2024 International Conference on Nuclear Security:

Shaping the Future

ICONS 2024

Vienna, Austria, 20-24 May 2024

Co-Presidents' Report

Introduction

The 2024 International Conference on Nuclear Security: Shaping the Future (ICONS 2024) was convened by the IAEA at its Headquarters in Vienna from 20 to 24 May 2024.

The purpose of the conference was to provide a forum for ministers, policymakers, senior officials and nuclear security experts to discuss the future of nuclear security worldwide, whilst providing opportunities for exchanging information, sharing best practices and fostering international cooperation.

The conference succeeded in:

- Raising awareness on a wide range of nuclear security topics to maintain and further strengthen national nuclear security regimes, as well as underscoring the critical role of international cooperation to strengthen nuclear security globally;
- Reviewing national and international nuclear security experiences and achievements along with current approaches and trends, and highlighting areas that may need more focused attention, including in the technological domain;
- Promoting IAEA nuclear security guidance, and the experience of States in their application, including through peer reviews, advisory services and capacity building;
- Promoting the sharing of information and good practices in nuclear security while protecting sensitive information;
- Reaffirming and supporting the central role of the IAEA in strengthening nuclear security globally and serving as a convening force for international activities in the field of nuclear security;
- Highlighting and promoting the IAEA's efforts to promote adherence to relevant international legally binding instruments and commitment to the legally non-binding instruments;
- Demonstrating the importance of recruiting and fostering the development of the next generation of nuclear security professionals;

- Discussing further enhancements of IAEA nuclear security activities and their sustainability;
- Stressing the critical role that nuclear security plays for all countries;
- Emphasizing the fundamental enabling role that nuclear security plays in the global pursuit of the UN's 2030 Agenda for Sustainable Development; and
- Orienting the international nuclear security community towards the threats and challenges which lie ahead in order that its members can shape a future that is safe, secure, and sustainable.

The conference did not discuss any sensitive nuclear security information.

Over 2000 participants from 142 countries and 16 invited organizations registered to participate at ICONS 2024, with 17 ministers, 21 vice-ministers and 10 high-ranking officials participating in the ministerial segment of the conference.

Ministerial Segment

Opening Plenary Session

During the opening plenary session of ICONS 2024, IAEA Director General Mr Rafael Mariano Grossi and the conference Co-Presidents, Mr Tim Watts MP, Assistant Minister for Foreign Affairs of Australia, and Mr. Sungat Yessimkhanov, Vice-Minister of Energy for Kazakhstan, delivered opening remarks.

Following the remarks delivered by the Director General and Co-Presidents, Ms Ana-Cristina Tinca, Deputy Minister for Foreign Affairs and Secretary of State for Strategic Affairs of Romania, and Mr Dario Chiru Ochoa, Ambassador and Permanent Representative of Panama, both provided remarks in their capacities as outgoing Co-Presidents of ICONS 2020. All introductory remarks are available for review online: ICONS 2024 Opening Statements.

The Co-Presidents then officially opened the conference and presented a Co-Presidents' Joint Statement in lieu of a Ministerial Declaration on Nuclear Security. While many Member States agreed on the tenets of a draft Ministerial Declaration that was negotiated in the months preceding the conference, consensus was not achieved. The Co-Presidents' Joint Statement sought to reflect the outcome of the many negotiations and open-ended working groups, highlighting the critical role that nuclear security plays in achieving global peace and security and reaffirming the central role of the IAEA in coordinating international nuclear security activities. The Co-Presidents requested that Member States state their alignment with the Joint Statement during their national remarks. The full Joint Statement is available for review online: Joint Statement of the Co-Presidents.

National Statements

A total of 99 national statements were delivered by ministers and other heads of delegation, along with 3 joint statements, 2 statements delivered by international organizations, and 1 country exercising their right of response. National Statements are available for review online: National Statements.

Plenary Panel: Securing Sustainable Progress: The Important Role of Nuclear Security in Advancing the Sustainable Development Goals

One plenary panel was held during the ministerial segment of the conference. The session sought to highlight the ways in which nuclear security underpins the global pursuit of the United Nations' 2030 Agenda for Sustainable Development, with particular focus on Sustainable Development Goals (SDGs) 2 (Zero Hunger) and 3 (Good Health and Well Being). Panellists provided examples of the ways in which nuclear security enables various peaceful applications of nuclear technology, including using nuclear techniques to improve crop yields, promote environmental sustainability, and ultimately work towards improving food security (SDG 2). The IAEA's Atoms4Food programme (implemented jointly with the Food and Agriculture Organization) was specifically addressed. Panellists also discussed the integral role of nuclear security as the Agency works to improve States' capacities for cancer therapy within the framework of the IAEA's flagship cancer initiative "Rays of Hope" (SDG 3). The discussion highlighted the critical role of nuclear security education to ensure that individuals who support activities that utilize nuclear technologies are vigilant and adequately prepared to secure radioactive and nuclear materials from malicious actors.

Ministerial Segment Event: Beyond Borders – a Collaborative Discourse on the Future of Nuclear Security

The Secretariat also organized an event outside the Vienna International Centre for ministers and other heads of delegation. This included a round table discussion during which the panellists emphasized that given the expanding interest in nuclear technologies for a variety of peaceful applications, the role of nuclear security in the international landscape will grow in importance. Moreover, it was noted that in today's environment, potential threats have become increasingly international in nature. In order to effectively deal with this shift, panellists concurred that international cooperation and strong partnerships will be essential. They stressed the need for nuclear security experts to translate the technical language of nuclear security into ideas that are digestible for wider audiences, to include lawmakers and parliamentarians, in order that decisionmakers at all levels can better understand the threats that exist and the steps that can be taken to mitigate them.

Interactive Ministerial Session

Ministers and other heads of delegation were invited to a scenario-based, interactive policy discussion organized by the Secretariat. The ICONS moderator, acting as a national security

briefer, walked participants through two separate fictional nuclear security event scenarios. Participants were asked to respond to question prompts following the presentation of each scenario, after which the moderator facilitated discussion about submitted responses. The main foci of the session were the importance of the universalization of the Convention on the Physical Protection of Nuclear Material (CPPNM) and its Amendment (A/CPPNM) and political commitments to the Code of Conduct on the Safety and Security of Radioactive Sources. Discussions also addressed the requirements and resources needed for States to effectively prevent, detect, and respond to nuclear security events.

Scientific and Technical Segment

Opening Plenary Session

The scientific and technical segment was opened on the second day of the conference and ran in parallel with the second day of the ministerial segment. During the opening plenary session for the scientific and technical segment, remarks were delivered by Deputy Director General and Head of the Department of Nuclear Safety and Security, Ms Lydie Evrard; Director of the Division of Nuclear Security, Ms Elena Buglova; and the Scientific Secretary of ICONS 2024, Ms Sara Mroz.

