

MARCH 2014



Nuclear Materials Security

Education Module



THIS MODULE is designed to serve as a toolkit to support undergraduate or graduate courses in international relations, security studies, diplomacy, counter-terrorism, or nuclear sciences. It consists of lesson plans and additional resources, including a PowerPoint briefing.

This introduction to nuclear materials security covers two class periods with a lecture and simulation exercise to develop students' perspectives on nuclear materials security. During the two classes, students will consider technical questions, policy issues, and engage in a discussion of sovereign versus global responsibilities.

The module incorporates NTI's Nuclear Materials Security Index (www.ntiindex.org), a first-of-its-kind public benchmarking project of nuclear materials security conditions on a country-by-country basis. The NTI Index, prepared with the Economist Intelligence Unit, was created to spark an international discussion about priorities required to strengthen security.

About the Nuclear Threat Initiative

The Nuclear Threat Initiative (NTI) is a nonprofit, nonpartisan organization with a mission to strengthen global security by reducing the risk of use and preventing the spread of nuclear, biological, and chemical weapons and to work to build the trust, transparency, and security that are preconditions to the ultimate fulfillment of the Non-Proliferation Treaty's goals and ambitions.

Send feedback or comments to contact@nti.org.



www.nti.org

www.ntiindex.org

1747 Pennsylvania Avenue, NW
Seventh Floor
Washington, DC 20006

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Day 1: Introduction to Nuclear Security

TIME: 1.5–2 HOURS

Objectives

- Introduce the concept of nuclear security, the threat of nuclear terrorism, the need for securing weapons-usable nuclear materials, and the existing nuclear security measures.
- Familiarize students with the NTI Nuclear Materials Security Index.
- Prepare the class for a simulation of a summit on nuclear security in the next class.

Outline of Day 1

- Lecture on nuclear security (40–60 minutes)
 - The threat
 - Nuclear security
 - The global system
 - Challenges
 - Opportunities
 - Summary and discussion
- Discussion of the NTI Nuclear Materials Security Index (20–30 minutes)
 - Motivations
 - NTI Index goals
 - Framework: Categories and indicators
 - Summary and discussion
- Introduce simulation (20 minutes)

Materials

- PowerPoint presentation to support the lecture and discussion on nuclear security (page 8 and online at www.ntiindex.org)
- NTI Nuclear Materials Security Index (online at www.ntiindex.org)
- Introduction of the simulation (page 14)
- Research resources (page 15)

Readings

For students:

- 2014 NTI Nuclear Materials Security Index. Washington, DC: NTI, 2014. Available at www.ntiindex.org.
- Bunn, Matthew. *Securing the Bomb: Securing All Nuclear Materials in Four Years*, Executive Summary. Project on Managing the Atom, Belfer Center for Science and International Affairs, Harvard University, April 2010. Available at www.nti.org/media/pdfs/Securing_The_Bomb_2010-ES.pdf?_=1317159850.
- Hecker, Siegfried S. "Toward a Comprehensive Safeguards System: Keeping Fissile Materials Out of Terrorists' Hands." *Annals of the American Academy of Political and Social Science* 607 (September 2006). Available at http://iis-db.stanford.edu/pubs/21247/Toward_a_Comprehensive_Safeguards_System.pdf.
- *Nuclear Security Primer: The Existing System*. Washington, DC: NTI, 2012. Available at www.nti.org/media/pdfs/Nuclear_Security_Primer_2.pdf?_=1353443441.

For professors:

- Bernhard, Ambassador John. *The Value of Universalizing the Current Regime*. Nuclear Security Governance Experts Group, July 2012. Available at www.nsgeg.org/Value%20of%20Universalizing%20the%20Current%20Regime%20-%20John%20Bernhard.pdf.
- Boureston, Jack and Dr. Andrew K. Semmel. "The IAEA and Nuclear Security: Trends and Prospects." *Policy Analysis Brief*, The Stanley Foundation, December 2010. Available at www.stanleyfoundation.org/publications/pab/Boureston_SemmelPAB1210.pdf.

Homework

Students will:

- Research nuclear security policy.
- Prepare an opening statement describing the country's national policy on nuclear security.
- Write a proposal for a consensus statement. Be prepared to present the proposal. If multiple representatives authored a proposal, select a representative to present it.

