1st Workshop on the Radiological and Nuclear Training Framework in the European Union

27 January 2020
ENEA Research Centre, Frascati (Italy)

Workshop Summary

Date: 08.05.2020
Contract No. 833573

This project has received funding from the European Union's Horizon 2020 research and innovation under grant agreement No. 833573

CONTENTS

Executive Summary

This document summarizes the contributions and discussions during the "*1st Workshop on the Radiological and Nuclear Training Framework in the European Union*" that has been organized by the European Project INCLUDING and held at the ENEA Research Centre of Frascati (Italy) on 27 January 2020.

1 SCOPE AND OBJECTIVES OF THE WORKSHOP

The "*1st Workshop on the Radiological and Nuclear Training Framework in the EU*" has been an initiative of the INCLUDING project within the activities of WorkPackage (WP) 4. The main scope of this WP is to contribute to harmonize the education and training activities for Radiological and Nuclear (RN) First Responders and Practitioners across the EU (European Union) Member States.

The Workshop has been hosted by the Department of Fusion and Technology for the Nuclear Safety and Security of ENEA at the Research Centre of Frascati, 20 km south of Rome on 27 January 2020.

The Workshop was open to first responders, practitioners, innovators, suppliers and academia with an interest in the RN sector and was kept to a non-classified level in order to maximize participation. Sixty-two participants from eleven different Member States attended the workshop in Frascati. Remote connection was activated for other four participants. Forty participants were from the INCLUDING Consortium and 22 from external Stakeholders and in representation of Fire Fighters, Civil Protection, Nuclear Security Organizations, Industry, SMEs and Academia. The following ongoing EU projects took part to the workshop: No-Fear, Enotice, Resist, Melody and Bullseye.

The Workshop was designed to orient participants to new or updated plans, policies, or procedures in RN training at EU level. In presenting the workshop to the participants the objectives were listed in a bullet form as here reported:

- To deliver an overview of the current status of the standardization of RN training at EU level;
- To clarify the role of innovative methodologies and technologies in RN training;
- To assess the relevance of threat scenarios in RN training;
- To collect recommendations, suggestions and lessons learnt from participants and other EU projects.

These objectives are instrumental to support WP4 in reaching its scope. A 2nd Workshop it is scheduled for spring 2022 and with the aim to assess progresses in the above objectives in light of recommendations arising from the present workshop.

2 WORKSHOP SUMMARY

The workshop started with a welcome speech from Eng. A. Dodaro, Head of the Fusion and Nuclear Safety and Security Department at ENEA. Eng. Dodaro pointed out the relevance of a tight collaboration between research organizations and RN First Responders for developing innovative solutions that can improve their response and intervention capabilities. Eng. Dodaro went on by reinforcing the full support of ENEA to this research vision in full adherence to the CBRNe Action Plan issued by the European Commission and claiming that INCLUDING is a project rooted at the core of its Department mission.

2.1 Session 1 – Scenarios and Methods

The opening session of the Workshop was devoted to a thorough analysis of how RN threat scenarios are evolving and on the impact of this shifting on national training programs. The fist speech was from Prof. F. Steinhaeusler of the International Security Competence Centre (ISCC) in Austria and focused on **Training on R&N threats scenarios.**

The intervention began with an exhaustive analysis of the global movement of radioactive material on yearly basis and demonstrating the scale of the issue. In fact, globally, about 20 million consignments of radioactive material are transported each year on public roads, railways, aircraft, and ships. About 95% of radioactive consignments are not related to nuclear power. In 2016, a total of 143 incidents of nuclear or other radioactive materials was found to be outside of regulatory control, which occurred in 19 countries. The current threat situation is reflected in the incident in Austria in December 2019: Austrian counterterrorism-unit arrested 3 Slovak citizens in Vienna on 7 December 2019, offering 900 g „weapon-grade“ uranium for US$ 3 Million. The current risk assessment has to account for the potential threats due to millions of radioactive sources in use worldwide and hundreds of tons of military grade U/Pu not under IAEA safeguards.
Prof. Steinhaeusler categorized the threat scenarios as those with High probability-Low radiological consequence (HPLC) and those with Low probability-High radiological consequence (LPHC) threats.

The HPLC category includes threats like:

- *Natural radioactive isotope* used as contaminant and that offer several advantages for the criminal: it can be delivered by mail, scattered in public space, distributed by aircraft or drone(s) over public space. This category is characterized by high social impact
- *Radioactive solution as contaminant* gave the criminals various options for contaminating the environment: Spreading the solution in public places, injecting it into drinking water, distributing it by manned aircrafts or unmanned aerial vehicles over public spaces.
- *Radioactive aerosol* can be distributed by criminals via ventilation system located in Shopping centre, Government building, school, subway, or airport.
- *Radioactive material can be deposited by criminals on surfaces* like door handles in public space; seats in public transport; keypads at cash-dispensing machines (ATM), or banknotes.
- *Radioactive material can be used with criminal intent to contaminate food* like unwrapped vegetables, fruit and bread in supermarkets, or a drinking water dispenser.

