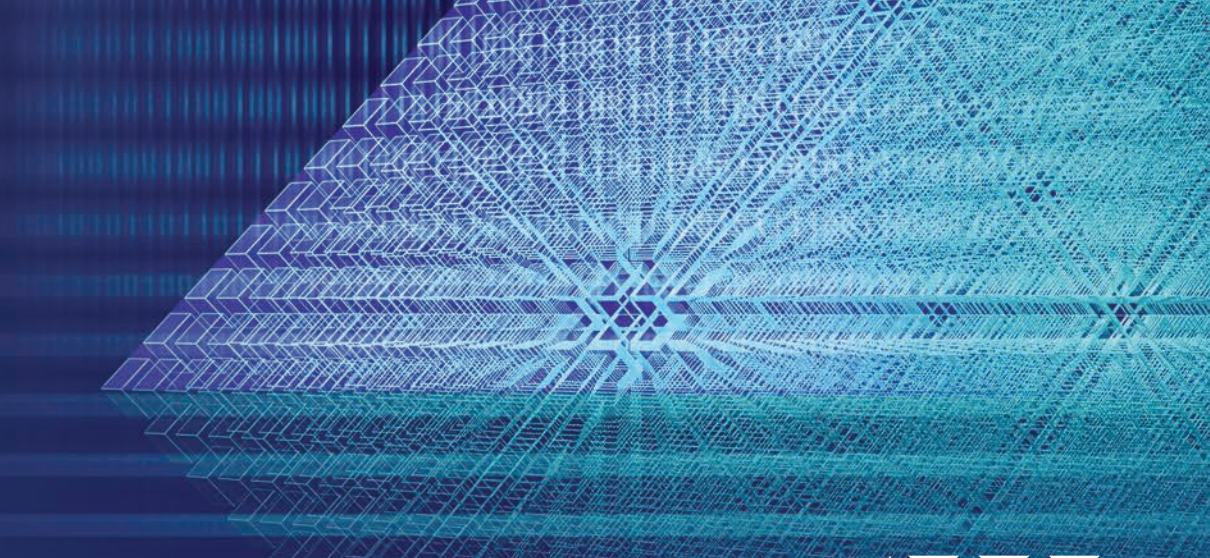

TECHNICAL REPORTS SERIES NO. 1000

The Nuclear Safety and Nuclear Security Interface: Approaches and National Experiences

IAEA
International Atomic Energy Agency

THE NUCLEAR SAFETY AND NUCLEAR SECURITY INTERFACE: APPROACHES AND NATIONAL EXPERIENCES

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The Agency's Statute was approved on 23 October 1956 by the Conference on the Statute of the IAEA held at United Nations Headquarters, New York; it entered into force on 29 July 1957. The Headquarters of the Agency are situated in Vienna. Its principal objective is "to accelerate and enlarge the contribution of atomic energy to peace, health and prosperity throughout the world".

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FOREWORD

Nuclear safety and nuclear security share the same goal: to protect individuals, the public and the environment from harmful effects of ionizing radiation. However, the activities that address nuclear safety and nuclear security are different, and actions taken to strengthen nuclear safety may affect nuclear security positively or negatively, and vice versa. It is therefore essential to establish a well coordinated approach to managing the interface between nuclear safety and nuclear security so that relevant measures are implemented in a manner that aims to capitalize on opportunities that may be available for mutual enhancement without compromising either nuclear safety or nuclear security.

The responsibility for nuclear safety and nuclear security within a State rests entirely with that State. In this context, the importance of international cooperation and the central role of the IAEA is widely recognized. The IAEA assists Member States in establishing or strengthening their nuclear safety infrastructure as well as their nuclear security infrastructure. In addition, it provides support to establish synergy between both infrastructures to ensure that actions taken in the two fields complement rather than compromise each other. The interface between nuclear safety and nuclear security is highlighted in IAEA safety standards and nuclear security guidance.

This publication was developed from the exchange of information, experiences and practices by participating Member States at the IAEA Technical Meeting on the Safety and Security Interface — Approaches and National Experiences, held in Vienna in 2018. The information presented in this publication summarizes the views expressed by the participants during the technical meeting; it is not a consensus report. The IAEA gratefully acknowledges the cooperation of all participants. The IAEA officer responsible for this publication was Y. Chaari of the Office of Safety and Security Coordination.

EDITORIAL NOTE

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CONTENTS

1. INTRODUCTION

1.1. BACKGROUND

Nuclear safety and nuclear security are two closely related areas, and both have in common the aim of protecting human life and health and the environment [1, 2]. To meet this aim, nuclear safety measures and nuclear security measures have to be designed and implemented in an integrated manner, so that nuclear security measures do not compromise nuclear safety and conversely nuclear safety measures do not compromise nuclear security. The importance of addressing the nuclear safety and nuclear security interface is highlighted in:

(a) IAEA Safety Standards Series No. SF-1, Fundamental Safety Principles [1];
(b) IAEA Nuclear Security Series No. 20, Objective and Essential Elements of a State's Nuclear Security Regime [2];
(c) INSAG-24, The Interface between Safety and Security at Nuclear Power Plants [3].

While the responsibility for nuclear safety and nuclear security within a State rests entirely with that State, the central role of the IAEA in promoting international cooperation in this area is widely recognized.

The IAEA General Conference and the Board of Governors highlighted the importance of the nuclear safety and nuclear security interface and requested the IAEA to continue to facilitate, in close cooperation with Member States, a coordination process to address the interfaces in a timely manner [4].

It is against this backdrop that the IAEA Secretariat organized the Technical Meeting on the Safety and Security Interface — Approaches and National Experiences, from 29 October to 1 November 2018, at IAEA Headquarters, in Vienna. The meeting was attended by over 120 participants from 64 Member States, representing governments, competent authorities, regulatory bodies and operators, among others. The high level of participation reflects the continuing importance attached to addressing the interface between nuclear safety and nuclear security and the value that Member States placed on the forum provided by the meeting.

The meeting provided an opportunity for participants from all IAEA Member States to discuss issues, challenges and solutions related to addressing the nuclear safety and nuclear security interface. The meeting focused on sharing

views, information, knowledge and experience. The specific objectives of the meeting were:

(a) To identify and present the technical elements of nuclear safety and nuclear security interfaces and approaches to addressing the interface in facilities and activities implemented by governments, competent authorities, regulatory bodies, operators and users in Member States;
(b) To identify challenges, gaps and good practices in this area;
(c) To recommend activities that address nuclear safety and nuclear security interfaces in such a way that nuclear security measures do not compromise nuclear safety and that nuclear safety measures do not compromise nuclear security.

The meeting included plenary as well as five technical sessions with presentations by selected speakers drawn from Member States having experience with a broad range of facilities and activities. This ranged from Member States whose activities involve the use of radioactive sources, to those embarking on a nuclear power programme and to those with operating nuclear power plants. Five working groups addressing the same topics as the technical sessions provided further opportunities to discuss the issues in more detail. A Co-Chair presentation summarizing the meeting was produced.

While it is a common goal of Member States to address the interface between nuclear safety and nuclear security, there are a range of different approaches being used by Member States to achieve this goal. These different approaches reflect the circumstances prevailing in Member States, such as the nature and scale of the facilities and activities being operated or undertaken and the nature of the national legal framework. It was not the purpose of the meeting to provide Member States with model approaches to addressing the interface between nuclear safety and nuclear security. The participants were clear that the views expressed during the meeting did not represent a consensus and that some Members States intend to retain their current arrangements for addressing the nuclear safety and nuclear security interface.

The five technical sessions covered the following topical areas:

— Legal and regulatory framework;
— Nuclear installations;
— Radioactive sources and associated facilities and activities;
— Management systems and nuclear safety and nuclear security culture;
— Emergency preparedness and response.

The working groups were tasked with identifying the technical elements important to the nuclear safety and nuclear security interface as well as how they are being addressed by Member States. The participants identified challenges, gaps and good practices and made recommendations for potential activities to continue to facilitate a coordination process to address the nuclear safety and nuclear security interface. A list of these technical elements, with the associated challenges, gaps and good practices identified by the participants, is provided in Annex II.

This publication was prepared in light of the request for the IAEA to continue to facilitate a coordination process to address nuclear safety and nuclear security interfaces in Member States in a timely manner [4].

1.2. OBJECTIVE

The objective of the publication is to summarize the information and experience provided by participants at the technical meeting on addressing the effective management of the interface between nuclear safety and nuclear security for facilities and activities. It aims to provide a better understanding of the important elements of the interface and to highlight the challenges, opportunities and good practices for its effective management when planning and implementing different programmes and activities.

1.3. SCOPE

This publication summarizes the output from the technical meeting, including the participants' presentations during the five technical sessions, the views and deliberations expressed during the working group sessions and the summary presentation by the Co-Chairs of the technical meeting. The publication is also supported by insights from IAEA safety standards and nuclear security guidance as well as other relevant IAEA publications.

1.4. STRUCTURE

Sections 2–6 summarize the presentations and discussions of the five technical sessions, supported with insights from IAEA safety standards and nuclear security guidance and other relevant IAEA publications. Section 7 of this publication highlights some of the cross-cutting issues that were discussed during the technical meeting.