During these remarks, the speakers acknowledged the efforts of the Programme Committee, co-chaired by Costa Rica and Sweden, and which consisted of representatives from 45 Member States and 5 international organizations. An overview of the conference programme was presented, and it was noted that the Secretariat made concerted efforts to ensure the diversity of presenters, panellists, session chairs, and participants. Speakers introduced the four main themes of the conference under which the 52 technical sessions were organized. The themes of the conference were: Policy, law and regulations for nuclear security; Technology and infrastructure for nuclear security prevention, detection and response; Capacity Building for nuclear security; and Cross-cutting nuclear security topics.

Following the introductory remarks, the Nuclear Security Delegation for the Future was introduced by the Secretariat. This cohort of young nuclear security professionals included 24 participants from 19 countries selected ahead of ICONS to take an active role in the conference and be provided with various professional development opportunities.

Policy, law and regulations for nuclear security

Technical sessions organized under this theme addressed various dimensions of national and international policy, law and regulatory frameworks to reinforce and bolster the global nuclear security regime. Special attention was given to the ways in which the international community could adapt frameworks to address emerging challenges, while also communicating to all States the importance of signing onto international legal instruments that reinforce international norms associated with nuclear security (e.g., the A/CPPNM).

Plenary Panel: Policy, law and regulations in an evolving nuclear security landscape

The first plenary panel of the scientific and technical segment of the conference explored the challenges associated with developing, implementing and adapting policy, law, and regulatory frameworks in a rapidly changing international landscape. Panellists also identified potential gaps and areas for improvement in developing and implementing international legal and regulatory frameworks, while emphasizing the importance of identifying sustainable solutions for strengthening nuclear security in an environment of uncertainty. All participants stressed the importance of international instruments such as the A/CPPNM and the International Convention for the Suppression of Acts of Nuclear Terrorism (ICSANT), and the critical need for Member States to sign on to these instruments. Additionally, panellists addressed national perspectives on developing and implementing regulatory frameworks for new technologies such as Small Modular Reactors (SMRs), while concurrently commenting on industry's role in this process. The participants recognized the continuous work being done by the IAEA to assist Member States in enhancing their legislative and regulatory capacities for robust national nuclear security regimes. All those in attendance were strongly encouraged to take advantage of these services and to advocate for the universalization of the A/CPPNM.

Technical sessions

Global Perspectives on Nuclear Security Regulations for SMRs

This technical session provided an overview of different perspectives on developing and implementing regulations for SMRs given the differences between this reactor technology and traditional large reactors and the potential impact on standing regulatory frameworks. Several panellists highlighted the importance of security by design approaches and the consideration of interfaces between security, safety and safeguards. Various regulatory approaches were discussed, to include prescriptive, performance based and combined approaches, along with multiple elements of a given State's regulatory infrastructure, to include licensing, design and change management, and computer security. Panellists from North America, Europe, and Africa each acknowledged the unique challenges that these technologies pose for their specific regions, while recognizing that there were lessons to be learned from diverse national experiences.

Strategies for Strengthening Regulatory Frameworks for the Transport of Nuclear and Other Radioactive Material

During this technical session, panellists provided diverse perspectives on their respective national approaches to implementing and improving regulatory frameworks for the transport of nuclear and other radioactive material. One panellist acknowledged that given the increase in the use of these technologies for peaceful purposes, there has been a need to adapt their national strategy to the increase in transport activities. Their national regulatory authority has collaborated extensively with other national competent authorities to improve legal frameworks and will continue to foster these cooperative relationships. Another panellist detailed some national experiences with utilizing IAEA guidance to develop national regulatory frameworks

for transport, suggesting that there may be value in the development of an integrated guideline for the safety and security of material transport. There was also a presentation about the unique challenges posed by transshipment platforms, along with some of the steps taken within the presenter's country to mitigate potential issues.

A Continental Case Study: Lessons Learned in Regulation Development in the African Region

This technical session discussed the development and implementation of legislative and regulatory frameworks for nuclear security in several countries of the African region, to include representatives from Cameroon, Ghana, Kenya, Nigeria, Tanzania and Uganda. Panellists gave status updates about their States' alignment with IAEA safety standards and nuclear security guidance, while detailing the value gained from their respective participation in IAEA hosted consultancy meetings, workshops, and staff training. Panellists discussed some of the challenges associated with coordinating between numerous national stakeholders when developing regulations and some of the methodologies that can be implemented to ensure all viewpoints are considered. One panellist addressed national experiences in amending existing regulations given the potential expansion of new technologies in the region (i.e., SMRs). Another detailed national experiences with interfacing with neighboring countries to develop cooperative approaches to nuclear security, specifically in the development of Memorandums of Understanding for the import and export control of radioactive materials at borders, and for the establishment of joint measures at One-Stop Border Posts.

Charting the Way Forward: Assessing Current and Future Challenges on the Implementation of the A/CPPNM

This technical session focused on various aspects of the A/CPPNM. Key presentations included strategic steps suggested for the second Conference of the Parties to the A/CPPNM, the role of a repository of national legislations in combating nuclear terrorism, and the use of effective self-assessment tools to enhance nuclear security. Additionally, participants covered legal and regulatory challenges, methodologies for evaluating the adequacy of the A/CPPNM, and the critical need for inclusivity and targeted support for smaller States. The session concluded with a discussion addressing best practices, the importance of self-assessment and peer reviews, and recommendations for enhancing international cooperation. Panellists agreed that collaborating with international partners was crucial to addressing emerging threats and pursuing harmonization of relevant legal matters to strengthen nuclear security worldwide. It was suggested that a framework be established for the regular review and adaptation of the A/CPPNM to ensure that it responds to contemporary and future security challenges.

Better Together: Experiences in International Cooperation for Regulatory Implementation

During this technical session, panellists discussed successful experiences in strengthening national nuclear security regimes through international cooperation and collaboration. Presenters noted that international cooperation needs to be driven by national needs, and acknowledged the central role that organizations like the IAEA play in these efforts. Panellists also recognized how

regional networks and NGOs (e.g., the African Commission on Nuclear Energy and the African Center for Science and International Security) can supplement the work of international organizations, while also discussing experiences in bolstering national nuclear security regimes through bilateral relationships. One panellist noted that nuclear maritime systems pose potential challenges and suggested that the IAEA should work closely with the International Maritime Organization to harmonize nuclear security requirements for these systems. Participants recognized that all countries, regardless of the maturity of their nuclear security programmes, can contribute to strengthening nuclear security globally, while encouraging those with advanced programmes to commit to being resource providers for the international community.

Bits and Bytes: Computer Security Considerations for Regulatory Framework

This session provided a comprehensive overview of ways to develop and implement computer security regulations for nuclear facilities. Several key principles were highlighted, to include implementing risk informed and defense-in depth approaches, along with the need to strike a balance between safety and security. Panellists also noted that consistency between computer security regulations and other national regulations is important. Presentations pointed to the ways in which computer security regulations might be tailored for different operational settings, as one presenter discussed the steps being taken to draft regulations for the computer security of advanced reactors, and another discussed the ways in which computer security could be strengthened at radioactive material facilities. It was noted that in order to develop strong computer security regulations, staff of regulatory authorities need to have professional competence in these areas. Cooperative, bilateral training programmes can help to fill these gaps, along with the services offered by the IAEA.

