



Nuclear Safety, Security and Safeguards

Alberto Muti

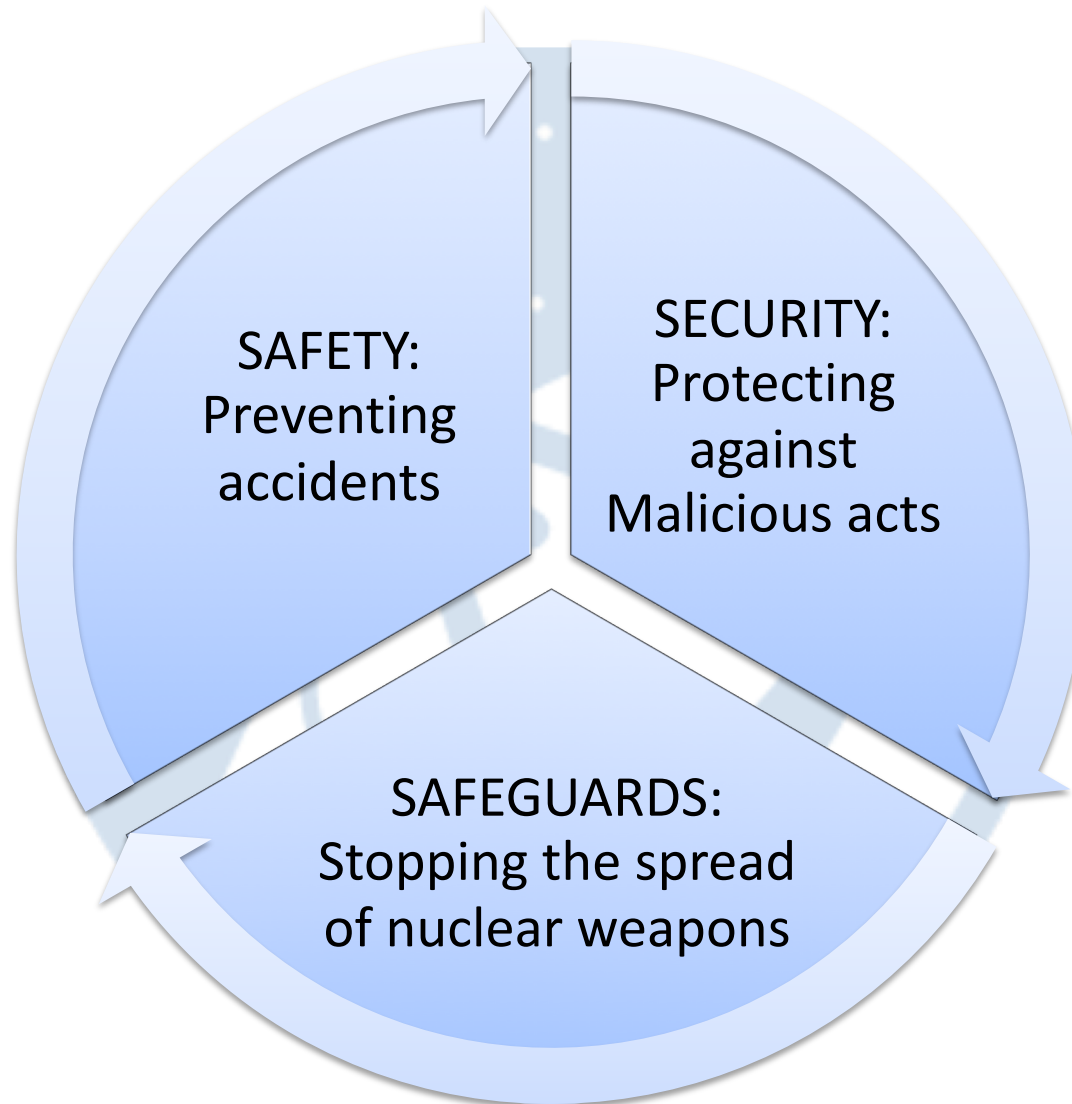
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Introduction

- Safety, Security, Safeguards as policy areas: forms of governance developed to manage risks connected to the use of nuclear technology.
- Action at different levels:
 - Facility: Management, internal rules, practices
 - National: Policies, regulatory framework
 - International: treaties, cooperation agreements, trade control regimes, IAEA

Introduction



Nuclear Safety

“The achievement of proper operating conditions, prevention of accidents or mitigation of accident consequences, resulting in protection of workers, the public and the environment from undue radiation hazards.”

