Develop an action to support technical and scientific capacity in embarking countries (TSO Forum)

Report

Workshop on Building Technical and Scientific Capabilities in Embarking Countries (TSO Forum), 10- 13 April 2018

Introduction

A. Background

The International Conference on Challenges Faced by Technical and Scientific Support Organization (TSOs) in Enhancing Nuclear Safety and Security, held in Beijing in October 2014 with 200 participants from 42 Member States, recognized that the Technical and Scientific Support function is a critical component of an effective regulatory system. The conference concluded that Member States should have the possibility to evaluate the capabilities of their national technical and scientific support function through peer review missions, either within the scope and context of the IAEA Integrated Regulatory Review Service (IRRS) Missions or in any other way, to be identified and developed (e.g. dedicated TSO self-assessment missions). It was also concluded that the TSO Forum (TSOF) can contribute to the TSO capacity building of newcomer countries.

As outlined in its Terms of Reference, the TSOF was established in order to reach the following objectives, in close relations with the Regulatory Cooperation Forum (RCF) and with the Committee of the Safety of Nuclear Installations of the Nuclear Energy Agency (NEA/CSNI) on science related issues to:

- Strengthen the role of TSOs and their global coordination and collaboration, including countries in the process of expanding or embarking on a nuclear programme;

- Promote coordination and collaboration among the TSOF Member States to foster Scientific and Technical Capacity Building including Education and Training.

- Share and mutually learn from safety and security experiences, and communicate lessons learned including feedback on the use of IAEA Safety Standards and security publications.

As a follow-up to the TSO Conference deliberations in Beijing, the Steering Committee of TSOF decided in March 2016 to develop an action plan to support Member States in developing and strengthening their technical and scientific capacities in nuclear and radiation safety. Consequently, a number of activities were initiated including the development of a TECDOC, of cases studies of TSO establishment and of a self-assessment methodology. The Workshop on Building Technical and Scientific Capabilities in Embarking countries was intended to provide a platform to present the conclusions of all related activities and to seek a way forward by learning from the experience of Member States that have developed and strengthened their regulatory function by using TSOs. The main conclusions of the workshop will be presented during the fourth *International Conference on the Challenges Faced by Technical and Scientific Support Organizations in Enhancing Nuclear Safety and Security: Ensuring Effective and Sustainable Expertise* to be held 15 to 18 October 2018 in Brussels, Belgium.

B. Objectives

The objectives of the workshop are:

- The introduction of initiatives to support Member States in developing and improving their strategies to establish TSO functions and to maintain their capacity;

- Presentation of the key components within the scope of the IAEA-TECDOC-1835[1] on Technical and Scientific Support Organizations Providing Support to Regulatory Functions including safety research and development;

- Practical exercise on TSO self-assessment methodology in line with IRRS and Integrated Nuclear Infrastructure Review (INIR) review missions to support the development and improvement of national capabilities strategies;

- Knowledge sharing of the experience gained by some Member States through case studies and discussion of the adequacy of existing tools;

- Member States sharing knowledge and experience in specifying their needs to national TSOs supporting regulatory functions, and in working with TSOs from abroad, through lessons learned, national presentations, and discussions;

- Discussion and feedback from the participants on TSO related activities to evolve recommendations as a way forward to enhance effectiveness of TSO initiatives.

23 participants from 13 Member States (Bangladesh, Belarus, Canada, Finland, France, Germany, Iran, Kazakhstan, Republic of Korea, Pakistan, Poland, Russian Federation, South Africa) **attended the workshop with the participation of IAEA Technical Officers from NENP, NSNI, NSRW.**

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[1] The IAEA-TECDOC-1835 is being published and will be sent in advance to the selected participants.

Contents

Session 1 – Setting the Stage for the Workshop

After the opening remarks of G. Caruso, Director of NSOC/NC, the session 1 about "Setting the Stage for the Workshop" started with the presentation of Mr. Karim Ben Ouaghrem from IAEA on TSO Forum initiative background activities as well as the TSO self-assessment questionnaire and case study approach. He explained the reasons behind the initiative and especially highlighted the importance of holding national workshops to support Member States in developing TSO capability supporting regulatory functions. In addition, he encouraged the member states to participate actively in the 4th TSO Conference on 15-18 October 2018.

