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Establishing a National Nuclear Security Support Centre

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ESTABLISHING A NATIONAL NUCLEAR SECURITY SUPPORT CENTRE

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ESTABLISHING A NATIONAL NUCLEAR SECURITY SUPPORT CENTRE

INTERNATIONAL ATOMIC ENERGY AGENCY
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FOREWORD

The responsibility for creating and sustaining a nuclear security regime for the protection of nuclear and other radiological material clearly belongs to the State. The nuclear security regime resembles the layers of an onion, with the equipment and personnel securing the borders and ports representing the outer layer, and nuclear power, research reactors and nuclear medicine facilities representing the inner layers, and the actual target material representing the core. Components of any nuclear security regime include not only technological systems, but the human resources needed to manage, operate, administer and maintain equipment, including hardware and software.

This publication provides practical guidance on the establishment and maintenance of a national nuclear security support centre (NSSC) as a means to ensure nuclear security sustainability in a State. An NSSC's basic purpose is to provide a national focal point for passing ownership of nuclear security knowledge and associated technical skills to the competent authorities involved in nuclear security. It describes processes and methodologies that can be used by a State to analyse the essential elements of information in a manner that allows several aspects of long term, systemic sustainability of nuclear security to be addressed. Processes such as the systematic approach to training, sometimes referred to as instructional system design, are the cornerstone of the NSSC concept. Proper analysis can provide States with data on the number of personnel requiring training and instructors needed, scale and scope of training, technical and scientific support venues, and details on the type and number of training aids or simulators required so that operational systems are not compromised in any way.

Specific regulatory guidance, equipment or technology lists, or specifications/design of protection systems are not included in this publication. For such details, the following IAEA publications should be consulted: Combating Illicit Trafficking in Nuclear and Other Radioactive Material, IAEA Nuclear Security Series No. 6; Nuclear Security Recommendations on Physical Protection of Nuclear Material and Nuclear Facilities (INFCIRC/225/Revision 5), IAEA Nuclear Security Series No. 13; Nuclear Security Recommendations on Radioactive Material and Associated Facilities, IAEA Nuclear Security Series No. 14; Nuclear Security Recommendations on Nuclear and Other Radioactive Material out of Regulatory Control, IAEA Nuclear Security Series No. 15.

This publication is been based on material presented during meetings and workshops that focused on State requests to establish NSSCs and the International Network for Nuclear Security Training and Support Centres.

The IAEA officer responsible for this publication was D. Lambert of the Division of Nuclear Security.

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1. INTRODUCTION

1.1. BACKGROUND

In September 2005, the Board of Governors considered and approved a *Nuclear Security Plan* covering the period 2006–2009[1]. The objective of the *IAEA Nuclear Security Plan* is to achieve improved worldwide security of nuclear and other radioactive material in use, storage and transport, and of associated facilities, ***by supporting States in their efforts to establish, maintain and sustain effective national nuclear security regime,*** inter alia, through the implementation of relevant international legal instruments. This goal is continued in the Nuclear Security Plan 2010–2013[2].

An effective nuclear security system requires the provision of capabilities to prevent, detect and respond to a criminal or unauthorized act with nuclear security implications, involving nuclear and other material[3]. If the established capabilities are to remain effective, they should be developed systematically and sustained over the long term by the State and by the competent authorities[4]. This goal can be reached through the establishment of sustainable and tailored human resource development and through the establishment of sustainable technical and scientific support services. Both components are equally important and ultimately ensure that States continue to meet the national and international requirements for nuclear security.

In recent years, requests for IAEA support in human resource development and for technical and scientific support in nuclear security have significantly increased. As a result, the IAEA has identified the need to develop a concept that seeks to effectively pass ownership of nuclear security knowledge and associated technical skills to States through the establishment of Nuclear Security Support Centres (NSSCs). In the light of this need, a proof of concept draft document was developed in 2007. The establishment of pilot NSSCs has shown that they are an ideal instrument to ensure nuclear security sustainability in a State. The positive feedback from States that are currently implementing the concept and requests from other countries to support them to establish an NSSC have led to the decision to review the first draft and to publish this guidance.

1.2. OBJECTIVE

This publication provides guidance to States and competent authorities on how to develop capacity for ensuring continued effectiveness of nuclear security systems through their nuclear security assistance programmes. In this context, the objective of this publication is to provide guidance on establishing and sustaining an NSSC focused on continuous improvement of human resource development and effective technical and scientific support services in a State. This publication addresses, among other things, the developmental, organizational and financial framework that should be considered in conjunction with the decision to establish an NSSC.

This guidance is primarily addressed to senior decision makers responsible for nuclear security functions at the various competent authorities in a State.

1.3. SCOPE

This publication describes the advantages of establishing a nuclear security network of experts within the NSSC concept and emphasizes the importance of national commitment to this long term project. It describes the role of a coordination council within the NSSC concept, provides guidance on how to assess

[1] GOV/2005/50
[2] GOV/2009/54-GC(53)/18.
[3] Objective and Essential Elements of a State's Nuclear Security Regime, Nuclear Security Fundamentals, Nuclear Security Series 20, IAEA, Vienna (2013)
[4] "Competent authority" means a governmental organization or institution that has been designated by law to carry out one or more nuclear security functions. Nuclear Security Fundamentals, Revision 7, Draft 30 July 2009. [2]

the need for such a centre and on how to assess the existing capacities that should be used for the purposes of the NSSC.

Further, this publication suggests that the implementation of the NSSC concept should be performed in two phases. Phase I describes the necessary steps in order to establish a tailored nuclear security human resource development programme, and Phase II provides details about the functions of technical and scientific support services. In addition, it provides an overview of representative resources and budget that may be related to the establishment and sustainment of an NSSC and, finally, it discusses internal and external factors that should be taken into consideration during the concept implementation.

This publication does not address aspects specific to developing a tailored *Nuclear Security Training Programme* as this is described in detail, including self-training needs assessment questionnaires, in a separate publication entitled *Nuclear Security Training – National Needs Assessment Methodology* [3].

Finally, this publication does not address support services for maintaining security systems at nuclear or other associated facilities, as these services are usually covered by the facility operator.

2. NUCLEAR SECURITY SUPPORT CENTRE (NSSC)

2.1. ROLE

The primary role of an *NSSC* is to facilitate the development of human resources and the provision of technical and scientific support on several levels to ensure the long term sustainability and effectiveness of nuclear security in a State.

Each State with activities involving nuclear and *other radioactive material* needs trained human resources for the:

- Operation of nuclear security systems at the facilities with nuclear and radioactive material, and during transport;
- Enforcement of nuclear security requirements through inspections and sanctions;
- Operation of nuclear security systems at the borders to combat illicit trafficking involving nuclear and other radioactive material;
- Provision of technical and scientific resources to support local, regional, and national response to nuclear security events, evidence gathering and forensics;
- Provision of technical support services for the installation, operation and maintenance of equipment used for nuclear security;
- Search, identification and recovery of lost or orphan radioactive sources;
- Cooperation with available laboratories for quick response to nuclear security events / illicit trafficking incidents;
- Nuclear security information management, information security and computer security;
- Remote monitoring/transmission of nuclear security related data(e.g. from borders) and its assessment;
- Advice to competent authorities on nuclear security matters.