Day 2: Simulation of Nuclear Security Summit

TIME: 1.5–2 HOURS

Objectives

- Encourage and develop analytical thinking about nuclear security by asking students to prepare and discuss a consensus statement with recommendations at a high-level summit on nuclear security.
- Explore the strengths and weaknesses of the nuclear security system.
- Build awareness of the challenges to strengthening nuclear security.

Outline of Day 2

- Introduction to simulation exercise (5 minutes)
- Simulation of Nuclear Security Summit (60–80 minutes)
- Debrief of simulation (20–30 minutes)

Materials

- Guide for conducting the simulation (page 16)

Readings

For students:

- *2012 Seoul Nuclear Security Summit: Key Facts*. 2012 Seoul Nuclear Security Summit, Seoul, South Korea, March 26–27, 2012. Available at www.nss2014.com/sites/default/files/documents/key_facts_on_the_2012_seoul_nuclear_security_summit.pdf.
- Golan-Vilella, Robert, Michelle Marchesano, and Sarah Williams. *The 2010 Nuclear Security Summit: A Status Update*. Washington, DC: Arms Control Association and Partnership for Global Security, April 2011. Available at www.armscontrol.org/system/files/Status_Report_April_11_2011_WEB.pdf.
- Hibbs, Mark. *The Legacy of the Nuclear Security Summit*. Washington, DC: Carnegie Endowment for International Peace, March 29, 2012. Available at www.carnegieendowment.org/2012/03/29/seoul-nuclear-security-summit/a5kl.
- *Highlights of Achievements and Commitments by Participating States as Stated in National Progress Reports and National Statements*. 2012 Seoul Nuclear Security Summit Preparatory Secretariat, Seoul, South Korea, March 26–27, 2012. Available at www.nss2014.com/sites/default/files/documents/highlights_of_the_seoul_nuclear_security_summit120403.pdf.
- *Highlights of National Commitments*. 2010 Washington Nuclear Security Summit, Washington, DC, April 12–13, 2010. Available at <http://fpc.state.gov/documents/organization/140356.pdf>.
- *Key Facts about the Nuclear Security Summit*. 2010 Washington Nuclear Security Summit, Washington, DC, April 12–13, 2010. Available at <http://fpc.state.gov/documents/organization/140352.pdf>.

LESSON PLANS

- *Seoul Communiqué.* 2012 Seoul Nuclear Security Summit, Seoul, South Korea, March 26–27, 2012. Available at www.nss2014.com/sites/default/files/documents/seoul_communique_final.pdf.

For professors:

- Luongo, Kenneth N. *Funding the Objective of Securing All Vulnerable Nuclear Materials in Four Years.* FY11 Budget Impact on Securing Nuclear Material Security for a New Century Hill Briefing, Washington, DC, February 24, 2010. Available at www.fmwg.org/sitefiles/luongo_funding_the_four_year_goal.pdf.
- *Nuclear Security Summit Work Plan Reference Document.* 2010 Washington Nuclear Security Summit, Washington, DC, April 12–13, 2010. Available at <http://fpc.state.gov/documents/organization/140357.pdf>.

Day 1 Resources

Slides

These PowerPoint slides support the first day of lessons and cover:

- Lecture on nuclear security (40–60 minutes)
 - The threat
 - Nuclear security
 - The global system
 - Challenges
 - Opportunities
 - Summary and discussion
- Discussion of the NTI Nuclear Materials Security Index (20–30 minutes)
 - Motivations
 - NTI Index goals
 - Framework: Categories and indicators
 - Summary and discussion

You can download the PowerPoint slides at www.ntiindex.org by navigating to “News and Resources,” then selecting “Other Resources.”

Introduction to Nuclear Security

Outline

- The Threat
- Nuclear Security
- The Global System
 - Challenges
 - Opportunities
- Summary and Discussion
- NTI Nuclear Materials Security Index
 - Motivations
 - NTI Index Goals
 - Framework: Categories and Indicators
- Summary and Discussion

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The Threat Is Real

- Terrorists have stated their desire to use nuclear weapons.
- Acquiring weapons-useable nuclear material is the key step in constructing a nuclear weapon.
- Weapons-useable nuclear material exists at hundreds of sites in 25 countries.
- Not all sites are well secured against terrorists or criminals and nuclear security is only as strong as the weakest link.
- Once a terrorist has acquired weapons-useable nuclear materials, countermeasures have limited effectiveness.