All these scenarios have low radiological consequences but high societal impact that demands a specific planning to deal with.

The main LPHC threats are:

- *Covert irradiation by Radiological Exposure Device (RED)* for (a) Assassination of individual(s) by applying a high radiation dose either at a high dose rate for a short

time (e.g., radiation source hidden in a crowded public space), or protracted over a long period at a low dose rate (e.g., radiation source hidden in furniture), (b) irradiating large crowds in public spaces at a high dose rate (e.g., hidden radiation source in subway station), causing a large collective dose.

- *Detonation of Radiological Dispersal Device (RDD)* where criminals can combine radioactive material with an explosive and detonate it in two modes: (a) device hidden in a vehicle as a car bomb (Vehicle-based RDD (VBRDD); (b) Person-based RDD (PBRDD) as a suicide bomber.
- *Detonation of Improvised Nuclear Device (IND)* provided the criminal(s) have access to an adequate amount of weapon-grade nuclear material and sufficient logistical infrastructure, the construction and deployment of an IND is possible. This would result in a catastrophic impact on the targeted society in terms of: Physical damages due to the initial blast wave, the return wave; intense light flash leading to blinding effects among the population; wide spread incineration of combustible material by the heat wave; initial high dose rate radiation exposure, followed by variable radiation exposure due to fallout.
- *Uncontrolled radioactive release from nuclear installation* is a major release of radioactivity can occur either intentionally due to a terror attack, or unintentionally caused by a plane crash onto a nuclear installation, or due to a technical failure (INES Scale >5).

Prof. Steinhaeusler finally took into account the impact of this current threat environment on RN training programs and suggested that the main RN related training objectives should encompass the following topics:

- Address specific requirements for the safe management of sources
- Contain specific information on possible consequences of the loss of adequate control of sources
- Address short term- and long-term response phase after loss of control
- Emphasize wide spectrum of potential threat scenarios leading to radiological or nuclear emergencies
- Differentiate between the needs and skills of the different responders (fire-fighters, police, medical institutions, national/regional/local administration, research institutions, industry).

The second presentation of the day was held by Mrs. D. Neimontaite of the Nuclear Security Centre of Excellence (NSCOE) in Lithuania and devoted to **Systematic Approach to Nuclear Security Training.**

Mrs. Neimontaite started the speech by explaining to the audience that the primary mission of NSCOE is to contribute to the sustainable and effective nuclear security regime through the provision of the human resource development services to the multiple national stakeholders as well as to support the development of the national nuclear security capabilities and coordination. The activities of the NSCOE have been based on the good international practice, recommendations and training aids; the methodology, experience and support from the International Atomic Energy Agency (IAEA), USA, UK and other countries have been consistently used developing NSCOE projects.
Nowadays the NSCOE is a structural unit of the State Border Guard Service Border Management (SBGS) Board. The main objectives of NSCOE are:

- To focus on organising trainings, specialised seminars and simulation exercises in the field of countering nuclear smuggling
- To facilitate and promote the cooperation between the national institutions involved in to combating the smuggling of the nuclear and other radioactive materials

- To carry out and maintain the international cooperation in the area of nuclear security and border guard training
- Training needs analysis in the area of nuclear security

The national stakeholders involved in the procee of training needs assesments are the State Border Guard Service, Customs Department, Security Department, Military forces, Police Department, Intelligence services and Personnel at the Nuclear power plant.
The presentation then analyzed the Systematic Approach to Training (SAT) that NSCOE has developed and adopts in its training programs. SAT is an iterative process based upon five different phases, which start with evaluation and go on with analysis, design, development and implementation.

Analysis is the first step of the process and where are analysed the following points:

- Functions, job descriptions and instructions analysis in order to identify the necessary competence
- Customers survey
- Legal acts changes
- Working with events summaries
- New sites
- Rotation /new staff
- Trained personnel data basis

Then the Design and Development phase follows and with a focus on:

- The annual training planning,
- Training calendar harmonization with customers,
- Personnel and equipment,
- Logistics (training facilities, accommodation, transport, classrooms, training field, technical measures),
- Preparation of training material, handouts

In the Implementation part are treated the:

- Theoretical part - e-learning
- Assessment on the beginning of practical training,
- Repetition of problematic topics,
- Practical training,
- The overall evaluation of the training – exams

Finally there is the Evaluation phase with:

- Participants Survey after the training,
- Customers survey after the training,
- The observed gaps on training (by trainers),
- Changes in the quality of work (arrests/alerts summaries, National communication system (NCS) analysis).
- TTX, Field exercises
- Sites inspections

As an explicative example, it was reported the SAT structure of the training program for State Border Guard Service. It encompasses four different levels with Level I for Decision Makers, Level II for Training Instructors, Level III with a focus on Radiation Portal and radiation safety and Level IV as a general introductory course. The presentation ended with figures on target groups and number of participants to the training programs.