Annex I sets out the Co-Chair summary of the technical meeting. Annex II presents the technical elements important to the nuclear safety and nuclear security interface that were discussed at the technical meeting. Lists of presentations and of participants at the technical meeting are provided in Annexes III and IV, respectively.

2. LEGAL AND REGULATORY FRAMEWORK

2.1. INSIGHTS FROM RELEVANT IAEA PUBLICATIONS

Paragraph 2.5 of IAEA Safety Standards Series No. GSR Part 1 (Rev. 1), Governmental, Legal and Regulatory Framework for Safety [5], states that "The government shall promulgate laws and statutes to make provision for an effective governmental, legal and regulatory framework for safety" including the "Provision for an interface with nuclear security".

Reference [2] states that the responsibilities for implementing the various elements of physical protection within a State should be clearly identified. In particular, para. 3.3 of Ref. [2] states that the legislative and regulatory framework, and associated administrative measures, to govern the nuclear security regime, ensure, among other things, that prime responsibility for the security of nuclear material, other radioactive material, associated facilities, associated activities, sensitive information and sensitive information assets rests with the authorized persons.

The International Nuclear Safety Group (INSAG) notes in INSAG-24 [3]:

> "22. Both safety and security are built on a legal and regulatory framework. That framework should define the responsibilities of several organizations: the State, the regulatory authority or authorities, and the operating organizations.
>
> …….
>
> "24. The State must designate a regulatory authority or authorities in both the safety and security fields and provide the regulator(s) with the authority, competence and the financial and human resources necessary to accomplish their tasks. …"

2.2. NATIONAL EXPERIENCES AND PRACTICES

In some Member States, the interface between nuclear safety and nuclear security is addressed in the regulatory framework through the application of rules, the production of guidance and the conduct of inspections. The licensees or operators have prime responsibility for nuclear safety and nuclear security; and they balance the needs of their safety and nuclear security programmes through planning, coordination and communication for effective management of the interface. The participants highlighted the need for a clear definition of the roles, responsibility and missions of competent authorities and operators in the legal framework. The framework would need to allow for joint working of nuclear safety and nuclear security regulatory bodies and the development of harmonized nuclear safety and nuclear security approaches, wherever practicable. The participants considered that a harmonized approach to nuclear safety and nuclear security is of benefit to both the regulatory bodies and the regulated parties.

The development and review of regulations and regulatory guides in some Member States is jointly undertaken by nuclear safety and nuclear security teams to ensure consistency of approach. In addition, some Member States use the same licensing processes for regulating the safety aspects and the nuclear security aspects of activities, ranging from the use of radioactive materials to the operation of nuclear power plants. These processes include the use of the same generic inspection guidance and inspections conducted according to an integrated inspection plan. Inspector training for nuclear safety and nuclear security culture is conducted jointly.

The impact of different regulatory approaches towards safety and nuclear security was discussed during the technical meeting. Some participants considered that the adoption of different approaches to nuclear safety and nuclear security, such as using a prescriptive approach for one and a non-prescriptive approach for the other, has the potential to cause confusion for regulated parties. This may lead to the development and use of different methodologies and processes by the regulated parties to achieve similar aims. The adoption of one common regulatory approach for nuclear safety and nuclear security may be beneficial to certain Member States for managing the regulatory aspects of the interface.

Some participants noted that managing nuclear safety and nuclear security in a coordinated manner can present challenges, irrespective of whether there are single or multiple regulatory bodies involved. Isolated working may occur within a single regulatory body or across multiple bodies within a regulatory framework. This can lead to decision making processes that might not be fully informed by an understanding of the nuclear safety and nuclear security issues and their synergies. Consequently, joint working within and between nuclear safety and nuclear security regulatory bodies needs to be promoted at a high level within

the regulatory framework. The adoption of a holistic approach to nuclear safety and nuclear security would assist in the better targeting of protection measures and would provide more opportunity to identify and exploit potential synergies between the two areas.

In some Member States, the responsibility for regulating nuclear safety and nuclear security lies within the same organization. It was reported that nuclear safety and nuclear security measures are designed and implemented in an integrated manner and that nuclear safety and nuclear security expertise is used in the preparation of all regulatory guides. The 'one organization — one culture' approach allows safety and nuclear security matters to be taken into account in all decision making and can take advantage of the synergies and avoid the adverse effects of conflicting regulations.

The benefit of a comprehensive licensing review and assessment process, in which safety and nuclear security aspects, including their interface, are fully integrated into the licensing process, was highlighted by some participants. Such processes allow for changes to be assessed taking into account both nuclear safety and nuclear security perspectives. In this regard, most participants welcomed the use of joint groups of nuclear safety and nuclear security experts to inform and assist the regulation of both nuclear safety and nuclear security. The participants highlighted the benefit of involving safety and nuclear security experts when taking enforcement actions or undertaking regulatory investigations. Furthermore, coordinated safety and nuclear security regulatory requirements that are understood by all stakeholders may strengthen the efforts to achieve regulatory compliance.

The issue of terminology used in nuclear safety and nuclear security was raised by several participants. The use of different definitions and terminology within the regulatory framework may lead to confusion within the regulatory bodies and the regulated parties, adversely affecting their interaction. The adoption and use of common terminology could improve understanding of the interface issues by all parties, leading to more aligned nuclear safety and nuclear security outcomes.

It was noted by some participants that the concept of 'national nuclear security' is much wider than the concept of 'regulatory nuclear security'. While nuclear safety involves specific bodies such as the regulatory body, technical support organizations and licence holders, many other national bodies may be involved in nuclear security. These bodies can include the nuclear security authority, security forces, intelligence agencies and ministries for foreign affairs and defence. Some participants suggested that the IAEA consider focusing on the use of the term 'regulatory nuclear security'.

In some Member States, the national language has only one word for the two concepts of nuclear safety and nuclear security. This may cause difficulties in properly reflecting these concepts in the national framework when translating IAEA safety standards and nuclear security guidance into the national language (see also Section 7.3).

On a related theme, some participants noted that the communication, transparency and confidentiality aspects of the interface can be difficult issues to address. The need for transparency of nuclear safety information can be in direct contradiction with the need for confidentiality of nuclear security matters. For example, authorities in some Member States are obliged to make available technical documentation, such as a preliminary safety report for a nuclear power plant that may contain detailed descriptions of its design and layout, that may be sensitive from a nuclear security perspective.

3. NUCLEAR INSTALLATIONS

3.1. INSIGHTS FROM RELEVANT IAEA PUBLICATIONS

The needs of nuclear safety and nuclear security could either mutually complement or counteract one another during the lifetime of a nuclear installation. Some aspects of the IAEA safety standards and nuclear security guidance and other IAEA publications that are relevant to the nuclear safety and nuclear security interface during the lifetime of nuclear installations are presented below.

3.1.1. Design

Requirement 8 of IAEA Safety Standards Series No. SSR-2/1 (Rev. 1), Safety of Nuclear Power Plants: Design [6], states:

> "**Safety measures, nuclear security measures and arrangements for the State system of accounting for, and control of, nuclear material for a nuclear power plant shall be designed and implemented in an integrated manner so that they do not compromise one another.**"

Paragraph 3.28 of IAEA Nuclear Security Series No. 13, Nuclear Security Recommendations on Physical Protection of Nuclear Material and Nuclear Facilities, (INFCIRC/225/Revision 5) [7], states that for a new nuclear facility:

> "…the site selection and design should take physical protection into account as early as possible and also address the interface between physical protection, safety and nuclear material accountancy and control to avoid any conflicts and to ensure that all three elements support each other."

3.1.2. Commissioning and operation

Paragraph 11.2 of IAEA Safety Standards Series No. SSR-4, Safety of Nuclear Fuel Cycle Facilities [8], states:

> "…The operating organization shall maintain coordination with State organizations that are involved in accounting for and control of nuclear material, safety and nuclear security. The operating organization shall also ensure the availability of adequate trained personnel with knowledge of these interfaces, and shall establish and implement a management system integrating, among others, safety and nuclear security objectives to the extent possible".

Requirement 17 of IAEA Safety Standards Series No. SSR-2/2 (Rev. 1), Safety of Nuclear Power Plants: Commissioning and Operation [9], states:

> "**The operating organization shall ensure that the implementation of safety requirements and security requirements satisfies both safety objectives and security objectives.**"

Furthermore, para. 5.1 of SSR-2/2 (Rev. 1) [9] states:

> "The operating organization shall be responsible for managing the implementation of safety requirements and security requirements by ensuring close cooperation between safety managers and security managers, with the objective of minimizing risks".

Paragraph 242 of INSAG-12, Basic Safety Principles for Nuclear Power Plants 75-INSAG-3 Rev. 1 [10] states:

> "*Principle: The design and operation of a nuclear power plant provide adequate measures to protect the plant from damage and to prevent the*

unauthorized release of radioactive material arising from unauthorized acts by individuals or groups, including trespass, unauthorized diversion or removal of nuclear materials, and sabotage of the plant."