IAEA Nuclear Safety Glossary

Nuclear Safety – Domestic

- The oldest of the “three S”
- High-profile incidents have energised the international community:
 - Chernobyl (1986)
 - Fukushima (2011)
- Safety is a responsibility of the state and of facility operators – IAEA provides assistance

Nuclear Safety – Domestic

- Domestically, countries pursue this through appropriate legislation, and through regulatory activity – licensing and inspections
- Operators develop and implement policies at facilities in accordance to best practices and national law.

Nuclear Safety – International

Key International Agreements on Nuclear Safety:

- Convention on Nuclear Safety (1994)
- Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (1997)
- Convention on Early Notification of a Nuclear Accident (1986)
- Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency (1986)

Nuclear Safety – International

- IAEA supports the implementation of these treaties and encourages ratification
 - IAEA acts as coordination body for the implementation of these treaties
- IAEA supports improvements in Nuclear Safety in Member States
- IAEA Action Plan on Nuclear Safety (2011)

Nuclear Safety – International

IAEA Action Plan on Nuclear Safety (2011)

- Safety assessments of nuclear facilities
- Peer review service
- IAEA Safety Standards form a bedrock of recognised and trusted good practices
- Supports the implementation and strengthening of international instruments on nuclear safety
- Provides assistance to government authorities and private sector

Nuclear Safety – International

IAEA Assistance:

- Support to new infrastructure projects
- Liaising with operators through bodies such as WANO
- Capacity-building:
 - 500 Technical Cooperation projects on NS
 - 14 Coordinated Research Projects

Nuclear Security

“The prevention and detection of, and response to, theft, sabotage, unauthorized access, illegal transfer or other malicious acts involving nuclear material, other radioactive substances or their associated facilities.”

IAEA Nuclear Safety Glossary

Nuclear Security

- The youngest of the “Three S”
- Energised by changes in the international environment:
 - Disgregation of the former Soviet Union
 - 9/11 Attacks and “War on Terror”
- Since then, it has risen to prominence in international agenda – and profoundly changed as a concept
- Nuclear Security is a responsibility of the state

Nuclear Security

- “Original” nuclear security was physical protection: guards, gates and guns
 - Principles such as “Defence in Depth” and “Deter, Detect, Delay, Respond, Recover”
- Over time, the concept expanded to include the human elements of security:
 - Insider Threat
 - “Security Culture” among facility staff

Nuclear Security – Domestic

- Government:
 - Sets Regulations and standards, including defining threat (DBT)
 - Leverages law enforcement, intelligence and counterterrorism resources
- Facilities
 - Establish physical protection
 - Follow appropriate protocols (NMAC)
 - Train staff to maintain security

Nuclear Security – International

Key International initiatives on Nuclear Security:

- Cooperative Threat Reduction Programmes (1990s onwards)
- Global Partnership (G7-backed, 31 members, 2002)
- Nuclear Security Summits (2010-2016)
- US Partnership for Nuclear Security
- EU CBRN Centres of Excellence

Nuclear Security – International

Key International agreements on Nuclear Security:

- Convention on the Physical Protection of Nuclear Material (1980) + 2005 Amendment
- Code of Conduct on the Safety and Security of Radioactive Sources
- International Convention for the Suppression of Acts of Nuclear Terrorism (2007)
- UN Security Council Resolutions:
 - 1373 (2001)
 - 1540 (2004)

Nuclear Security – International

- Not all these instruments relate back to the IAEA – the international framework is more fragmented
- The IAEA has stepped up to provide a coordination and support role on nuclear security after 2001
- Key documents: Nuclear Security Plans, starting in 2003. Current plan is 2018-2021

Nuclear Security – International

IAEA Support on Nuclear Security

- IAEA Nuclear Security Series provides a a bedrock of recognised and trusted good practices
- Supports implementation and ratification of CPPNM and Amendment, maintains CoC
- Supports with needs assessment and coordinates assistance providers

Nuclear Security – International

- Assists with Physical Security Enhancements
- Delivers training and capacity-building
- Supports and equips national regulators
- Assessment and Peer Review services on a range of issues, including physical security, regulation, staff training
 - IPPAS is a good example and well-documented in a Nuclear Security Series Guide

Nuclear Safeguards

“A set of technical measures applied by the IAEA on nuclear material and activities, through which the Agency seeks to independently verify that nuclear facilities are not misused and nuclear material not diverted from peaceful uses.”