The session was concluded by the presentation of Prof. A. Kovacs from the Nuclear Security Department of the Hungarian Academy of Science and on **Innovative training programs for RN related activities in Hungary**

Prof. Kovacs introduced the activities of the Centre for Energy Research (EK, Budapest, Hungary) in nuclear security and explained that the main aim is to operate the Hungarian National Nuclear Forensic Laboratory and the Collaborating Centre of the International Atomic Energy Agency (IAEA) for Nuclear Forensics. It provides Member States as IAEA partner laboratory enabling coordinated research, provision of applied different interactive training courses and programs, as well as access to advisory expertise, and mentoring opportunities. The alignment of subject matter expertise with laboratory infrastructure for the response to a nuclear security event distinguishes this nuclear forensics partnership and promotes its availability within Central Europe and beyond. The Centre for Energy Research is further positioned to provide specialized and effective solutions in nuclear forensics as part of the IAEA Nuclear Security Support and Training Centre network.
In the frame of the Collaborating Centre and separately, the following practical training programs are organized at EK internationally and for national stakeholders:

- 1-week long IAEA Practical Introduction Training Course for Nuclear Forensics (from 2014). Training contains a table top exercise for Analytical Plan and interpretation of data for nuclear forensics findings. The expected results include orientation in practical nuclear forensics to include gamma-spectrometry, mass spectrometry and scanning electron microscopy as well as sample preparation and analysis of LEU samples.
- 3-months long IAEA Residential Assignment Program (5 programs from 2015 with 13 participants (Slovakia, Malaysia, Kenya, Croatia, Czech Republic, Thailand, Kazakhstan, Bulgaria, Romania, Ghana, South-Africa, Lebanon). It is a comprehensive program including theoretical education and practical exercises (non-destructive and destructive techniques with laboratory work) to understand how nuclear forensics works in practice. Besides, overview on the Hungarian regulation and traditional forensics together with the Hungarian Atomic Energy Authority and the Hungarian Police ”from crime scene to court” model
- MEST and Radiological Crime Scene Management Trainings
- Basic radiation protection and detection training
- Source searching (laboratory-based and external location)
- How-to-use the personal protective equipment (PPE)
- Response to a nuclear security event

Prof. Kovacs concluded the presentation by announcing that at EK is in progress the establishment of an open-air training facility for different national and international stakeholders using different scenarios to renspond different type of nuclear security events. Besides, development of virtual training (VR) programs for first responders (e.g. for radiological crime scene management) or to respond a nuclear security event like a dirty bomb explosion is also planned together with the Hungarian Police.

2.2 Session 2 – Civil Military Cooperation

Civil military cooperation in emergency management has been growing in the recent years and with specific initiatives in CBRN training. The session was open by Captain S. Kolovos of the Hellenic National Defence General Staff (Greece) and with a talk on the **NATO CBRN Civil - Military Framework**

The presentation of Captain Kolovos provided Workshop's participants information on the latest NATO's CBRN defence policy related to civil-military cooperation. Regarding CBRNe civil-military cooperation, NATO has lately adopted the CBRN defence comprehensive

approach, which leverages increased civil-military interaction, improves coordination and cooperation, and brings benefits at the strategic level, ensuring a more holistic approach in meeting the CBRN threat. The talks went on by explaining that the responsible NATO authority for the conduct of civil-military cooperation is the Civil Emergency Planning Committee (CEPC). It has been then pointed that after a NATO Foreign Ministers' decision (June 2018) it was tasked to prepare non-binding guidelines in order to find ways for an enhancing CBRN cooperation in several fields. These guidelines cover the following fields:

(1) **Planning:** Mutual understanding of the military and civilian plans and procedures / Support by national legislation, policy and strategy.
(2) **Logistics**: Coordination of logistical capabilities for flexibility, availability and effective logistics support.
(3) **Medical**: Military medical capabilities may be proved crucial in case of a large scale CBRNe incident.
(4) **Public Awareness and Warning Information Systems**: Use of NATO guidance documents on developing and implementing a Public Communication Plan.
(5) **Notifications and Emergency Communications**: Providing of CBRNe information from military and civilian intelligence sources to agencies without access.
(6) **Training and Exercises**: Specific training in civil-military cooperation and interoperability, combined with regular exercise to ensure sufficient knowledge of capabilities

Following the aforementioned guidelines NATO Joint Health Group provided its recommendations for civil-military cooperation in medical domain:

(1) Development of regional CBRN mass casualty planning, preparedness, response and recovery framework.
(2) Establishment of national health resilience strategic stockpile including CBRN countermeasures for civ-mil use.
(3) Creating of a national CBRN medical incident management framework
(4) Development of a common national CBRN medical competency framework to support civ-mil personnel training.
(5) Enabling access and participation of civ-mil personnel from healthcare sectors to exercises.
(6) Development of a MOU between civ-mil healthcare authorities to enable such cooperation.