The impulse speech was delivered by Mr. Repussard - former DG of IRSN. He gave some insights about the IAEA TSO initiative and expressed four pillars of regulatory sustainability namely:
1) Institutional strength
2) People
3) Technical resources and
4) Stakeholder and public confidence

He mentioned the concept of "linkage" which provides feedback or feedforward mechanism linking different types of regulatory-related activities and cultures, to ensure permanent improvement, and natural adaptation to changing environments, in an "ecosystem" like approach.

Following the Session Topic 1.1 "What is a TSO and what functions are performed", Ms. Fedotova from Russian Federation, presented "the scientific and technical support to the regulatory authority in the Russian Federation". She gave information about the activities of two regulatory TSOs: SEC NRS and VO "Safety". The last presentation from Member States was delivered by Ms. Eibl-Schwaeger from GRS. She gave a presentation about the activities of ETSON (European Technical and Scientific Support Organization Network). She described ETSON core values and its involvement in sharing experience, knowhow, good practice, research and training.

The second issue of the Session 1 was dedicated to the question "how is the IAEA addressing TSO challenges?", Mr. Beaupre presented the IAEA International School of Nuclear and Radiological Leadership for safety. He explained in detail the activities of the leadership school including the objectives and case study methodology. In addition, he gave some explanation about SARCoN methodology based on TECDOC 1757. In continue, Mr. Shah presented the "safety review and assessment by regulatory body-a need for TSO". He described in detail the safety review conducted by the regulatory bodies, and indicated that the inclusion of TSO issues were under consideration in connection with the current review of IRRS (IAEA's Integrated Regulatory Review Service). Mr. Lepouzé presented "the milestones approach to develop a new nuclear power programme". He explained the IAEA milestones approach including 3 phases and 19 specific infrastructure issues, and how TSO considerations could fit in the 3 phases.

Based on the discussions the chairmen remarks were the following:
1) The participants emphasized the importance and the fruitful role of the workshop.
2) It is believed that the workshop provides a good opportunity for the Member States for sharing viewpoints of the participants on issues related to the building of TSOs,
3) It was emphasized that each Member State should develop its own national roadmap linked to the ecosystem around its TSO,
4) The critical role of international support of advanced TSOs for the establishment of TSOs in embarking countries was accepted,
5) The IAEA initiative of conducting national workshops on TSO was welcomed,

6) The importance of development of good leadership in TSOs was recognized,
7) It was recommended to link the TSO Initiative with the Regulatory Cooperation Forum (RCF),
8) The support of vendor countries also in the establishment of the regulatory dedicated TSO in the countries importing NPPs was found to be important,
9) It was proposed that the issue of funding and financing of a TSO be more highlighted already in Phase 1 of the IAEA Milestone approach.

Session 2 – What are the key components to construct and maintain the TSO capability?

The second part of Session 2 started with an overview of the **TSO situation from Belarus.** They are using a novel approach with a small coordinating organization so that the existing capabilities in Belarus can be used even though these capabilities are spread over 16 organizations.
Then there were presentations from Korea and France on in-house training and knowledge management. While these are not of immediate concern to embarking countries, **some thought should be given to these issues in developing a long-term TSO strategy**. France and Canada presented two views on **independence of judgment**, from the point of view of an external or an internal TSO. While the TSO model needs to reflect the national situation, consideration of how independence of judgment is to be fostered and maintain should be formally documented. This can be in law and/or in the management system of the TSO.

Finland (VTT) made a presentation on **Research and Development (R&D) as one of the key components to construct and maintain the TSO capability in particular for embarking countries**. Finally, the IAEA provided an update on Post-Fukushima R&D activities. Embarking countries with new TSOs were invited to note that there will be opportunities to collaborate with the IAEA on some of these activities that include training sessions.

A few words on the Chair's summary: need for knowledge management, R&D to be developed mostly independently from operators, specificities of embarking countries.

Session 3 – How to assess TSO challenges and find appropriate solutions? (See Annexe 2)

The purpose of the session was to introduce the TSO Self-Assessment Questionnaire under development by the IAEA and to work with Member States representatives on the specifics of the questionnaire, in two parallel sessions, in order to obtain their feedback. The following main findings were identified (see detailed outcomes in Annex 2).

No gaps were found in the coverage of the questionnaire. It will be simplified and made more user-friendly to better guide users. In particular, the description of expectations will be shortened and focussed on key points. It will be adapted to address the development of capabilities, which is the concern of countries under phase 1 of a nuclear power programme **or** in the early stages of developing a TSO, with an adjusted number of questions. The questionnaire will be directly linked with TSO specific questions of **SSG16** and be revised to better lead to the identification of gaps and areas in particular in the domain of the development of capabilities.
Charts (e.g. spider webs) will be developed to ease the screening of the goals to be achieved considering the phase.