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Security Lapses Continue

- Over the last 20 years, there have been 1000s of nuclear smuggling incidents, of which ~ 20 involved highly enriched uranium or plutonium.
- It's likely that many more cases were undetected.
- There have been numerous lapses in security that, under different circumstances, could have been catastrophic:
 - Y-12 (U.S.) security breach (2012)
 - Pelindaba (South Africa) break-in (2007)
 - Kurchatov Institute (Russia) accounting problem (2001)

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Nuclear Security Definition

As defined by the IAEA, nuclear security is:

[T]he 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.

- Note: This is distinct from nuclear safety and international nuclear safeguards.

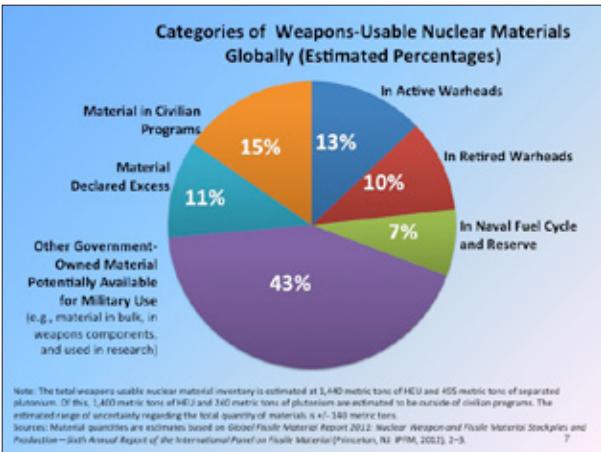
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Global Nuclear Security System

- Nuclear security is historically viewed as the sovereign responsibility of individual states.
- Each country's regulatory systems were often developed independently.
 - Often variable
- There is no comprehensive global system for tracking, protecting, and managing nuclear materials in a way that builds confidence.
 - The existing international system is a patchwork of agreements, guidelines, and multilateral engagement mechanisms.
 - It encompasses only civilian materials (15% of total weapons-useable nuclear materials).

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RESOURCES



IAEA's Security Role

- The principle objective is to "accelerate and enlarge the contribution of atomic energy..."
- It administers a *safeguards* system to detect diversion for military purposes.
- Nuclear security is a relatively new mission.
- IAEA develops nuclear security guidelines and provides numerous nuclear security advisory services.
- The scope of responsibility is *civilian* materials, largely outside the five nuclear weapons states.

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Nuclear Security Summits

- Nuclear Security Summits were held in Washington (2010) and Seoul (2012).
- They focused high-level attention on the issue.
- They led to a non-binding communiqué, a work plan, and commitments by states and groups of states.
- The third summit planned for 2014 in the Netherlands, and fourth in the U.S. in 2016.

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What Type of Global System Is Needed?

- The system should be **comprehensive**; it should cover all weapons-usable nuclear materials and facilities in which they might be present, at all times.
- The system should **employ international standards and best practices, consistently and globally**.
- At a national level, each state's system should have **internal assurance and accountability mechanisms**.
- Globally, the system should facilitate a state's ability to provide **international assurances** that all nuclear materials and facilities are secure.
- The system should work to reduce risk through **minimizing** or, where feasible, **eliminating weapons-usable material stocks** and the number of locations where they are found.

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What Is Limiting Progress?

- There are differing views on the magnitude of the threat and how best to secure materials.
- There is the view that nuclear security is a sovereign responsibility.
- There are sensitivities regarding sharing of security arrangements.
- There exists regional and other nuclear (e.g., nonproliferation) issues.

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Summary and Discussion

- Nuclear security is a cornerstone of preventing nuclear terrorism.
- An attack anywhere would be an attack everywhere.
- Currently, nuclear materials security largely depends on actions by individual states.
- A comprehensive global system is needed to provide confidence in each state's materials security.

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NTI Nuclear Materials Security Index (NTI Index)

Motivations

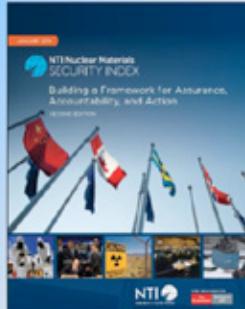
- The threat of nuclear terrorism and that an attack “anywhere” would be an attack “everywhere.”
- No consensus on what it would mean to secure all materials and no means to track progress.

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The NTI Index Has Several Important Goals

It provides a country-by-country assessment of global nuclear materials security conditions.

