Towards the end, an assessment of few potential challenges has been made, which might need to be addressed by AERB in future, if the private entities are also deemed eligible for operating the NPPs.

A number of aspects have to be thoroughly considered and carefully implemented in order to establish an effective regulatory system. Amongst these the foremost ones which constitute the principal tenets of Indian regulatory system and have also been adopted globally, have been discussed in this paper namely: development of competent human resource; learning from the experience to improve on existing level of safety; reliance on scientific principles in regulatory decision making; early adoption of Periodic Safety Review System for licensing of the nuclear facilities; making a conscious effort that regulations don't dilute the Licensee's responsibility for ensuring safety; consideration of stakeholders' views in development of regulatory requirements &

decision-making and emphasis on regulatory research to strengthen the decision-making process in times of fast changing nuclear technologies.

In the aftermath of Fukushima accident, as elsewhere, India too carried out an in-depth review of existing safety-levels in its NPPs and concluded that while adequate safety-margins exist to cope up with external events considered as design bases; as an abundant caution further safety augmentation is needed for addressing the external events beyond design bases. Pursuant to objective of strengthening the nuclear safety globally in the aftermath of Fukushima accident, international community unanimously adopted 'Vienna Declaration on Nuclear Safety' in 2015. The Declaration seeks to achieve significant safety enhancements in the nuclear power plants all over the world, both new as well as the existing ones and calls for enhancements in the design, siting and construction of nuclear power plants, with the objectives of preventing accidents and mitigating possible radioactivity releases, should an accident occur and avoiding early and large radioactivity releases. It has been further highlighted that owing to its adoption of aforementioned core regulatory values, implementation of actions identified to achieve the objectives of the Declaration can easily be effected through simple augmentation of existing regulatory structure.

Presenter/Member State or Org.:	Y. Pramono		Indonesia
No. of Paper IAEA-CN-236:	16	***Topic:***	5
Title of the paper:			
Recent Status of Indonesian Nuclear Regulatory System Development in Responding the Results of IRRS Mission			

BAPETEN as Nuclear Energy Regulatory Agency of Indonesia faces challenges in performing its tasks for assuring the safety, security, and safeguards in nuclear energy utilization through the regulatory system. Based on the recent IRRS mission to Indonesia, hosted by BAPETEN, several recommendations and suggestions shall require special attention to provide strategic action plans in following them up.

Some of the recommendations include the necessity of the Government to develop and document a national policy and strategy for safety, to provide BAPETEN with human and financial resources to ensure adequate discharge of its statutory regulatory obligations, to ensure that prime responsibility of safety is assigned to the person or organization responsible for a facility or an activity through the legal framework, to ensure appropriate coordination and liaison between BAPETEN and other relevant authorities in the areas of medical application of radiation and transport of radioactive material. The suggestions cover, among others, the need of having a graded approach policy in implementing all regulatory functions, clarifying the responsibility of the individual reporting on the performance of the management system to senior management, establishing procedures for assessing the safety and appropriateness of the working environment and enhancing the implementation of self-assessments by including safety culture aspects. As part of the action plans, BAPETEN is currently drafting the national policy and strategy on nuclear and radiation safety. Furthermore, BAPETEN is revising the existing act on nuclear energy in order to assign the prime responsibility of safety to be borne by the licensees, to ensure the adequacy of its human and financial resources, and to provide clearer distinction of responsibilities between BAPETEN and other relevant authorities in the areas of medical application of radiation and transport of radioactive material. To counter the issue on coordination and liaison, BAPETEN is strengthening its collaboration as implementation of the memorandum of understanding with other relevant authorities aiming to enhance the regulatory system.

To further improve the regulatory system, BAPETEN shall underline all the suggestions to be implemented in practical fields. Based on the hierarchy of regulatory system, the graded approach will be addressed in lower level of regulations, such as government regulations and BAPETEN Chairman Regulations. Documentation of procedures and working instructions needs to be completed and properly recorded.

