

**CONCLUSIONS OF THE INTERNATIONAL CONFERENCE ON THE CHALLENGES
FACED BY TSOs IN ENHANCING NUCLEAR SAFETY AND SECURITY
25–29 October 2010, Tokyo, Japan**

Jacques REPUSSARD
President of the Conference

BACKGROUND TO THE CONFERENCE

In 2007, the first International Conference on the Challenges Faced by Technical and Scientific Support Organizations in Enhancing Nuclear Safety was held in Aix-en-Provence, France, with an objective of providing technical and scientific support organizations (TSOs) from different countries, and other organizations and experts, with an opportunity to discuss and develop a common understanding of the responsibilities, needs and opportunities of TSOs. At the Aix-en-Provence conference, senior regulators, heads of TSOs and other stakeholders concluded that a platform for networking between TSOs for the enhancement of nuclear safety and security was needed. Accordingly, a second International Conference on Challenges Faced by Technical and Scientific Support Organizations (TSOs) in Enhancing Nuclear Safety and Security was held in Tokyo from 25 to 29 October 2010, with a focus on international cooperation and networking among TSOs to enhance nuclear safety and security, especially in terms of their role in the regulatory framework, including capacity building in those countries embarking on nuclear power programmes.

OBJECTIVES OF THE CONFERENCE

The objective of this conference was to develop a common understanding of the responsibilities, needs and opportunities of TSOs and to further promote international cooperation and networking among TSOs to enhance nuclear and radiation safety and nuclear security, including capacity building in countries with experience – extensive or limited – in nuclear power and in countries embarking on nuclear power programmes.

In this context, the conference:

- Discussed the roles, functions and value of TSOs in enhancing nuclear and radiation safety, including capacity building in those countries launching or expanding their nuclear power programmes;
- Shared experiences and good practices in planning and implementing cooperative activities for capacity building and in identifying needs for assistance from the standpoint of recipient countries;
- Discussed approaches to enhancing cooperation and effective networking among TSOs, including the establishment of a ‘virtual TSO’ and centres of excellence;
- Provided an overview of the technical and scientific support needed for maintaining a sustainable nuclear security system;
- Discussed mechanisms for provision of technical and scientific support for nuclear security and the development of human resources for carrying out related functions;
- Fostered dialogue, at the international level, on technical, scientific, organizational and legal aspects of technical and scientific support.

OPENING SESSION

Mr. Tadahiro Matsushita, Senior Vice Minister of Economy, Trade and Industry (METI), emphasized that current environmental and other issues have led to an increase in the number of countries considering enhancing their use of nuclear energy as well as those considering entering the nuclear energy arena for the first time. He stressed the importance of TSOs in helping to develop adequate infrastructures and in supporting regulatory bodies with scientific and technical advice. He encouraged the attendees to develop an even better international network to deepen their mutual understanding and further contribute to global nuclear safety and security. Finally, he pledged Japan's continuing support to national and international nuclear safety and security efforts through development of knowledge, experience and technology.

Mr. Denis Flory, Deputy Director General of the IAEA, detailed the conference objectives: to develop a common understanding of the TSOs responsibilities, needs and opportunities; to promote international cooperation and networking between TSOs; and to foster capacity building through the use of TSOs in countries embarking on nuclear power programmes, and those with limited as well as extensive experience in nuclear power programmes. He also described the roles of TSOs and challenges in carrying out their roles, for example: the need for existing TSOs and their networks to organise themselves to answer the crucial development needs of education, research and training systems in physics, chemistry and engineering; the significance of long term operation and the process for extension of operating licenses, and the need for long term operation to be systematically addressed and integrated with all aspects of safety and security through science and research; the question of how to reduce the safety and security 'gap' of different nuclear power plant designs that coexist with different levels of safety and security features; the need for improvement in the long term management of radioactive waste.

Mr. Nobuaki Terasaka, Director General of the Nuclear and Industrial Safety Agency (NISA), underscored the human resources deficiency in nuclear power programmes and its direct influence on nuclear safety. Because of this, TSOs are increasingly expected fill the gap. He encouraged the global network of TSOs to address these challenges together, to maximize competences, reach common global goals, share knowledge and implement solutions.