- Identifies needed improvements and tracks progress
- Promotes action to improve nuclear materials security
- Serves as a basis for dialogue on priorities for preventing theft of nuclear materials



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The NTI Index Assesses Country Actions and Progress

- An index is a structured way of assessing country actions and enables tracking over time.
 - Simplifies complex issues
 - Provides a framework for discussion
 - Permits objective, standardized evaluation
- Several index characteristics are critical:
 - Broad framework
 - International perspective
 - Transparent

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Index Scope and Constraints

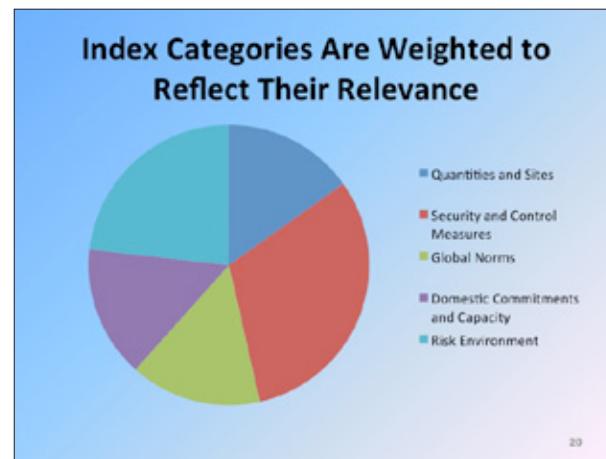
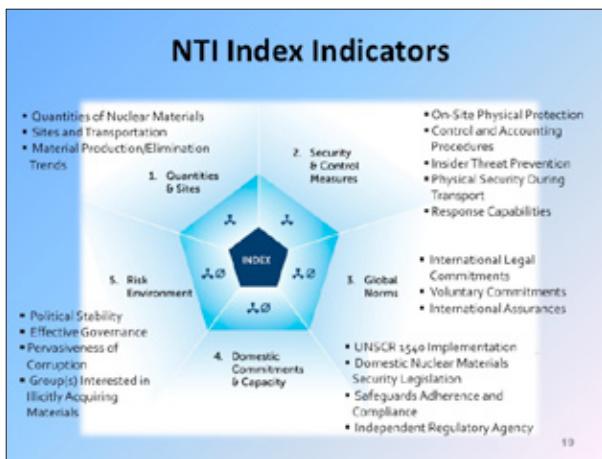
- The Index scope is countries with weapons-useable nuclear materials (25 countries), with other (151) countries evaluated separately. It does not consider radiological sources or LEU.
- It assesses indicators related to potential for theft, not sabotage.
- It uses publicly available information: laws, regulations, government reports, and international organizations
- It is an assessment at the country, not facility, level.

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The NTI Index Framework Has Five Categories

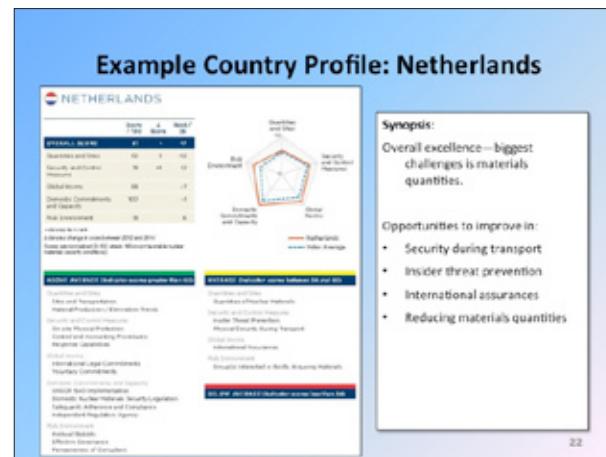


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Country Scores and Rankings (2014)

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- Key Index Findings**
- Governments are more aware of the threat and are engaged.
 - The consensus on priorities is lacking.
 - The lack of openness impedes confidence and accountability.
 - Several states are more vulnerable to insider threats.
 - Stocks of weapons-useable nuclear materials continue to increase.
 - More states could eliminate their stocks.
 - Many states lag on joining international agreements.