2.2. OBJECTIVE

The objective of an *NSSC* is multifaceted, namely:

- Supporting and facilitating the development of sustainable human resources through the provision of a *National Nuclear Security Training Programme;*
- Providing *Technical Support Services* for lifecycle equipment management and *Scientific Support Services* for the prevention, detection of, and response to nuclear security events.

In realizing these main objectives, the NSSC also fosters nuclear security culture, enhances national coordination and collaboration among the various competent authorities involved in the nuclear security matters and, at the same time, supports the development of a nuclear security network of experts. This network can facilitate the exchange of information and experience among its members and provide access to relevant scientific and technical knowledge and tools[5] to the nuclear security competent authorities in a State.

The functions and the structure of an NSSC and the interrelations between the various nuclear security stakeholders, and with the IAEA, are illustrated in Figure 1.

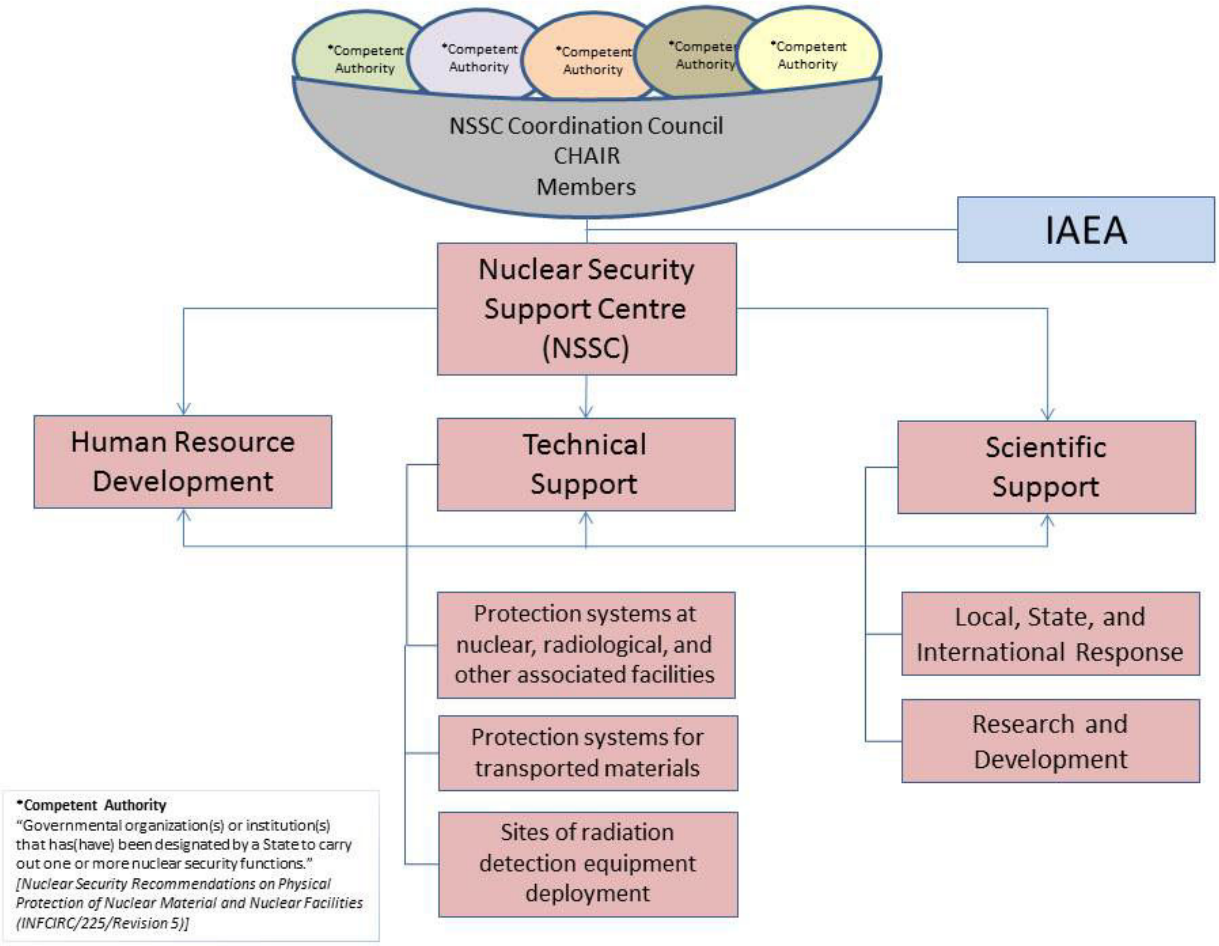

FIG. 1. Structure and functions of NSSC.

2.3. NATIONAL COMMITMENT AND ESSENTIAL ELEMENTS OF A STATE'S NUCLEAR SECURITY REGIME

In order to achieve sustainable nuclear security, it is crucial that a State makes a national commitment to adhere to international instruments, such as the *Convention on the Physical Protection of Nuclear Material* and the *Code of Conduct on the Safety and Security of Radioactive Sources.*

[5] Such as databases, legal, scientific and technical publications, IAEA publications and open source literature or training material.

A national commitment[6] results in implementing several elements for ensuring the protection of persons, property, society and the environment from harmful consequences of a nuclear security event. The twelve essential elements of a State's nuclear security regime are described in detail in the IAEA publication *Fundamentals of a State's Nuclear Security Regime: Objective and Essential Elements* [4] Since a detailed discussion about the individual essential elements would go far beyond the scope of this publication, an overview of the twelve essential elements will be provided with a focus on the essential element, sustaining a nuclear security regime, which is of most relevance here.

2.3.1. Essential elements of a State's nuclear security regime

- State responsibility;
- Identification and definition of nuclear security responsibilities;
- Legislative and regulatory framework;
- International transport of nuclear material and other radioactive material;
- Offences and penalties including criminalization;
- International cooperation and assistance;
- Identification and assessment of nuclear security threat identification and assessment of targets and potential consequences;
- Use of risk-informed approaches detection of nuclear security events;
- Planning for, preparedness for and response to a nuclear security event;
- Sustaining a nuclear security regime.

A nuclear security regime ensures that each competent authority and authorized person and other organizations with nuclear security responsibilities contribute to the sustainability of the regime by:

- Developing, implementing, and maintaining appropriate and effective integrated management systems including quality management systems;
- Demonstrating leadership in nuclear security matters at the highest levels;
- Developing, implementing and maintaining a robust nuclear security culture consisting of both physical and computer security elements;
- Allocating sufficient human, financial and technical resources to carry out the organization's nuclear security responsibilities on a continuing basis using a risk-informed approach;
- Routinely conducting maintenance, training, and evaluation to ensure the effectiveness of the nuclear security systems;
- Having processes in place for using best practices and lessons learned from experience;
- Establishing and applying measures to minimize the possibility of *insiders* becoming *nuclear security threats*;
- Routinely performing assurance activities to identify and address issues and factors that may affect the capacity to provide adequate nuclear security, including computer security, at all times.