Presenter/Member State or Org.:	Z.H. Shah		Pakistan
No. of Paper IAEA-CN-236:	24	***Topic:***	5
Title of the paper:			
PNRA Process for Utilizing Experience Feedback for Enhancing Nuclear Safety			

One of the elements essential for any organization to become a learning organization is to learn from its own and others experience. The importance of utilizing experience feedback for enhancing operational safety is highlighted in nuclear industry again and again and this has resulted in establishment of several national and international forums. In addition, IAEA action plan on nuclear safety issued after Fukushima accident further highlighted the importance of experience sharing among nuclear community to enhance global nuclear safety regime. PNRA utilizes operating experience feedback gathered through different sources in order to improve its regulatory processes. During the review of licensing submissions, special emphasis is given to utilize the lessons learnt from experience feedback relating to nuclear industry within and outside the country. This emphasis has gradually resulted in various safety improvements in the facilities and processes. Accordingly, PNRA has developed a systematic process of evaluation of international operating experience feedback with the aim to create safety conscious approach. This process includes collecting information from different international forums such as IAEA, regulatory bodies of other countries and useful feedback of past accidents followed by its screening, evaluation and suggesting recommendations both for PNRA and its licensees. As a result of this process, several improvements concerning regulatory inspection plans of PNRA as well as in regulatory decision making and operational practices of licensees have been highlighted. This paper will present PNRA approach for utilizing experience feedback in its regulatory processes for enhancing / improving nuclear safety.

Presenter/Member State or Org.:	M. Ridwan		Indonesia
No. of Paper IAEA-CN-236:	25	***Topic:***	5
Title of the paper:			
BAPETEN Goes Social Media Initiative: An Age-based Segmentation Service to Communicate with Public			

Introduction

Social media is a term referring to various activities that integrate technology, social interaction and content creation. It is fast, cheap to the consumer, easily available and part of the fabric of people's lives. Social media also brings attention as it enables conversation that everyone can participate in.

Public relations practitioners around the world have been paying attention to social media as an important communication tool. Research done in 2010 by the public relations firm Burston-arsteller found that eight of 10 Fortune Global 100 companies used at least one of the most popular social media platforms i.e. Twitter, Facebook, YouTube or corporate blogging. However, a post-Fukushima informal poll indicated many nations' nuclear regulators are looking at broadening their social media use, although some may not know how to proceed, and everyone can benefit from the "lessons learned" by others.

Regulatory Requirements for Public Communication

Relevant IAEA Safety Standards have stated the responsibility of government to set up appropriate means of informing and consulting interested parties and the public parties about the possible radiation risks associated with facilities and activities, as well as the processes and decisions of the regulatory body. In particular, such communication shall be conducted in an open and inclusive process.

At national level, Act Number 14 Year 2008 regarding Public Information Disclosure is a key regulatory framework that mandated all government institutions to provide public information in plain language and easy to understand through any effective and efficient means. Special attention is given for any emergency situation that threaten public safety and the environmental.

So far, we disseminate public information by three different media: (1) printed, (2) electronic, and (3) public gathering. But the fast growing of internet technology in public sector has introduced a competitive advantage compared with the other two.

BAPETEN and e-Gov Establishment

As stipulated in BAPETEN IT Master Plan 2015-2019, a number of IT projects have been established to improve and simplify regulatory functions. A major project was initiated in 2012 as a part of the Indonesian National Single Window (INSW) Project. Being the first government agency to be fully integrated with the INSW, BAPETEN has offered substantial changes in licensing process to its customers. Within this scheme, the approval process that took several days can now be reduced to a single day. Once approved, customers can go directly to the clearance process in the airports and seaports customs.

Next: Go Social Media, Create Larger Audience

Regulatory bodies have been aware of the significance of social media as an important communication tool, and many regulatory bodies have been using them or considering their usage. However, many regulatory bodies are unclear about how to proceed with developing social media content, and how to integrate the platforms into existing public communication programs.

As a matter of fact, Indonesia has nearly 74 million active social media fans. It is easy to predict that younger population (age: 12-34) dominates this digital native demographic. This number increases more than 19% in one year only (January 2015 – January 2015). Facebook takes the lead in social media platform which makes Indonesia as the 4th largest Facebook population in the world. After many years of delivering classic website and learning from the above fact, BAPETEN needs to integrate social media engagement into existing public communication program. Technically, we should create a public communication service based on age differentiation.

The option is to use major social media platforms (e.g. WhatsApp, Twitter and LinkedIn). This is done by third party RSS (Really Simple Syndication) feed mechanism that allows us to syndicate material across the web (from one to many). Every half an hour, all new information available in our website is transmitted to third party website that handle RSS feeding. We started this so-called ""BAPETEN Goes Social Media Initiative" in October 2013.

Using respective built-in analytics and metrics, our record shows slow but increase activities from those social media platforms, including post reach and engagement (likes, comments, and shares). Analytics from Facebook, for example, shows that 66% engagement rate coming from age 18 to 34. The same analytics also tells us that the most commented news is achieved in October 2015, when we post a TV talk show regarding medical patient dose. Reviewing the complete social media analytics brings a new understanding on how to perform a better way to communicate with parties. This is in turn will satisfy the requirement to establish and maintain the confidence and trust of interested parties in order to be identified as an independent, transparent, reliable and competent regulatory body.