In addition, para. 244 of INSAG-12 [10] states that "Physical protection measures are co-ordinated with nuclear safety programmes to ensure that physical protection is not jeopardizing nuclear safety". Furthermore, in INSAG-5, The Safety of Nuclear Power [11], INSAG considered that "Review of vulnerability of the plant to violent attack should be part of the design process."

3.1.3. Decommissioning

Paragraph 1.22 of IAEA Safety Standards Series No. GSR Part 6, Decommissioning of Facilities [12], recognizes that "Security aspects have to be considered during decommissioning".

3.2. NATIONAL EXPERIENCES AND PRACTICES

Some participants reported on their experience with addressing the interface between nuclear safety and nuclear security during the lifetime of their nuclear installations. It was noted that the nuclear security risk profile is dynamic and can increase and decrease throughout an installation's lifetime. For example, the nuclear security envelope may be challenged during the commissioning and decommissioning stages of an installation when large numbers of people may need access to security sensitive parts of the facility.

Some participants noted that the siting of nuclear installations has historically been focused on safety. However, the introduction of new technologies such as small modular reactors or medium sized reactors may necessitate a change to this approach if it is proposed to site them close to highly populated areas.

The participants considered that nuclear security is often considered too late in the design of nuclear installations. The very early integration of nuclear safety with nuclear security into the design of a nuclear installation provides an opportunity to address the interface and potentially to remove long term problems. Assessment of design needs to be performed interactively by nuclear safety and nuclear security experts, and joint working is fundamental to improving the synergy between the two processes. In some Member States, threats to nuclear security are assessed and converted into design requirements. These design assessments and requirements are not publicly disclosed.

Similar methods of assessment are used in nuclear safety and nuclear security but often in different ways; the application of the graded approach was

noted by the participants as an example. The use of multidisciplinary teams to review the nuclear safety and nuclear security envelope can promote the concept of 'safe and secure by design' and the application of the graded approach. This can deliver enhanced outcomes and improve the efficiency of the operator's activities and its interaction with the regulatory bodies.

Some participants noted that there appears to be a need to define a common method for nuclear security analysis and common codes of practice for threat assessment. Furthermore, participants noted that consequence assessment methodology and criteria always ought to be the same, regardless of whether the initiating event is nuclear safety or nuclear security related.

The supply chain during construction and commissioning of nuclear installations necessitates the involvement of large numbers of personnel from many organizations at a time that nuclear safety and nuclear security systems are not necessarily fully functional. This introduces a risk of unrecognized plant hardware and software manipulations along with the potential for introduction of sensitive material before all of the nuclear security systems are active or operational.

Reference [13] addresses the nuclear safety and security interface during the operational stage of a research reactor. Tasks such as maintenance, periodic testing and design and implementation of plant modifications requires well planned and applied nuclear safety and nuclear security measures. The participants considered that the process for controlling the design and implementation of modifications to a research reactor or a nuclear installation in general, has to involve joint assessment of such changes with appropriate governance using a common approach to categorization of plant and equipment. Some participants noted that the categorization of nuclear security equipment and the identification of the significance of the nuclear security equipment for maintenance purposes might be limited and that there might not always be an analogous approach to the safety case or to considerations of safety significant maintenance.

Some participants considered that the opportunities to share information and operating experience at nuclear installations is impeded by the security 'need to know principle'. The balance between the need to know nuclear security principles and safety requirements still needs to be bridged under appropriate circumstances. Some participants noted that demand for information on nuclear installations by external stakeholders was challenging particularly when the aggregation of requested safety information could result in a challenge to nuclear security requirements.

Some participants noted that during the decommissioning stage, both the nuclear safety related risk and the nuclear security related risk may increase. This increase may arise from the removal of the physical barriers confining radioactive material as decommissioning progresses. There will also be a drive to reduce cost,

and there will be a need to guard against the loss of nuclear safety and nuclear security resources and equipment. Retaining competent personnel throughout the lifetime of an installation is a challenge, in particular during decommissioning. In some Member States, training is provided as personnel as the nuclear installation makes the transition from the operational stage to decommissioning.

4. RADIOACTIVE SOURCES AND ASSOCIATED FACILITIES AND ACTIVITIES

4.1. INSIGHTS FROM RELEVANT IAEA PUBLICATIONS

Paragraph 2.27 of IAEA Safety Standards Series No. GSR Part 3, Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards [14], states that "The government shall ensure that infrastructural arrangements are in place for the interfaces between safety and the security of radioactive sources." Requirement 13 of GSR Part 3 [14] states:

> "**The regulatory body shall establish and enforce requirements for safety assessment, and the person or organization responsible for a facility or activity that gives rise to radiation risks shall conduct an appropriate safety assessment of this facility or activity.**"

Furthermore, para. 3.32(f) states that "The safety assessment shall include, as appropriate, a systematic critical review of:…The implications for protection and safety of security measures or of any modifications to security measures".

The Code of Conduct on the Safety and Security of Radioactive Sources [15] has an objective of achieving and maintaining a high level of safety and security of radioactive sources, through the development, harmonization and implementation of national policies, laws and regulations, and through the fostering of international cooperation. States should take the appropriate measures necessary to ensure that radioactive sources are safely managed and securely protected during their useful lives and at the end of their useful lives and the promotion of safety culture and security culture with respect to radioactive sources [15].

The Guidance on the Import and Export of Radioactive Sources [16] aims to improve the safety and security of imports and exports of radioactive sources in accordance with the provisions laid down in the Code of Conduct [15].

The Guidance on the Management of Disused Radioactive Sources [17] encourages States to improve the safety and security of disused sources in line with the provisions of the Code of Conduct [15]. The intent of this guidance is to identify actions to be taken, starting with the decision to acquire a radioactive source and continuing through disposal, to ensure that disused sources are safely and securely managed.

Requirement 5 of IAEA Safety Standards Series No. GSR Part 5, Predisposal Management of Radioactive Waste [18], states that "**Measures shall be implemented to ensure an integrated approach to safety and security in the predisposal management of radioactive waste.**" Paragraph 3.20 of GSR Part 5 [18] also states that "The level of security is required to be commensurate with the level of radiological hazard and the nature of the waste".

4.2. NATIONAL EXPERIENCES AND PRACTICES

Some participants reported on their activities relating to authorization and inspection for inventories of over several hundred radioactive sources. In these instances, the regulatory body staff are trained in both safety and security of radioactive sources and further legislation is planned that will establish regulations to integrate nuclear safety and nuclear security. This includes requirements for a nuclear security plan, regulatory inspection, general criteria for nuclear security arrangements for the use, transport and storage of radioactive sources. Ongoing challenges to the development of nuclear security regulations include the use of surveillance systems and strengthening coordination among the relevant national authorities.

The challenges to the nuclear safety and nuclear security interface associated with the storage of spent nuclear fuel were reported. Some important factors that were identified included ensuring the provisions for cooling, the availability of backup and redundant power supply systems, and the structural vulnerability of buildings. Specific issues that were identified included the range of activities to be conducted during the commissioning period and the risk of sudden depletion of resources for managing the nuclear safety and nuclear security interface. Nuclear safety and nuclear security were considered in an integrated manner to reduce the likelihood of unwanted systemic errors and to strengthen defence in depth.

Some participants reported on their experience and the challenges associated with the transport of radioactive material. They considered these

challenges related to the need to improve international harmonization of nuclear security measures for transport including:

(a) Implementation of flexible nuclear security measures to meet national differences, such as priority use of escorts instead of physical protection;
(b) Improving transparency of licensing procedures to enable transport preparation where the consignor needs to know the transport configuration;
(c) Promoting harmonization of nuclear security measures and provisions particularly by neighbouring Member States in order to facilitate effective handover arrangements.

The challenges to the interface between nuclear safety and nuclear security arise from the need for national nuclear security requirements and authorizations to respect the consignor's safety responsibilities, as required under IAEA Safety Standards Series No. SSR-6 (Rev. 1), Regulations for the Safe Transport of Radioactive Material, 2018 Edition [19]. An example is the need to avoid operations such as unloading, reloading and repackaging, which may challenge the safety measures, such as the application of the as low as reasonably achievable (ALARA) concept.

Participants noted that the IAEA provides nuclear security guidance for the transport of radioactive material and nuclear material in Refs [20, 21]. However, there can be national differences in the application of this guidance, which can be a source of conflict for the international transport of radioactive material. Several regulatory bodies may be involved, and they might have conflicting nuclear security approaches, for example adopting a 'need to know' approach to information compared to sharing information in full.

Some participants noted that transport of radioactive material is internationally harmonized for all transport modes, such as road, rail, inland waterways, air and sea. Internationally harmonized regulations are embedded in the dangerous goods regulatory framework such as the United Nations Recommendations on the Transport of Dangerous Goods: Model Regulations (commonly known as the Orange Book) [22]. However, the participants considered it essential to use the worldwide transport infrastructure for the transport of radioactive material. They also suggested that the scope of IAEA nuclear security guidance could be increased with respect to transport to strengthen the focus of international harmonization as well as considering the dangerous goods regulatory framework.