2.4. ORGANIZING AN NSSC

2.4.1. Coordination council

As a first step in the establishment of an NSSC, the competent authorities and other organizations responsible for nuclear security in a State should establish a coordination council that deals with the

[6] *Commitment* refers to commitment of time, attention and resources (human and financial) to address the assessed threat [5].

functions and activities of the NSSC. The council should be chaired by a representative from one of the competent authorities and the role of the chair should preferably be rotated periodically. This coordination council should be in charge of managing and coordinating the functioning of the NSSC. The chair of this council should function as the focal point of contact to the IAEA Office of Nuclear Security in this regard. Subsequently, each competent authority or other organization should designate a representative and an alternate who would serve on the council and commit to participate in meetings and activities arranged by the council to discuss or implement issues related to the NSSC.

The next step would be for the council, together with the designated representatives of the various organizations, to determine the scope and scale of the NSSC on the basis of the analyses described below [5].

2.4.2. Analysis

2.4.2.1. Framework analysis

A State should perform a *framework analysis* that aims at describing the legal, human and economic environment in which the centre will be operating. It should validate that there is a genuine need in the State for the centre's services and that the need for the NSSC is great enough to support substantial participation in the centre's services.

A good starting point would be to discuss the international/national requirements for nuclear security, the related trends and how these trends relate to an NSSC.

Suggested questions to be answered include:

- What are the national requirements for nuclear security personnel and technical and scientific support services? Are they in line with the international legal framework (such as the *Convention on Physical Protection of Nuclear Material*, the *International Convention for the Suppression of Acts of Nuclear Terrorism/Nuclear Terrorism Convention, UN res 1540*) for nuclear security? Do they need to be developed?
- What factors will affect the requirements for nuclear security personnel or equipment? International requirements? Changing regulatory conditions? Changing security needs?
- Are there national plans to develop or expand nuclear programmes?
- What is the projected growth of the national nuclear programmes?
- What are the roles and responsibilities of each organization related to nuclear security, including border monitoring and security at major public events?
- What is the current number of staff responsible for nuclear security and their functions in each organization?
- What is the average age of the current nuclear security systems and staff?
- How many staff members responsible for nuclear security will be in each organization within the next five years?
- What level of education and how many years of experience do staff responsible for nuclear security have in each organization?
- What kind of nuclear security training has been attended by these at the national, regional and international level in the past?
- What kind of nuclear security equipment is used by staff in each organization?
- Which funding models for the NSSC could be used?

- What type of nuclear/radioactive material needs to be protected against malicious and unauthorized acts?
- What level of security is needed against a particular type of threat?
- What type of systemic upgrades are required periodically or in case of change of DBT?
- What are the responsibilities of each organization, including facility operators , regulatory staff and response organizations.
- Will the existing infrastructure (e.g. utilities, communications, human resource base) support the activities of the NSSC?

As a means to begin determining the need for an NSSC, a simple tool for performing a capability assessment for human resource development, technical support and scientific support is provided in Annex 1. The output of a capability assessment provides a comprehensive view of the existing infrastructure and resources which are already identified or available in a State and could be a part of the NSSC. Please note that the lists are not exhaustive.

Each question should be considered individually and answered as to whether or not an existing capability exists. If yes, a professional, objective estimation should be made concerning the level of the existing capability's application (e.g. *low* – exists, but not adequate to meet all needs; *medium* – exists and adequate to meet most needs; *high* – exists and adequate to meet all needs). If no, then the potential sources should be identified and listed that can provide support or assistance to develop or acquire that capability. The next step is to determine if the potential sources are available to provide support or assistance. The final entry in the capability assessment should document (or include) comments, explanations, or information pertinent to the previous assessment steps.

2.4.2.2. User analysis

The *user analysis* aims at identifying the user groups of the NSSC. The first step of the *user analysis* is to define which competent authorities and other organizations responsible for nuclear security in the State the NSSC will serve.

Once the user groups and their overall needs have been clearly identified, it is necessary to explain the demographics of these users.

Questions to be answered include:

- Where, geographically, are the users based?
- How many potential users fit the given definition? Is this user base growing or decreasing?
- Is it possible to group the potential users and their overall needs?
- Who will pay for the services of the NSSC?

2.4.2.3. Competitive analysis

Regarding competition, the key categories of competitors and the general competitive landscape should be discussed. There are *direct* and *indirect* competitors. Direct competitors are those that serve the same user groups with similar services; indirect competitors are those that serve the same user groups with different services, or a different user group with similar services.

Suggested questions to be answered include:

- Who offers training and services in nuclear security at the regional and international level?
- What kind of training (content, duration) or services does the competitor offer?
- How relevant are the training and services for the State?

- What is the cost?
- What are the strength and weaknesses of the competitor?

Once the council, together with the various national organizations responsible for nuclear security, has performed the different analyses described above, the implementation phases should be jointly discussed.

2.5. IMPLEMENTATION

In establishing an NSSC, it is recommended to implement the concept in two phases. Phase I should concentrate on developing human resources tailored to the State's nuclear security needs and Phase II should deal with the provision of technical and scientific support services. The following two subchapters provide details on the two phases.

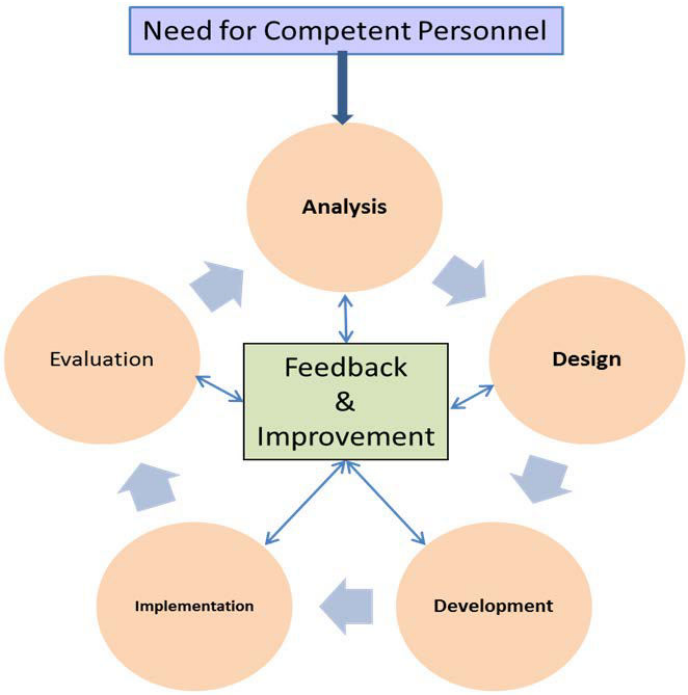

FIG. 2. Systematic approach to training (SAT).

2.5.1. Phase I — Human Resource Development

Human resource development constitutes the main pillar for sustainable knowledge and skills in a State; therefore, it is advisable to develop a tailored national nuclear security training programme within the NSSC concept before establishing the technical and scientific support services[7]. The national nuclear security training programme[8] should be based on a process such as the systematic approach to training (SAT), shown in Figure 2. The SAT has five key phases:

(1) ***Analyse*** — For all job classifications that have a potential impact on the safe and reliable operation of nuclear facilities and activities, the training needs associated with both technical competence and soft skills should be considered and analysed as part of the SAT process [10].

[7] Depending on the individual State, the establishment of the technical and scientific support services can also take place in parallel to the establishment of the human resource development.
[8] Guidance on the performance of a nuclear security self-training needs assessment is provided in detail in a separate publication titled *Nuclear Security Training – National Needs Assessment Methodology* [3].