Strengthening Regulatory Frameworks for Radioactive Sources Throughout the Life Cycle

This session highlighted the ways in which regulatory frameworks, complemented by industry standards, can be tailored and implemented to address challenges associated with handling radioactive sources throughout the life cycle. Presenters discussed national experiences with developing new regulatory frameworks, while also addressing national and regional challenges associated with regulating the transnational movement of radioactive sources. One panellist presented a new standard developed by the International Electrotechnical Commission for the security of medical electrical equipment using high-activity radioactive sources, recognizing that although the IAEA and industry standards have different approaches, these efforts are complementary in nature and lead to a strengthened impact. Novel approaches to managing radioactive and disused sealed radioactive sources were also discussed, including a new opensource online database for source security frameworks, and a first-of-its-kind borehole disposal project in Malaysia.

Regulatory Frameworks Around the World: National Best Practices

During this technical session, a diverse set of panellists shared varying experiences with developing new regulatory frameworks and amending existing ones to ensure robust national

nuclear security regimes. Panellists noted that open, cooperative approaches between various stakeholders within the State are essential. Presenters discussed the need for regulators to develop open lines of communication with operators, along with national experiences in developing violation prevention programmes. One presenter discussed the possibility of leveraging potential interfaces between a State's established emergency preparedness and response framework and a nascent nuclear security framework. Discussions touched on numerous facets of developing robust national nuclear security regimes, to include experiences with developing an Integrated Nuclear Security Sustainability Plan (INSSP) and ratifying international nuclear security instruments. It was noted that prolonged regulatory drafting and promulgation processes can be problematic and measures should be taken to ensure efficient approaches.

From Commitments to Action: Perspectives on Implementing Legal Provisions for Nuclear Security

This technical session discussed numerous topics related to the implementation of legal frameworks for nuclear security, along with associated challenges. Key themes included the critical role of international cooperation, particularly through conventions like the ICSANT, along with the need for a dynamic and responsive nuclear security regime to effectively address evolving threats. The session also highlighted practical insights about how States can meet international nuclear security obligations and explored the relationship between the Nuclear Non-Proliferation Treaty and nuclear security, underscoring the need for global collaboration. Panellists noted that integrating international standards into national frameworks and updating national laws to address new threats was an essential process for robust regimes. Panellists stressed the importance of assisting developing countries with these processes through technical assistance and capacity-building programmes, which will in turn reinforce global nuclear security.

Regulations for the Future: Adapting and Implementing Regulatory Frameworks for Materials and Facilities

Panellists during this session covered various perspectives on how the security of nuclear material and facilities are addressed in national regulatory frameworks. One panellist discussed the possibility of expanding guidance to operators on how to implement a Design Basis Threat (DBT), with practical considerations for the development of location-specific DBT scenarios and how to assess them. Another presented the ways in which the nuclear security regulatory framework was revised in their State through the use of performance-based approaches, while considering various challenges associated with SMRs, computer security, and safety-security interfaces. Another presentation detailed a novel "Fitness for Duty" program for advanced reactors to ensure their sustained secure operation. Other speakers discussed radioactive source safety and security at a gamma irradiation facility, and the evolution of regulations to account for the need to manage changes resulting from industrial activity or enhancement programs at nuclear facilities. It was noted that IAEA guidance on DBT for regulators is available in NSS 10-

G while guidance for operators is not. It was suggested that the IAEA might consider developing guidance for the use of DBT by operators.

Technology and infrastructure for nuclear security prevention, detection and response

The majority of the technical sessions which comprised the conference programme fell under the theme of technology and infrastructure for nuclear security prevention, detection and response. Given the pace at which the international environment is evolving, sessions organized under this theme sought to address a variety of emerging threats while working towards collective approaches through the sharing of novel research, national experiences, and new perspectives on emerging technology.

Plenary Panel: Managing the Threats and Benefits of Emerging Technologies

This plenary panel included a diverse set of experts who each contributed a unique regional perspective on the challenges associated with emerging technologies. One of the drivers of the discussion was the role that Artificial Intelligence (AI) might play moving forward. Concerns were expressed about removing humans from decision making processes without fully understanding the implications of this technology's practical use. The panel shifted the discussion to the growing interest in SMRs, and the need to assist international partners with their secure deployment. Panellists discussed the benefits of both vendors transparently demonstrating that security by design has been applied to their SMRs and purchasers making market demands for demonstrable security by design. The panel concurred that technical assistance projects and knowledge sharing will be essential to ensure that new technologies will be regulated and employed in a responsible and secure manner. Similarly, training will play a key role in ensuring that practitioners are equipped with the tools and knowledge to stay apprised of rapid developments in the field. Panellists noted that utilizing capabilities like the IAEA's Nuclear Security Training and Demonstration Centre will play a central role in ensuring that practitioners are ready to confront the challenges of the future.

Technical Sessions

Exploring the Interfaces between Nuclear Security and State Systems of Accounting and Control

This technical session explored the nexus between those areas. Panellists acknowledged that centralized nuclear material accountancy is an effective tool to detect theft or repeated diversion of small quantities of materials; contributes to the management of crisis situations; and enables States to meet the IAEA's requirements for safeguards agreements, as well as relevant nuclear security requirements. Several challenges associated with reliable State systems of accounting and control were noted, including the possibility of limited resources or skilled analysts, potentially inadequate national regulatory frameworks, and a lack of globally acceptable guidelines. One panellist detailed the ways in which NMAC can serve as a strong deterrent

against insider threats, in that it delivers the ability to maintain precise knowledge on nuclear material attributes and locations, while ensuring the activities performed in connection with these materials have been properly authorized. Panellists stressed the importance of close collaboration between different multi-disciplinary subject matter experts through consultancy meetings, workshops, and reviews of previous lessons learned.

Protecting the Public: Implementing Nuclear Security Measures for Major Public Events

During this technical session, panellists discussed measures to incorporate nuclear security considerations into planning for major public events (MPEs). Several case studies were presented, including national experiences with planning the Commonwealth Heads of Government meeting in Rwanda, the 50th World Petanque Championship in Benin, COP 28 in the United Arab Emirates, and the U:20 Women's World Cup in Costa Rica. Panellists highlighted the benefits of clear and consistent coordination between multiple stakeholders, including their national governments, and the importance of providing effective training and timely preparation. Pre-event, during-event, and response phases all can present challenges and each need adequate contingency plans in place. Other lessons-learned included the need to clearly define roles and responsibilities, the importance of adequately preparing and testing detection instruments, and the value of conducting preparatory exercises in the lead up to the event. One panellist noted that timely, accurate, and clear public communication is fundamental to MPEs and that there should be strategies in place prior to event execution. Several acknowledged the extensive help and support received from the IAEA, and the value of the training courses offered by the Agency.

