Meeting challenges of professional development

of EU Technical Safety Organisations experts

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###### Abstract. The support provided by Technical Safety Organizations (TSOs) to Nuclear Regulatory Authorities (NRAs) in carrying out their designated functions, depends on highly qualified personnel who are competent in many disciplines. The development and maintenance of this workforce needs on-going attention from governments and stakeholders to ensure that adequately skilled and competent personnel are available at any time, taking into consideration retirements and the continuous need for personnel resulting from natural fluctuation, from new developments or national requirements.

In the European Union, this demand for skilled personnel set against a generally ageing workforce makes it very clear that it is high time to put in place a training mechanism that ensures the maintenance of the current skilled and competent personnel at NRAs and TSOs, and the flow of new recruits for long-term sustainability.

In the light of the above identified need, and in the aftermath of the Fukushima Daiichi accident, the European Commission took action and launched a project for “Sharing & Growing Nuclear Safety Competences” (NUSHARE project). This project aims at strengthening nuclear safety and fostering a common nuclear safety culture in the EU-28. One out of three working packages of the NUSHARE project is dedicated to the development of a comprehensive training programme for new entrants, professional staff already working at NRAs or TSOs, or experts who wish to start a career in this field. This important task is coordinated by the European Nuclear Safety Training and Tutoring Institute (ENSTTI), an initiative of the European Technical Safety Organizations Network-ETSON. ENSTTI is a centre specialized in meeting the growing need for highly qualified personnel with adequate knowledge and skills in nuclear safety and security at NRAs and TSOs.

The paper provides a brief overview of the NUSHARE project with a focus on the development of a comprehensive training programme tailored to the requirements of NRAs and TSOs. In addition, the paper highlights one module of the training programme that is dedicated to the systematic development of entry-level skills necessary for employment at NRAs or TSOs.

# Introduction

Human resources development is recognized as the cornerstone of capacity building and sustainability of nuclear skills by the European Commission and the International Atomic Energy Agency (IAEA). This is set out in several legally binding instructions agreed by the European Council of Ministers, in particular in the Nuclear Safety Directive adopted on 25 June 2009 and its further amendment adopted on 8 July 2014, the Directive on the safe management of Spent Fuel and Radioactive Waste adopted on 19 July 2011 and the Council Directive laying down basic safety standards for protection against the dangers arising from exposure to ionising radiation adopted on 8 December 2013 as well as in a number of IAEA documents, such as the Action Plan on Nuclear Safety , the Nuclear Security Plan 2014-2017 or in the IAEA Safety Standards and Security Guidelines. These documents explicitly emphasize the importance of education and training, and require the maintenance and further development of knowledge, skills and competences of experts working, *inter alia*, at competent authorities and safety organisations responsible for nuclear safety, nuclear security and radiation protection.

Capacity building in nuclear safety, nuclear security and radiation protection integrates a wide range of scientific and technological disciplines. Moreover nuclear and radiation safety requires highly professional expertise in broad areas of nuclear technology. The construction of this expertise is more than a matter of education as it involves transfer of practical knowledge and culture. This practical knowledge transfer is best done by senior experts from Nuclear Regulatory Authorities (NRAs) and Technical Safety Organizations (TSOs) that actually work in the areas that are pertinent to regulatory practices. It is internationally recognized that the quality of training in safety and security assessment depends upon the practical expertise of the trainers and that safety training has to be implemented in educational planning through NRA and TSO informed teaching programmes.

# Disparity and shortcomings of vocational training of EU nuclear safety experts

A recent study by the ENSTTI [1] on vocational training within Nuclear regulatory Authorities (NRA) and Technical Safety Organisations (TSO) of the European Union members having a nuclear energy programme, shows a great heterogeneity in the transmission of knowledge and know-how for the regulatory functions[[1]](#footnote-1) they provide in their national regulatory framework. The technical specificity of some of these functions requiring a strong link between expertise and research, sometimes coupled with a under-sizing of the human resources of these organizations, result that 50% of them cannot afford to self-insure the professional training of their experts and must turn to outside vendors where they exist.