Mr. André -Claude Lacoste, Head of the French Nuclear Safety Authority (ASN), listed three 'magic words' relevant for TSOs: competence, expertise and research, and highlighted several key related questions. How does each country organize competence, expertise and research in its regulatory control system (at the national and international levels)? What is the best method of sharing information with the regulatory body? Should there be a united TSO, or separate TSOs, or should the TSO be integrated into the regulatory body itself? What is the sharing of researching and information at the international level? Has international peer review of TSOs been considered as a possible way forward to enhance safety worldwide?

Mr. Katsuhiko Sogabe, President of the Japan Nuclear Energy Safety Organization (JNES), spoke of the speed of change and its effects on the international challenges facing TSOs: nuclear energy resurgence, nuclear energy emergence, the globalization of the nuclear industry, and the increased importance of nuclear security. All of these challenges require foresight by TSOs in applying a broader perspective to technology, to ascending to a higher level of safety and security, to improving capacity building and to globally harmonizing processes and standards. He further stressed that TSOs must support international technical cooperation with respect to risk reduction, human and organizational factors, and improvements in safety inspections, infrastructure building and improvements in safety regulation.

Mr. Jacques Repussard, President of the Conference and Director General of the Institute de Radioprotection et de Sûreté Nucléaire (IRSN), emphasized that nuclear safety, radiation protection and nuclear security are not static, and that their constant evolution is dependent upon science and technology, progressing or regressing on the basis of economic and societal influences and fluctuations. The question arises of how research, training activities and scientific analysis of operating plants contribute to create an expertise capability that can be put at the service of the regulatory body. For this purpose, some countries have created a specific organisation, labelled TSO but there are other models. Each country must determine its own model. However, there is a common problem: safety is based on science and every country should follow a ‘harmonized’ way to develop this knowledge and maintain it over time. This second TSO conference is an important endeavour to discuss these challenges internationally and to determine the way forward.

KEYNOTE PANEL

Panel discussion: Challenges in enhancing the global nuclear safety and nuclear security framework. How can technical and scientific support contribute?

The panel was introduced by addresses by the Philippines, Japan, the USA, Belgium and the international organizations WANO and ENSRA. In the short presentations the different perspectives of the speakers on the role of TSOs, the status of the various nuclear safety infrastructures and existing issues were outlined. The discussion emphasized the need to strengthen the role of TSOs and their global cooperation, particularly for countries in the process of expanding or embarking on a nuclear programme. Technical support in capacity building was offered by the main players worldwide. It was further emphasized that TSOs and regulatory authorities must maintain independent but complementary roles.

OVERVIEW OF TOPICAL ISSUE SESSIONS

Topical Issue 1: Roles, Functions and Values that Guide TSOs

This session was a follow-up of the discussions initiated at the first TSO conference in 2007 in Aix-en-Provence. The progress achieved since that time in developing a common understanding of the role, responsibilities and key values and principles that guide TSOs was summarized.

Six presentations were made, by Germany, Republic of Korea, France, Canada, Australia and Indonesia. The session indicated the substantial progress made in providing adequate scientific and technical support to regulatory bodies.

Topical Issue 2: Technical and Scientific Support for Nuclear Safety and Infrastructure Development and Capacity Building

The session presented the status and the challenges in capacity building and infrastructure development. A number of examples were raised, such as support to medical and industrial dosimetry or support during extended shutdown of research reactors. The challenges in both extending an existing nuclear programme and in establishing new nuclear safety infrastructure were discussed. Six presentations were made, by the United Arab Emirates, Vietnam, the Russian Federation, Brazil, Japan and the OECD/NEA.

Topical Issue 3: The Emerging Need for Nuclear Security Technical and Scientific Support

This session included five presentations from the USA, India, Morocco, Pakistan and France. In the presentations it was pointed out that security culture is essential to further develop nuclear security. There is a strong need for technical support in the field of nuclear security. New areas of work in this field must be covered by a high degree of competence. Questions on how to develop human and other resources were discussed and the need for cooperative and integrated approaches was pointed out. There was a strong consensus on the need to fully take into account security issues, including the provision of scientific and technical expert advice to the regulatory body, so as to adequately balance security and safety requirements.