Captain Kolovos reported that NATO CBRN threat assessment related to civilians till 2030, states that more actors will have access to WMD/E leading to increased possibility of their use. Specifically, CBRN weapons will be universally available to almost anyone with enough financial resources. Moreover, the impact of these weapons will increase significantly within the large urban populations. Additionally, the use of technology increases the possibility for the remote execution of such attack, especially in mass gathered people areas, like metro stations, malls, market places.

The second presentation of the session was held by Mrs. A. Rizzo from the Methods and techniques for Nuclear Safety, Monitoring and Traceability Laboratory at ENEA and on **Training structure on Radionuclide techniques: examples from the Comprehensive nuclear Test Ban Treaty verification**

Mrs. Rizzo introduced to the audience the basic contents of the Comprehensive nuclear Test Ban Treaty (CTBT), a multilateral treaty whose art 1 claims that "*Each State Party undertakes not to carry out any nuclear weapon test explosion or any other nuclear explosion, and to prohibit and prevent any such nuclear explosion at any place under its jurisdiction or control*." It was adopted by the United Nations General Assembly on 10

September 1996 but has not still entered into force, as some nations have not ratified the treaty.
Art. V of CTBT is about verification and affirms that *"in order to verify compliance with this Treaty, a verification regime shall be established consisting of the following elements a) International Monitoring System, b) Consultation and clarification, c) On-site inspections and d) Confidence-building measures".*
The presentation focused its attention on development of training programs of inspectors appointed for on site inspections. Their duty is to gather evidences that may arise the suspect that a violation of CTBT has occurred and for identification of the violator. Information can be gathered only by allowed international means and provided that inspectorate is not permanent, neither residential and that no more that forty inspectors are on the inspected territory country. Several techniques are involved (geophysical, radiometric, multispectral, visual observation). The training program developed at ENEA for inspectors is open to experts from civil, military and scientific sectors. It consists of three blocks: an introductory block (27 working days), a advanced block (51 working days) and a block devoted to soft skills and leadership (15 days). Attention was then pad to the contents of the advanced training and most notably on deepening the knowledge of radionuclide technical activities within the framework of an on-site inspection (OSI), acquiring hands-on experience with the available hardware and software, practice on procedures in place, obtaining practical knowledge related to radionuclide and noble gas sampling, handling and analysis, validating the pertinent Standard Operating Procedures and Work Instructions, maintenance and handling of the equipment and on use of Geospatial Information Management System for OSI. The presentation was concluded with a presentation of main challenges of the training course so far faced and with the different national approaches in the procedures above all and with the final statement that an Investigation Mission is not a Scientific Mission

2.3 Session 3 – Innovative Technologies

New technologies are key to innovate RN training programs and to enable new learning paths. Table-Top Exercise have been demonstrating a versatile and fruitful tool for assessing response organizations capabilities and to enhance experts knowledge in concepts of emergency management.

Mrs. A. Iannotti from University Tor Vergata of Rome, INAC and HESAR (Italy) gave a presentation on **Table Top Exercise (TTX) as a training tool to prepare experts in case of emergency of R/N situation**. Mrs. Iannotti started by explaining that one tool that is being exploited more and more within the training domain is the table top exercise or TTX. The TTX is a versatile element of the RN training toolbox that is relatively cheap to design and can be delivered almost anywhere. The TTX can be used to develop awareness, validate plans, policies and procedures, to help prevent, protect, respond and recover from these events The table top exercise is one tool that can be used to test response plans and operating procedures, identify areas where there is a need of improvement in communication or capability and help countries understand cross border issues. TTXs are normally carried out in an informal and stress-free environment although in some cases, an element of stress can be introduced, typically to simulate the situation in real life.
The table top allows participants to make mistakes, as it is far better to make an error during a TTX and have it corrected, then if you were making errors during a full-scale exercise.
Mrs. Iannotti then treated a very interesting subject: TTX is an important tool for businesses and can be used to verify and test a business continuity plan. Business continuity can be considered as a corporate capability. This capability exists whenever organizations can continue to deliver their products and services at acceptable predefined levels after disruptive incidents have occurred. A good business continuity plan recognises potential threats to an organization and analyses what impact they may have on day-to-day operations. It also provides a way to mitigate these threats, putting in place a framework that allows key functions of the business to continue even if the worst happens.

During the presentation was reported examples of Business Continuity Plan testing following a CBRN event, such as the hospital table-top exercise with a scenario of a communicable disease outbreak, run by the National Health Service Scotland and the TOPOFF 4 Looking Glass TTX, this being based on the detonation of a radiological dispersal device in New Jersey. However, many businesses, particularly the smaller ones, do not take the threat seriously and therefore have no business continuity plan, and those that do have a plan may not update them regularly enough, as people and roles may, and do change and plans need to be updated to reflect this.
A TTX can range from the simplest of facilitated round table discussions, to sophisticated simulation games, their complexity being driven by a combination of the reasons for using a TTX and available resources. Simulating the response to a particular scenario or scenarios, means that processes can be checked, procedures streamlined and gaps identified. Other advantages of a TTX, particularly with respect to full-scale exercises are that with a TTX it is possible to try a variety of approaches on the same situation. It is possible to stop a TTX at any moment, go back and re-run a part of the exercise using a different capability. A TTX can be stopped and a capability (resource) removed, this allows the testing of the resilience of a team. Successful completion of a TTX can make the participants feel more confident afterwards as well as identify gaps that may need to be addressed.
Playing a TTX can also raise awareness of the existence, or in some cases the non-existence of plans and processes that are available during the response of a CBRN incident. These can be a local, national or regional level as many CBRN incidents are cross border in nature. At the end it was stressed the concept that Table top exercises can uncover issues before they happen for real.