Nuclear Forensics' Role in Bolstering International Nuclear Security

This technical session focused on various aspects of national nuclear forensics programmes, along with means and methods to enable practitioners or strengthen national programmes. Panellists discussed various national and international training initiatives, including one State's experience with instituting monthly drills and another State's experience with vocational training, e-Training, field exercises, and an International Training Course on Nuclear Forensics Methodologies. Other panellists discussed lessons learned from the development of national nuclear forensics databases, along with experiences in establishing partnerships with entities external to the State. The session concluded that the development and expansion of nuclear forensics capabilities globally requires its contributors to develop the science and better understand nuclear forensic signatures, while continuing to foster collaboration between scientists, investigators and policymakers. It was stressed that a collaborative global effort is needed in order to continue making advances in the field of nuclear forensics.

Improving National Detection and Response Capabilities for Material Outside of Regulatory Control

During this technical session, panellists presented on several projects and capabilities that may help to improve efforts to detect nuclear or other radioactive material out of regulatory control. Panellists stressed the need to strengthen national regulatory controls, provide continuous technical expert support, and work towards enhancing the software and technology of existing security systems. Presentations ranged from national case studies on enforcing regulatory frameworks to real world testing and application of new technologies for use by practitioners. These new technologies included a newly developed Gateway Radiation Monitoring System; advanced machine-learning algorithms to recognize innocent radiation and reduce nuisance alarms; and the IAEA's Mobile-Integrated Nuclear Security Network (M-INSN). The session highlighted the power of data to improve the operation of existing detection systems and ultimately alleviate the burden on frontline officers. It was suggested that the IAEA continue to promote the use of open-source software (i.e., M-INSN) that users in Member States can adapt to their needs.

Secure from the Start: Issues in Supply Chain Security

During this session, panellists addressed the critical issue of computer security in nuclear supply chains, highlighting vulnerability risks due to reliance on third-party solutions and emphasizing the need for robust, tailored computer security frameworks. They underscored the complexity of these challenges and the importance of collaborative approaches, continuous improvement, and maturity models for effective security management. Key recommendations included enhancing stakeholder engagement, leveraging technology, and ensuring adequate resources and coordination to protect against cyber-attacks. Panellists noted that Cyber Security Maturity Models and Supply Chain models are available online and provide valuable resources for establishing regulatory standards that guide actions. The IAEA's TDL011, "Computer Security Approaches to Reduce Nuclear Security Threats" was also recommended as a vital resource that can be downloaded from the IAEA website. Further emphasis was placed on the importance of cooperation between facilities and vendors to align expectations throughout the supply chain.

From Construction to Closure: Approaches to Sustainable and Secure Life Cycle Management and Decommissioning Practices

This technical session emphasized that nuclear security should be a priority throughout the lifecycle of nuclear facilities in order to enable the safe, secure, and sustainable use of nuclear energy, science and technology. Panellists focused on several real-world decommissioning case studies of nuclear power plants along with the decommissioning of a reprocessing plant. Various aspects of these projects were presented, including the development of a high-activity solid waste measurement system; the evolution of national regulatory standards for decommissioning; and the institution of a graded approach to physical security, cybersecurity, and fitness for duty at decommissioning reactors. Panellists agreed that robust security measures are crucial in the design, construction, operation, and eventual decommissioning of reactors, and acknowledged that the decommissioning of nuclear reactors poses a unique set of challenges that may be

addressed early in the design process. One presenter discussed lessons learned from a decommissioning project in which they were assisted by an international partner. It was noted that States can benefit from international cooperation and that sharing lessons learned from such projects can be enormously helpful during decommissioning phases.

Exploring the Practical Uses and Potential Threats of Artificial Intelligence

This technical session focused on the emerging applications of AI to nuclear security, while concurrently addressing the potential challenges it may pose to the field. Panellists discussed AI as a potential tool to enhance various operations, to include examining fuel elements for damage, managing knowledge, enhancing robotics, providing nuclear emergency response recommendations, and deterring intrusions by malicious actors. One panellist discussed the potential for AI to be used to monitor for "red flags" in personnel, as well as for system anomalies, to better identify potential insider threats. Panellists also acknowledged concerns that AI is developing rapidly, which could lead to it being entrusted with increasingly vital tasks without full understanding of the underlying risks or vulnerabilities. Despite these concerns, there was general agreement that AI will prove to be a net-positive for nuclear security, but it will require advocates to bridge the divides between AI experts, policymakers, and the broader nuclear security community.

Is The Source Secure? Case Studies in Radioactive Source Security

During this technical session, panellists discussed the security of radioactive sources in their respective countries. Presentations covered diverse topics, including physical protection design and evaluation at facilities with radioactive sources; the successful replacement of high activity radioactive sources with alternative technology through international cooperation programmes; collaboration between states to remove disused high activity Co-60 sources from hospitals; and positive outcomes of cooperation between federal agencies in a task force on radiation source protection and security. Panellists highlighted the importance of international cooperation and assistance; the need for effective coordination amongst multiple national stakeholders; and the importance of continuous self-assessments. Panellists stressed that when a State pursues alternative technology, stakeholders must be well-informed and establish a national strategy for the management of disused radioactive sources while concurrently leveraging international partnerships if assistance is needed.

Eyes on the Sky: Strategies to Mitigate the Threats Posed by Uncrewed Aerial Systems

This technical session addressed the threats posed by Uncrewed Aerial Systems (UAS), while also discussing some of the practical and regulatory approaches to countering these threats. Panellists noted that while "counter-drone" systems have become more reliable, there still exist significant barriers to ensuring that the security of nuclear facilities is consistently maintained against the use of UAS. Some of the barriers mentioned included high implementation costs, technical deficiencies in effectively combatting attacks, and issues associated with implementing effective regulatory frameworks for governing UAS. One panellist pointed to persistent concerns

that UAS technologies are outpacing Counter-Uncrewed Aerial System capabilities (CUAS), and as such, stakeholders should conduct careful threat assessments, pursue CUAS technology integration, and push for additional expertise by facility decision makers. Panellists recognized that despite the potential threats, UAS technologies can also serve as valuable tools to enhance the safety and security of nuclear facilities. A key recommendation from the discussion was that the IAEA should hold periodic workshops and develop technical guidance on combatting threats posed by UAS. It was agreed that as the technology rapidly develops, the IAEA can serve as a platform for countries to come together and share national lessons learned in securing critical infrastructure against UAS.

Potential Security Solutions for Traditional and Emerging Reactor Technologies

This technical session explored key security challenges and potential solutions for various reactor technologies. Topics included addressing potential nuclear security threats when deploying SMRs in some regions; protecting nuclear power plants from social engineering; adapting physical security measures for advanced reactors; potential risks associated with floating nuclear power plants; and integrating proliferation resistance into next-generation research reactors. The session highlighted the importance of comprehensive security strategies and international cooperation to mitigate risks associated with both traditional and emerging nuclear technologies. Given the rise in interest for SMRs, panellists agreed that this topic should be a priority for the IAEA and the broader international community.