It was suggested by some participants that the nuclear security provisions in the Orange Book [22] could be updated and the provisions be adapted to fit into the general dangerous goods framework, instead of being standalone arrangements and concerning only radioactive material. This approach would

address the nuclear safety and nuclear security interface directly in the dangerous goods regulations. It would also help to overcome the absence of an interface between different national legislation and support harmonization between Member States for security in the transport of radioactive material.

5. MANAGEMENT SYSTEMS AND NUCLEAR SAFETY AND NUCLEAR SECURITY CULTURE

5.1. INSIGHTS FROM RELEVANT IAEA PUBLICATIONS

Requirement 6 of IAEA Safety Standards Series No. GSR Part 2, Leadership and Management for Safety [23], states:

> "**The management system shall integrate its elements, including safety, health, environmental, security, quality, human-and-organizational-factor, societal and economic elements, so that safety is not compromised.**"

Furthermore, para. 4.10 of GSR Part 2 [23] states that "Potential impacts of security measures on safety and potential impacts of safety measures on security shall be identified and shall be resolved without compromising safety or security". IAEA Nuclear Security Series No. 7, Nuclear Security Culture [24], recognizes that:

> "Safety and security cultures coexist and need to reinforce each other because they share the common objective of limiting risk. There will be occasions where there are differences between safety and security requirements. Therefore, an organization in charge of nuclear matters has to foster an approach that integrates safety and security in a mutually supporting manner."

5.2. NATIONAL EXPERIENCES AND PRACTICES

It was reported that in some Member States nuclear security culture was initially considered to be a subset of safety culture. However, the enhanced perception of nuclear security culture has created synergies with safety culture resulting in a positive impact on overall organizational culture.

Some participants reported on the creation of specific nuclear safety and nuclear security culture groups within their regulatory bodies whose aim was to understand the culture of their organization and to identify and implement improvements. Personnel from all levels and all departments receive training on conducting nuclear safety culture assessment and nuclear security culture assessment. This has increased the pool of human resources that are knowledgeable on how nuclear safety and nuclear security interact. The opportunities identified for improvement included developing an aligned nuclear safety and nuclear security culture with clear communication of common goals for nuclear safety and nuclear security functions and establishing aligned training in both nuclear safety and nuclear security to further support and develop nuclear safety and nuclear security culture.

It was noted that some Member States with small and medium sized organizations might not have adequate resources in terms of personnel with the necessary qualifications and experience in both nuclear safety and nuclear security. Furthermore, the participants considered there is a lack of human resource development programmes that address jointly both nuclear safety and nuclear security and such programmes could promote a positive culture for both disciplines. The participants considered that further support and training programmes could be developed by IAEA in this area.

In some Member States, the national legal framework requires the integrated implementation of safety, nuclear security and safeguards at their facilities and for their activities. In such frameworks, safety culture is integrated with nuclear security culture. Experience has shown that to maintain an integrated approach to nuclear safety and nuclear security the commitment and support from all levels of management within relevant organizations is needed. Integrated nuclear safety and nuclear security departments need to have one vision and to report through the same executive.

Some participants noted that in order to develop an integrated approach to nuclear safety and nuclear security, it is helpful to consider three different levels of approach: the strategic level; the operational level; and the cultural level. Emphasis needs to be placed on the management systems architecture to fully promote both nuclear safety culture and nuclear security culture and their interface. Personnel who are appropriately qualified and experienced in both areas are best placed to promote an effective safety and nuclear security interface that could have an overall positive impact on organizational performance.

In some Member States the responsibility for nuclear safety and nuclear security falls on different bodies. In these circumstances, cooperative agreements across all relevant bodies is needed, supported by regular meetings to coordinate activities.

Promotion of nuclear safety culture and nuclear security culture and their interface could be achieved by the involvement of nuclear safety and nuclear security personnel in review, assessment and inspection activities of each other's area. In addition, multi-organizational and multidisciplinary debriefing of personnel following emergency exercises and safety, or following nuclear security events and incidents, will further enhance the interface. Regular joint public forums or meetings to share appropriate information relating to nuclear safety and nuclear security can serve to earn the trust of communities in the vicinity of facilities.

Some participants considered that while addressing some aspects of the nuclear safety and nuclear security interface may be beneficial to an organization, they may also be contradictory. It was suggested that future effort focus on strengthening those aspects of the interface that bring about positive results but that it also be very important to address those aspects that may result in conflict.

6. EMERGENCY PREPAREDNESS AND RESPONSE

6.1. INSIGHTS FROM RELEVANT IAEA PUBLICATIONS

IAEA Safety Standards Series No. GSR Part 7, Preparedness and Response for a Nuclear or Radiological Emergency [25], allows for consistency with IAEA nuclear security guidance [2], in terms of planning for, preparedness for and response to a nuclear security event. Paragraph 1.16 of GSR Part 7 [25] states that "The requirements apply for preparedness and response for a nuclear or radiological emergency irrespective of the initiator of the emergency, whether the emergency follows a natural event, a human error, a mechanical or other failure, or a nuclear security event".

While the IAEA Safety Requirements do not cover preparedness for, or response measures that are specific to, nuclear security events, they do provide for a coordinated and integrated approach to preparedness and response for a nuclear or radiological emergency arising from a nuclear security event. Particularly for events that necessitate protective actions and other response actions to be taken for protection of members of the public, workers and emergency workers.

Furthermore, it is assumed in that States applying the requirements of GSR Part 7 [25] have in place an infrastructure for regulating the security of nuclear material and other radioactive material, associated facilities and associated activities, as well as nuclear security measures for nuclear material and other radioactive material out of regulatory control.

Paragraph 4.10 of GSR Part 7 [25] requires that "The government shall establish a national coordinating mechanism…to be functional at the preparedness stage, consistent with its emergency management system," with functions among other things:

> "To ensure consistency among requirements for emergency arrangements, contingency plans and security plans of operating organizations specified by the regulatory body and by other competent authorities with responsibilities for regulating nuclear security, as relevant, and to ensure that these arrangements and plans are integrated".

Paragraph 4.22 of GSR Part 7 [25] requires that "The government shall ensure that the hazard assessment includes consideration of the results of threat assessments made for nuclear security purposes".

6.2. NATIONAL EXPERIENCES AND PRACTICES

Some participants identified the elements of the nuclear safety and nuclear security interface that need to be addressed in emergency preparedness and response. These include the following elements:

(a) At the facility level, where emergency and contingency plans of the facility are in place to deal with nuclear or radiological emergencies and nuclear security events;
(b) At the competent authority level, as many organizations are involved in the response, both from nuclear safety and nuclear security perspectives;
(c) At the State level, where the overall State level response plan is being coordinated.

Recent developments in the processes for planning, preparedness and response to a nuclear security event in some Member States were reported. These developments included review and revision of these response plans and associated arrangements, exercising and evaluating the response plans, including coordination with plans for dealing with a nuclear or radiological emergency. In addition, further training for nuclear security personnel has been introduced and a defined chain of command has been implemented.

One of the areas noted by the participants where there may be different approaches between nuclear safety and nuclear security was in command and control. This is an area that needs extensive coordination, particularly for considerations such as who makes the decisions and how are the responsibilities

allocated. The participants emphasized that during the preparedness process, it is crucial to allocate roles and responsibilities for decision making at all levels, taking into account the synergies between nuclear safety and nuclear security. High level decision making ultimately needs to be performed by a single authority or a designated person that can take account of the interface between nuclear safety and nuclear security. In order to improve the decision making process at all levels, many States are conducting training of responsible organizations specifically on this interface.

The participants noted the need for Member States to implement a mechanism for coordinating any revisions to the nuclear security response plans and the nuclear or radiological emergency plans before they are implemented. This will facilitate the consideration of any changes that may impact both nuclear safety and nuclear security plans.

The participants considered it crucial that the interface between nuclear safety and nuclear security is addressed in the conduct of exercises involving scenarios of an emergency triggered by a nuclear security event as well as any other scenario that may warrant a response that can challenge both nuclear security and nuclear safety. However, the availability of personnel and resources from both nuclear safety and nuclear security to carry out full scale exercises is often challenging, and the participation of senior management in exercises can be difficult.

The request, delivery and implementation of international assistance by both nuclear safety and nuclear security may be a challenge. The participants highlighted a number of terms that were understood differently by the nuclear safety and nuclear security experts involved in emergency preparedness and response. These terms included:

— The nuclear safety and nuclear security interface;
— Threat and hazard assessments;
— Assessment;
— Risk and consequence assessments;
— Scenario(s);
— Nuclear security.

7. CROSS-CUTTING ASPECTS

A number of cross-cutting aspects arose during the technical sessions and the working group discussions. These aspects included:

— Staffing, competence, education and training;
— The definition of the nuclear safety and nuclear security interface;
— The terminology used in nuclear safety and nuclear security;
— Transparency and confidentiality;
— Future challenges.