Session 4 – How to build your technical and scientific capability?

This session was devoted to presenting and discussing cases studies on TSO development. Warm thanks were expressed by all participants to representatives of Pakistan (PNRA) and South-Africa (NNR) for their efforts to prepare and present comprehensive studies of the development of their national TSO capabilities, providing a unique and detailed insight into the processes followed in their respective countries since the initial intention to the present day. It was observed that although there are significant differences between the countries nuclear background problematics, a similar motivation was stated for the decision to create a national TSO capability, that is developing national self-reliance for nuclear safety regulatory matters. Self-reliance was analyzed as a source of sustainability and of efficiency for regulatory systems, which would in particular facilitate their readiness to confront the challenges of new build programs. In was also concluded from preliminary studies that this national solution was in the long run also cost effective, compared to the dependence on foreign TSO services.

The two presentations gave rise to numerous and focused questions, and answers. In particular, it could be useful, considering the future use of this Case Study material, to complement the documentation with information pertaining to the funding issues (brief description of the national funding system for the Regulatory Body, and its TSO component) and to HR development (recruitment process, status of TSO staff compared to RB staff, training…). It was also concluded that the development of a new case study (taken from a different country) targeting specifically the HR challenges in building a TSO would be very useful.

Four key lessons could be drawn from the presentations and ensuing discussions:

1) The key importance of the support provided by the IAEA and its Member States to the national RB in order to facilitate its TSO development process. In this respect the reference to IAEA guidance and services (SSG16, Four quadrant approach, INIR/IRRS,…) provides a common framework which facilitates cooperation through the successive phases of development.

2) The TSO development process can be expected to last in the order of a decade, to have available a first fully operational technical support service. During this inception period, it is essential to ensure the continued availability of alternative TSO services to fulfil essential regulatory needs, usually from other Member States organizations, and in many cases from the NPP technology vendor country. These services can be progressively phased out as the national TSO develops know how and gains experience.

3) The organizational model chosen by a given country for its TSO structure is essentially country dependent, as it must be tailored to "harness" and attract as efficiently as possible the existing national scientific and technical resources which are considered pertinent for the TSO missions (from research centers, universities, as well as from the RB itself of course). Thus, depending on country specifics, an internal TSO, or an external TSO structure, or a mix of the two, with a "network" or "hub and spoke" cooperative system may be preferred.

4) Once the decision has been taken to go forwards with setting up an indigenous TSO capability, with a suitable type of organization, the development phases can be expected to be constrained by the availability of funds and (even more critically) of appropriate human resources. Both case studies illustrate that success is dependent on a careful prioritization of the missions and tasks expected from the emerging TSO (for example on the basis of gap analysis and

benchmarking with comparable countries), in the frame of a roadmap multiannual planning process, in coherence with the SSG16 phases of development of the regulatory infrastructure.

Session 5 – Discussion on country specific concerns

During the Session 5, participants shared their specific national concerns. National workshops appeared to be an appropriate tool to improve strategies and optimise efforts and also to raise awareness at different levels. National workshops will be implemented upon request. The format and participation of the workshop will be adjusted considering the specificity of the request.

Potential candidates could be:

- South Africa
- Belarus
- Bangladesh
- Kazakhstan
- Iran (after IRRS)

Any further points and/or conclusions from Session 5?

Session 6 – Conclusions

Further step: implementation a first pilot national workshop to address a specific request or need of a Member State.