Assessing and Evaluating Physical Protection Systems in an Evolving Threat Landscape

During this technical session, panellists presented various means and methods to evaluate the performance and effectiveness of physical protection systems in nuclear facilities. Several different approaches were discussed, including: defining Key Performance Indicators for security processes within an organization; the use of computer programs to evaluate physical protection systems' effectiveness; the development of Modelling and Simulation capabilities for use in physical protection system exercises, training, and assessments; and implementing performance testing programmes. One presenter detailed possible challenges associated with developing reliable and effective performance testing, due to issues with identifying specialized technical expertise; difficulty in defining clear performance assurance requirements; and extensive time needed to investigate, select, purchase, and deploy the equipment necessary for certain performance testing exercises. The concept of "deterrence" was also discussed, and the panel provided advice around deterrence communication to influence the psychology of threat actors, including insider threats.

Threats or Opportunities? Confronting the Non-traditional Challenges Posed by Emerging Technology

This technical session addressed various emerging technologies and the issues they pose, including UAS; more affordable, high-performance computing and miniaturized electronics; SMRs; and remotely operated weapons systems. Panellists addressed ways in which nuclear

power station operators might be enabled through existing legislation to address UAS threats; the new threat profile of SMRs and nuclear fusion reactors; and considerations for defensively using remotely operated weapons without human intervention. While many challenges were noted, it was agreed that opportunities to leverage emerging technology also exist, such as deploying UAS for area surveys or using machine learning to advance real-time security assessments of nuclear power facilities.

The Threat from Within: Addressing and Mitigating the Insider Threat

During this technical session, panellists discussed newly developed assessment tools and questionnaires to identify potential insider threats both at nuclear facilities and during transport operations. A newly developed empirical model to evaluate the effectiveness of measures to deter threat actors was also presented. Several of the panellists conducted their research within the framework of the IAEA's Coordinated Research Project (CRP) on Preventive and Protective Measures against Insider Threats at Nuclear Facilities (CRP J02010). In addition to presenting research associated with the development of these tools, presenters also discussed various limitations associated with their practical implementation into vetting processes. Further discussion noted that evaluation of personnel should include continuous monitoring, not just initial vetting. A key takeaway was that there may need to be a shift in thinking about personnel, in that the workforce should not be thought of as threat vectors, but as a security force multiplier. Moreover, it was noted that there is no "one size fits all" approach to mitigating the insider threat.

Radiation Detection Instruments for Nuclear Security: Strategies for Optimizing Performance

This technical session focused on national experiences with deploying detection systems, while also looking to the future to identify areas for improvement. Panellists detailed the work being done today to advance the detection systems of tomorrow. They discussed improving radiation sensors and associated signal processing electronics; developing more powerful computers; aggregating larger datasets; employing more sophisticated on-line monitoring and analysis software; and developing more comprehensive modeling capabilities. The use of AI and Machine Learning in detection systems was also addressed, along with the potential to network more instruments. AI may assist with the development of radiation detector algorithms, which can enhance older equipment without necessitating the purchase of new detectors.

Preparing for the Future: Lessons Learned and Developments in Nuclear Security Event Response

This session focused on the national level response to nuclear and radiological incidents, including those incidents caused by malicious acts. The presentations covered cross-cutting approaches to nuclear security and emergency response, along with the importance of pre-planned and practiced coordination for national response. Panellists presented case studies of incorporating Chemical, Biological, Radiological and Nuclear (CBRN) response into federal

police protocols; integrating nuclear security expertise into national emergency response organizations; and exercising Armed Forces to be prepared to respond to nuclear or radiological incidents. An additional case study presented lessons learned from a real-world investigation, in which the value of effective coordination and communication between CBRN advisory teams, regulatory bodies, and local police forces was highlighted.

Step One: The Use of DBT and Threat Assessment to Know the Adversary

Panellists of this technical session represented several countries at varying stages of developing a DBT, while also touching on other threat assessment methodologies. One presenter detailed the steps being taken to revise and peer-review the national DBT for nuclear facilities. Another discussed a project involving multiple national organizations to develop an action plan to create a DBT. Presenters noted that given new and evolving threat actors, shifts in attacker intentions, and ongoing technological advancement, States should work to establish processes for evaluating and updating their respective DBT. While a lot of the focus was on means and methods to assess threats to physical protection systems (i.e., through drills, modelling software, and performance testing exercises), one panellist addressed ways to assess cyber security risk. The similarities and differences between cyber and physical attacks were noted. Given the strong relationship between operational technology and information technology systems, coupled with the potential for blended attacks from adversaries, it was stressed that physical and cyber security experts must work together.

Managing and Mitigating Threats from Counterfeit, Fraudulent and Suspect Items

This technical session included diverse perspectives on the challenges posed by Counterfeit, Fraudulent, and Suspect Items (CFSI) in the nuclear security supply chain. Panellists explained that within the nuclear supply chain, CFSI can diminish the integrity of equipment, systems, structures, components or devices that contribute to nuclear safety and/or nuclear security. Moreover, the inadvertent introduction or malicious insertion of CFSI within the nuclear security supply chain could lead to the occurrence of a nuclear security event. Panellists' research was presented, some of which formed part of an IAEA CRP on the topic. Presenters detailed several mitigation strategies, to include implementing robust supplier vetting and qualification processes, establishing secure authentication mechanisms and implementing rigorous inspection protocols. Research associated with implementing risk assessment models and detection frameworks were also discussed.

Exploring Successful Implementation Strategies for Nuclear and Other Radioactive Material Transport Security

This technical session explored various implementation strategies for the security of nuclear and other radioactive material during transport. Presenters discussed diverse topics, including using numerical tools and experimental data to enhance future vulnerability assessments along with a Dynamic Threat Assessment approach incorporating AI. Panellists also presented new methods

for monitoring nuclear material in transport and newly developed, advanced e-learning tools to better train and equip practitioners. One presenter discussed the emerging role of uncrewed systems for transport in complex environments, detailing the pros and cons of their employment. Panellists and participants highlighted the importance of sharing best practices for implementing strategies and developing regulatory frameworks for the security of nuclear and other radioactive materials in transport, due to its significance to the global nuclear security regime.

Building Resilience: Sustaining and Enhancing National Nuclear Security Detection Architectures

This technical session focused on Member State experiences in developing and sustaining National Nuclear Security Detection Architectures (NSDA). Panellists addressed multiple facets of successfully employing an NSDA, including drafting effective standard operating procedures (SOPs), human resource development, maintenance and performance testing, and assessing new technology for possible adoption into national architectures. A common challenge noted was finding ways to properly communicate threats to decisions makers at all levels in order to gain their support for advancing national NSDA capabilities (i.e., investing in the people, processes and equipment needed to achieve the detection mission). One presenter discussed the creation of a lead national coordination body for nuclear security which was tasked with managing CONOPs, SOPs, NSDA evaluations, regional coordination initiatives and other core capabilities. Another discussed the development and deployment of maintenance management software for the detection systems that their State employs.