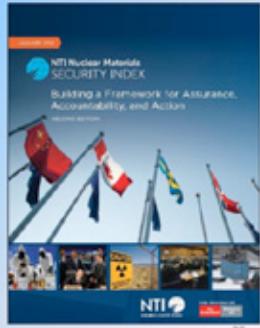
23

- Major Recommendations**
- Collectively:**
 - Reach consensus on the key principles of a global system.
 - Cover all weapons-useable materials, military and civilian.
 - Apply international standards and best practices.
 - Build confidence and accountability.
 - Become parties to nuclear security treaties.
 - Strengthen voluntary mechanisms.
 - Secure military and other non-civilian materials to same or higher standards as civilian materials.
 - Each Country:**
 - Decrease stocks of weapons-useable nuclear materials.
 - Improve measures to protect weapons-useable nuclear materials from theft.
 - Establish and strengthen independent regulatory agencies.
 - Deliver on Nuclear Security Summit commitments.

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Summary and Discussion

- Second edition of Index released in January 2014.
- NTI Index will continue to be used to promote dialogue and actions.



NTI Index on the web:

www.ntiindex.org

Index updates on Twitter:

@NTI_WMD

#NTIINDEX



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Introduction of the Simulation

At the next class, we will simulate a high-level summit on nuclear security. Summits help bring attention to key international issues and provide political momentum to efforts to address those issues. The Nuclear Security Summit process is one example of how these summits operate. This process was initiated in 2010 by President Barack Obama in his speech in Prague on April 9, 2010, as an effort to improve nuclear security¹ around the world by focusing high-level attention on the threat of nuclear terrorism.

The first summit was held in Washington, DC, in 2010, the second was held in Seoul, South Korea, in 2012, and the third will be held in the Netherlands in 2014. Each summit is a meeting among invited governments, mostly at the president and prime minister level. At the end of each summit the participants announce national and multilateral commitments to improve nuclear security and issue a consensus-based communiqué.

We will simulate a meeting similar to a Nuclear Security Summit in which you will negotiate a consensus statement outlining the collective position of participating governments on nuclear security and recommendations for improving it. You will be [paired up and] assigned a country to represent at the meeting. During the simulation, your goal is to work with other delegations to write a consensus statement. This statement should express a collective position on nuclear security and include recommendations for future action.

Ideally, within the statement, you should be able to point to specific language and measures that reflect your country's specific priorities and policies on nuclear security. At a minimum, it cannot contain anything that you (or anyone else) object to seriously. A consensus document is not unanimous endorsement; it is the absence of disagreement. Consequently, a consensus statement can be something that no state objects to, even if they don't particularly like it.

Remember, not all countries agree on how to conduct nuclear security, and many have different views on its overall importance. States with weapons-usable nuclear material will have a different perspective than those without any material at all, and states disagree on how much responsibility falls to different members of the international community. Additionally, long-standing rhetorical opposition and political tensions color all diplomatic interactions, and factors unrelated to nuclear security can have a strong influence in these discussions. As a result, you will need to negotiate with the other representatives to find language that all countries can accept. This will require thoughtful debate, careful persuasion, and skillful compromise to write a statement that can be adopted as a consensus.

To prepare for the simulation, you will need to have a general understanding of the threat of nuclear terrorism and research your country's nuclear security policy. You will need to know how much nuclear material your country possesses, the government's policy on nuclear security, and more general nuclear issues. The NTI Nuclear Materials Security Index is a good resource for the current state of nuclear security. Read through your country's profile to get a sense of what your government has already accomplished and what other actions your government might take. Read the documents from past Nuclear Security Summits to see what type of commitments have been made in the past, particularly from your country. Become familiar with your own country's positions on nuclear security and also with important allies or potential opponents.

¹ Nuclear security focuses on the prevention of, detection of, and response to, criminal or intentional unauthorized acts involving or directed at nuclear material, other radioactive material, associated facilities, or associated activities (IAEA).

RESOURCES

Before class begins you should be able to answer these questions:

- What kind of nuclear material, facilities, or activities exist in your country?
- Is there a high level of concern regarding nuclear terrorism?
- What is the state of nuclear security in your country?
- What is your government's policy on nuclear security?
- What domestic and regional dynamics might affect your policy and the negotiations?
- What are the most meaningful commitments you can make to support your government's policy and nuclear security worldwide?
- Who are your allies (including regional or political groups) with whom you may cooperate and act together, and who might challenge your position?

In addition to research, you will need to meet and consult with other delegations before class. Talk about what policies you might have in common and how you want to see that developed on an international level. Develop, negotiate, and build support for proposed language for a consensus statement.