The analysis phase may have several levels all based on understanding the tasks that make up a job or function within an organization. An important activity of the SAT analysis phase is job analysis. Job analysis is a method used to obtain a detailed listing of the duties and tasks of a specific job. The primary goal of job task analysis is to identify and compile a list (or inventory) of all tasks associated with each job position (job task analysis) or functional area of an organization (functional needs analysis), if needed. The results of job analysis are an important input to the SAT design phase. From this information, performance measures for the tasks to be learned can be identified, usually in the form of knowledge, skills, and abilities, and training required to meet those performance measures. At this point, instructional settings for the tasks to be learned (e.g. classroom, e-learning, on-the-job, self-study, blended) can be ascertained, and facility space requirements and number of instructors can be calculated.

(2) ***Design*** — The results of the SAT analysis phase provide the basis for developing training objectives that are clear, measurable and based on job requirements [10]. Training objectives that are appropriately developed provide the basis for designing training programmes, developing training material and performing post-training assessments of competencies. The first step in designing training to become part of a structured programme is to develop both terminal and enabling training objectives. A terminal objective is a statement of the instructor's expectations of student performance at the end a training session written from the perspective of what the student will do — not what the instructor will do. Enabling objectives are concise statements of the steps a student must take to successfully complete the training written from the perspective of the student and what he/she must do to accomplish the terminal objective.

Training settings, methods and training tools, suitable for achieving training objectives, should be identified within the SAT design phase. Training tools that are particularly important in the nuclear industry include:

- Simulators, including full-scope simulators, part-task simulators;
- Analytical or functional simulators, and basic principle simulators (the latter includes simulators for educational purposes);
- Equipment in workshops and laboratories;
- Mock-ups;
- Computer based and web based training systems; tools for e-learning;
- Video and audio training aids;
- Data and knowledge bases, information technology and communication aids.

Training courses should include performance tests to show mastery of learning tasks, structure and sequence of lessons, duration and pace of courses, format of training to be conducted and mode of delivery, and the type of participant assessments and assessment conditions that will be used for each course. An important part of the training programme is to develop an evaluation methodology, data collection methods (for instructors, students, and course content), and reporting formats.

(3) ***Develop*** — Training tools should be supported by suitable training material (such as lesson plans, simulator exercise guides and workshop training guides), which are developed during the SAT development phase [10]. To effectively build the competence of personnel, the following methods should be used in a balanced manner:

- Education.
- Participation in various projects and external work groups.
- Performance based formal training, including on-the-job training.
- Informal training methods, performance feedback and coaching.

For the transfer of tacit knowledge, efficient methods are on-the-job training, networking personnel using mechanisms such as communities of practice, temporary work assignments, rotation, performance feedback and coaching. Particularly important activities within the SAT development phase are the training of instructors and validating training material by trial usage to ensure the required quality of training delivery. If possible, validate course instruction to ensure it accomplishes all goals and objectives through the use of pilot courses, as part of instructor training, peer review, etc. Review existing material for applicability and sufficiency to meet specific needs. Develop, modify, or use existing instructional courseware and institutionalize the courseware into a viable learning programme.

(4) ***Implement*** — This is the phase when training is conducted. Only relevant training is provided, because SAT based training objectives that are derived from an analysis of job needs [10]. The SAT implementation phase also includes an assessment of whether personnel have achieved the standards identified in the training objectives (the standards and associated assessment methods are determined during the design phase). Thus, the implementation of SAT based training is both efficient (providing only the training that is needed) and serves as a basis for measuring and increasing the effectiveness of the training (by assessing that essential competencies are developed within the implementation phase). When practical, develop a training management plan for conducting the training to include schedules, required training aids, instructor schedules, and administrative requirements (e.g. registration, completion certification, record keeping).

(5) ***Evaluate*** — The final step in the SAT process is to perform a comprehensive evaluation [10]. This phase focuses on the evaluation of training programmes, including a determination of their effectiveness (rather than assessment of competencies of individuals, which, as already indicated, is part of the SAT implementation phase). This evaluation is conducted to both increase training effectiveness and improve performance. Review and evaluate each previous phase (analyse, design, develop, implement) to ensure it is accomplishing what it is supposed to. Perform operational evaluations (e.g. observe that the tasks that were taught/demonstrated can actually be performed by the relevant trainees in their working environment) and check that any operating procedures are consistent with training content. Revise the training programme to make it better and to meet future challenges. Performance improvement has received increasing emphasis for nuclear facilities. One of the results of this emphasis is to ensure that SAT supports performance improvement as well as achieving needed competence.

Four levels of evaluation are often used to determine the impact of training[13]:

- Level 1: Participants' reactions to the training.
- Level 2: Participants' achievement of training objectives.
- Level 3: Transfer of competencies acquired through training to job
- performance or behaviour.
- Level 4: Impact of training on organizational performance.

Four activities should be performed when evaluating training:

- Monitoring training system performance indicators.
- Analysing data resulting from monitoring.
- Undertaking changes for identified deficiencies or development needs.
- Evaluating effectiveness of improvement actions taken.

Applicable phases of the SAT should be training needs assessment that is conducted by the individual organizations responsible for nuclear security, and coordinated by the council. This allows for identification of the State's overall training needs in nuclear security, prioritizing the needs and filling, systematically, gaps of competence [8].

Key components and practices

National nuclear security training programme

A State's coordination council should designate an individual or individuals with overall responsibility for the training or retraining of personnel involved in nuclear security. The designee(s) should possess managerial and organizing skills and should be knowledgeable about all aspects of nuclear security and training methods and procedures. He/she should also be familiar with the competence requirements in nuclear security-related areas, and also possess the skills necessary to coordinate the implementation of the national nuclear security training programme at possibly more than one training centre/institution.

A national nuclear security training programme could consist of one or more classroom training course(s) in a particular area of nuclear security. It might also consist of a variety of drills for different nuclear security audiences, such as bomb squads, ambulance, police and fire brigade, in the form of practical exercises, fellowship programmes for junior staff, on-the-job training, technical visits for senior staff and/or a structured plan for attending selected nuclear security training courses offered by the IAEA and/or other international organizations or participating in relevant distance learning programmes [3]. In addition to the technical subject matters, the national nuclear security training programme should also anticipate future training activities to support the State's organizational, institutional and legal framework development.

Public awareness

Raising public awareness is an important part of efforts at the national level to prevent criminal or unauthorized acts involving nuclear and other radioactive material, and should be taken into consideration during the development of the national nuclear security training programme. The State's competent authorities are encouraged to participate in the development and establishment of an effective programme to raise public awareness. The form of a public awareness programme should be consistent with the national regulations and, accordingly, will vary from State to State. It may include information on changes in legislation, advertising campaigns directed towards target groups such as metal recycling industries, or news items on successful instances of prevention.

Nuclear security instructor, and instructional material and training equipment

To ensure the long term success and sustainability of a national nuclear security training programme, there are several components that are considered fundamental. One of these components is the development of qualified nuclear security instructors. Once a solid pool of national instructors is developed, the required nuclear security expertise can be transferred on a regular basis to the personnel working at the nuclear security competent authorities. However, the training function of the NSSC includes many activities in addition to actual teaching.