Also, there is a difference of consideration between NRA and TSO on the importance of control functions. NRAs have mostly implemented nationally certified curriculum for the Inspection function. The TSOs work rather on the Evaluation function (Assessment).

Professional devlopment of NRA and TSO experts remains at present a difficulty for some highly technical assessment functions and for certain organizations of size too limited to develop internal professional learning pathways.

# The European framework for non-formal education

The rules governing the vocational training in the European Union were first designed to facilitate the mobility of workers between different Member States. This goal naturally impulse a harmonization of curricula and training practices. Harmonization is accompanied by the desire to retain as much as possible existing curricula and best practices. Everything is framed by a European qualification system (EQS) which is itself based on training outcomes expressed in terms of knowledge, know-how and competences gained.

A European Credit system for Vocational Education and Training (ECVET)[[2]](#footnote-2) recorded into a professional passport, must allow each worker to have his qualification recognized in any of the EU countries. European Commission General Directorates are active promoters of the EQS and the ECVET and a programme of Directorate Genetal on Education and Culture, the program Leonardo da Vinci, is dedicated to the mobility of workers through vocational training.

The field of nuclear energy is still little impacted by this program but projects aiming at the harmonization of training curricula and qualification of nuclear workforce are under implementation.

# The NUSHARE project

The [NUSHARE project for Sharing & Growing Nuclear Safety Competences](http://www.enen-assoc.org/en/training/for-nuclear-community/nushare.html) originated as a EURATOM Education & Training initiative proposed by Commissioner for Research and Innovation and Commissioner for Energy after the Fukushima Daiichi accident in Japan 11 March 2011. This project is interdisciplinary (e.g. requiring "hard" and "soft" sciences) and multi-sectorial (e.g. addressing policy makers and opinion leaders on the one hand and nuclear technology and radiation protection experts on the other). It is a Euratom FP7 support action of four years, launched under the work programme 2012. The main objective of this project is to develop and implement education, training and information (ETI) activities aimed at sharing and growing nuclear safety culture across the EU in all nuclear installations and in all applications of ionizing radiation, including security aspects.

Within the project it is planned to establish a NUSHARE ETI catalogue, containing the ETI schemes that will pass the required quality and performance tests. A NUSHARE action programme will also be published, containing objectives, implementation roadmap and “best practice guidelines” (e.g. regarding lessons learnt from ETI actions in each Member State, networking techniques, task descriptions in terms of "learning outcomes" and related "knowledge, skills and competences", wherever applicable, assessment methodologies or international collaboration).

The NUSHARE Working Package 3 (WP3) is dedicated to the development of a training scheme for new and existing staff working at NRAs and TSOs and to the subsequent delivery within a qualification system. This important task has been entrusted to ENSTTI.

Considering the ENSTTI study’s findings [1] and relevant IAEA documents[[3]](#footnote-3), it is clear that the impact of NRAs and their TSOs on safety, security or radiation protection culture will, *inter alia*, significantly depend on the professional background and development of their analysts and inspectors. Recognizing the need for a consistent training approach for this expert group, the stakeholders of the NUSHARE WP3 recommended concentrating, as a first step, on the development of a well-structured *Basic Training Programme* covering regulatory functions as well as all technical areas of activities. In addition, it was recommended to take into consideration specialized and expert training modules as well as individual tutoring programmes. This will assure the consistent development of a comprehensive training programme that leads to continuous performance improvement at the organizational, process and job level at NRAs and their TSOs.

# The Basic Training Programme

The purpose of the Basic Training Programme is to strengthen nuclear safety, nuclear security and radiation protection, to foster a common culture by transferring specific knowledge and skills required to carry out efficiently and effectively regulatory functions, and to support the harmonization of regulatory excellence at the regional and international level.