The second presentation of the session was about the role of **Virtual Reality for Training and Certification** and was held by M. Melo of the Institute for Systems and Computer Engineering, Technology and Science (Portugal)

Mr. Melo explained that the goal of Virtual Reality (VR) technologies is to transport its users to a virtual environment where they can interact with the virtual elements. With technological evolution, VR technologies reached a point where they can mimic real scenarios with a high degree of fidelity. This has made VR a strategic technologic, being successfully adopted in the most diverse application fields.
In the field of training, VR offers a variety of advantages and opportunities when compared to conventional training approaches, such as:

- Possibility of recreating real scenarios in a High-fidelity VR environment
- Creation of safe training environments
- Optimization of training costs associated with employees allocation for training monitoring and production stoppage times for training purposes
- Training of individuals or teams at anytime and anywhere;
- Systematic training of unusual events.

While VR has shown to be valuable for training procedures, the process of certifying training using only digital tools is still in its infancy. This is precisely the focus of MASSIVE VR Laboratory, which is devoted to the multidisciplinary study of the relationship between VR technologies and the different dimensions of human performance. In the scope of the INCLUDING project, MASSIVE has the following vision:

a) Short-term goal: VR training scenarios for addressing CBRN training gaps and integration of such in the INCLUDING training framework (to be delivered whiting the INCLUDING project)
b) Medium-term goal: one of the major barriers for the adoption and maintenance of VR training programs are the costs associated and the need of dedicated specialized human resources. To overcome this, we envisage the creation of authoring tools that

enable the fast and expeditious creation of immersive CBRN VR training scenarios.

c) Long-term goal: Putting forward Artificial Intelligence-powered mechanisms that allow the automatic assessment of procedures, behaviours and decision-making processes. This will allow the certification of trainees using only digital tools and without human intervention if intended.

2.4 Session 4 - Bloom's Taxonomy

Application of educational methodologies to RN training programs is an emerging field that has given already interesting results during the FP7 EDEN project and with particular regard to the adoption of the Bloom's Taxonomy. In this session the **basics of the Bloom's Taxonomy** were recalled by a presentation of Prof. G. Agrusti – Libera Università di Maria SS. Assunta of Rome, LUMSA (Italy).

Prof. Agrusti outlined that Bloom's Taxonomy of educational objectives (1956) represents one of the fundamentals of educational practices and it allows framing and carrying out quality assurance processes of training interventions. It allows to understand learning processes, to modify teaching according to learning processes that are actually taking place, and it can be applied to almost any field of study. However, to apply it properly it is crucial to get to know its rationale and its terminology. The revised version of the taxonomy (Anderson & Krathwohl, 2001[1]) for the cognitive domain is composed of six levels:

1. Remember (recognize or recall names, facts, properties)
2. Understand (interpret, exemplify facts or objects)
3. Apply (execute, implement simple chain of repetitive actions)
4. Analyze (differentiate, dividing in parts, identify components)
5. Evaluate (check, attribute a value)
6. Create (plan a set of stages to reach a goal, produce something new).
7.

This levels can be applied differently to the plain acquisition of knowledge or to the skills formation and ultimately to the mastery of competences.

The Affective and Psychomotor domains are instead composed by other different levels of achievement as in figure 1.