Presenter/Member State or Org.:	M. Tronea		Romania
No. of Paper IAEA-CN-236:	29	***Topic:***	5
Title of the paper:			
Nuclear Safety And Security Culture Within The Regulatory Body In Romania			

The paper (poster) presents the activities implemented in the Nuclear Fuel Cycle Division of CNCAN (National Commission for Nuclear Activities Control) for promoting nuclear safety and security culture.

Presenter/Member State or Org.:	A. El-Messiry		Egypt
No. of Paper IAEA-CN-236:	34	***Topic:***	5
Title of the paper:			
Regulatory Body Of Egypt: Practices And Challenges			

In past, Egypt issued the law No. 59 of year 1969 for regulating the use of ionizing radiations inside the country, this law assigns the responsibilities of Egypt Atomic Energy Authority EAEA to control reactors, open sources, and all nuclear and radiation facilities inside its premises, while the ministry of health was responsible for controlling x-ray machine, sealed sources and accelerators. In 1982 EAEA established within its structure a new regulatory body called national centre for Nuclear Safety and radiation Control NC-NSRC as a dependent regulatory body, science EAEA is the operator of reactors and many nuclear and radiation facilities. On 30 March 2010 Egypt issued a nuclear law No 7 of year 2010, followed by its executive regulation in October 2011, the new law replaced the old law 59 of year1969, in addition, the prime minster issued a decree on march 5td 2012 of establishing an independent regulatory body reported directly to him, it has the name of Egypt Nuclear and Radiological Regulatory Authority ENRRA, it is responsible for regulating all nuclear and radiation facilities and activities inside the country, except X-ray machines and linear accelerators for the medical uses, that still remains under the control of ministry of health. The new nuclear law defines the responsibility of the government to establish, support and determine the authorization and the responsibilities of the independent regulatory body. ENRRA is managed by a board of directors comprises from chairman, vice chairman, head of national security, interior, exterior, customs, export& import, standards, environment, justice organizations, besides two scientific experts from ENRRA. The board of council is the supreme authority of the dominant, and the conduct of ENRRA affairs, and take decisions within the framework of the national plan of Egypt, to achieve the objectives for which the ENRRA was established. ENRRA was organized from the old NC-NSRC staff into three regulatory sectors: (i)nuclear installation safety sector, (ii)radiation installations and radiation sources safety sector and (iii)security and safeguard safety sector, and a Technical Support Organization TSO includes three main divisions of (i)nuclear installation safety, (ii)radiation control division, and (iii)regulations and emergency division, in addition to departments of public communication, centre labs, radiation network monitoring, emergency, security, and administrations. In building capacity of ENRRA, and improving the present skills of the personnel's, Egypt undertakes three current international projects with EU, IAEA, and south Korea, emphasizing on upgrading the existing capabilities of ENRRA employees related to the proposed nuclear power plant to be built, in the area of safety review and assessment, licensing, site evaluation, inspections, safeguard and security, regulation preparing and updating, which are the main challenges being faced by ENRRA.

Presenter/Member State or Org.:	F. Kazadi Kabuya		Democratic Republic of Congo
No. of Paper IAEA-CN-236:	36	***Topic:***	5
Title of the paper:			
Nuclear Regulatory Systems in Africa: Improving Safety and Security Culture Through Education and Training			