Annex 1: Agenda

Tuesday 10 April	Wednesday 11 April	Thursday 12 April	Friday 13 April
(10:00-10:30) **Opening by G. Caruso, IAEA, Director of NSOC/NS)** • Introduction of participants • Objectives of the workshop and the TSO initiative: K. Ben Ouaghrem (IAEA-NSOC/NMPS) *(10:30-15:00)* **Session 1 – Setting the Stage for the Workshop** Chair: Ms C. Eibl-Schwaeger (GRS, Germany) and co-chair: Mr K. Sepanloo (INR, Iran) • Impulse address: J. Repussard (France) *(11:00-12:30)* **1.1 What is a TSO? What functions are performed?** *National examples: (5-10 mins)* • North America, • Europe (ETSON), • Russian Federation: SEC NRS and VO Safety • Republic of China, • Republic of Korea, • Others? *(12:30-13:30) Lunch break* *(13:30-15:00)* **1.2 How is the IAEA addressing TSO challenges?** • Review and assessment by the regulatory body, Mr Z. Shah (IAEA, NSNI/RAS) • Introduction to the IAEA TECDOC-1835 on Technical and Scientific support organizations supporting Regulatory Functions: Mr K. Ben Ouaghrem (IAEA, NMPS) + distribution of participants among the two parallel sessions	*(9:30-12:30)* **Session 2 – What are the key components to construct and maintain the TSO capability** Chair: Mr P. Elder (CNSC, Canada) and co-chair: Ms M. Mkhosi (NNR, South Africa) • Education and training: Mr C.Y. Myung (KINS, Republic of Korea) • Human Resources development: Mr D. Louvat (ENSTTI, France) • Knowledge management: Mr B. Autrusson (IRSN, France) • IAEA activities on safety related R&D: Mr A. Amri (IAEA, NSNI/SAS) • Independence of judgment and management of conflict of interest – two examples from Canada and France: Mr Bruno Autrusson (IRSN, France) and Mr P. Elder (CNSC, Canada) • Chair concluding remarks	*(9:30-12:30)* **Session 4 – How to build your technical and scientific capability? Case studies** Chair: Mr J. Repussard (France) and co-chair: Belarus TBC 4.1 Introduction of the case study methodology: J. Repussard (France) 4.2 National situation prior to the creation of a TSO: • Pakistan: Mr N.Maqbul (PNRA, Pakistan) • South Africa: Ms M.Mkhosi (NNR, South Africa) • Comments, questions from the participants 4.3 Context and key elements of the national decision to set up a TSO • Pakistan: Mr N.Maqbul (PNRA, Pakistan) • South Africa: Ms M.Mkhosi (NNR, South Africa) • Comments, questions from the participants 4.4 Current status of the national TSO • Pakistan: Mr N.Maqbul (PNRA, Pakistan) • South Africa: Ms M.Mkhosi (NNR, South Africa) • Comments, questions from the participants 4.5 Lessons learnt from an international perspective • Chair concluding remarks	*(9:30-12:30)* **Session 6 – Conclusions onclusions** Chair: Mr A.O. Koteng (RPB, Kenya) and co-chair: Ms M. Demeshko (VO-Safety, Russia) • Session chair reports • Summary of recommendations for next steps to consolidate the IAEA TSO initiative (Chair of session 5 and IAEA Secretariat) **Closing Remarks** (IAEA, NSOC/NMPS)

• Safety leadership school: Mr E. Beaupre (IAEA, PSCS/NSOC) • The Milestones Approach to develop a new nuclear power programme – the role of TSOs in the programme: Mr B. Lepouze (IAEA/NENP) • Chair concluding remarks			
(15:00-15:30) Coffee break *(15:30-17:00)* **Session 2 – What are the key components to construct and maintain the TSO capability** Chair: Ms N. Fedotova (SEC-NRS, Russian Federation) and co-chair: Mr Bruno Autrusson (IRSN, France) • Bilateral/multilateral cooperation for safety assessment: S. Stransky (GRS, Germany) including INSC projects, • Research and Development: Ms E.-K. Puska (VTT, Finland) including ETSON position paper • Example in Belarus • Chair concluding remarks **Posters:** ETSON, R&D papers TSO Conference 2014 in Beijing	*(12:30 – 14:00) Lunch break* *(14:00-17:00)* **Session 3 – How to assess TSO challenges and find appropriate solutions? TSO Self-Assessment Questionnaire** Chair: Mr M.-G. Albert (France) and co-chair: Mr U. Habib (PNRA, Pakistan) 3.1 Setting the scene for TSO self-assessments and background for questionnaire development (IAEA) 3.2 Introduction to the draft TSO self-assessment questionnaire – Mr M.-G. Albert (France) 3.3 Evaluation of the draft TSO self-assessment questionnaire (Split into two parallel sessions) • 3.3.1 Roles and responsibilities of TSOs in the regulatory framework (rapporteur – Ms Z. Trafimchik) • 3.3.2 Nature and scope of TSO activities (rapporteur - TBC) 3.3 Report to workshop on results of the two group discussions (rapporteurs) 3.4 Group discussion on main points and recommendations • Chair concluding remarks **Chairs meeting with IAEA Secretariat**	*(12:30 – 13:30) Lunch break* *(13:30 – 14:30)* **Meeting with chairs to consolidate the reports and the preparation of the conclusions** *(14:30-16:30)* **Session 5 – Discussion on country specific concerns** Chair and co-chair: TBC • What is your opinion about the IAEA TSO initiative • How did the workshop contribute to your concerns? • What are your expectations for follow-up actions? • Chair concluding remarks	