IAEA

Nuclear Safeguards

- Item-specific Safeguards (1960s) were created as a confidence-building measure
- With the NPT (1970), Safeguards became the key instrument to verify adherence to non-proliferation commitments
- Established through Bilateral treaties between the IAEA and Member States
- IAEA's role is to verify compliance

Nuclear Safeguards

Goals of Safeguards:

- Detect the diversion of nuclear material to the manufacture of nuclear weapons
- Deter the diversion of nuclear material by risk of early detection
- Ensure that all nuclear activity a state undertakes is for peaceful purposes and that a state is not engaging in illicit nuclear activities.

Nuclear Safeguards

Key approaches in Safeguards:

- Creation of a State System for Accountancy and Control (SSAC) of Nuclear Material at the state level
- Submission of regular reports on nuclear material and activities to the IAEA
- IAEA inspection of nuclear facilities to verify reports and prove compliance

Nuclear Safeguards

- Nuclear Material: Uranium, Plutonium, Thorium “of a composition and purity suitable for fuel fabrication or for being isotopically enriched”
- Amount, composition and chemical form of material measured :
 - When passing through “Key Measurement Points”
 - When held in “Material Balance Areas”
- A “Facility” for safeguards: fuel cycle facility or location where a certain material is stored

Nuclear Safeguards

- State Authorities collect information from operators and compile regular reports to the IAEA, including:
 - Inventory holdings of material
 - Operations – including transformation of composition and form of material (e.g. enrichment, fuel fabrication)
 - Transfers of material between facilities in the same country
 - Imports and exports
 - Losses and Material Unaccounted For

Nuclear Safeguards

IAEA Inspectors verify correctness of reports through a number of approaches:

- Visual observation
- Non-destructive assay (radiation detection, neutron counting)
- Destructive assay (samples) and environmental sampling
- Use of tamper-indicating devices (seals, tags) and remote monitoring systems (cameras, alarms)

Nuclear Safeguards

Key Safeguards Agreements:

- Comprehensive Safeguards Agreement (INFCIRC/153)
- Small Quantities Protocols
- Additional Protocols (INFCIRC/540)

Nuclear Safeguards

Comprehensive Safeguards Agreement

- “Classic” Safeguards
- First post-NPT Safeguards agreement, covers all the state
- Reports and inspections system focuses on verifying correctness of declarations

Small Quantities Protocol:

- Suspends application of most CSA provisions for states with little to no nuclear material

Nuclear Safeguards

- Cases of nuclear proliferation in 1990s proved that a state with a CSA could run a secret, illegal nuclear weapons programme and remain undetected
 - Iraq
- CSA was sufficient to verify correctness, but could not guarantee completeness
- Safeguards needed a new instrument

Nuclear Safeguards

Additional Protocol

- Introduced in 1996
- Expands reach of safeguards to verify that there is no undeclared activities
- Gives IAEA inspectors new forms of access
- Voluntary measure (subject to fierce international debate)

Nuclear Safeguards

Additional Protocol reporting

- Expanded reporting on nuclear sites (maps and information of use of building)
- Expanded reporting on source material, uranium mines, and nuclear waste
- Expanded reporting on non-nuclear activities of fuel cycle interest
 - R&D and industrial plans
 - Manufacturing, import and export of material and equipment related to nuclear technology

Nuclear Safeguards

Additional Protocol inspections

- Environmental sampling at nuclear sites
- Complementary Access to areas and buildings not declared as nuclear facilities
- Complementary Access to decommissioned facilities
- Managed Access to areas that present health and safety or confidentiality risks



Any Questions?