Topical Issue 4: Nuclear Safety and Nuclear Security Networking and Centres of Excellence

In this session four presentations were made, by the IAEA, Japan, the ETSON association and the Russian Federation. The session started with a comprehensive review of the elements that constitute the global nuclear safety and security framework. This was then followed by the presentation of several examples of networks: regulatory networks such as the Asian Nuclear Safety Network (ANSN), networks of TSOs such as the ETSON association, and educational networks. The discussion focused on the value of these networks in the sharing of safety and security knowledge, experience, lessons learned and culture and it was emphasized that all such networks have to be oriented towards improving nuclear safety and security, following the principles set out the IAEA safety standards and nuclear security guidance.

CLOSING SESSION

Panel discussion: Actions needed to move forward

As an introduction to the final panel discussion, five addresses were provided, by China, Malaysia, the USA, Germany and the IAEA. The panel discussion focused on the development of concrete proposals to promote the role of TSOs as an essential part of the global nuclear safety and security framework and to organize and foster information exchange and cooperation between TSOs.

CONCLUSIONS

1. Much progress has taken place in the field of TSO issues since the first TSO conference in France (2007), but there are also many ongoing challenges, particularly in Member States embarking on nuclear power development programmes

- 1.1 In 2007, the first International Conference on the Challenges Faced by Technical and Scientific Support Organizations in Enhancing Nuclear Safety was held in Aix-en-Provence, France, with a focus on providing TSOs from different countries and other organizations and experts with an opportunity to discuss and develop a common understanding of the responsibilities, needs and opportunities of TSOs. At the Aix-en-Provence conference, senior regulators, TSO leaders and other stakeholders concluded that a second conference dedicated to these issues was needed. Accordingly, a second International Conference on Challenges Faced by Technical and Scientific Support Organizations (TSOs) in Enhancing Nuclear Safety and Security was held in Tokyo from 25 to 29 October 2010, with a focus on international cooperative activities and networking among TSOs to enhance nuclear safety and security, especially in terms of the regulatory framework, including capacity building in those countries embarking on nuclear power programmes. The conference thanked both the IAEA for organizing this important global

event and the Government of Japan, in particular the Japanese Nuclear Energy Safety Organization (JNES), for hosting this important conference.

1.2 The conference recognized that the sustainable performance of a national nuclear safety regulatory system requires that three major functions be adequately resourced and organized:

- The **regulatory body's authoritative function**, whose roles are mainly to propose nuclear safety policies, to elaborate regulations and to perform licensing operations, inspections, incident management and emergency preparedness.
- Because nuclear safety and security is largely science based, the regulatory body's authoritative function, in relation to nuclear facilities and other licensed activities involving radioactive substances, needs to have permanent access to a suitable **technical and scientific advisory expert function**.
- The continuous generation of this expertise capability, able to provide a competent and timely response to regulatory needs, requires in turn a **function dedicated to the development and maintenance of an appropriate knowledge base and associated tools** (e.g. calculation codes, databases, operating experience technical analysis, laboratories, simulators) **and services** (e.g. dosimetry, radiation monitoring, laboratory tests, competence certification). This development also implies the availability of **education and training services**, and a **close association with**, and whenever possible active participation in, **national and international R&D** efforts in the field of nuclear safety, including radiation protection, and in the field of nuclear security.

The two last functions (safety and security expertise analysis and knowledge base development) represent what is often referred to as '**technical support functions**'.

1.3 The conference recognized that it is up to each Member State to decide which type of organization is most suitable for carrying out these technical support functions, taking into consideration relevant national parameters, in particular with respect to the existing mechanisms to recruit staff and manage funding systems in governmental bodies. It was noted in this respect that:

- Some Member States have preferred a high level of integration, with all three key regulatory functions included into a single organization, while others have made the choice of creating a separate TSO, or procuring the required support services from existing TSOs, if necessary in other Member States.
- Integration has the advantage of resulting in a simpler organization model, while separation has the advantage of giving high visibility to science issues associated with nuclear safety and radiation protection, and to the values that must be observed throughout the expert analysis function: independence of judgement, competence and honesty, and a holistic approach. Several conference participants noted that this model may facilitate communication with the public, particularly in those Member States in the process of developing a nuclear power programme, as well as properly taking into account public expectations in terms of protecting people, the environment and society as a whole. Similar considerations apply for scientific and technical issues related to nuclear security.
- The procurement of services from established TSOs may provide an appropriate intermediate approach in Member States where the 'roadmap' to the development of national competencies requires a rapid start-up of technical assessment activities. However, in the longer term, it is essential that appropriate national core competencies and capabilities are developed, including education and training.

