Terrorism in all its forms is a major threat to national security. Nuclear terrorism however is the most serious possible terrorist threat. Samantha Pitts-Kiefer from the Nuclear Threat Initiative, outlines the history and current reality of a nuclear terrorist threat, highlighting the urgent need to better strengthen global nuclear security. This contribution summarises the key global initiatives focused on this task and how the NTI Nuclear Materials Security Index aims to provide better evidence to measure amongst countries of the world, the quantities, security and control measures, global norms, domestic commitments and capacity and risk environment for nuclear materials.

NUCLEAR NIGHTMARES

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Thirteen years after the 9/11 attacks stunned the world and nearly a decade after the subsequent attacks in London, Madrid, and Bali made global terrorism a painful reality, public concern and awareness about the terrorist threat had started to fade. But the emergence this year of the Islamic State of Iraq and the Levant (ISIL), most notably with gruesome videotaped beheadings, has once again captured the attention of citizens across the globe.

Images of the barbaric ritualistic killings of American journalists and British aid workers sparked international outrage. At the same time, however, in many parts of the world, a sense remains that these kinds of deeply troubling events take place only in remote and far-off lands, and pose little threat closer to home. Unfortunately, it is naïve to think so. ISIL has tens of thousands of fighters, is well-financed, pays little respect to international borders and, in addition to individual acts of barbarism, engages in large-scale attacks on civilians. Al Qaeda leaders made it clear they were seeking weapons of mass destruction, including nuclear weapons. What if ISIL decides it too wants them? World leaders and their publics have a duty to ask such "what-ifs." What if ISIL, al Qaeda, or some other yet-as-unknown terrorist group obtained nuclear materials and fashioned a crude improvised nuclear device? What if they were able to ship it, undetected, through one of the world's porous ports? What if they succeeded in detonating it in one of the world's cities?

This is not just the stuff of Hollywood. Such "what-ifs" must be treated in capitals with seriousness and resolve from Washington, DC, to Moscow and beyond. World leaders, including U.S. presidents Barack Obama and George W. Bush, have identified nuclear terrorism as the number one security threat and have taken steps to address the threat through the Nuclear Security Summit process and other programs such as the Global Initiative to Combat Nuclear Terrorism and the G8 Global Partnership Against the Spread of Weapons and Materials of Mass Destruction. But much more needs to be done. Until all the materials needed to make a bomb are properly secured, the world will not be safe from terrorists bent on unleashing unimaginable horror.

THE THREAT OF NUCLEAR TERRORISM

During the Cold War, the United States and the Soviet Union built up vast amounts of nuclear weapons and materials. The Cuban Missile Crisis heightened fears that the nuclear arms race could result in destruction on a massive scale, whether as a result of an intentional or accidental launch and detonation of a nuclear bomb. As the Cold War came to a close, a new threat emerged: nuclear terrorism. With the disintegration of the Soviet Union, nuclear weapons and

materials were left scattered across hundreds of sites in former Soviet states prompting urgent concern that smugglers or terrorists would steal enough material for a bomb. Russia and the United States worked together, through the Nunn-Lugar Cooperative Threat Reduction Program, to dismantle and destroy thousands of weapons and to ensure that the nuclear materials from those weapons were disposed of safely. Despite all that has been achieved, the security of weapons-usable nuclear materials remains an urgent concern, while at the same time terrorist groups have grown more sophisticated and more adept at carrying out mass-casualty attacks.

So, today's leaders and citizens face a chilling prospect: the detonation of a crude nuclear weapon built by terrorists with materials stolen or purchased on the black market. Though the al Qaeda that attacked the United States on 9/11 has been much diminished, al Qaeda affiliates in the Arabian Peninsula and Northern Africa, ISIL, and terrorist organizations like al-Shabaab in Somalia remind us that the terrorist threat is dynamic, constantly evolving, and, most of all, enduring.

At the same time, the materials needed to build a bomb are spread around the world. Globally, there are approximately 2,000 metric tons of weapons-usable nuclear material (plutonium and highly enriched uranium or HEU) located at hundreds of sites—some of them poorly secured—scattered across twenty-five countries. Building one bomb requires only enough HEU to fill a five-pound bag of sugar or a quantity of plutonium the size of a grapefruit. Terrorists also have access to the technology and know-how needed to build a crude nuclear device, and a number of terrorist groups have in the past stated a desire to acquire and use a nuclear bomb. The consequences of detonating such a bomb in a major city would be staggering: hundreds of thousands of casualties; long-lasting environmental damage; economic losses in the hundreds of billions; and considerable political and social ramifications. No matter where a bomb is detonated, the consequences would reverberate around the globe.