7.1. STAFFING, COMPETENCE, EDUCATION AND TRAINING

The participants considered that in some Member States separate cultures still exist for nuclear safety and nuclear security. Consequently, human resource development programmes may be needed that address jointly both nuclear safety and nuclear security, particularly to support smaller organizations, where appropriately qualified and experienced personnel might not be available. The synergy between nuclear safety and nuclear security could be improved through combined staff training arrangements and conducting joint exercises. For the purpose of emergency preparedness and response, the decision making process could be improved by conducting training on the nuclear safety and nuclear security interface for all organizations with responsibilities in this area.

7.2. DEFINITION OF THE NUCLEAR SAFETY AND NUCLEAR SECURITY INTERFACE

The participants discussed appropriate means to define the nuclear safety and nuclear security interface with several alternatives being suggested. These suggestions included:

(a) The nuclear safety and nuclear security interface is the development and implementation of safety requirements, nuclear security recommendations and measures, affecting/impacting the nuclear safety and nuclear security of nuclear material, other radioactive material, associated facilities or associated activities, in a manner so that nuclear security measures do not compromise nuclear safety and nuclear safety measures do not compromise nuclear security.

(b) The nuclear safety and nuclear security interface is aspects of safety requirements and nuclear security requirements, and measures that could mutually complement or counteract one another, throughout the lifetime of the nuclear facilities.
(c) The nuclear safety and nuclear security interface is a common boundary which enables the design and implementation of nuclear safety and nuclear security measures in a harmonized manner so that nuclear security does not compromise nuclear safety, nuclear safety does not compromise nuclear security and synergy is achieved between the two.

Some participants considered that any definition of the nuclear safety and nuclear security interface ought to be framed in positive language, using for example, words such as ‘foster’, ‘enhance’ and ‘support’.

7.3. TERMINOLOGY

The participants considered that the use of different definitions and terminology across nuclear safety and nuclear security is a potential source of confusion both at a national and international level. In some languages, there is one word to describe ‘safety’ and ‘security’, and there is the need for a common understanding and a common terminology for these concepts. One proposal identified during the meeting was to clarify the term ‘nuclear security’ by distinguishing between ‘regulatory nuclear security’ and ‘national nuclear security’. The use of common terminology improves understanding and leads to better, more aligned nuclear safety and nuclear security outcomes.

In the area of emergency preparedness and response, there are differences in the understanding of some terms, including the nuclear safety and nuclear security interface, threat and hazard assessments, risk and consequence assessments, scenario(s) and nuclear security.

7.4. TRANSPARENCY AND CONFIDENTIALITY

The communication, transparency and confidentiality aspects of the nuclear safety and nuclear security interface can be one of the most difficult issues to address. The need for transparency of nuclear safety information can be in direct contradiction with the need for confidentiality of nuclear security matters. For example, some State bodies are obliged to make available safety reports that may contain information that may be sensitive from a nuclear security perspective. Furthermore, there may be national differences in the application of IAEA safety

standards for transport which can be a significant issue for the international transport of radioactive material where several regulatory bodies may be involved and may have conflicting nuclear security approaches; for example, adopting a 'need to know' approach to information compared with fully sharing information.

7.5. FUTURE DEVELOPMENTS

The participants considered some of the future developments in technology and the latest changes in risks relating to the interface between nuclear safety and nuclear security that may impact the interface and where the production of further guidance may be necessary. These included:

— Computer and information security for nuclear security;
— New nuclear power plant technologies such as small modular reactors and medium sized reactors;
— Insider threats;
— Falsification of documents.

REFERENCES

[1] EUROPEAN ATOMIC ENERGY COMMUNITY, FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS, INTERNATIONAL ATOMIC ENERGY AGENCY, INTERNATIONAL LABOUR ORGANIZATION, INTERNATIONAL MARITIME ORGANIZATION, OECD NUCLEAR ENERGY AGENCY, PAN AMERICAN HEALTH ORGANIZATION, UNITED NATIONS ENVIRONMENT PROGRAMME, WORLD HEALTH ORGANIZATION, Fundamental Safety Principles, IAEA Safety Standards Series No. SF-1, IAEA, Vienna (2006).

[2] INTERNATIONAL ATOMIC ENERGY AGENCY, Objective and Essential Elements of a State's Nuclear Security Regime, IAEA Nuclear Security Series No. 20, IAEA, Vienna (2013).

[3] INTERNATIONAL NUCLEAR SAFETY GROUP, The Interface between Safety and Security at Nuclear Power Plants, INSAG-24, IAEA, Vienna (2010).

[4] Nuclear and Radiation Safety, Resolution GC(62)/RES/6, IAEA, Vienna (2018).

[5] INTERNATIONAL ATOMIC ENERGY AGENCY, Governmental, Legal and Regulatory Framework for Safety, IAEA Safety Standards Series No. GSR Part 1 (Rev. 1), IAEA, Vienna (2016).

[6] INTERNATIONAL ATOMIC ENERGY AGENCY, Safety of Nuclear Power Plants: Design, IAEA Safety Standards Series No. SSR-2/1 (Rev. 1), IAEA, Vienna (2016).
[7] INTERNATIONAL ATOMIC ENERGY AGENCY, Nuclear Security Recommendations on Physical Protection of Nuclear Material and Nuclear Facilities (INFCIRC/225/Revision 5), IAEA Nuclear Security Series No. 13, IAEA, Vienna (2011).
[8] INTERNATIONAL ATOMIC ENERGY AGENCY, Safety of Nuclear Fuel Cycle Facilities, IAEA Safety Standards Series No. SSR-4, IAEA, Vienna (2017).
[9] INTERNATIONAL ATOMIC ENERGY AGENCY, Safety of Nuclear Power Plants: Commissioning and Operation, IAEA Safety Standards Series No. SSR-2/2 (Rev. 1), IAEA, Vienna (2016).
[10] INTERNATIONAL NUCLEAR SAFETY ADVISORY GROUP, Basic Safety Principles for Nuclear Power Plants, INSAG-12, IAEA, Vienna (1999).
[11] INTERNATIONAL NUCLEAR SAFETY GROUP, The Safety of Nuclear Power, INSAG-5, IAEA, Vienna (1992).
[12] INTERNATIONAL ATOMIC ENERGY AGENCY, Decommissioning of Facilities, IAEA Safety Standards Series No. GSR Part 6, IAEA, Vienna (2014).
[13] INTERNATIONAL ATOMIC ENERGY AGENCY, Management of the Interface between Nuclear Safety and Security for Research Reactors, IAEA-TECDOC-1801, IAEA, Vienna (2016).
[14] EUROPEAN COMMISSION, FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS, INTERNATIONAL ATOMIC ENERGY AGENCY, INTERNATIONAL LABOUR ORGANIZATION, OECD NUCLEAR ENERGY AGENCY, PAN AMERICAN HEALTH ORGANIZATION, UNITED NATIONS ENVIRONMENT PROGRAMME, WORLD HEALTH ORGANIZATION, Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards, IAEA Safety Standards Series No. GSR Part 3, IAEA, Vienna (2014).
[15] INTERNATIONAL ATOMIC ENERGY AGENCY, Code of Conduct on the Safety and Security of Radioactive Sources, IAEA, Vienna (2004).
[16] INTERNATIONAL ATOMIC ENERGY AGENCY, Guidance on the Import and Export of Radioactive Sources, IAEA, Vienna (2012).
[17] INTERNATIONAL ATOMIC ENERGY AGENCY, Guidance on the Management of Disused Radioactive Sources, IAEA, Vienna (2018).
[18] INTERNATIONAL ATOMIC ENERGY AGENCY, Predisposal Management of Radioactive Waste, IAEA Safety Standards Series No. GSR Part 5, IAEA, Vienna (2009).
[19] INTERNATIONAL ATOMIC ENERGY AGENCY, Regulations for the Safe Transport of Radioactive Material, 2018 Edition, IAEA Safety Standards Series No. SSR-6 (Rev. 1), IAEA, Vienna (2018).
[20] INTERNATIONAL ATOMIC ENERGY AGENCY, Security of Radioactive Material in Transport, IAEA Nuclear Security Series No. 9-G (Rev. 1), IAEA, Vienna (2020).
[21] INTERNATIONAL ATOMIC ENERGY AGENCY, Security of Nuclear Material in Transport, IAEA Nuclear Security Series No. 26-G, IAEA, Vienna (2015).
[22] UNITED NATIONS, Recommendations on the Transport of Dangerous Goods: Model Regulations, 2 vols, UN, New York and Geneva (2011).