- 1.4 There was a strong consensus on the need to **fully take into account security issues**, including at the scientific and technical expertise level of the regulatory system. This important issue was further developed in a specific topical session (see paragraph 3).
- 1.5 There was general agreement that it is virtually impossible to include in the regulatory system (authority and its technical support) all scientific resources and competences needed for regulatory purposes. This is particularly true for those Member States that are at the beginning of their nuclear strategy implementation. Consequently, it is advisable to organize appropriate liaisons with universities and research bodies, and, as appropriate, with technology development centres, in order to benefit from available specialized expert knowledge. Instituting an explicit TSO may, however, facilitate the necessary emergence of a general safety culture and the setting up of core nuclear safety and security scientific competencies within the national community, thus providing the regulatory body with indispensable information while ensuring its full independence: **the regulatory system must be independent, but not isolated.**
- 1.6 **The explicit identification of TSO functions may facilitate the appropriation, at the national level, of the human, technical, organizational, institutional and financial resources needed to perform these key support functions**, according to a development ‘roadmap’ that should ensure that the regulatory system evolves in accordance with the national nuclear development strategy, including safety and security infrastructure and capacity building.

In this context, the conference invited Member States to provide the IAEA with their further comments on the draft Safety Guide DS429 on External Expert Support on Safety Issues, in order to ensure that this important document takes full advantage of the outcome of the discussions that took place in Tokyo, and is able to serve in the future as an appropriate basis for peer review mechanisms dedicated to TSO functions.

The explicit identification of TSO functions may also facilitate international and regional cooperation on scientific and technical matters by giving higher visibility to such matters. **The conference took note of the progress made in the development of regional TSO networks and associations and of the availability of advanced professional training and tutoring capabilities open to all Member States. The IAEA was encouraged to reinforce the TSO networking capacity worldwide by providing, alongside the Regulatory Cooperation Forum, a forum for TSO issues where international and regional technical cooperation issues could be addressed.**

- 1.7 The Tokyo TSO conference recognized the outstanding contribution of TSOs to the enhancement of nuclear safety and security worldwide, in particular, under the auspices the IAEA. In this respect, the conference reaffirmed the importance of TSOs and shared the following understandings concerning the key values that should govern TSO activities:
- In an effort to achieve a high level of global nuclear safety and security, TSOs, as key actors supporting regulatory bodies, should continue to play important roles in contributing to ensuring the safe and secure implementation of nuclear energy programmes and of related technologies.
 - However regulators must be fully responsible for their own judgments and decisions, even when these are based on work by TSOs. They should be able to analyse and make use of the work done by TSOs in support of their regulatory activities [see also the last bullet on page 6 of the President’s Report for the International Conference on Effective Regulatory Systems for Further Enhancing Global Nuclear Safety and

Security Regime, Cape Town, South Africa, December 14-18, 2009].

- Taking into account that nuclear safety and security is science based and that science issues should be addressed in a streamlined way, TSOs provide a unique capability to maintain state of the art knowledge and facilities for safety and security assessment and to provide a comprehensive and holistic view of the safety and security issues at hand, through the aggregation of specialized expert findings.
- TSOs must maintain independence of judgement while also achieving the highest level of technical competence and transparency. Ensuring effective independence requires the implementation of adequate instruments that avoid potential conflicts of interest, and the availability of adequate financial and human resources.
- International cooperation among TSOs for sharing information, experience, lessons learned and good practices is essential not only to improve their ability to provide the services (e.g. assessment, training, expertise, peer reviews and advisory services) but also to strengthen regional and global forums and knowledge networks in support of harmonization of nuclear safety and security practices at the highest level of performance. In this respect, TSOs have an important role in supporting the IAEA in its mission, especially in promoting the use of its safety standards and security guidance, and its services in support of newcomer states for capacity building and infrastructure development.
- TSOs contribute to public outreach by providing information to the stakeholders concerned, to the media and to the public in general.