In accordance with the SAT process, training objectives have to be defined and lesson plans prepared; training material for both trainers and trainees written, produced, stored and issued; and the material, such as radioactive sources, dosimeters, boxes or vehicles for exercises, acquired. Assistance should be sought from the IAEA Office of Nuclear Security 'train-the-trainers' programme, which is available to help. The other important component is a set of written instructions for each lecture. The IAEA has a library of all the training materials for the most important topics relevant to nuclear security. The next important component is the availability of installed/portable nuclear security equipment relevant to the training courses

Training courses must be evaluated and reviewed periodically, and revised as necessary. To ensure the quality of training, each course must be evaluated for the continuous improvement of the programme [7]. The competent authorities are advised to cooperate in the development of training material and the holding of training courses. Moreover, States may consider participating in nuclear security related instructor training courses provided by the IAEA or other organizations and using training material produced by these organizations.

Training facility

In order to successfully provide specific training course(s) on a regular basis, it is essential to identify one or more suitable training facilities. Virtually every State has centres or institutions serving the common training needs of different professional entities responsible for national security, such as police, military or customs; or covering areas of radiation protection or nuclear technology. Time and effort can be saved by exploring the possibility of co-locating the identified nuclear security training activities to one or more existing training centre(s)/institution(s). Ideally they should be integrated into existing national training curricula, such as training curricula for customs, police, or personnel responsible for radioactive material and associated facilities.

Training equipment

Another fundamental component of successful and sustainable human resource development in nuclear security is the availability of simulators and specific equipment. This equipment is needed to provide training to equipment operators, technicians, computer system and database administrators, and personnel providing scientific support, e.g. members of the mobile expert support team (MEST)[9]. The training of these personnel usually represents the largest part of the national nuclear security training programme.

2.5.2. Phase II — Technical and scientific support services

Once human resource development has been established, the council, together with the various organizations responsible for nuclear security, should discuss the establishment of technical and scientific support services [10]. The main purpose of the establishment of these services at the national level is (a) to ensure equipment lifecycle management and (b) to provide expert assistance during and after a nuclear security event and expert advice to competent authorities on nuclear matters.

Equipment management can include equipment selection, testing, and acceptance, preventive and corrective maintenance, and limited replacement of installed equipment. Maintenance can involve tasks such as periodic calibration, performance checks, testing of equipment, or reinstallation of corrupted software setup files and minor repairs of the equipment. Maintenance of equipment can be performed at the designated laboratories of the NSSC, and installed equipment (e.g. *radiation* portal monitors) can be maintained through on-site visits by in-house or contracted specialized technicians. Software, computer network and communication issues can be addressed locally or remotely by computer system administrators.

Nuclear security technical support services

To perform the activities related to detection of and response to criminal and unauthorized acts involving nuclear and other radioactive material, the managers, administrators, operators, and maintainers must rely on specialized equipment and associated software. For most systems, this is developed by commercial enterprises. These important tools should be available at all times to ensure continued system effectiveness. Therefore, the sustained, long term use of equipment requires care through a formal maintenance programme, focused on ensuring continued performance, with dedicated, trained staff. This publication provides recommendations on the functions such technical support staff should fulfil, and also the resources and processes involved in establishing indigenous technical support for equipment.

The process of acquiring new or spare/replacement equipment may include the following major steps:

- Specifications determination (e.g. power, communication, size, environment, and integration with existing systems);

[9] For more details of the MEST concept and functions see Nuclear Security Series No. 6 [6].
[10] Depending on the State, the establishment of the technical and scientific support services can also take place in parallel to the establishment of the human resource development in a country.

- Procurement, delivery, and storage;
- Installation, testing and acceptance; and
- Training in the correct, local use of equipment.

Efforts must be made to ensure the sustainability and long term use of installed systems. This can be achieved by ensuring proper infrastructure for maintenance and timely supply of spare parts and regular upgrades of software/hardware to stay abreast of technological developments. The following services or functions carried out by a research institution (or university) involved in nuclear science/technology can represent key functions and practices that support the sustainability of installed systems by:

- Arranging for routine and scheduled testing of equipment following defined procedures to maintain and improve the availability of equipment, to ensure compliance with the design specifications and to detect and correct abnormal conditions before they can give rise to failures;
- Facilitating a performance monitoring system to ensure optimal equipment performance through regularly performed preventive maintenance by equipment designers or manufacturers, including inspections, alignments or calibrations, partial or complete overhauls and replacement of components to prevent breakdowns and failures;
- Where possible, establishing remote preventive maintenance through periodic checking of the hardware using pre-established check-lists and any on-line obtained state-of-health reports. In addition, remote preventive maintenance can also be performed on some software, including backup of certain software elements and archiving of data, and patch management/system update support for software elements;
- Facilitating timely corrective maintenance to restore a failed system or component to operational status within the shortest possible time by equipment designers or manufacturers repairing or replacing equipment components on the spot when necessary;
- Establishing remote corrective maintenance scheduled and undertaken in timely manner following relevant performance monitoring information on damaged hardware components or on-line repair or reinstallation of corrupted software setup files;
- Establishing a secure spare parts inventory to provide timely support for both preventive and corrective maintenance needs;
- Ensuring calibration of equipment by approved authorities;
- Assisting in procurement (specifications, technical evaluation of offers, acceptance testing);
- Evaluating new equipment;
- Establishing equipment acceptance test procedures;
- Utilizing help desk resources, when available (dealing with vendors, maintenance, repair, shipment);
- Developing specifications of requirements for equipment performance;
- Establishing procedures on correct use of equipment in case of alarms, trafficking incidents, radiological or nuclear events.

Nuclear security scientific expert support

The NSSC could also play a key role in the characterization of suspected or seized nuclear/radioactive material by providing *scientific expert support*[11].

Scientific expert support could carry out:

1. Remote monitoring through networking, for example;
    - Hot line between equipment operators and scientific expert for coordination of advanced resolution of alarms.
    - Coordination of response activities in case of a criminal or an unauthorized act involving nuclear/radioactive material out of regulatory control (e.g. radiological assessment, safe and secure transportation of contaminated material to temporary/permanent storage, nuclear forensics support, decontamination, disposal).
2. Remote/on-site analytical support: on categorization of seized radioactive material[12];
3. Other functions, such as;
    - Development of mobile expert support team (MEST)[13] capability including field measurements, analytical support to analyse radiation spectra, including alpha, beta and gamma rays, X rays and neutrons.
    - Development and establishment of effective communication schemes between equipment operators and the provider of scientific expert support, including remote links and data transmission.
    - Research & development to provide support for specific measurement and ID problems.

Once the technical and scientific support services have been established, the training needs of the personnel carrying out these services have to be assessed using a process such as SAT and tailored training, including initial and refresher training, should be developed and provided to them on a scheduled basis [9].

2.6. Budget

It is essential to discuss the funding of the NSSC in order to ensure the sustainability of the centre. Suggested questions to be answered:

- Which organization/institution will be responsible to cover the capital and running cost of the centre?
- What will be the annual budget needed to sustain the centre?

It is recommended that the council, together with the national organizations responsible for nuclear security, performs a cost analysis to define the costs related to establishing, operating, and sustaining an NSSC. The cost analysis should take the result of the capacity assessment into consideration. Annex 2 might be used as basis to perform the cost analysis. Please note that the list is not exhaustive.