[23] INTERNATIONAL ATOMIC ENERGY AGENCY, Leadership and Management for Safety, IAEA Safety Standards Series No. GSR Part 2, IAEA, Vienna (2016).
[24] INTERNATIONAL ATOMIC ENERGY AGENCY, Nuclear Security Culture, IAEA Nuclear Security Series No. 7, IAEA, Vienna (2008).
[25] FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS, INTERNATIONAL ATOMIC ENERGY AGENCY, INTERNATIONAL CIVIL AVIATION ORGANIZATION, INTERNATIONAL LABOUR ORGANIZATION, INTERNATIONAL MARITIME ORGANIZATION, INTERPOL, OECD NUCLEAR ENERGY AGENCY, PAN AMERICAN HEALTH ORGANIZATION, PREPARATORY COMMISSION FOR THE COMPREHENSIVE NUCLEAR-TEST-BAN TREATY ORGANIZATION, UNITED NATIONS ENVIRONMENT PROGRAMME, UNITED NATIONS OFFICE FOR THE COORDINATION OF HUMANITARIAN AFFAIRS, WORLD HEALTH ORGANIZATION, WORLD METEOROLOGICAL ORGANIZATION, Preparedness and Response for a Nuclear or Radiological Emergency, IAEA Safety Standards Series No. GSR Part 7, IAEA, Vienna (2015).

Annex I

CO-CHAIR SUMMARY AND GENERAL CONCLUSIONS

I–1. SUMMARY

The technical meeting comprised 5 technical sessions with 20 presentations. Five workings groups were formed with the same topics as the technical sessions:

— Legal and regulatory framework;
— Nuclear installations;
— Radioactive sources, associated facilities and activities;
— Management systems and nuclear safety and nuclear security culture;
— Emergency preparedness and response.

The working groups presented practices for Member States to consider in developing their activities and suggestions for consideration by the IAEA. In addition, general conclusions were presented in the Summary session. The technical meeting was successful in providing a wide range of views and ideas to assist the IAEA on the further steps to improve the nuclear safety and nuclear security interface.

I–2. GENERAL CONCLUSIONS AND SUGGESTIONS FOR CONSIDERATION

In summary:

(a) Clarification is needed of what is meant by the safety and security interface.
(b) Terms that have some ambiguities in nuclear safety and nuclear security need to be clarified.
(c) There is a need for clear allocation of responsibilities and coordination mechanisms for managing the nuclear safety and nuclear security interface in relevant national authorities and related organizations.
(d) There is a need for coordination and cooperation of nuclear safety and nuclear security experts of regulatory bodies and licensees, especially in review and inspection activities.
(e) Systematic consideration is needed of the nuclear safety and nuclear security interface in IAEA publications and consideration could be given to

the development of joint nuclear safety and nuclear security publications to provide practical guidance to Member States.

(f) The latest changes in risks relating to the nuclear safety and nuclear security interface and achievements in technologies need to be considered, including:
   — Cyber risks;
   — Insider threats;
   — Falsification of documents;
   — New nuclear power plant concepts such as small modular reactors and medium sized reactors.

(g) Exchange can usefully be facilitated, when appropriate, of lessons identified with regard to nuclear safety and nuclear security when they might impact each other in facilities and activities.

(h) Emergency exercises that address emergencies triggered by nuclear security events are valuable and the Member States could be encouraged to develop national exercises to address both nuclear safety and nuclear security.

(i) Integrated assistance to establish and strengthen national regulatory infrastructure for nuclear safety and nuclear security, can be provided upon a State's request, especially during early development phases of a nuclear programme, considering the national regulatory approach.

Annex II

TECHNICAL ELEMENTS IMPORTANT TO THE NUCLEAR SAFETY AND NUCLEAR SECURITY INTERFACE

TABLE II–1. TECHNICAL ELEMENTS RELATING TO THE LEGAL AND REGULATORY FRAMEWORK

Technical elements	Challenges	Opportunities	Good practices
Competent authority Regulator(s)	Isolated working within a unitary regulatory body or between separate regulatory bodies can lead to activities that are not fully informed on safety and nuclear security matters. Regulatory arrangements may be inadequate, disproportionate and/or inefficient. This approach may also be replicated in the operators'/ licensees' organization. The management of the interface between competent authorities, including the regulatory body for safety, nuclear security and nuclear material accounting and control (NMAC).	A more holistic consideration can lead to an improved understanding of nuclear safety and nuclear security matters and regulatory activities can be better targeted. There may be greater opportunity to identify and exploit potential synergies. Regulatory requirements that are sympathetic to and understood by all stakeholders are more likely to be supported and achieve compliance. Management of the interface can be done by unitary or multiple regulatory bodies.	Establishment of a joint group of regulatory experts trained in nuclear safety and nuclear security for assessment and inspection activities. For separate safety and nuclear security regulatory bodies, the high level regulatory framework ought to include reference to joint working, through for example a memorandum of understanding. For unitary regulatory bodies a cell of individuals trained in both nuclear safety and nuclear security ought to be established to identify areas of common interest where joint working is beneficial.

TABLE II–1. TECHNICAL ELEMENTS RELATING TO THE LEGAL AND REGULATORY FRAMEWORK (cont.)

Technical elements	Challenges	Opportunities	Good practices
		Recognize that NMAC also has influence on safety and nuclear security.	Following the implementing guide on NMAC[1]. Preventing any potential adverse influence on each other and adopting a flexible approach.
Responsibilities for nuclear safety and nuclear security	The need for clear definition of roles and responsibilities of regulatory bodies and competent authorities. Identify overlaps and gaps where responsibilities are not clearly defined. Coordination of interactions with operators.	Assuring the absence of gaps in responsibilities and also no overlaps.	The high level legal framework needs to define the roles, responsibility and missions of competent authorities and operators.

[1] INTERNATIONAL ATOMIC ENERGY AGENCY, Use of Nuclear Material Accounting and Control for Nuclear Security Purposes at Facilities, IAEA Nuclear Security Series No. 25-G, IAEA, Vienna (2015).

TABLE II–1. TECHNICAL ELEMENTS RELATING TO THE LEGAL AND REGULATORY FRAMEWORK (cont.)

Technical elements	Challenges	Opportunities	Good practices
Regulatory approach: Performance based or prescriptive	Different regulatory approaches taken by nuclear safety and nuclear security regulators may confuse the operator/licensee on how to best meet regulatory expectations. Opportunities for efficiency and innovation can be lost.	Different regulatory approaches can lead to the operator/licensee developing different methodologies and processes to achieve similar aims.	Development of harmonized nuclear safety and nuclear security regulatory framework and approach. Regulators need to seek to adopt similar approaches within their regulatory framework wherever practicable to do so.
Regulatory guidance	Lower level regulatory guidance fails to highlight synergies between nuclear safety and nuclear security and efficiency may be lost.	Safety and nuclear security regulatory guidance can use a similar methodology and process where possible, allowing the operator/licensee to implement similar processes to achieve regulatory outcomes. For example, examination, maintenance, inspection and testing; categorization and classification of structures, systems and components.	Provide a high level cue on issues where an effective safety and nuclear security interface is important.
Regulations and guides	Coherent and consistent legislation/regulation of safety, nuclear security and NMAC.	One common legislation/regulation and one common licence/authorization for nuclear safety and nuclear security may be beneficial to certain Member States.	Regulations and guides need to take into account the nuclear safety and nuclear security interface.

TABLE II–1. TECHNICAL ELEMENTS RELATING TO THE LEGAL AND REGULATORY FRAMEWORK (cont.)

Technical elements	Challenges	Opportunities	Good practices
Assessment/licensing and approvals	Isolated working within the regulator results in suboptimal assessment/ licensing processes and can lead to approval of conflicting arrangements.	Development of working processes to ensure that approval is only granted when safety and nuclear security requirements are satisfied but also aim to be efficient.	Comprehensive licensing review and assessment process, where safety and nuclear security aspects, including their interface is fully integrated into licensing process.
		Consequence analysis covering both nuclear safety and nuclear security aspects, including all safety and nuclear security relevant scenarios.	Changes are assessed from both nuclear safety and nuclear security points of view before approval is granted for new applications or modifications to existing designs or arrangements.
Regulatory enforcement	Enforcement actions may be made without proper coordination. Regulatory actions, including enforcement actions may adversely affect safety or nuclear security.	More holistic regulatory actions and better root cause analysis.	Involvement of both nuclear safety and nuclear security experts when taking enforcement actions or undertaking investigations.

TABLE II–1. TECHNICAL ELEMENTS RELATING TO THE LEGAL AND REGULATORY FRAMEWORK (cont.)

Technical elements	Challenges	Opportunities	Good practices
Consistency of terminology	Lack of uniformity in the application of terminology. The same terms may be understood differently by nuclear safety and nuclear security experts. Use of different definitions and terminology leads to confusion among regulator(s) and the regulated parties. Inability to properly reflect some concepts when translating IAEA publications from English.	Use of common terminology improves understanding and leads to better, more aligned nuclear safety and nuclear security outcomes.	New publications and updates to existing regulatory framework publications involve experts from both nuclear safety and nuclear security to ensure mutual understanding among the respective communities.

TABLE II–2. TECHNICAL ELEMENTS RELATING TO NUCLEAR INSTALLATIONS

Technical elements	Challenges	Opportunities	Good practices
Siting of nuclear installations	Identifying sites that equally satisfies safety and nuclear security criteria. Addressing safety and nuclear security concerns for the siting of installations including small modular reactors and medium sized reactors close to highly populated areas or well developed infrastructure. Nuclear security recommendations are difficult to retrofit to older installations.	Establishment of both nuclear safety and nuclear security criteria to be met. Define possible counter measures to be applied if a criterion cannot be met.	Use of screening criteria such as the proximity to populated areas and high hazard installations.