2. *It is essential to continue the ongoing efforts to improve and optimize the technical capabilities needed worldwide in order to adequately support nuclear safety and security supervision.*

2.1 The conference recognized that effective nuclear safety and security supervision in a **global perspective** requires access to excellent and state-of-the-art risk assessment capabilities, which should be continuously developed by relying on the following sources, wherever possible in a cooperative multi-national manner:

- Scientific risk-oriented research: This is an essential prerequisite for the success of defence in depth in terms of safety and operational expertise capacity, which is derived from it. For nuclear security the equivalent prerequisite is an updated design basis threat.
- Relevant operating experience analysis.
- Professional educational and training courses and e-learning at a national, regional or international level.
- Knowledge management, dissemination and transfer to new generations of experts.

2.2 **There was a widely shared concern that, from a quantitative point of view, the currently available TSO resources are insufficient to address all needs.** The conference noted that such needs are not only generated by launched or planned new build programmes. TSO capability is also required for the effective **management of long term operation of existing NPPs** and research reactors, and of decommissioning and waste management programmes. The **rapid expansion of the use of ionizing radiation technologies for medical purposes**, as well as in non-nuclear industries, also requires a strengthening of technical capabilities and associated services (e.g. dosimetry, reference analytical laboratories, radioactive sources traceability systems) to correctly assess radiological risks and ensure their appropriate management.

- 2.3 The conference pointed out that access to existing expert resources could be improved and optimized in several ways:
- Improvement of mechanisms for **international coordination and collaboration**, as well as information and knowledge sharing among TSOs, for example by further developing **cooperative e-services** between TSOs.
 - Better identification of the breadth of existing TSO capabilities, including in the field of **capacity building**.
 - Development of cooperation with those **Member States embarking on nuclear power programmes** and/or expanding their nuclear power programmes.
 - **Enhanced support from government and industry to research in relation to nuclear safety and security at nuclear facilities**. Such initiatives would promote innovative and competitive research in the nuclear energy field, with a focus on safety and security related issues.

3. *There is an emerging need for nuclear security scientific and technical support.*

- 3.1 The conference illustrated the **strong international consensus on the need to address the nuclear security challenges with a holistic and synergetic approach, taking into consideration technical, organizational and cultural aspects**. It was recognized that **nuclear security is a broad field of interest to stakeholders outside of established nuclear facilities (and locations) and the competent nuclear regulator**.
- 3.2 **Advanced expertise and analysis capability is indispensable for establishing nuclear security guidelines, for nuclear and other radioactive materials, nuclear facilities and for the expanded reach to security of radioactive materials outside of regulatory control**. New and advanced expertise would be required in a broad perspective and for **effectively assessing operators' technological and organizational response to current threats, some of them involving new challenges, as for example cyber-crime**.
- 3.3 **Security optimization** of nuclear installations requires that it be taken into account from the **design stage**. It was recognized that engineering measures have the potential to eliminate, or reduce, vulnerabilities. It was also recognized that processes for assessing the need for physical protection of materials or equipment should take into account the assessment processes used to oversee safety to ensure that nuclear safety and security are mutually enforcing and without contradictions.
- 3.4 **The broader range of stakeholders that have responsibilities for nuclear security may require specific coordination arrangements, such as a federation of organizations**.
- 3.5 Several positive examples were presented of the necessity to introduce and implement a nuclear security culture. It was also recognized that benefits are achieved through close interaction between **the competent law enforcement and national security agencies with the specialized nuclear safety and security expertise required for regulatory assessment** of nuclear installation projects.
- 3.6 **Safety and security training, and applied tutoring programmes**, including tabletop or in situ exercises, should be organized with the support of the IAEA where necessary. The possibilities of joint training events were identified as a way to bring together the safety and security technical communities.

- 3.7 There was consensus on the idea that **there is in all Member States a growing need for a broad range of TSO capabilities in the field of security**, and that the **development of such capabilities should be a key security policy objective at the national level**. It was noted that the **development of research activities** in this field was an effective way to develop such broad expertise capabilities. It was further reaffirmed that **confidentiality issues were not an obstacle to technical cooperation in this field, provided that this cooperation was centered on generic and theoretical security assessment methods and analysis techniques**. Thereby, sensitive, system-specific information would be kept separate, outside of the scope of the research project.
- 3.8 The usefulness of extending such cooperation to non-nuclear security fields was also pointed out as a good way to enrich and optimize nuclear security response assessment capability.