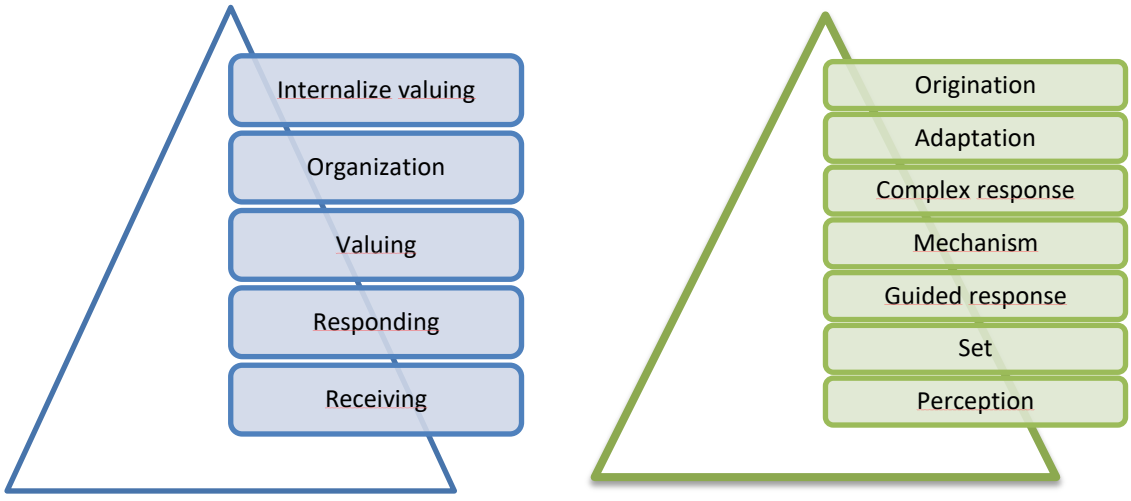

Figure 1 The different levels of the Affective and Psychomoto domains

[1] Anderson, L.W. (Ed.), Krathwohl, D.R. (Ed.), Airasian, P.W., Cruikshank, K.A., Mayer, R.E., Pintrich, P.R., Raths, J., & Wittrock, M.C. (2001). *A taxonomy for learning, teaching, and assessing: A revision of Bloom's Taxonomy of Educational Objectives* (Complete edition). New York: Longman

Finally, Prof. Agrusti explained that in order to measure progress and changes in learners, it is crucial to differentiate between broad and general aims of the course and the specific and observable learning goals built with reference to the Bloom's Taxonomy.

An example on the **Practical use of Bloom's Taxonomy** was given by Mrs. V. Capaite from the Nuclear Security Centre of Excellence (NSCOE) in Lithuania.

Mrs. Capaite recalled the basic of the systematic approach to training (SAT) at NSCOE and added that NSCOE has a Training Programmes Development Working Group (TPDWG), which is composed of qualified curriculum designers, certified RN security and safety instructors, with experience in border guard operations. TPDWG members continually analyze their field of activity, operate in accordance with SAT principles and carry out common steps in the training planning process.
Training programmes are designed in compliance with the training programmes standard with respect to Institution's and national legislation and European Border and Coast Guard Agency (FRONTEX) Sectorial Qualifications Framework for Border Guarding (SQF) recommendations[2]. The Sectoral Qualifications Framework for Border Guarding is a framework of high-level learning outcomes (LOs) that reflect all of the learning, for all border-guarding activities, across the EU. As overarching frame of reference, the SQF encompasses all levels of qualifications acquired in vocational and academic education and training for border guards.
The SQF is designed to align with levels 4,5,6 and 7 of the European Qualification Framework for Lifelong Learning (EQF) and is consistent with the Bologna and Copenhagen processes. It addresses the border guard professional sector and it will relate the different countries' qualifications systems and frameworks together around a common European reference. The SQF does not dictate learning or training requirements to any individual state or organization with border guarding responsibilities, but it should reflect comprehensively the entire scope of learning in the border guard field throughout the EU.
Mrs. Vaida highlighted that NSCOE uses this framework to identify the learning outcomes for each area of border guarding and went on explaining that learning outcomes (LOs) are explicit description of what a learner should know, understand and be able to do as a result of learning and that they indicate a minimum standard of learning.

The presentation also included examples on how to generate LOs adopting Bloom's Taxonomy and with a focus on classification of levels of thinking during the learning process.

2.5 Session 5 – Standardization

Standardization in the security sector has the potentiality to improve the efficiency of the prevention and response mechanisms as well to act as driver for Pan-European integration. During the recent years, the most important initiatives in this regard, are the TC 391 of CEN/CENELEC and the H2020 Stair4Security (S4S) project. The workshop hosted a keynote speech of Mrs. Patricia Compard, chairperson of TC 391 and members of S4S and on **European security standardization in the CBRNe sector.**

Mrs. Compard initiated the speech with a revise of the main challenges in the CBRN-E sector and outlining that with increasing globalization, the security threats growing in scale and sophistication. In particular it was discussed issues related to the EU specific challenge: open space with 27 member states responsible for security, 27 governments and different territorial organizations, 24 official languages.

[2] FRONTEX Sectorial Qualifications Framework for Border Guarding (SQF for BG) recommendations aren't prescriptive, but Lithuanian State Border Guard Service included SQF for BG in all training programmes.