TABLE II–2. TECHNICAL ELEMENTS RELATING TO NUCLEAR INSTALLATIONS (cont.)

Technical elements	Challenges	Opportunities	Good practices
Design	Accommodate both nuclear safety and nuclear security recommendations in the design in a balanced way. Achieving balance between transparency and confidentiality, particularly in stakeholder engagement. Categorization of equipment important to nuclear security for maintenance requirements. Safe evacuation routes may challenge nuclear security.	Balanced design requires a multidisciplinary team with safety and nuclear security expertise. Apply the secure by design approach. Identification of vulnerable and vital areas in a manner equivalent to the design of radiation and contamination zones.	Application of the graded approach to nuclear safety and nuclear security measures in design. The nuclear security community defines nuclear security threats and convert threats to design requirements. Designers apply the design requirements. Design details for nuclear security not publicly disclosed. Use of advanced assessment tools for nuclear safety and nuclear security analysis such as probabilistic safety assessment may identify potentially adverse interactions between nuclear safety and nuclear security. Application of an appropriate stress test approach for nuclear security systems being considered.

TABLE II–2. TECHNICAL ELEMENTS RELATING TO NUCLEAR INSTALLATIONS (cont.)

Technical elements	Challenges	Opportunities	Good practices
Construction and commissioning	Large number of people and organizations present on-site when safety and nuclear security systems are not fully operational. Opposing demands from nuclear safety and nuclear security as a result of the need for access for large numbers of people against the limitation of access. Control over organizations supplying goods and services (the supply chain). Risk of unrecognized manipulations to equipment and structures. Potential aggregation of nuclear security information in external organizations. Introduction of sensitive material before all nuclear security systems are operational.	Implement interim or temporary nuclear security measures. Extend nuclear security measures to whole of the supply chain. Establish controls during commissioning to check for the absence of sabotage.	Application of temporary nuclear security arrangements approved through appropriate governance arrangements. Apply a two person entry requirement to nuclear security sensitive areas while recognizing the constraints on entering high radiation zones.

TABLE II–2. TECHNICAL ELEMENTS RELATING TO NUCLEAR INSTALLATIONS (cont.)

Technical elements	Challenges	Opportunities	Good practices
Design modifications at operating installations	Changes in design, operational management and organizational structure relating to nuclear safety and nuclear security could create adverse effects. While good practices in design modifications are available for safety, they are limited from a nuclear security perspective.	Implementation of an effective change control process that covers nuclear safety and nuclear security issues. Modifications to be reviewed by nuclear safety and nuclear security experts prior to implementation.	
Operation/ maintenance	Ensuring balanced attention is given to both nuclear safety and nuclear security. Creating awareness on constraints in the nuclear safety and nuclear security domains. Continuous improvement of the effectiveness of nuclear safety and nuclear security interface.	Develop performance indicators for monitoring the effectiveness of the nuclear safety and nuclear security interface. Establish experience feedback mechanisms across safety and nuclear security. Develop effective methods and tools for protection of nuclear safety	Accommodate responsibility for nuclear safety and nuclear security under the same management line where applicable. Using safety staff to train nuclear security staff and vice versa. Performing integrated nuclear safety and nuclear security exercises.

TABLE II–2. TECHNICAL ELEMENTS RELATING TO NUCLEAR INSTALLATIONS (cont.)

Technical elements	Challenges	Opportunities	Good practices
	Recognize and respond to the growing issue of computer security. Balance of maintenance and inspection of nuclear security equipment against the protective marking and nuclear security recommendations. Establish how to determine the difference between a safety and nuclear security event.	and nuclear security relevant digital systems (software and hardware) including physical protection. Process monitoring equipment could be first indication of malicious event. This information could be utilized to recognize a nuclear security breach. High integrity safety equipment is not maintained by a single person. This principle could be applied to nuclear security equipment. Application of a 'stress test' approach could be used to confirm the robustness of the nuclear safety and nuclear security interface.	Establish safety and nuclear security advisory groups with joint meetings.

TABLE II–2. TECHNICAL ELEMENTS RELATING TO NUCLEAR INSTALLATIONS (cont.)

Technical elements	Challenges	Opportunities	Good practices
Cost of operation	Increase in cost from enhanced safety and nuclear security requirements.	Apply the concept of the graded approach[1] equally to nuclear safety and nuclear security.	
Decommissioning and removal from regulatory control	Challenges similar to construction and commissioning. Nuclear and radioactive material may be on the site while defence in depth concept is no longer fully operable — changes to the nuclear security status are rapid and quick to occur. Confinement barriers progressively removed and could increase the nuclear safety and nuclear security risk.	Defence in depth[2] and physical barriers. The changing operating environment during decommissioning requires changes to nuclear safety and nuclear security measures. Sound planning of both nuclear safety and nuclear security aspects is required.	Staff in transition from the operational phase to the decommissioning phase are provided with appropriate training. Planning to provide people a future perspective for the time when decommissioning ceases.

[1] For a system of control, such as a regulatory system or a safety system, a process or method in which the stringency of the control measures and conditions to be applied is commensurate, to the extent practicable, with the likelihood and possible consequences of, and the level of risk associated with, a loss of control.

[2] A hierarchical deployment of different levels of diverse equipment and procedures to prevent the escalation of anticipated operational occurrences and to maintain the effectiveness of physical barriers placed between a radiation source or radioactive material and workers, members of the public or the environment, in operational states and, for some barriers, in accident conditions.

TABLE II–2. TECHNICAL ELEMENTS RELATING TO NUCLEAR INSTALLATIONS (cont.)

Technical elements	Challenges	Opportunities	Good practices
	As decommissioning progresses there will be a drive to reduce costs. There is a need to protect against the uncontrolled release of nuclear security resources and equipment. Keeping competent personnel through the facility lifetime.		

TABLE II–3. TECHNICAL ELEMENTS RELATING TO RADIOACTIVE SOURCES AND ASSOCIATED FACILITIES AND ACTIVITIES

Technical elements	Challenges	Opportunities	Good practices
Regulatory staff	Lack of cross-training between regulatory staff in nuclear safety and nuclear security.	Can use readily available training packages for nuclear safety and nuclear security as a baseline.	Encourage awareness of nuclear safety and nuclear security aspects for both the regulators and the operator/licensee.
Advisory and peer review services	Not all IAEA services address the nuclear safety and nuclear security interface.		Harmonize IAEA advisory and peer review services so that they address the nuclear safety and nuclear security interface.
Regulatory framework	Lack of arbitration process to resolve conflicts between nuclear safety and nuclear security.	Establish processes for arbitration.	Develop internal committees for nuclear safety and nuclear security.
Operator/licensee	Lack of cross-training between nuclear safety and nuclear security for the operator/licensee.	Where training exists, it can be incorporated into national training programmes.	Incorporate safety and security interface training into both nuclear security and safety training programmes.
Confidentiality issues	Balancing transparency and confidentiality concerns.	Establish an arbitration process.	Develop internal committees for nuclear safety and nuclear security.

TABLE II–3. TECHNICAL ELEMENTS RELATING TO RADIOACTIVE SOURCES AND ASSOCIATED FACILITIES AND ACTIVITIES (cont.)

Technical elements	Challenges	Opportunities	Good practices
Transport	Lack of coherence between national transport nuclear security regulations and the internationally harmonized dangerous goods regulations.	IAEA developing safety publications on the nuclear safety and nuclear security interface and a workshop and exercise materials for implementation. IAEA security publications being reviewed to include additional guidance on the nuclear safety and nuclear security interface. An e-module is being developed on the nuclear safety and nuclear security interface. Promote the sharing of best practice at multilateral forums.	Use of existing regional transport safety networks.

TABLE II–4. TECHNICAL ELEMENTS RELATING TO MANAGEMENT SYSTEMS AND NUCLEAR SAFETY AND NUCLEAR SECURITY CULTURE

Technical elements	Challenges	Opportunities	Good practices
Legal framework	Multiple States with different legal frameworks. State borders with multiple boundaries. Complexity of arrangements may result in a tendency to take shortcuts.	Joint meetings of nuclear safety and nuclear security committees within each organization and at national level to identify potential conflicts. Harmonize mission statements across agencies and organizations regarding nuclear safety and nuclear security culture to encourage effective protection measures.	Cooperative agreements across agencies and organizations, regular meetings to coordinate activities.
Responsibility for nuclear safety and nuclear security	The nuclear safety and nuclear security experts do not always have the same appreciation and understanding of their roles and responsibilities in each other's area.	A common system for nuclear safety and nuclear security to conduct the initial triage of events for nuclear safety and nuclear security. This could promote a common culture, integrating thinking and foster an appreciation of the importance of both areas.	A nuclear security organization introduced safety terminology and concepts having a positive impact on the overall safety and nuclear security culture.

TABLE II–4. TECHNICAL ELEMENTS RELATING TO MANAGEMENT SYSTEMS AND NUCLEAR SAFETY AND NUCLEAR SECURITY CULTURE (cont.)