Annex 2: List of participants

Choudhury Naiyyumn - Bangladesh

Ghose Satyajit - Bangladesh

Kruk Yulyana - Belarus

Trafimchik Zoya - Belarus

Elder Peter - Canada

Puska Eija Karita - Finland

Albert Marc-Gerard -France

Repussard Jacques -France

Mathieu Anne Marie T. - France

Autrusson Bruno - France

Eibl-Schwaeger Carla - Germany

Stransky Sebastian - Germany

Sepanloo Kamran- Iran

Romanenko Oleg - Kazakhstan

Shiganakov Shaiakhmet - Kazakhstan

Myung Chang Yeon - Republic of Korea

Habib Uzman - Pakistan

Maqbul Naveed- Pakistan

Skrzypek Maciej - Poland

Demeshko Marina - Russian Federation

Fedotova Nataliya - Russian Federation (10 April only)

Mkhosi-Motsaathebe Margaret - South Africa

Mohlala Nthabiseng - South Africa

Annexe 3: Outcomes from Session 3

General comments

Relevance and applicability:
- The proposed 5 situations of the country were deemed to cover adequately the various national situations
- For phase 1 most of questions are not applicable as there is no TSO established;
- It would be good to specify who is answering- TSO or RB or both and in which cases.

Coverage
- No missing topics were identified

Understandability and user-friendliness:
- The questionnaire should be more user-friendly, guide more the users
- Stages could also be presented in form of flow charts - systematic questions with yes or no answers.
- Complementing one question in another question is discouraged
- The questionnaire in general should be simpler
- When too many expectations are described, it may get to be confusing
- In general, indicate clearly when a question is not applicable to certain situations, in particular when the TSO does not exist yet

References
- There are too many references
- The relevant TECDOC section should be used as the main reference
- All general references should be listed at the beginning.
- There should be a specific reference for each question
- SSG-16 is useful but needs to be complemented
- Providing supporting documents or their reference should be encouraged rather than providing lengthy write-ups. In this regard, the proposed boxes to tick if a document is available/provided are useful.

Usefulness and orientation towards action:
- In its present form, the questionnaire is not useful enough to those in early stages of the TSO development
- If recommended improvements were added, the questionnaire would be more useful
- It should concentrate on the development of capabilities and present step-wise methodology for TSO development.
- Self –assessment questionnaire (SQA) should present the questions in relation with the development stage and the actions identified in SSG-16
- The major purpose should be to help in the development of national TSO, it would be useful to provide a roadmap
- After answering the questions, the answering organization should be able to identify weak areas for improvement, rate its situation, prioritize actions needed. This could be done for

instance by adding, in the table in the Appendix to the TECDOC, a line to assign a rating to each column.

Major question-specific comments

Question 4.2
- Help is needed to answer on "stage of development of the TSO". This notion should be refined by identifying more precisely various possible stages, several proposals were made to that effect. This may be added to boxes in the proposed table
- Introduce the notion of TSO system to account for situations with several TSOs
- With these additional notions, the proposed table can be useful

Question 5
- When providing information in the table in the Appendix of the TECDOC, do not provide only a static description but provide explanation to account also for possible future developments. For instance: "...if you foresee any development then describe", or "if TSO is not in the national regulatory framework... then please describe your plans".

Question 7
- not applicable for phase 1
- The question is good if the TSO is in place. If not - who will answer? If it is the RB, then add that the expectation will be " RB vision on mission statement for future TSO"
- The description of expectations to be made simpler

Question 10
- A question was raised regarding how TSO independence is ensured, and it was highlighted that answering this question might require lengthy considerations and many documents or pieces of evidence
- It was noted that it can be looked at independence as seen from outside and by the TSO itself.

Question 11
- Description of expectations is too complicated
- To facilitate the answer, add in expectations more examples of possible provisions, e;g. statement, agreement, dedicated team for TSO functions, reflection in mission and values.

In addition, many specific proposals were made for wording improvements, which are not reported in detail here.