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[11] *Scientific expert support* might consist of analysts or other experts (from a network such as ALMERA: Analytical Laboratories for the Measurement of Environmental Radioactivity) and might not necessarily work at the same organization/institution. This network of experts should liaise with the NSSC.

[12] Upon request, analytical support could also be provided by the IAEA;

[13] A MEST should include a person equipped and trained to use basic radiation monitoring instruments and perform simple assessment tasks; it should include a forensic evidence management team or at least a person who is trained in crime scene management and classical forensics [6].

Alternative funding models should be considered, such as leasing or joint ownership of the training facility, breakout rooms, knowledge centre and equipment. Other funding models are not reflected in Annex 2.

Although the NSSC is designed as a non-profit centre, the possibility exists to use the facilities for other purposes, thus creating an income stream.

2.7. Operations Plan

The *operations plan* outlines the NSSC's action plan for executing its mission. It describes the operational relationships that must be established to adequately meet the needs of NSSC users on a daily basis (short term processes); and the overall business milestones that the centre must attain to be sustainable (long term process).

The operations plan should detail the key operational processes for serving NSSC users. Charts supplemented with text are often the best way to explain the key relationships between the parties involved in these processes. These parties could include departments within an organization, administration, training personnel, donors and schedulers.

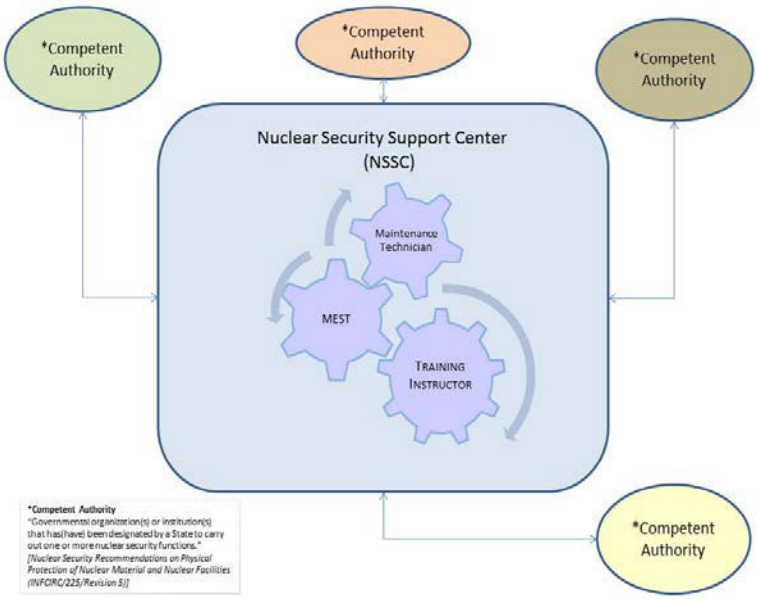

FIG. 3. Operations plan diagram.

Short-Term Processes

These processes are best presented as a diagram. One approach is to link major functional areas of the NSSC to the competent authority assuming responsibility (Figure 3).

Suggested NSSC functions that could be included in the diagram:

- Computer System Administrator.
- Training Developer.
- Training Instructor.
- Maintenance Technician.
- Mobile Expert Support Team (MEST).

Long term processes

These processes are best presented as a chart (Figure 4).

One approach is to list the key milestones on the left and the target date for achieving them on the right.

Key Milestones	Target Date
New Training course	
Particular Technical Service	
Financial event	
etc	

FIG. 4. Example milestone chart.

Suggested dates which should be included in the milestones:

- New training courses or technical or scientific services will be introduced.
- Key partnerships will be executed.
- Key financial events will occur.
- Key employees will be hired.
- Staffing goals will be met. [3]

2.8. COORDINATION OF EFFORTS — INTERNATIONAL NETWORK FOR NUCLEAR SECURITY TRAINING AND SUPPORT CENTRES

In order to coordinate current and future efforts in States or regions to establish and maintain these centres, the IAEA facilitated the establishment of a collaborative network of the different operators of such centres and other relevant stakeholders. Forty-seven representatives from 30 Member States and a number of international organizations agreed by consensus on terms of reference for the network and decided to name it the *International Network for Nuclear Security Training and Support Centres*.

The overall objectives of the *network* are to:

- Promote a high level of nuclear security training and support services as a cornerstone in the development of sustainable national, regional and global nuclear security training and support centres;
- Facilitate cooperation and assistance activities (including technical and scientific); and
- Optimize the use of available resources to meet specific needs.

For more details see the meeting report, which is available from the IAEA Office of Nuclear Security upon request.

2.8.1. Value of coordinated collaboration

The IAEA recognizes the need for enhanced cooperation and collaboration and for improved coordination at the international level while supporting States in their efforts to strengthen their nuclear security through support centres/centres of excellence.

This can be achieved through the newly established network mentioned above, which already consists of more than 40 institutions worldwide and has agreed on common goals to strengthen and continuously improve global nuclear security. The overwhelming interest in collaborating and enhancing coordination

and collaboration efforts in nuclear security training and technical and scientific support indicates an urgent need for these services.

Registration with the network and active participation will assist in the identification and prioritization of needs and define how these needs can be addressed best by using existing capacities in the network. On the basis of these results, the IAEA — in close cooperation with other potential donors and initiatives — can provide global coordinated support to accelerate the establishment and maintenance of robust national nuclear security regimes and the global nuclear security framework by joining and implementing such efforts. This unique approach will ensure optimized use of resources and optimized assistance to States/regions based on global, regional, national needs expressed jointly and in agreement by States concerned.

Coordinated collaboration among centres within the network will facilitate sharing of generic information, experience and lessons learned across borders, accelerate the development of nuclear security capacities, foster nuclear security culture and lead to innovative approaches in delivery of training and technical and provision of scientific support.

2.9. CONSIDERATIONS

There are several issues that could influence the implementation of the NSSC and should be taken into consideration. The items below highlight some internal and external factors that should be considered by the council when establishing an NSSC.

2.9.1. Internal considerations

- Instability of the political situation of the country (e.g. change of government, ministerial reshuffle).
- National commitment (see 2.2).
- Budget:
  - Allocated funds are not available in time or are not sufficient.
  - Restrictions on planned budgets.
- Management support:
  - Change of senior management, particularly within the council.
  - Availability of key persons.
  - Barriers to involving more people, spreading knowledge among more people in the individual organizations.
- Implementation of NSSC concept:
  - Target deadlines delayed or not met.
  - Decrease of resources for the implementation, more work, less staff.
- Laboratory, training facility, equipment:
  - Laboratory not available or not well equipped.
  - Training facility not ready (e.g. no appropriate training equipment, no technical instruments available or malfunctioning equipment).

2.9.2. External considerations

- Reduced foreign funding (if any).