4. *Governments have a unique responsibility in the definition and implementation of TSO capability policies*

- 4.1 **The conference underlined the essential role of competent governmental institutions, in the current context of development of nuclear energy applications, to ensure that adequate and timely measures are adopted in order to strengthen and maintain TSO capabilities in the light of national needs**. The conference recalled that in addition to their many beneficial uses, nuclear and radiation technologies may constitute a source of significant risk for people, the environment and society as a whole, which must be minimized worldwide to levels as low as technically achievable. The conference pointed out that this challenge requires the implementation of public policies aimed at ensuring the adequate availability of:
- **State-of-the-art science based knowledge and tools** to analyse nuclear safety and security issues, which are prerequisite elements for assessing in depth nuclear safety and security at nuclear installations.
 - **Qualified and appropriate trained personnel**, which are needed both by the nuclear industry and the regulatory system. However, it should be noted that the industry's focus is on technology development, including safety, and on economic performance, while the regulatory system's focus is on optimal and independent risk assessment capability.
 - **Adequate levels of financial resources dedicated to nuclear safety and nuclear security**, in particular, **funding plans for new build programmes, should include from the start the coverage of costs associated with technical support needs in the context of licensing and regulatory supervision processes**.
- 4.2 **The choice of the most suitable organisation for technical support functions is a national responsibility, to be exercised in line with the prescriptions and recommendations of the IAEA Safety Fundamentals, the Convention on Nuclear Safety, the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management**, and other relevant international instruments. The conference noted in this respect that beyond the requirement to ensure a clear separation between the regulatory body on one hand and the organizations in charge of the promotion and of the operation of nuclear activities, there is a need to ensure that safety, security and radiation protection knowledge and best practice are made available to operators, who are primarily responsible for ensuring safety and security in their installations: **the regulator and the operator both require adequate scientific and technical support**. It was noted that **the institution of a separate TSO serving both**

needs, under the condition that it is appropriately resourced and operates in full transparency to the regulatory body, and with an internal organizational structure ensuring effective avoidance of conflicts of interest, was an acceptable solution where national resources are limited.

- 4.3 Finally, there was a consensus on the **need for TSOs**, whatever their mode of organization at the national level, to **maintain close scientific connections with the research and academic world, as well as with industry and other stakeholders, so as to be able to provide at all times state of the art technical support**, not only in terms of personal competence of experts, but also with respect to assessment tools, such as advanced computational codes.

5. *TSO needs are particularly crucial for countries engaged in nuclear energy programmes*

- 5.1 In particular, the conference pointed out that one of the main challenges for countries embarking on nuclear power programmes is to develop their own capacity building strategy, plans and practical organization, especially for safety and security regulation, as part of their national responsibility and in compliance with IAEA Fundamental Safety Principles 1 and 2 (responsibility for safety and the role of government). **In this respect, the conference reaffirmed the crucial importance of the availability of adequate technical and scientific support. To this end and to allow those countries to benefit from existing capabilities worldwide, it is important that the relevant capability requirements are identified from the outset of the nuclear energy strategy development, including the associated costs and funding mechanisms.**

- 5.2 The conference considered that the goal of achieving high levels of nuclear safety and security worldwide, especially given the perspective of a larger number of countries using nuclear energy, calls for more concerted efforts from all stakeholders to develop and maintain the knowledge base and to make it readily available. This further calls for a significant worldwide increase in the capacity of high level experts to be able to implement this knowledge into effective regulatory activities. **The conference noted in this context that it is essential that the international community facilitates the necessary capability building process in those countries, in particular through knowledge and experience transfer.** This concept includes not only human resources development, education and training, but also organizational, technical (e.g. laboratories, calculation codes, and probabilistic studies), institutional and legal frameworks for the development of TSO functions.

6. *The IAEA should continue to be a strong driving force for the development of TSO capability*

- 6.1 The conference agreed that the IAEA should continue to play a central role in facilitating the emergence of consensus on safety, security, public health and environmental issues by developing **comprehensive standards and guidance documents in the frame of the global nuclear safety and security framework. It was noted in this respect that such developments require sustained input by high level experts from the Member States.**
- 6.2 IAEA should also encourage the further development of **networking between TSOs worldwide**, as a key element to facilitate effective and sustainable capacity building and infrastructure development for new and expanding nuclear power programmes. It was agreed that the form that a 'TSO network' can take depends on the context within which it

is created. For instance ETSON reflects the high degree of maturity of the European nuclear power programmes, whilst ANSN strives to feed the needs of all the new entrants in the Asian region. It was also recognized that the value of these networks is in the sharing of safety and security knowledge, experience and culture, and they are oriented toward improving nuclear safety and security following principles set out by the IAEA safety standards and security guidance.