The Basic Training Programme is addressed mainly to new staff at NRAs and TSOs, but should also be of interest for professionals at these institutions recently assigned to the nuclear safety, nuclear security or radiation protection sector and professionals involved in the licensing of all types of activities and facilities from the nuclear cycle as well as personnel involved in the regulatory oversight of non-nuclear power applications, such as in research and education, medicine or industry.

The different training modules are designed to build-up basic generic and technical competencies among professionals holding a master degree or higher academic degree such as legal experts, engineers, nuclear scientists, physicians, agricultural engineers, veterinary surgeons, technicians and security professionals to prepare them to carry out regulatory functions or to technically support NRAs in their duties. The focus of the Basic Training Programme is on the legal framework and regulations, technical concepts governing nuclear safety, nuclear security and radiation protection necessary for regulatory control of nuclear and radioactive materials in all their applications. It aims at increasing the understanding of regulators why safety systems and requirements defined by plant management are in place, why they are so important and how nuclear culture can be regulated.

The Basic Training Programme will consist of four thematic modules which are independent. Each module will be divided into sessions.

* **Module I:** Legal and Regulatory Framework & Regulatory Functions
* **Module II:** Technical Concepts governing Nuclear Safety, Nuclear Security and Radiation Protection
* **Module III:** Regulatory Oversight of Safety Culture
* **Module IV:** Individual Tutoring

After the successful completion of the Basic Training Programme, learners are expected to be able to:

1. Demonstrate a systemic vision of nuclear safety by understanding the explicit and implicit connections among technological, social, human and organizational features
2. Explain the fundamental principles that form the system for the protection of human and their environment from ionizing radiation;
3. Discuss the legal basis and regulatory process that empower the NRA to govern its operation;
4. Explain the basics of regulatory oversight of licenses including the management of  safety culture and to compare the different oversight approaches;
5. Identify the different steps of the safety culture oversight process and to differentiate between nuclear safety and nuclear security culture;
6. Discuss the basic, applied and advanced technical disciplines related to the regulatory control of facilities and activities using ionizing radiation;
7. Describe and discuss regulatory practices such as assessment and inspections technologies, investigation and auditing;
8. Demonstrate soft skills necessary to carry out regulatory functions

# Future prospects

The next step in the development of the Basic Training Programme is to perform a study to assess feasibility to establish through this programme an EU wide harmonised level of competences in nuclear safety for Regulators and TSOs. ENSTTI has the objective to perform a test case of its basic Training programme in 2015.

The result of the test case will be analysed to identify strength and weaknesses, and to provide recommendations to improve the training programme. It will also be used to assess whether there is a real potential, through this method, to support the establishment of an EU wide level playing field for nuclear safety, contributing to the development of best practices in relation to the training of staff working for EU regulators and technical safety organisations.

######  References

[1] European Nuclear Safety Training and Tutoring Institute; EU Nuclear Regulatory Authorities and Technical Safety Organisations-Functions, Fields of Activities and Training; Report to the NUSHARE project; ENEN, Paris, (*In Press*).

[2] International Atomic Energy Agency, Safety Culture in Nuclear Installations: Guidance for use in enhancement of safety culture, IAEA TECDOC 1329, IAEA, Vienna (2002).

[3] International Atomic Energy Agency, Regulatory Oversight of Safety Culture in Nuclear Installations. TECDOC 1707, IAEA, Vienna (2013).

1. The term “regulatory functions” refers to functions defined in the IAEA Safety Standards, GSR 1 in particular. [↑](#footnote-ref-1)
2. European Commission <http://ec.europa.eu/education/lifelong-learning-policy/ecvet_en.htm> [↑](#footnote-ref-2)
3. Such as: IAEA TECDOC 1329 [2], IAEA-TECDOC-1707 [3]; [↑](#footnote-ref-3)