Fortifying the Foundations: Implementing Physical Protection Systems and Measures

This technical session addressed physical protection systems (PPS) and measures for materials and facilities. Presentations ranged from one State's approach to developing and implementing regulatory frameworks, to newly developed software and evaluation tools to assess physical protection systems during the design process and following implementation. Presenters also discussed more practical topics, including a method to evaluate and optimize surveillance system locations and a novel vehicle inspection system for nuclear facilities. It was noted that the IAEA supports Member States with the evaluation of PPS through various activities, including developing publications, conducting research projects, hosting training activities, and conducting IPPAS missions. All those present were encouraged to take advantage of these services.

Prepared to Respond: National Strategies for Nuclear Security Events

During this technical session, panellists shared recent developments, along with existing and emerging challenges, associated with the employment of nuclear security event response plans. Panellists noted that given the complex international environment and the expansion of other competing serious threats, it is important to ensure that nuclear security threats are not deprioritized. Panellists emphasized that States must work to avoid situations where nuclear security is insufficiently integrated in national emergency and crisis response plans.

Presentations demonstrated that a strong nuclear security response system should rely on appropriate levels of involvement from all relevant stakeholders. Collaboration with neighboring countries can also increase national capacities to respond to nuclear security events. One panellist described the extremely useful employment of regional exercises on nuclear security event response as an efficient tool to train and increase national readiness.

Capacity Building for nuclear security

The nuclear security community faces challenges in sustainably training, developing and retaining the current workforce while concurrently attracting and retaining young talent, women and diverse personnel. Sessions within this theme examined ways to shape the future with a focus on diversity, equality and inclusiveness.

Plenary Panel: Shaping the Future: Retaining and Developing the Nuclear Security Workforce of Tomorrow

This plenary session discussed the challenges the community faces in training and retaining the current workforce; the obstacles to training new employees; and the preparation of the next generation to deal with new and emerging challenges. Panellists discussed various barriers to entry for women and younger professionals into the nuclear security field, as well as strategies to create and maintain inclusive and diverse workforces. Panellists noted the importance of teaching the "language of nuclear" to those not coming from the nuclear field, in order to effectively bridge the gap between those in technical fields and those in the policy space. Communicating the importance of nuclear security by focusing on real-world threats would galvanize the current workforce and increase threat awareness for those both inside and outside of the field. It was suggested that expanding the target recruitment audience to include educating high school students about careers in nuclear security and encouraging non-standard applicants (e.g., mechanical engineers) would be beneficial. In addition, panellists provided an overview of educational programmes, research initiatives and the development of new curricula to prepare the next generation of nuclear security experts. Moreover, panellists highlighted the critical role filled by the International Nuclear Security Education Network (INSEN), which is established by the IAEA, in fostering international cooperation and collaboration to promote sustainable nuclear security education.

Technical Sessions

Establishing Strong Nuclear Security Programmes

Panellists from six different countries and one international organization shared national experiences and discussed various training and capacity building initiatives. Panellists provided updates and progress on their capacity building activities, with each presenter hailing from a State that was at a different stage of developing or pursuing a nuclear power programme. Presenters agreed that with the expansion of the use of nuclear technology for peaceful purposes comes the requirement for States to ensure their workforce is competent, engaged, and vigilant.

This applies to those States with established nuclear programmes and for newcomer countries. Depending on where a given country may be in their pursuit of nuclear technologies, it was acknowledged that each country will be faced with unique challenges associated with that specific stage of development. The panel demonstrated that it was important for the international community to collaborate in order that embarking countries can learn from those that have already encountered these challenges. They concluded that establishing robust national education, training, and human resource development programmes is and will continue to be an integral part of this process.

Equality in Action: Strategies for Establishing an Inclusive Workforce

This technical session explored strategies for pursuing and developing an inclusive workforce. The panel shared their diverse perspectives through case studies and national experiences, while also detailing various initiatives implemented at the IAEA. The IAEA was recognized for its ongoing efforts and for the progress it has made in gender parity, with one panellist noting improvements in the diversity of administrative staff and in the inclusion of early career professionals. The session concluded that sharing best practices in gender diversity fosters understanding and advances national and international progress. It was noted that various metrics indicate that the collective efforts of professional women, institutions and the IAEA are driving progress in inclusive workforce development, but continued work is needed.

Competence Building and Human Resource Management for a Robust Nuclear Security Workforce

The panellists in this technical session highlighted key challenges in the field of human resource management for countries seeking to maintain a robust and well-prepared nuclear workforce. Presentations were delivered from representatives of several diverse organizations representing various levels of national nuclear security regimes. These included regulatory bodies, research institutions, and law enforcement agencies. Although these organizations and entities have different missions and foci, they each faced several common challenges. One of these challenges is an aging workforce, and the need to retain older professionals in order that institutional knowledge can be passed down to the next generation. Another challenge which was discussed is the retention of trained staff, as personnel are often reassigned or leave the organization for separate ventures. It was noted that such changes create a vacuum, especially when there are limited personnel with such specific knowledge or training on these topics.

Beyond the Chalkboard: Modernizing Nuclear Security Training

This technical session introduced a broad range of new approaches and innovative technologies used by Member States to address challenges in training and capacity building. Some of these technologies include remote communication tools, multimedia channels, virtual/augmented reality, and simulators. Both Member States and the IAEA have started implementing tools like virtual reality and simulations in order to create more realistic training scenarios, create more

engaging training exercises, and to yield better results than standard classroom environments. Presenters demonstrated how these tools can be used for both security response and cyber security training programmes. In addition, panellists discussed the ways in which various web-based platforms enable practitioners to engage in virtual mentoring sessions or distribute video tutorials to wider audiences. In this way, new technology allows for more efficient and sustainable training and capacity building over time. Several panellists discussed the need to continually evaluate the effectiveness of new tools to ensure they are yielding the desired results.

Education to Excel: Lessons Learned from National Training Centres and Institutes

During this technical session, the panellists illustrated global efforts to enhance nuclear security through comprehensive training programmes, international cooperation, and the establishment of dedicated facilities to achieve these ends. Panellists highlighted that sustainable training activities are crucial for maintaining high standards, facilitating the secure use of nuclear technologies, and contributing to the socio-economic development of their respective countries. The successful implementation of training methodologies, coupled with sustained meaningful international collaboration, has significantly strengthened the knowledge and capabilities of personnel involved in nuclear security worldwide. Several panellists noted that continuous evaluation is needed to assess training programmes and to ensure those managing these programmes are maintaining high standards and constantly improving.

Securing our Future: Empowering and Enabling the Next Generation of Nuclear Security Professionals

This technical session discussed the work that several international organizations and networks are doing to develop the next generation of workers. Diversity, equity, inclusion, and accessibility (DEIA) were discussed in light of surveys conducted by different national and international organizations. Part of this data indicates that the youth have a positive perception of the nuclear security industry, but also that the nuclear sector faces a “leaky pipeline” where women exit the industry at various stages in their career. Several UN organizations and the IAEA have implemented various programmes and initiatives to support the next generation of professionals. Work being done by the INSEN was specifically highlighted. It was also suggested that the international community consider drafting language for inclusion in the next nuclear security resolution which emphasizes the importance of youth engagement.