The purpose of this paper is to address the important issue of supporting safety and security culture through an educational and training course program designed both for regulatory staff and licensees. Enhancing the safety and security of nuclear facilities may involve assessing the overall effectiveness of the organization's safety culture. Safety Culture implies steps such as identifying and targeting areas requiring attention, putting emphasis on organizational strengths and weaknesses, human attitudes and behaviours that may positively impact an organization's safety culture, resulting in improving workplace safety and developing and maintaining a high level of awareness within these facilities. Following the terrorist attacks of September 11, 2001, international efforts were made towards achieving such goals. This was realized through meetings, summits and training courses events, with main aim to enhance security at facilities whose activities, if attacked, could impact public health and safety. During regulatory oversight inspections undertaken on some licensee's premises, violations of security requirements were identified. They mostly involved inadequate management oversight of security, lack of a questioning attitude, complacency and mostly inadequate training in both security and safety issues. Using training and education approach as a support to raise awareness on safety and security issues in the framework of improving safety and security culture, a tentative training program in nuclear and radiological safety was started in 2002 with the main aim of vulgarizing the regulatory framework. Real first needs for a training course program were identified among radiographers and radiologists with established working experience but with limited knowledge in radiation safety. In the field of industrial uses of radiation the triggering events for introducing and implementing a training program were: the loss of a radioactive source in a mining site, the terrorist attacks, and the uncontrolled traffic of radioactive minerals and devices under a specific name of “uranium material”. Human resources development program involving more than 250 radiation workers and staff from regulatory body, research reactor facilities, hospitals, mines, customs, intelligence and immigration service’s was implemented. Training topics covered ranged from regulatory framework, regulations, reactor operation and radiation safety issues, radiation protection of patient, security of radioactive sources in industries, emergency preparedness and response, nuclear security, threat assessment and response, sources risks management, illicit trafficking and safety and security culture. The implemented Training program resulted in substantially raising collective awareness about security and safety issues, from staff members to the management, increasing the level of regulatory inspections and putting more emphasis on the control of radioactive sources and more regulatory requirements on handling orphan radioactive sources. On the other hand, using generated incomes from trainings undertaken, training facilities were gradually upgraded and training syllabuses progressively updated to be consistent with country current and future needs. While important progress has been achieved, future needs have been identified. Extending educational and training program to cope with university and academic requirements in the field of nuclear and radiological sciences, with a view to

introducing nuclear power program in the country; strengthening the enforcement and sanctions regime, monitoring of border crossings to detect illegal source movements, increasing the capability and basic knowledge of first responders, collecting and upgrading conditioning and final storage of radioactive sources facility.

Presenter/Member State or Org.:	S. Suharyanta		Indonesia
No. of Paper IAEA-CN-236:	38	***Topic:***	5
Title of the paper:			
National Program Initiative to Prevent Illicit Trafficking for Radioactive Materials Out of Regulatory Control at the Border			

Introduction

The existing function of regulatory authority in a country which use a lot of radioactive sources is important key. The regulatory body has to in a position independence from other operators and nuclear research centre activities, so that their justification on Regulatory objective of safety and security can be achieved. The essential function of regulatory authority has to be represented such as development regulations, perform review and assessment, inspection and enforcement, and emergency preparedness and response functions. Under regulatory object coverage is divided into two clusters i.e. licensed nuclear installation and radiation facilities clusters,. There is other regulatory object is radioactive material out of regulatory control. This kind object is new option in the county and there for need priority policy judgement. This paper will discuss the Regulatory infrastructure and functions and it focused on the experience about National Progamme Initiative to Prevent Illicit Trafficking for Radioactive Materials out of Regulatory Control at the Border.

Regulatory Infrastructure and Functions. In Indonesi4 the independent regulatory authority "called BAPETEN" has been established since early 2000 based on the Act No. l0 year 1997, independent from operator organization and other nuclear research centre. Organization structure of BAPETEN has defined main divisions dealing with developing regulations, perform review and assessments, inspection and enforcement, and emergency preparedness and response, and also covered assessment function as a backup technical support division as a think-tank functions.

Regulatory objects are nuclear installations such as three research reactors, Fuel fabrication facility, Isotope production facility, and waste storage facility for spent fuel and dis-used radioactive sources is running well. Recently, Regulatory of radioactive sources out of regulatory control is a new challenges, they need strengthened policy and strategy to be considered such as global security issues, commitment the country on some international ratified conventions, and domestic regulatory needs in order to enhance safety, security and safeguards assurance to the worker, public, and the environments.

Regulatory effectiveness challenges on Radioactive material out of regulatory control.

Background analysis and challenges

In fact, there are a lot of radioactive material used spread out in the country, both for medical and industrial application activities. More than 10.000 declared sources has been registered into developed Electronic data based systems for medical and industrial purposes. In other case of transportation, there is number main seaport and international destination airports of entry point and other land-border the country without any detection system for import and /or export vessel container in the seaports and land-borders. This illustrate a realistic consideration to enhance

capability to install detection and response system in order to prevent possible illegal or illicit trafficking radioactive material without authorization.

Policy and strategy

BAPETEN mission states in the middle term programme since 2012 is to implement the commitment of any obligation in the ratified international conventions, in this respect such as CPPNM and its amendment addressed on Transport security, and UN Resolution 1540 addressed focused on enhanced system for export and import material of CBRN safety and security, and an effort to strengthened integrated safeguards implementation of Additional Protocol to the safeguards agreement in the country, and harmonized other rules and regulations.