- Failure of external support, e.g. lecturers lecturers, vendors/suppliers.
- Competiveness (equivalent training available more cost effective elsewhere). [5]

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DEFINITIONS

Authorized person	A natural or legal person that has been granted an *authorization*. An *authorized person* is often referred to as a 'licensee' or 'operator'.
Competent authority	Government organization(s) or institution(s) that has (have) been designated by a State to carry out one or more nuclear security functions.
Design basis threat	The attributes and characteristics of potential insider and/or external adversaries, who might attempt *unauthorized removal* or *sabotage*, against which a physical protection system is designed and evaluated. (This may in the future include cyber based threats in which a computer protection system is designed and evaluated.)
Detection	A process in the protection system that begins with sensing a potentially malicious or otherwise unauthorized act and that is completed with the assessment of the cause of the alarm.
Detection measure	Measures intended to detect a criminal or an unauthorized act with nuclear security implications.
Detection system	Integrated set of *detection measures* including capabilities and resources necessary for *detection* of a criminal act or an unauthorized act with nuclear security implications.
Malicious act	An act or attempt of *unauthorized removal* or *sabotage*.
Major public event	A high profile event that a State has determined to be a potential target.
Nuclear material	Material listed in the table on the characterization of nuclear material, including listed in its footnotes, in Section 4 of IAEA Nuclear Security Series No. 13, Nuclear Security Recommendations on Physical Protection of Nuclear Material and Nuclear Facilities (INFCIRC/225/Revision 5).
Nuclear facility	A facility (including associated buildings and equipment) in which nuclear material is produced, processed, used, handled, stored or disposed of and for which a specific licence is required.
Nuclear security	Nuclear Security is the prevention and detection of, and response to, theft, sabotage, unauthorized access, illegal transfer or other malicious acts involving nuclear material, other radioactive substances or their associated facilities.
Nuclear security event	Any event that has been determined have potential implications for nuclear security that must be addressed.
Nuclear security regime	A regime comprising: • the legislative and regulatory framework and administrative systems and measures governing the nuclear material, other radioactive material, associated facilities and associated activities.

	• the institutions and organizations within the State responsible for ensuring the implementation of the legislative and regulatory framework and administrative systems of nuclear security; and • nuclear security systems and nuclear security measures for the prevention of, detection of, and respond to, nuclear security events.
Nuclear security measures	Measures intended to prevent a nuclear security threat from completing criminal or intentional unauthorized acts involving or directed at nuclear material, other radioactive material, associated facilities, or associate activities or to detect or respond to nuclear security events.
Nuclear security system	An integrated set of *nuclear security measures*.
Other radioactive material	Any radioactive material that is not nuclear material.
Radiation	Radiation refers only to ionizing radiation, which is radiation capable of producing ion pairs in biological material.
Radioactive material	Radioactive material that is any material designated in national law, regulation, or by a regulatory body as being subject to regulatory control because of its radioactivity.
Radioactive source	Radioactive material that is permanently sealed in a capsule or closely bounded, in a solid form and which is not exempt from regulatory control. It also means any radioactive material released if the radioactive source is leaking or broken, but does not mean material encapsulated for disposal, or nuclear material within the nuclear fuel cycle or research and power reactors.
Regulatory body	One or more authorities designated by the government of a State as having legal authority for conducting the regulatory process, including issuing authorization.
Regulatory control	Any form of institutional control applied to nuclear material or other radioactive material, associated facilities, or associated activities by any competent authority as required by the legislative and regulatory provisions related to safety, security or safeguards.
Response	All of the activities by a State that involve the assessing and responding to a *nuclear security event*.
Response Measure	Measure intended to assess an alarm/alert and to respond to a *nuclear security event*.
Response System	Integrated set of *response measures* including capabilities and resources necessary for assessing the alarms/alerts and *response* to a *nuclear security event*.
Sabotage	Any deliberate act directed against an associated facility or an associated activity that could directly or indirectly endanger the health and safety of personnel, the public, or the environment by

	exposure to radiation or release of radioactive substances (or radioactive material).
Threat	A person or group of persons with motivation, intention and capability to commit a *malicious act.*
Unauthorized removal	The theft or other unlawful taking of radioactive material.

ANNEX 1: Capability Assessment

HUMAN RESOURCE DEVELOPMENT CAPABILITY ASSESSMENT					
Key Capability	**Existing Capability?**	**If Yes, Level of Capability**	**If No, Potential Support Source**	**Potential Support Source Available?**	**Comments**
Is an organizational position responsible for training identified?	□ Yes □ No	□ High □ Medium □ Low		□ Yes □ No	
Does your organization utilise a process such as the systematic approach to training (SAT)?	□ Yes □ No	□ High □ Medium □ Low		□ Yes □ No	
Has your organization conducted a job task analysis?	□ Yes □ No	□ High □ Medium □ Low		□ Yes □ No	
Has your organization identified job/position performance measures (knowledge, skills, and abilities to complete tasks)?	□ Yes □ No	□ High □ Medium □ Low		□ Yes □ No	
Has your organization conducted an analysis of training required to perform all tasks (training needs analysis)?	□ Yes □ No	□ High □ Medium □ Low		□ Yes □ No	
Has your organization estimated amount of training space, equipment/training aids/simulators, and number of instructors required for training	□ Yes □ No	□ High □ Medium □ Low		□ Yes □ No	

HUMAN RESOURCE DEVELOPMENT CAPABILITY ASSESSMENT

Key Capability	Existing Capability?	If Yes, Level of Capability	If No, Potential Support Source	Potential Support Source Available?	Comments
Has your organization developed a designed training programme?	□ Yes □ No	□ High □ Medium □ Low		□ Yes □ No	
Has your organization developed training courses and a training evaluation methodology?	□ Yes □ No	□ High □ Medium □ Low		□ Yes □ No	
Has your organization identified existing, relevant training courses?	□ Yes □ No	□ High □ Medium □ Low		□ Yes □ No	
Has your organization developed a training management plan?	□ Yes □ No	□ High □ Medium □ Low		□ Yes □ No	
Does your organization have qualified training instructors?	□ Yes □ No	□ High □ Medium □ Low		□ Yes □ No	
Does your organization conduct training?	□ Yes □ No	□ High □ Medium □ Low		□ Yes □ No	

HUMAN RESOURCE DEVELOPMENT CAPABILITY ASSESSMENT

Key Capability	Existing Capability?	If Yes, Level of Capability	If No, Potential Support Source	Potential Support Source Available?	Comments
Does your organization evaluate training (facility, courses, instructors, students)?	□ Yes □ No	□ High □ Medium □ Low		□ Yes □ No	
Does your organization perform operational evaluations?	□ Yes □ No	□ High □ Medium □ Low		□ Yes □ No	
Does your organization utilise training to promote strong nuclear security culture?	□ Yes □ No	□ High □ Medium □ Low		□ Yes □ No	
Does your organization include public awareness in the training programme?	□ Yes □ No	□ High □ Medium □ Low		□ Yes □ No	
Does your organization have a computer security programme that promotes computer security awareness?	□ Yes □ No	□ High □ Medium □ Low		□ Yes □ No	
Does your organization conduct combined computer security and physical security training exercises?	□ Yes □ No	□ High □ Medium □ Low		□ Yes □ No	

TECHNICAL SUPPORT CAPABILITY ASSESSMENT

Key Capability	Existing Capability?	If Yes, Level of Capability	If No, Potential Support Source	Potential Support Source Available?	Comments
Does your organization ensure technical support personnel receive appropriate training?	□ Yes □ No	□ High □ Medium □ Low		□ Yes □ No	
Has your organization established a maintenance management plan, with schedule?	□ Yes □ No	□ High □ Medium □ Low		□ Yes □ No	
Has your organization identified specialised maintenance equipment needed for maintenance support?	□ Yes □ No	□ High □ Medium □ Low		□ Yes □ No	
Has your organization acquired specialised maintenance equipment needed for maintenance support?	□ Yes □ No	□ High □ Medium □ Low		□ Yes □ No	
Does your organization provide space for conducting necessary maintenance tasks?	□ Yes □ No	□ High □ Medium □ Low		□ Yes □ No	
Does your organization have a software/path management system for performing software maintenance?	□ Yes □ No	□ High □ Medium □ Low		□ Yes □ No	