To build a bomb the biggest challenge terrorists face is obtaining enough HEU or separated plutonium. Every step after acquiring the material—building the bomb, transporting it, and detonating it—is easier for terrorists to take and harder for the international community to stop. So it is imperative that terrorists don't get a hold of the materials.

Today, there are myriad ways that a well-organized and sufficiently-funded terrorist group could seize the materials they need to build an improvised nuclear device that would destroy the heart of a city. They could send a team of armed assailants to overwhelm guards at an understaffed nuclear facility or to attack a convoy transporting weapons-usable nuclear materials from one facility to another. A terrorist or criminal network could corrupt insiders or use a cyberattack to defeat security controls.

That is why ensuring that all weapons-usable nuclear material is properly secured to the highest standards is the key to preventing nuclear terrorism.

BUILDING A STRENGTHENED GLOBAL NUCLEAR SECURITY SYSTEM

The Nuclear Security Summits, launched by the United States in 2010, have brought high-level attention to the threat of nuclear terrorism and have catalyzed actions by the 54 participating states to strengthen their own security and work collectively to strengthen global security. As a result of the Summit process, states have strengthened their nuclear security laws and regulations, signed on to international treaties that require them to secure nuclear materials and criminalize acts of nuclear terrorism, and provided financial or other assistance to states to help them secure their materials. Significantly, since the Summit process was launched in 2009, twelve countries have eliminated all of their inventories of these dangerous materials.

Yet, despite these important efforts, there is still no global system for securing all material. Incredibly, the security of some of the world's most dangerous material is not subject to any common international standards or "rules of the road" that all states must follow. Indeed, security practices vary widely across states. While several elements for guiding states' nuclear security practices do exist, they fall short of what is needed. In particular:

- The international legal agreement for securing nuclear materials—the Convention on the Physical Protection of Nuclear Material (CPPNM) and its 2005 Amendment—does not define standards and best practices and the 2005 Amendment, which strengthens the overall scope of the CPPNM, has not yet entered into force. Entry into force must be a priority and the United States, which has so far failed to complete ratification of the 2005 Amendment, must act swiftly to do so.
- Nuclear security recommendations and guidelines issued by the International Atomic Energy Agency (IAEA) are not mandatory and are implemented inconsistently.
- Existing legal agreements and guidelines cover only 15 percent of all global stocks of weapons-usable nuclear material: those used in civilian programs. The remaining 85% are considered "military material" and are not subject even to those limited practices.

Not only is the current system devoid of an agreed-upon set of international standards or best practices, there is no governing body tasked with holding states accountable for lax security and no expectation that states should take steps to build confidence in others that they are effectively securing their materials. Even though poor security in one state can result in the detonation of a nuclear bomb anywhere else in the world, many states still consider nuclear security solely a sovereign, not a shared, responsibility, and continue to simply say, "Trust me."

NUCLEAR SECURITY LAGS BEHIND OTHER INDUSTRIES

The lack of global standards, information sharing, or accountability mechanisms in nuclear security is in stark contrast to other high-risk global enterprises, such as civil aviation, where public safety and security is at stake and where states understand and accept that all parties have an interest in the performance of others. In the case of aviation, for example, almost all states are members of the International Civil Aviation Organization (ICAO), which sets safety and security standards for all airlines, conducts audits, and shares security concerns with others states. Yet with weapons-usable nuclear materials, where poor security can lead to a nuclear catastrophe with global consequences, there is no shared system of standards, assurance, or accountability.

If the threat of nuclear terrorism is to be taken seriously and all weapons-usable nuclear material secured, there must be a global system of international standards and best practices that covers all materials, including military materials, and provides mechanisms for states to be held accountable and to build confidence in their security practices. In addition, sates must reduce risk by minimizing and, where possible, eliminating their stocks of

weapons-usable nuclear materials, for example by converting power and research reactors that use HEU fuel to low enriched uranium fuels.

STRENGTHENING GLOBAL NUCLEAR SECURITY

Securing vulnerable nuclear materials has been a priority at the Nuclear Threat Initiative (NTI) since its founding in 2001. In recent years, NTI's work in this area has followed two tracks: a public initiative that focused worldwide attention on the status of nuclear materials security, and a separate effort to engage governments and experts to shape the agendas and outcomes of the Nuclear Security Summits.