It has been concluded the strategy on instalment of detection system with Radiation Portal Monitor (RPM), step wise for the main seaports, airport and/or land-border. Enhancing coordination all stakeholder involve who has interface function in the entry point such as Ministry of Trades, Ministry of Finance cq. DG Custom and Excise, Ministry of Transportation cq. DG of Sea Transportation, and Seaport operator company. The objective is to harmonize all role and responsibilities effectiveness into some concern of dwelling time, SOP for RPM operation and maintenance, Secondary inspection, and Law enforcement of any Container suspects indicated illicit trafficking cases.

Special arrangement for Bilateral agreement between IAEA and Indonesia on RPM Donor

RPM construction project implementation and milestone. This paragraph will describe all progress of RPM construction and operation experience. Under special cooperation project between IAEA cq. European Union and Indonesia since 2012. It was been begun with first RPM construction project in Belawan seaport of Sumatera island, and continued in other seaport of eastern part of Bitung and Makasar, Batam, Semarang seaport, and others on second term.

Stakeholder Coordination mechanism

Coordination mechanism how to manage RPM is one of critical and unique issue in the country. This part will be explored bit more explanation in the case of coordination among stakeholders.

National - Integrated Nuclear Security Network (INSN)

Special arrangement on the operation of INSN is also important part of coordination issue, how to define link and match of dedicated SOP and communication mechanism stakeholder till law enforcement execution all cases of container suspect with indication of illegal or undeclared radioactive materials. In the paper also take into account a result from previous IRRS Mission August 2015, it addressed an coordination issues among stakeholders on the context of clarification overlapping structure, an Role and Responsibility, the need interface regulations, such indicated in a good practices for EPR coordination.

Concluding Remark

The main remark this paper is addressed on policy and strategy the steps wise how to regulate of radioactive material out of regulatory control in Indonesia. It is an unique experience of RPM construction project which is differ from other case in country to country.

Presenter/Member State or Org.:	L. Nachmilner		Czech Republic
No. of Paper IAEA-CN-236:	40	***Topic:***	5
Title of the paper:			
HORIZON 2020 - Project SITEX-II			

In the mid of 2015 a coordination action SITEX-II was initiated within the EC programme Horizon 2020. It aims at implementing in practice activities along with the interaction models issued by the SITEX project (carried out within FP7 programme in 2012-13), in view of developing an Expertise function network. This network is expected to ensure sustainable capacity of developing and coordination joint and harmonised activities related to the independent technical expertise in the field of safety of deep geological disposal of radioactive waste. SITEX-II tasks include:

- The definition of the Strategic Research Agenda (SRA) based on the common R orientations defined by SITEX, the definition of ToR for the implementation of specific topics of from the SRA, and the interaction with IGD-TP and other external entities mandated to implement research on radioactive waste disposal regarding the potential setting up of a respective European Joint Programming;
- The production of a guidance on the technical review of the safety case at its different phases of development, fostering a common understanding on the interpretation and proper implementation of safety requirements for developing, operating and closing a geological repository and on then verification of compliance with these requirements;
- The commitment of a Civil Society (CS) in the definition of the SRA mentioned above, considering the expectations and technical questions to be considered when developing R for the purpose of Expert function. Close interactions between experts conducting the review work and CS representatives will enhance establishing the safety culture and, more globally, proposing governance patterns with CS in the framework of geological disposal
- The preparation of the ‚administrative' framework for creating a sustainable network of Technical Safety Organisations from EU members states by addressing the legal organisational and management aspects.

Presenter/Member State or Org.:	J. Dillich		Australia
No. of Paper IAEA-CN-236:	46	***Topic:***	5
Title of the paper:			
Innovations in the Delivery of Regulatory Services in Australia			

The Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) is the country's primary authority on radiation protection and nuclear safety. ARPANSA aims to promote safety, security, and emergency preparedness through efficient and effective regulation of nuclear installations, controlled facilities, and radiation sources. Recent initiatives to improve regulation by 'cutting red tape' and reducing regulatory burden have been introduced. ARPANSA's Regulatory Delivery Model emphasises the key elements to good regulation and describes initiatives such as baseline inspection schedule, Performance Objectives and Criteria, and performance deficiencies. These and other initiatives have streamlined inspection efforts, increased risk-based oversight and risk-informed decision making, leading to increased efficiencies for both regulator and licence holder. In addition, ARPANSA has introduced 12 key performance indicators in its self-assessment of regulatory performance against the Australian Government's Regulator Performance Framework.

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