Shaping the Future Together: International Cooperation in Training and Capacity Building

This session discussed a wide range of past, current and future challenges to capacity building in the field of nuclear security. Several themes were highlighted including the COVID-19 pandemic, emerging technologies, complexities in international legal frameworks, and regional cooperation to address each of these issues. Participants reflected on the ways in which the COVID-19 pandemic drove innovation in developing effective tools for capacity building. Online and virtual tools became more widespread, which in turn were used to deliver training on topics such as physical protection and computer security. In addition, panellists noted that other

digital approaches, such as “gamifying” education and training, have also been deployed to engage the next generation. The session stressed the importance of forming communities of practice, particularly in the areas of computer security and AI, which will provide practitioners with networks in which they can cooperate, innovate, and develop solutions to unforeseen challenges.

Sharing Successes and Lessons Learned from National Training Initiatives

During this technical session, Member States shared success stories but also various issues encountered when implementing national training initiatives. Experts from seven Member States emphasized the critical role of competence building in ensuring strong national nuclear security regimes. This session not only highlighted the IAEA’s indispensable role in reinforcing international nuclear security, but also emphasized the collective responsibility of all nations to enhance global nuclear security through their national capacity building programmes. The panellists encouraged all participants to support collaboration between the Agency and Member States to ensure shared approaches to emerging threats and ongoing technological developments.

Leveraging Interactive Methods for Enhancing Nuclear Security Capacity Building

This technical session explored various case studies and results from national and international training exercises, drills, and workshops for nuclear security personnel. Panellists highlighted how interactive training methods encourage personnel to actively participate and to apply their skills in practical scenarios. Such activities provide an opportunity for participants to bridge the gap between theory and real-world situations as they can provide organizations with an effective tool to identify outstanding training gaps and areas for improvement. Additionally, although planning exercises often comes with extensive challenges, one presenter discussed the benefits of cross-border training exercises to more easily develop effective plans for national exercise scenarios.

From Theory to Practice: Insights and Innovations in Nuclear Security Education

During this session, panellists discussed the evolving nature of nuclear security education programmes. One speaker noted that online and distance learning Masters programmes are effective in attracting younger professionals to the nuclear security field. In addition, online programmes provide a platform on which established nuclear security professionals can advance and expand their expertise. Panellists acknowledged that as professionals progress through their respective careers, they may find it difficult to balance work schedules with in-person classes. Thus, it was argued that there is a need for novel education programmes using non-traditional models, supplemented by micro credentials, professional certificates and accreditation of prior experiential learning. The discussion highlighted that impact assessment and evaluation are an integral part of ensuring the effectiveness and sustainability of both novel and traditional education programmes.

Cross-cutting nuclear security topics

The fourth and final theme of the conference included discussions on subjects which spanned multiple dimensions of the nuclear security regime. Some of these topics included the role of the IAEA, international cooperation and collaboration, cybersecurity, nuclear security culture, the role of industry, and the safety and security interface. Such discussions demonstrated the interdisciplinary nature of nuclear security matters, while emphasizing the need for wholistic approaches to existing and emerging threats.

Plenary Panel: Looking Forward: The Evolving Role of the IAEA

Panellists shared national experiences with IAEA services and assessed the ways in which the IAEA's role may adapt in the future. They discussed various implications of new technologies and emerging threats for the IAEA's activities and priorities (e.g., preparing to work with Member States on mitigating threats associated with the growth of AI). The panel discussed ways in which the IAEA can enhance its role through regional or strategic partnerships, and shared ideas about how the Agency can become more efficient and effective in providing support to Member States. These included working closely with Parliamentarians; further enhancing the interface between nuclear safety and security; and simplifying the message about why nuclear security is important for all countries, to include smaller States with no nuclear power programme. It was also suggested that the experiences of the International Civil Aviation Organization (ICAO) and its engagement with stakeholders in industry might be useful for some relevant IAEA activities. No matter the changes that the future might bring, panellists agreed that the IAEA must continue to play a central role in advancing global nuclear security and in promoting the peaceful uses of nuclear technology.

Technical Sessions

Shared Challenges, Shared Solutions: Regional and International Cooperation to Enhance Nuclear Security

The technical session highlighted the importance and benefits of bilateral, regional, and international nuclear security cooperation activities. A recurring theme was the significance of partnerships between national and international organizations to effectively address nuclear security challenges by leveraging each other's expertise and resources. Panellists maintained that capacity building and tailored cross-border training activities are crucial for raising awareness and developing methodologies to enhance national nuclear security capabilities. Regional networks (e.g., RACVIAC's Nuclear Security Cooperation Initiative, the Forum of Nuclear Regulatory Bodies in Africa, or the European Nuclear Security Regulators Association) were also recognized as valuable vehicles for facilitating the sharing of best practices. Such networks can lead to harmonized security standards and collective responses to common threats. Panellists also discussed effective communication and coordination strategies between national stakeholders to

ensure that security measures are relevant and impactful, as local engagement aids in the successful implementation of security practices. Panellists agreed that proper documentation and sharing of good practices is essential for continuous improvement and knowledge dissemination across different regions and organizations. The central role of the IAEA in promoting and coordinating global efforts in nuclear security was highlighted and panellists recommended that the Agency continue to support its Member States, upon request, to further strengthen and sustain their nuclear security infrastructures.

Safety Meets Security to Ensure a Safe and Secure Future

This technical session covered various perspectives on assessing nuclear safety-security integration and enhancing nuclear safety-security interfaces, mainly by drawing on insights from national experiences. Key topics of discussion included safety-security integration assessment tools; security risk assessment methodologies; regulatory approaches for nuclear safety-security interface management; and nuclear safety-security studies in the context of climate change. In addition, one panellist presented a study comparing their national standards with recommendations proffered in a published joint report of the Advisory Group on Nuclear Security and the International Nuclear Safety Advisory Group. It was suggested that more IAEA Member States conduct this study to identify potential gaps and discrepancies. The collective insight gained could inform the further development of the IAEA safety and security publication series, or lead to the creation of joint publications. Another panellist presented the development of their national process for the issuance of regulations. In this State, a single authorization is issued for the safety and security of a facility. Joint inspections are carried out involving both safety and security experts.

The IAEA Can Help You: National Case Studies on IAEA Advisory Services and Assistance Missions

During this session, presenters shared national experiences with IAEA advisory services and assistance missions, including IPPAS, INSServ and INSSP. Panellists highlighted the benefits, lessons learned, and good practices developed as a result of these and other IAEA advisory or review missions. The panellists emphasized that developing and implementing an INSSP is very beneficial in that it applies a systematic and comprehensive approach to strengthening national nuclear security regimes. Others discussed the steps that their national competent authorities took in the lead up and following the completion of these missions, while noting some of the challenges that were encountered during these processes (e.g., coordination issues between several national competent authorities). Panellists agreed that these services will play a critical role in shaping and reinforcing the global nuclear security regime, and that the IAEA’s role in coordinated these activities is invaluable. Panellists encouraged conference participants to consider requesting assistance from the IAEA.