Technical elements	Challenges	Opportunities	Good practices
		Improve communication among organizational units, divisions, departments to promote awareness and appreciation of the concepts and importance of nuclear safety and nuclear security aspects.	
Regulatory framework		Creation of consistency in regulatory activities regarding cooperative compliance.	Cooperative compliance where operators set the targets to be achieved, and the regulator functions as a consultant.
Radioactive material associated facilities and activities	There may be many different users/ operators that may not have the required resources to focus on the nuclear safety and/or nuclear security aspects for their radioactive material. For example, hospitals, universities, manufacturing, industrial and small source users.		

TABLE II–4. TECHNICAL ELEMENTS RELATING TO MANAGEMENT SYSTEMS AND NUCLEAR SAFETY AND NUCLEAR SECURITY CULTURE (cont.)

Technical elements	Challenges	Opportunities	Good practices
	Radioactive materials may require very long term storage arrangements. There may be a lack of resources to maintain these arrangements. The need for storage of radioactive material could exceed the capacity of some facilities.		
Human resources		Appointment of staff with appropriate attributes to fit the nuclear safety and nuclear security culture.	
Emergency preparedness and response	Conducting joint exercises for nuclear safety and nuclear security.	Provide adequate awareness and promote a culture in all emergency responders to not compromise the nuclear safety and nuclear security of a facility. Training for all involved parties to have an appreciation of the nuclear safety and nuclear security aspects when responding to events.	Multi-organizational or multidisciplinary debriefing after exercises, events or incidents.

TABLE II–4. TECHNICAL ELEMENTS RELATING TO MANAGEMENT SYSTEMS AND NUCLEAR SAFETY AND NUCLEAR SECURITY CULTURE (cont.)

Technical elements	Challenges	Opportunities	Good practices
Computer and information security for nuclear security	Use of only secure information sharing systems, for example with end-to-end encryption.	Awareness of technology developments that may lead to nuclear security vulnerabilities and also impact on safety systems. Re-evaluation of the root causes of why employees would bypass IT security rules. For example, use of private email addresses for work purposes, use of external hard drives or installation of unauthorized software.	Information security policy and processes. Classification of all documentation and information. Introduction of awareness sessions relating to information and computer security.
Public communication and consultation with interested parties		Interactions and engagement with interested and affected parties, including awareness sessions to ensure their understanding of nuclear safety and nuclear security activities. Involvement of both nuclear safety and nuclear security personnel before releasing information to the public.	Regular forums/meetings held with the public in neighbouring areas are held, sharing some information relating to nuclear safety and nuclear security.

TABLE II–5. TECHNICAL ELEMENTS RELATING TO EMERGENCY PREPAREDNESS AND RESPONSE

Technical elements	Challenges	Opportunities	Good practices
Arrangements Measures Response plans	Revision of emergency plans and nuclear security plans need to be coordinated to ensure there is no significant impact on each area. There may be different approaches to Command and Control between nuclear security and safety. Allocating roles and responsibilities for decision making needs to be done during preparedness. How to implement GSR Part 7[1] with both nuclear security and safety taken into account.		During preparedness, roles and responsibilities for decision making at all levels are allocated. Decision making is made by a single superior authority or person. Training of responsible organizations both on-site and off-site to improve the overall decision making process.

[1] FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS, INTERNATIONAL ATOMIC ENERGY AGENCY, INTERNATIONAL CIVIL AVIATION ORGANIZATION, INTERNATIONAL LABOUR ORGANIZATION, INTERNATIONAL MARITIME ORGANIZATION, INTERPOL, OECD NUCLEAR ENERGY AGENCY, PAN AMERICAN HEALTH ORGANIZATION, PREPARATORY COMMISSION FOR THE COMPREHENSIVE NUCLEAR-TEST-BAN TREATY ORGANIZATION, UNITED NATIONS ENVIRONMENT PROGRAMME, UNITED NATIONS OFFICE FOR THE COORDINATION OF HUMANITARIAN AFFAIRS, WORLD HEALTH
ORGANIZATION, WORLD METEOROLOGICAL ORGANIZATION, Preparedness and Response for a Nuclear or Radiological Emergency, IAEA Safety Standards Series No. GSR Part 7, IAEA, Vienna (2015).

TABLE II–5. TECHNICAL ELEMENTS RELATING TO EMERGENCY PREPAREDNESS AND RESPONSE (cont.)

Technical elements	Challenges	Opportunities	Good practices
	Effective delivery and use of international assistance in the both nuclear safety and nuclear security areas.		
Periodic exercises Testing Evaluation	Creating scenarios that test key aspects of the interaction between nuclear safety and nuclear security response systems, to enable evaluation. Availability of personnel and resources from both nuclear safety and nuclear security to carry out full scale exercises. Obtaining the participation of higher management in joint exercises.		Testing the interface between nuclear safety and nuclear security through the conduct of exercises involving emergency scenarios triggered by a nuclear security event.

Annex III

LIST OF PRESENTATIONS

United States Regulatory Perspectives on Safety–Security Interface
Ms. Marissa G. Bailey
Nuclear Regulatory Commission, UNITED STATES OF AMERICA

Regulatory Perspective on the Interface between Safety and Security
Mr. Abel Gonzalez and Mr. Christian Elechosa
Argentine Nuclear Regulatory Authority, ARGENTINA

Interfaces with Security — A French Security Authority Perspective
Mr. Thomas Languin
Ministère de la transition écologique et solidaire — Service de Défense de Sécurité, et d'Intelligence Economique, Département de la Sécurité Nucléaire, FRANCE

The Management of the Interface between Safety and Nuclear Security in the United Arab Emirates
Ms. Fatima Al Hammadi
Federal Authority for Nuclear Regulation, UNITED ARAB EMIRATES

Safety and Security Interface — Slovak National Approaches and Experiences
Mr. Juraj Václav
Nuclear Regulatory Authority of the Slovak Republic (ÚJD), SLOVAKIA

Use of Nuclear Energy and Safety–Security Interface in Finnish Regulatory Framework
Ms. Marja-Leena Järvinen
Radiation and Nuclear Safety Authority of Finland (STUK), FINLAND

Safety and Security Interfaces during Lifetime of a Nuclear Power Plant — National Experience
Mr. Syed Rafat Ali
Pakistan Atomic Energy Commission, PAKISTAN

Interface Between Safety and Security at TRIGA Research Reactor
Mr. Constantin Silviu Rusu
Institute for Nuclear Research, ROMANIA

Managing the Interface Between Nuclear Safety and Security for Nuclear Installations in EAEA
Mr. Atef Abdel-Hameed Abdel-Fattah
Egypt Atomic Energy Authority, EGYPT

Sellafield Ltd Safety and Security Change Programme
Mr. Steven Slater
Sellafield Limited, UNITED KINGDOM

International Transport Experiences: Security Challenges Safety Harmonisation
Mr. Frank Koch
Swiss Federal Nuclear Safety Inspectorate (ENSI), SWITZERLAND

Safety and Security Interface Challenges for Clink, the Integrated Spent Nuclear Fuel Storage Facility in Sweden
Mr. Thomas Michaelson
Swedish Radiation Safety Authority, SWEDEN

Regulatory Approach in Addressing Safety and Security Interface: Cameroon's Experiences
Mr. Augustin Simo
National Radiation Protection Agency, CAMEROON

Safety and Security of Ionizing Radiation Sources in Cuba
Ms. Maidelys Rosa Rodríguez Rodríguez
National Center for Nuclear Safety (CNSN), CUBA

Improving Operational Efficiency, Compliance and Community Perception with Real-time Data
Mr. Simon Turner
Sensaweb, AUSTRALIA

Implementation of Safety and Security Culture at G.A. Siwabessy Multipurpose Reactor (RSG-GAS)
Mr. Dicky Tri Jatmiko
National Nuclear Energy Agency (BATAN), INDONESIA

Initiatives to Enhance Safety and Security Culture at the NNR
Mr. Avinash Singh
National Nuclear Regulator, SOUTH AFRICA

Montenegrin Experience
Ms. Vesna Bigovic
Directorate for Inspection, MONTENEGRO

Radiological Emergency Notifications by Brazilian Facilities
Mr. Marcello Gonçalves
Brazilian National Nuclear Energy Commission, BRAZIL

Managing the Interface between Safety and Security at the Slovenian TRIGA Research Reactor
Mr. Andrej Gyergyek
Jožef Stefan Institute, SLOVENIA

Annex IV

LIST OF PARTICIPANTS

Technical Meeting on the Safety and Security Interface — Approaches and National Experiences
Vienna, Austria
29 October – 1 November 2018

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ISBN 978–92–0–137810–1 Price: €20.00

This publication was developed from the exchange of information, experiences and practices by participating Member States at the IAEA Technical Meeting on the Safety and Security Interface — Approaches and National Experiences, held in Vienna in 2018. It aims to provide a better understanding of the important elements of the interface between nuclear safety and nuclear security for facilities and activities and to highlight the challenges, opportunities and good practices for its effective management when planning and implementing different programmes and activities.

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