In this framework standardization plays a key role for addressing solution to this issue. But what is standardization? A standard is a document providing, specifications, guidelines or characteristics that can be used consistently to ensure that materials, products, processes and services are fit for their purpose. Standards are concrete and shared outcomes, workable for all stakeholders developed by consensus of experts, as well as investments and powerful lever to strengthen resilience and develop markets. Standardization is a complex process and with pre-standardization that comes first. In fact Pre-standardization is building up the forward-looking big picture of standardization. It is particularly needed in EU current context. Standardization achievements are generally done within the standardization preliminary processes. In the EU they can also be done through EU funded research projects, practitioners networks or CEN Workshops Agreements. Improvements can be achieved such as enhanced coordination, identifying the state of the art, developing comprehensive guiding instruments, setting up priorities, assessing relevance of research and innovation investments, optimize, develop and protect investments (including training), developing needed and used standards. Mrs. Compard went on giving an exhaustive list of all actual approved standards (CEN and ISO) in the Security sector and with a focus on CBRNe. In particular she highlighted the work of the CEN/TC 391 "Societal and Citizen Security" in developing standards as driving factors to enhance the capabilities of European societal and citizen security stakeholders. The presentation was concluded with the presentation to the audience the ongoing efforts of the Stai4Securty (S4S) project. S4S is supporting governance of research, innovation and standardisation needs in CBRNe and DRR sectors – driven from policy levels and practitioner needs. S4S is a single-entry point for standard-related resources for the CBRNe /DRR sectors and will be delivering a framework consisting of a core networking and coordination platform plus a governance system, supported by an elearning tool, complemented by a revised CEN workshop and fast-track procedure that is well suited to the needs of the CBRNe / DRR users community.

2.6 Round Table – Chairman Prof. F. Steinhaeusler (ISCC)

The Round Table has been a one-hour session aimed at collecting views, opinions and recommendations from the participants on the workshop subjects. In order to create a friendly environment for contribution, the participants were briefed in the informed consent that any personal or professional view they might have express during the workshop would have been kept anonymous in all the dissemination materials. This implies that by no means the opinions or views expressed can be related to the personal data of the originator. This is in line with the project approach to treat this kind of inputs in a statistical way and out of a contextualization with personal sensitive data.
In view of the limited time available, after a detailed planning carried out by WP4, it was decided to address the overall topic A way forward for harmonization of RN Training in the EU, focusing on:

- Topic 1 - Validity of threat scenarios used in current R & N training programmes
- Topic 2 - New technologies for application in R & N Training programmes
- Topic 3 - Standardization in the CBRNe security sector

To achieve a structured discussion, the topics were introduced to the by the chairman and then discussions followed.

Topic 1

- The discussion on the first topic was introduced with the following question to the audience was: *Are our R & N threat scenarios valid or are we training to manage yesterday´s threats?*

The discussion was initially focused on the meaning of R&N threat scenarios in order to agree on a common definition among practitioners. The audience agreed on the definition of

RN threat given by IAEA[3] and stating that *it stems form person or group of persons with motivation, intention and capability to commit criminal or intentional unauthorized acts involving or directed at nuclear material, other radioactive material, associated facilities or associated activities*. It is different from a RN accident, that IAEA defines as *any unintended event, including operating errors, equipment failures and other mishaps, the consequences or potential consequences of which are not negligible from the point of view of protection and safety.*

Nevertheless there are some borderline cases that were discussed and among them the most debated was a violation of the Comprehensive Nuclear Test Ban Treaty (see presentation of Mrs. A. Rizzo at Sec. 2.2). The audience agreed that it must be included in the RN threats category because the perpetrator is committing an intentional unauthorized act. It was pointed out that the international CBRN threat scenarios are forever changing. Technological progress enables opponents to view attack modes considered unthinkable only a decade ago (e.g., drones misused for transport and dispersion; large number of orphaned radioactive material available internationally; sophisticated remote-control technology for detonating explosive devices, etc.). The audience agreed that it is important to consider threat scenario development as a continuing process of adapting R & N training programmes, requiring constant vigilance. This means that it is necessary to find a balance between the mounting trend to value capabilities-based approach over scenario-based approach in capacity building in the RN sector. This is all the more relevant in the prevention phase of the RN emergency management cycle.

Topic 2

- The question that introduced the second topic was: *Are we ready to adopt new technologies and how useful are they in case of R & N training programmes?*

The attractiveness of new technological concepts for RN measurements, dosimetry and risk assessment, as well as their application in RN training programs was generally acknowledged by the audience. Nevertheless some concerns were raised by First Responders over the real usefulness of VR/AR tools and based upon the belief that operations in a real RN emergency setting are not a game and cannot be trained with technologies borrowed from the game industry. Technology developers remarked that, despite having taken the initial inspiration from the game industry, the VR/AR tools now available and under development for FR training have gone further and allow for a multisensory experience that bridge the gap between the real world and the synthetic one. It was pointed out that new generations of FR will be more prone to accept the adoption of VR/AR technology in training programs because rooted in their culture.

However, at the same time, serious concern was raised about the financial limitations by some institutions to actually acquire them for their RN training programmes. Restricted budgets are prohibitive to many members in the audience of considering the purchase of these innovative devices and software, irrespective of their unquestioned usefulness.

In addition, some participants outlined the importance of exploiting the activities of EU projects to promote and boost the uptake of new technologies for First Responders and for integration into training programs. The nuclear forensic sector has been suggested as one that needs to tighten collaboration with the technology providers in order to quickly adopt the last development in technology, to reshape training programme accordingly and to improve the detection and prevention performances.

