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Protecting nuclear materials and facilities against the full spectrum of plausible threats

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Effective nuclear security systems must protect against a broad spectrum of adversaries

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- ❑ Key dilemma for nuclear security
 - States must protect against all realistic threats
 - But should not waste money protecting against unrealistic threats
- ❑ Existing agreements, resolutions, recommendations require effective protection against state's understanding of the threat
- ❑ Recent incidents demonstrate broad range of potential adversary tactics and capabilities
 - Key data for assessing what the design basis threat should be
 - But adversaries learn, adapt, change, so the past is not a fully reliable guide to the future

International instruments call for protection against the state's understanding of the threat

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- ❑ UN Security Council Resolution 1540
 - Provide “appropriate effective” security for all nuclear weapons and related materials
 - To be truly “effective” security must protect against all the types of theft attempts that might plausibly occur
- ❑ Amended physical protection convention:
 - Provide protection against “the state’s current evaluation of the threat”
- ❑ INFCIRC/225/Rev. 5
 - Protect against a DBT based on a regularly updated assessment of the threat, including all credible information
 - Key IAEA recommendation, so included in the commitments of the Strengthening Nuclear Security Implementation Initiative (INFCIRC/869)

Recent incidents provide lessons on adversary capabilities and tactics

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- ❑ Recent incidents of theft from or attacks on secured facilities demonstrate a wide range of capabilities and tactics
 - Well-armed, well-trained outsiders, sometimes with military-style tactics
 - Use of insiders (including multiple insiders in some cases)
 - Unusual vehicles to get past some layers of security (e.g., helicopters)
 - Prolonged intelligence collection to understand security system
 - Use of deception (e.g., official uniforms, forged IDs and documents)
 - Use of multiple teams, including to distract/delay response forces
 - Use of cyber intrusions (could be combined with physical theft or attack)
 - Willingness to die in the attack

Example: The Vastbërga heist

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- ❑ September 2009, armed men steal millions from a cash depot in Vastbërga, Sweden
 - Arrived in stolen helicopter
 - Had automatic weapons, explosives, custom-built ladders
 - Delayed police arrival with “caltrops” to puncture tires on nearby roads, bag that looked like bomb at police heliport
 - Escaped with millions ~30 minutes after the theft began
 - Eluded pursuit by abandoning helicopter, switching to unknown car
 - Gang was ex-paramilitary from Serbia – half a continent away



Source: NTDTV

Insider threats are the most dangerous nuclear security problem

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- ❑ Most known HEU and Pu thefts, and most sabotages, involved insiders
- ❑ People don't want to believe their friends and colleagues could betray the organization
 - Leads to serious lapses in protection against insider threats
- ❑ Getting people to report suspicious behavior is very difficult
- ❑ Often even obvious “red flags” go unreported, unaddressed
- ❑ Bunn-Sagan book offers case studies, “Worst Practices Guide” on lessons learned from past mistakes

<http://www.belfercenter.org/publication/insider-threats>



Cyber intrusions

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- ❑ Cybersecurity must be a key part of nuclear security protection
- ❑ Cyber means can be used to undermine all of the principal nuclear security measures
 - physical protection
 - material control
 - accountability, and personnel reliability programs.
- ❑ Collecting and sharing of cyber threat information is already taking place in some sectors



Source: cyberaware.gov

The need for expanded sharing of incident information and lessons learned

- ❑ It is crucial for both national governments (including regulators) and operators to be aware of the full spectrum of the threat
 - Yet detailed incident information – including the tactics adversaries used, how they defeated the security system, and how security systems could be modified to prevent similar attempts – is rarely shared
- ❑ States should develop approaches to compiling and analyzing such incident information, and sharing it with operators
- ❑ Means should be developed to share such information internationally as well
 - Some information is secret or sensitive
 - A great deal of important information is open-source, or could be shared between cooperating states
 - Example: U.S. sharing about 2012 Y-12 intrusion (should be expanded)

Protecting against a common baseline threat

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- ❑ Adversary capabilities and tactics vary from place to place
- ❑ But in a world with terrorists with global reach, there is a need for a common baseline of protection:
 - Weapons-usable nuclear materials and high-consequence nuclear facilities should, at a minimum, be protected against:
 - A modest group of well-trained, well-armed outsiders (able to operate as >1 team), a well-placed insider, and both outsiders and an insider together
 - Cyber threats, including the use of cyber assaults to compromise or confuse security systems to facilitate a physical theft or assault
 - Should be a floor, not a ceiling – countries facing higher adversary threats should put higher levels of security in place
- ❑ States should convene experts to develop such a common baseline – and make a political commitment to implement it

Cooperation to protect against the full spectrum of adversary tactics & capabilities

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- ❑ International cooperation and commitments can help achieve effective nuclear security worldwide
- ❑ A next step: political commitment to key nuclear security principles – flexible, but specific enough to be meaningful
 - One approach: draw on physical protection, material control, and material accounting goals from US-Russian technical cooperation
 - Most fundamental element of principles should be a commitment to protect against common baseline threat
- ❑ Group of like-minded states might develop principles
 - Initial participants (ideally, most or all of the states with substantial stocks of weapons-usable nuclear materials) could invite other states to join, and offer help in meeting the commitments

Cooperation to protect against the full spectrum of adversary tactics & capabilities (II)

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- ❑ Obstacles to cooperation to achieve protection against a broad spectrum of adversary tactics and capabilities worldwide
 - Complacency
 - Secrecy (don't want to reveal information about defenses to adversaries)
- ❑ It's possible to build confidence without revealing sensitive information
 - Review of security arrangements by international experts (IPPAS)
 - Confidential information sharing about security requirements, assessment and testing approaches to ensure that they are met
- ❑ IAEA should have a central role
 - Principles could be established in an INFCIRC open to all states, IAEA could help coordinate assistance, reviews on request
 - Military materials security should be addressed outside the IAEA

Ensuring that nuclear security systems will perform as required

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- ❑ States should have mechanisms for in-depth assessment and realistic testing of nuclear security system
- ❑ INFCIRC/225/Rev. 5 recommends nuclear operators have quality assurance programs
 - Including at least annual force-on-force exercises
- ❑ Genuinely effective quality assurance programs include:
 - Realistic force-on-force exercises
 - “Red teams” to find security vulnerabilities and propose solutions
 - In-depth vulnerability assessment evaluations
 - IAEA should develop guidance and advisory services on how to conduct realistic assessments and performance testing
- ❑ The IAEA, the United States, and other interested parties should work to convince countries to carry out regular, realistic tests

Further Reading and Background Material

- ❑ *Preventing Nuclear Terrorism: Continuous Improvement or Dangerous Decline?* (2016) :
<https://www.belfercenter.org/sites/default/files/legacy/files/PreventingNuclearTerrorism-Web.pdf>
- ❑ “Key Steps for Continuing Nuclear Security Progress” (2016)
https://www.belfercenter.org/sites/default/files/files/publication/%5B3A-1%5D_FUL_574_Bunn.pdf
- ❑ *Insider Threats* (2017)
<http://www.belfercenter.org/publication/insider-threats>
- ❑ *Threat Perceptions and Drivers of Change in Nuclear Security Around the World: Results of a Survey* (2012)
<https://www.belfercenter.org/sites/default/files/files/publication/surveypaperfulltext.pdf>
- ❑ Full text of *Managing the Atom* publications:
<http://belfercenter.org/mta>