Digital Defense: Preparing for and Defending Against Cyber Attacks

During this technical session, participants emphasized that computer security is an integral component of the safe and secure operation of nuclear facilities. In order to properly prepare practitioners, several panellists discussed national efforts to develop cyber training environments which simulate nuclear facility processes. In addition, one panellist presented a real-world example in which an actual cyber-security incident took place, along with the steps the national competent authority took to address this incident. Drawing on this experience, the presenter recommended that the IAEA consider developing technical guidance for protecting digital assets within a nuclear regulatory authority. Moreover, it was suggested that during future IAEA missions, the Agency might consider including cyber security assessments of not only relevant Information Technology/Operational Technology infrastructure, but also of regulatory information systems. All panel members confirmed their use of various IAEA guidance documents on computer security in nuclear facilities and championed the IAEA's central role in facilitating knowledge exchange amongst computer security experts.

Exploring Industry's Role in Supporting and Advancing Nuclear Security

This session centered on the role that industry plays in supporting and advancing nuclear security globally. All presenters provided details about the role of industry in their respective countries, while emphasizing that global nuclear security requires collaboration with industry partners. Presenters stressed that in addition to networks within nuclear industry, effective communication and collaboration between industry, government and intergovernmental/international organizations is key to ensuring that nuclear security adapts alongside advancements in technology. Presenters also discussed the importance of engaging and recruiting early career professionals into the field. Participants concurred that the IAEA is one of the many important fora for industry to become more formally involved in global nuclear security, and that the active engagement of industry in the maintenance of the global nuclear security regime should continue to be pursued.

From Threats to Solutions: Assessing and Mitigating Cybersecurity Risk

Presenters during this technical session highlighted the critical importance of robust and adaptive cybersecurity measures in the nuclear field. Panellists noted that while beneficial, the integration of modern digital technologies and autonomous systems may introduce new challenges that require tailored approaches and continuous vigilance. Several recommendations to mitigate cybersecurity risk were proposed to include continuous monitoring systems, regularly updating protocols, and establishing Computer Security Operations Centers in nuclear facilities. Given the expansion of autonomous systems, one panellist stressed the need to develop clear and consistent frameworks for assessing the cybersecurity risks associated with different levels of autonomy. In addition, there was discussion about developing comprehensive, industry-specific guidance and best practices for conducting cybersecurity assessments in industrial irradiator facilities. The

session concluded with a call for ongoing collaboration, sharing of best practices, and development of comprehensive frameworks to ensure cybersecurity risk is effectively managed.

Security - It's What We Do: Developing and Maintaining a Robust Nuclear Security Culture

This technical session covered various perspectives on assessing and enhancing nuclear security culture. Panellists discussed insights from national approaches and proposed models for self-assessment strategies. Key themes included the importance of continuous training, the role of raising public awareness, and the development of tailored initiatives to foster a robust security culture. Presentations highlighted the need for analysis of incidents and their causes, enhanced international collaboration and cooperation with the public, and innovative training methods utilizing tabletop exercises and “gamified” scenarios. Panellists stressed that nuclear security culture plays an important role in ensuring that individuals, organizations and institutions remain vigilant and that measures are sustained to prevent malicious acts. One panellist noted that the IAEA stands ready to support any country looking to reinforce its nuclear security culture.

Exploring the Role of Civil Society in Shaping the Future of Nuclear Security Together

In this technical session, panellists discussed the role of think tanks, universities, and civil society in enhancing nuclear security regionally and globally. Discussions centered around leveraging epistemic communities for expert knowledge generation and policy recommendations; addressing challenges, such as funding sustainability and policy impact uncertainty; and fostering inclusive cooperation and consistent leadership to strengthen nuclear security frameworks and norms. Some recommendations proffered by the panellists included prioritizing nuclear security during heightened risks, enhancing security culture, and promoting an inclusive narrative to shape a more secure future for all. Participants concurred that civil society can bring added value to nuclear security through collaboration, education, communication and effective messaging.

Let's Talk about Nuclear Security: Considerations for Public Communication

This session underscored the importance of effective and adaptive communication strategies in nuclear security, especially given the expansion of nuclear technologies to meet development goals. Panellists discussed the need for ongoing and continuous public engagement, and the importance of addressing misinformation to maintain public confidence and safety. One speaker discussed ongoing research associated with the use of humour as a strategy to reduce fears and improve message delivery. It was noted that communications on nuclear security must strike a delicate balance due to the need for transparency and given the potentially confidential information involved. Overall, panellists emphasized the advantages of using clear, culturally sensitive, and empathetic communication strategies in nuclear security, highlighting the importance of proactive engagement, accurate information dissemination, and technical expertise to maintain public trust.

Adapting to Adversity: Ensuring Nuclear Security in Complex and Challenging Environments

This technical session explored lessons learned from past challenges in order to enhance contemporary nuclear security systems. One panellist detailed the extensive work that had been done to develop nuclear security training for personnel in conflict zones. Other panellists discussed some of the strategies that their respective State employed to maintain nuclear security throughout the COVID-19 pandemic. Common experiences underlined the value of new digital technologies to sustain regulatory functions in periods when in-person interaction is very difficult or impossible. At the same time, the common view was that in-person interaction was vital to maintaining effectiveness over time and cannot be fully replaced by digital technology or virtual meetings.

Developing Approaches to Risk and Threat Assessments for Robust Nuclear Security

During this session, examples of various approaches to risk and threat assessments for several different components of the nuclear security regime were presented (e.g., transport security, computer security, etc.). Panellists discussed the use of innovative technologies and advanced security modelling as a means to assess the efficacy of physical protection system designs. Other panellists discussed the development of frameworks for the conduct of risk assessments at production sites, along with cybersecurity assessments at other radioactive material facilities. Each of these discussions highlighted both national and international efforts to improve approaches to assessing risk, in order that decision makers at all levels are properly equipped to make informed decisions about the implementation of nuclear security measures.

Closing Plenary Session

Following a brief introduction by Ms Lydie Evrard, Deputy Director General and Head of the Department of Nuclear Safety and Security, the ICONS 2024 "Nuclear Security Delegation for the Future" delivered a statement that they had cooperatively drafted in the months leading up the conference. Their statement highlighted the importance of providing various pathways to young professionals to join the nuclear security sector and of providing equitable access to workshops and training. They also stressed the importance of intergenerational discussions, especially on topics related to emerging technologies, as their generation will inherit the consequences of decisions made about their use. The full text of the statement is available on the conference website: Nuclear Security Delegation for the Future Statement.

HE Mr Ian Biggs, Ambassador and Permanent Representative of Australia, and HE Mr Mukhtar Tileuberdi, Ambassador and Permanent Representative of Kazakhstan, then delivered remarks as representatives of the Co-Presidents of the conference. Director General Rafael Grossi was then invited to deliver the closing remarks for ICONS 2024, following which he declared the conference officially closed. The closing plenary session of the conference, can be found on the ICONS website: Closing Plenary of ICONS 2024.