In January 2014, NTI published the second edition of the NTI Nuclear Materials Security Index (NTI Index), a unique public assessment of nuclear security conditions in 176 countries. The NTI Index provides a framework for analysis that has sparked international discussions about priorities for strengthening security. The NTI Index assesses 25 countries with one kilogram or more of weapons-usable nuclear material (HEU or separated plutonium) across five categories:

- **Quantities and Sites:** the quantities of material, number of sites at which the material is located, and whether material quantities are decreasing or increasing;
- **Security and Control Measures:** whether certain physical protection, control, and accounting measures are required by national laws and regulations;
- **Global Norms:** whether a state has joined international treaties, undertaken voluntary measures to support global efforts, and taken steps to build confidence in the security of its material;
- **Domestic Commitments and Capacity:** whether a state has implemented its international obligations; and
- **Risk Environment:** factors that though not directly related to the security of nuclear materials may still impact a state's ability to maintain appropriate security, including political instability, ineffective governance, corruption, and the presence of groups interested in illicitly acquiring material.

The NTI Index assesses an additional 151 countries with less than one kilogram of weapons-usable nuclear materials, or none at all, on the last three of these categories. These states are included in the NTI Index because all states, not just those with materials, have a responsibility to prevent nuclear terrorism by ensuring that their territories are not used as safe havens, staging grounds, or transit points for terrorist operations. NTI plans to release a third edition of the NTI Index in early 2016.

SETTING PRIORITIES

One of NTI's recommendations in the 2012 NTI Index was the need for a dialogue on priorities for securing nuclear materials. Although the 2010 Summit had resulted in important commitments by states to strengthen their own security and support global nuclear security efforts, these commitments were not driven by an agreed set of priorities. To address this challenge, in July 2012, NTI convened the first of a series of meetings called the Global Dialogue on Nuclear Security Priorities, a Track 1.5 dialogue among government officials, experts, nuclear security practitioners, and other stakeholders to build consensus on the need for a strengthened global nuclear security system and the elements of that system. Leading up to the 2014 Nuclear Security Summit, participants in the Global Dialogue developed the following set of principles that define such a system:

- **Comprehensiveness:** All weapons-usable nuclear materials and facilities should be covered by the system, including the 85% of all global stocks that are military materials.
- **International Standards and Best Practices:** All states and facilities with those materials should adhere to international standards and best practices.
- **Building Confidence:** States should help build confidence in the effectiveness of their security practices and take reassuring actions to demonstrate that all nuclear materials and facilities are secure (e.g., through peer review, best practice exchanges, and sharing of non-sensitive security information).
- **Material Minimization and Elimination:** States should work to reduce risk through minimizing or, where feasible, eliminating weapons-usable nuclear materials stocks and the number of locations where they are found.

The 2014 Summit Communiqué made significant headway on several of these fronts, calling for a strengthened international nuclear security architecture and emphasizing the value of countries building the confidence of others in the security of their weapons-usable nuclear materials. In addition, 35 countries (two-thirds of Summit participants) agreed to put principles into practice by joining the "Strengthening Nuclear Security Implementation" initiative, pledging to meet the intent of the IAEA's voluntary guidelines through implementing national regulations, committing to improve their nuclear security through internal assessments and peer reviews, and ensuring that those responsible for nuclear security are "demonstrably competent."

Despite this importance progress, challenges remain. The security of military material has largely remained unaddressed by the Summits. In addition, despite progress on minimizing stocks of HEU, discussions of the minimization and management of plutonium have been stymied by political and other challenges. Finally, at what is presumed to be the final Summit scheduled for 2016, leaders will need to agree on a way to sustain the nuclear security mission beyond 2016 or risk much of the positive work to strengthen nuclear security going unfinished or, worse, backsliding. To address these challenges, NTI has once again convened the Global Dialogue to continue our efforts to strengthen the global system in support of the 2016 Summit.

LOOKING AHEAD

Terrorism in all its forms presents a major threat to global security. Yet, the prospect of a terrorist using a nuclear bomb to destroy a city, killing and injuring hundreds of thousands, is the threat most likely to keep leaders and global experts awake at night. A nuclear nightmare like the kind seen in horror movies and television dramas could become a reality if the world does not do what we already know must and can be done to secure the materials that could be used in a nuclear bomb.

With the final Nuclear Security Summit approaching, the window of opportunity to put in place the global system necessary to get the job done is closing. We cannot stand aside and let the window close. States must agree to a path forward for sustaining the nuclear security mission and for building a truly global system for securing all nuclear materials—a system where materials are secured according to international standards and best practices, where states take actions to build the confidence of others that they are properly securing their materials, and where states continue to minimize and eventually eliminate stockpiles of weapons-usable nuclear materials.