TECHNICAL SUPPORT CAPABILITY ASSESSMENT

Key Capability	Existing Capability?	If Yes, Level of Capability	If No, Potential Support Source	Potential Support Source Available?	Comments
Does your organization perform remote computer hardware/software maintenance?	□ Yes □ No	□ High □ Medium □ Low		□ Yes □ No	
Does your organization utilise contractor/vendor maintenance support?	□ Yes □ No	□ High □ Medium □ Low		□ Yes □ No	
Does your organization document equipment warranty/guaranty limits?	□ Yes □ No	□ High □ Medium □ Low		□ Yes □ No	
Has your organization acquired new, spare, or replacement equipment in the past 12 months?	□ Yes □ No	□ High □ Medium □ Low		□ Yes □ No	
Has your organization installed new, spare, or replacement equipment in the past 12 months?	□ Yes □ No	□ High □ Medium □ Low		□ Yes □ No	
Does your organization perform routine maintenance?	□ Yes □ No	□ High □ Medium □ Low		□ Yes □ No	

TECHNICAL SUPPORT CAPABILITY ASSESSMENT

Key Capability	Existing Capability?	If Yes, Level of Capability	If No, Potential Support Source	Potential Support Source Available?	Comments
Does your organization perform corrective maintenance?	□ Yes □ No	□ High □ Medium □ Low		□ Yes □ No	
Does your organization conduct routine and scheduled testing of equipment and systems?	□ Yes □ No	□ High □ Medium □ Low		□ Yes □ No	
Has your organization established a spare parts inventory?	□ Yes □ No	□ High □ Medium □ Low		□ Yes □ No	
Does your organization have an inventory management system?	□ Yes □ No	□ High □ Medium □ Low		□ Yes □ No	
Does your organization perform calibration tasks, when applicable?	□ Yes □ No	□ High □ Medium □ Low		□ Yes □ No	
Does your organization evaluate/test new equipment, when applicable?	□ Yes □ No	□ High □ Medium □ Low		□ Yes □ No	

TECHNICAL SUPPORT CAPABILITY ASSESSMENT

Key Capability	Existing Capability?	If Yes, Level of Capability	If No, Potential Support Source	Potential Support Source Available?	Comments
Has your organization utilised Help Desk resources, where available?	□ Yes □ No	□ High □ Medium □ Low		□ Yes □ No	
Does your organization developed specifications of requirements for equipment performance?	□ Yes □ No	□ High □ Medium □ Low		□ Yes □ No	
Does your organization established proper equipment use procedures?	□ Yes □ No	□ High □ Medium □ Low		□ Yes □ No	

SCIENTIFIC SUPPORT CAPABILITY ASSESSMENT

Key Capability	Existing Capability?	If Yes, Level of Capability	If No, Potential Support Source	Potential Support Source Available?	Comments
Does your organization ensure scientific support personnel receive appropriate training?	□ Yes □ No	□ High □ Medium □ Low		□ Yes □ No	
Has your organization identified specialised equipment needed for scientific support?	□ Yes □ No	□ High □ Medium □ Low		□ Yes □ No	
Has your organization acquired specialised equipment needed for scientific support?	□ Yes □ No	□ High □ Medium □ Low		□ Yes □ No	
Does your organization conduct remote monitoring through networking, when applicable?	□ Yes □ No	□ High □ Medium □ Low		□ Yes □ No	
Does your organization coordinate response support to nuclear or radiological material emergencies?	□ Yes □ No	□ High □ Medium □ Low		□ Yes □ No	
Does your organization provide analytical support on categorization of seized radioactive material?	□ Yes □ No	□ High □ Medium □ Low		□ Yes □ No	

SCIENTIFIC SUPPORT CAPABILITY ASSESSMENT

Key Capability	Existing Capability?	If Yes, Level of Capability	If No, Potential Support Source	Potential Support Source Available?	Comments
Has your organization developed a mobile expert support team (MEST) capability?	□ Yes □ No	□ High □ Medium □ Low		□ Yes □ No	
Has your organization developed and established effective communication with equipment operators, when applicable?	□ Yes □ No	□ High □ Medium □ Low		□ Yes □ No	
Does your organization provide research & development support for specific measurement and material identification problems?	□ Yes □ No	□ High □ Medium □ Low		□ Yes □ No	

ANNEX 2: Cost Analysis

Cost Analysis	
Basic infrastructure - training facility (numbers and space requirements to be calculated based on needs assessment data)	
Item	**Capital costs**
Training facility	
• Classrooms • Management/administration office(s) • Equipment Storage • Training development/Instructor office(s) • Toilets/changing facilities (if necessary) • Break/lunch room(s) • Heating, ventilation, and air conditioning (HVAC) system • Lighting • Security system (interior/exterior) • Access control system • Berthing (if necessary) • Corrective Maintenance shops (if necessary)	
Exhibition room for demonstrations for the public and/or training purposes	
Demonstration kit (check sources, hand held detection equipment, sample shielding, etc)	
Independent communication system (phone, fax, e-mail)	
Training	
Item	**Capital costs**
Training equipment (**to be calculated based on needs assessment data**): - projectors, cameras and computers	

for presentations; - record keeping hardware and/or software - Network-related equipment (if necessary); - material preparation (photocopy, CD duplication, binding) - cordless microphones and speaker; - flip charts or white board; - renewal of calibration sources (including renewal period) - stationery;		
Practical training equipment for nuclear security training (to be calculated on the basis of needs assessment data)		
Technical support		
Item	**Capital costs**	
Purchase of special equipment for technical support		
Scientific support		
Item	**Capital costs**	
Special equipment for scientific support (to be calculated on the basis of needs assessment data)		
Running costs		
Basic infrastructure - training facility		
Item	**Direct costs**	**Miscellaneous & indirect costs**
Operating cost of training facility: - Electricity - Water - Sewer - Security	-	

- Lighting - Communication - AC/Heating - Cleaning Service - Access Control system - Emergency Power		
Salary and Benefits: - Management - Administration	-	

Training		
Item	**Direct costs**	**Miscellaneous and indirect costs**
Salary and Benefits: (number to be calculated based on needs assessment data): - Full-time training personnel - Part-time training personnel - Contracted instructors/developers - Record-keeping personnel	-	
Training Programme Implementation Costs: - Costs of training material for identified course(s) per year (including participants' manuals, trainer manuals, media, special material) - Costs associated with conducting required train-the trainer courses -	-	

Technical support		
Item	**Direct costs**	**Miscellaneous and indirect costs**
Salary and Benefits: - Technician(s) - Computer System Administrator(s)	-	
Scientific support		
Item	**Direct costs**	**Miscellaneous and indirect costs**
Salary and Benefits: - Scientific expert(s)	-	

Please note that the above proposed list is not exhaustive.

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