Regarding knowledge transfer, the conference noted the initiatives that were taken by TSO networks to organize and increase the training and tutoring possibilities and respond to the today pressing demand in this field. It was emphasized that the quality of training in safety and security assessment depends upon the practical expertise of the trainers. In that respect, TSOs are well positioned. The conference recommended to the IAEA to start a systematic mapping of the current training and tutoring services in order to better guide Member States toward the following of their respective needs.

- 6.3 The IAEA should facilitate the access of safety and security authorities in all Member States to state-of-the-art expertise services provided by TSOs, particularly for the benefit of countries that are currently embarking on nuclear power development, by **supporting the establishment of IAEA designated TSO centres of excellence**, which could contribute to supporting the efforts of countries that intend to create and to develop their own TSO activities.

7. *The Tokyo TSO Conference proposes five main recommendations.*

- 7.1 **Recommendation No. 1:** The draft IAEA Safety Guide on External Expert Support on Safety Issues (DS 429) should be completed, approved and published as soon as possible, taking into account comments by Member States on the available draft, particularly in the light of the Tokyo conference conclusions. This guide will provide a framework for the roles of TSOs in ensuring nuclear safety and its interface with nuclear security. It will also provide the basis for peer review and other IAEA generated review services, to be developed subsequently, and allow for an objective evaluation of the performance of TSO functions, and the formulation of recommendations for their further improvement.
- 7.2 **Recommendation No.2:** The IAEA should initiate plans for a third international TSO conference, to be held in 2013–2014. In this respect, the conference welcomed the proposal of China to host this next Conference.
- 7.3 **Recommendation No.3: The IAEA should foster the establishment of a forum dedicated to nuclear safety infrastructure development issues related to scientific and technical support.** Such a ‘TSO Forum’ would meet regularly in between the international TSO conferences, establish close working relations with the Regulatory Cooperation Forum (RCF), and operate in conjunction with established regional TSO cooperation structures as well as with the NEA/CSNI on science related issues. This TSO Forum would, inter alia, address the following:
 - **Achieving scientific excellence**, particularly through cooperative research projects, shared experimental facilities and knowledge, jointly developed key analysis tools, (e.g. computer codes) and cooperative training programmes;
 - **Addressing from a science based point of view the technical expertise requirements associated with important issues related to nuclear safety and security at nuclear facilities, such as the assessment of safety in generation III NPPs, ageing of existing NPPs, decommissioning of facilities, low dose exposure**

effects and the growth of medical exposures of patients;

- **Facilitating the open international availability of state-of-the-art expertise resources** in the fields of nuclear safety and security, or radiation protection and radiological emergency response. Similar rosters of experts should be established in the nuclear security field;
- **Contributing to the worldwide harmonization of nuclear safety practices** (in particular for the safety management of research reactors and carrying out nuclear safety assessment) on the basis of the highest standards; Similarly, practices should be established to ensure that measures for nuclear safety are implemented in harmony with those for nuclear security and that they are not in contradiction;
- **Fostering the reciprocal provision of certain services by TSOs, in particular in the fields of professional training, assessment, research and peer review.**

7.4 **Recommendation No. 4:** The IAEA, as well as other parties concerned, should promote the principal findings and outcomes of this conference on the occasion of major international nuclear safety meetings, such as the IAEA General Conference in 2011, the International Conference on Nuclear Regulatory Effectiveness Systems, meetings of senior regulators, and key national or regional nuclear safety and security events such as the forthcoming US-NRC RIC, EUROSAFE and EU-ENSREG nuclear safety conferences;

7.5 **Recommendation No. 5 :** Considering the increasing importance of the interdependence of nuclear safety and security in the light of emerging threats, including cyber-security issues, the conference recommended that, as appropriate, TSO functions be extended to providing technical support to competent authorities in the field of nuclear security, in order to achieve greater safety and security synergy.