Topic 3

- The third topic was introduced with the question: *What are the main challenges for standardization in the specific sector of R & N training?*

From the general point of view, the audience noted that there is an increasing interest in standardization in the CBRNe security sector. However, it was also recognized that there it

[3] https://www.iaea.org/sites/default/files/18/08/nuclear-security-series-glossary-v1-3.pdf

is a significant deficit at present in standardization and with the RN sector facing issues related the classified nature of some necessary information. In addition, a major challenge lies in the fact that interests of the various stakeholders (research, industry, end users) differ widely. Based upon the presentation from Mrs. P. Compard (See Sec. 2.5) it was also discussed what can be the benefits in supporting standardization in the RN sector. It was recognized that training should be the first phase where standardization must be improved because, among other benefits, it may contribute to better secure First Responders during their operations on the field. Nevertheless the audience recognized that standardization is a complex process, which demands also a financial commitment from all the stakeholders. In this regard it was pointed out that no specific actions to support the generation of standards are in place at EC levels. Some participants suggested to start with the production of CEN Workshop Agreements (CWA)[4] but others pointed out that also to reach a consensus among practitioners on best practices in RN training should be considered also a valuable contribution.
The discussion went on with the suggestion to take as common background to accomplish the task, the set of Operative Functions developed in D3.2 and D3.3 of the PRACTICE FP7 project[5].
The discussion on this topic was concluded with the audience acknowledging the efforts by dedicated institutions, like CEN/CENELEC, and their approach taken was fully endorsed.

3 CONCLUSIONS

At the end of the working day it has been carried out a consultation among the audience with a real time feedback. The questions with answer results in percentage are shown in Fig.2. The outcome is very satisfactory and 86% of participants keen to be informed on the 2nd edition of the workshop and 88% found the Round Table stimulating. The fact that 84% confirmed that the workshop met their expectation is a good indicators that the preparatory work was well carried out and as well the selection of presentations.

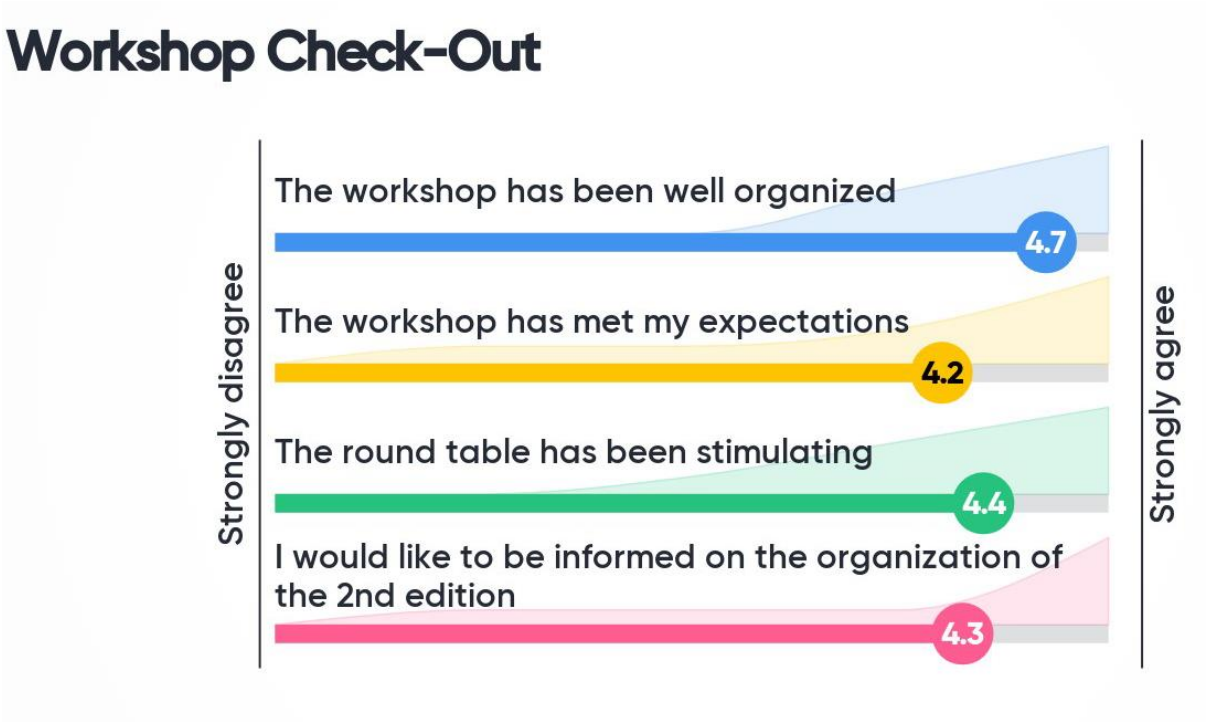

Figure 2 Statistics on audience feedbacks collected at the end of the workshop

[4] https://www.cen.eu/work/products/CWA/Pages/default.aspx

[5] https://www.practice-fp7-security.eu/cms,article,4,downloads.html