As part of your homework, by the beginning of next class, submit to me a proposal for language to go into a consensus-based statement. These proposals can be authored by more than one country; in fact, you should aim to write a proposal with at least one representative from another country. Proposals submitted from multiple countries will be considered before other proposals during the simulation. Also, you will need to bring an opening statement laying out your national policy and priorities for next steps on nuclear security.

Homework assignment, due for the simulation:

- Research nuclear security policy.
- Prepare an opening statement describing the country's national policy on nuclear security.
- Write a proposal for a consensus statement. Be prepared to present the proposal. If multiple representatives authored a proposal, select a representative to present it.

Research Resources

Students will find the following resources valuable when conducting their nuclear materials security research.

- 2014 NTI Nuclear Materials Security Index: www.ntiindex.org
- NTI Country Profiles: www.nti.org/country-profiles
- World Nuclear Association Country Profiles: world-nuclear.org/info/Country-Profiles
- IAEA Office of Nuclear Safety and Security: www-ns.iaea.org
- The Carnegie Endowment for International Peace (search site for "nuclear security"): www.carnegieendowment.org
- Nuclear Security Summit resources:
 - 2010 Washington Nuclear Security Summit: <http://fpc.state.gov/c35775.htm>
 - 2012 Seoul Nuclear Security Summit: www.state.gov/t/isn/nuclearsecuritysummit/2012/index.htm
 - 2014 Netherlands Nuclear Security Summit: www.nss2014.com/en

Day 2 Resources

Guide for Conducting the Simulation

The goal of this exercise is to get students to engage in critical thinking about nuclear security. Assigning students to represent different countries encourages them to explore the issues from different perspectives and to gain an appreciation of some of the challenges facing the diplomatic community in making progress on this issue.

During the simulation, the primary objective is to have a lively discussion about nuclear security. Your role as the chair is to facilitate and structure the discussion by calling on students to speak and managing the transitions between full-class discussions and informal, unstructured discussions.

As noted in the remarks at the end of the first class, students should arrive with:

- An opening statement laying out the country's national policy on nuclear security.
- A proposal for a consensus statement.

The recommendations below will help the simulation run smoothly:

- The simulation will be most effective if students represent countries with various views and positions. Consider including at least one state from the following categories of countries:
 - Nuclear weapon states (China, France, Russia, UK, USA)
The discussion will be more interesting if China or Russia as well as USA or UK or France are present.
 - Nuclear weapons possessing states (India, Israel, Pakistan)
 - Countries with weapons-usable nuclear materials (e.g., Argentina, Australia, Japan, Norway, South Africa)
 - Countries without weapons-usable nuclear materials (e.g., Brazil, Czech Republic, Denmark, Georgia, Jordan, Morocco, South Korea)
 - Example set of countries: Australia, Belgium, Brazil, China, Czech Republic, Japan, Pakistan, Russia, South Africa, USA
- Before the meeting prepare tent placards with country names. Students will use these to be recognized by the chair, simply by putting them in a vertical position when they have a question, wish to make a statement, or propose a motion. You can set them out beforehand or allow students to choose their own seats.
- You should have the ability to project electronic documents so everyone can see changes that have been made to proposals. It may be helpful for students to bring their own computers and USB drives to transfer copies of proposals from their personal computers to the projector.
- Establish the atmosphere of a formal diplomatic meeting when you start the simulation. Ask the students to come in business attire.

Agenda for the Simulation

The simulation should generally follow these steps (approximate times are given for each stage):

INTRODUCTION (20 MINUTES)

- Start the simulation with a welcome.
- Open the floor to speakers. Students who want to speak should place their name placard in a vertical position; you can then add them to the speakers list. Call students to speak in the order that they have been written down on the list.
- Students should give short, 2–3 minute statements about the national positions of each delegation. These should be delivered in formal diplomatic language (provide copies of statements to the UN or other international fora if students need examples).
- After statements, the simulation should move into discussion of language for the final statement. You may find it useful to give each proposal a number to help keep track of them. Ask for one of the authors of each proposal to present their draft. Then allow short comments (about 90 seconds) by the other delegations.

FIRST CAUCUS (10–20 MINUTES)

- Following the initial discussion, students will need to move from formally discussing the proposals under your guidance to informally discussing amendments to their proposals. An informal session is called a caucus, and it is an opportunity for representatives to make changes to their documents in small groups before presenting it to the whole meeting. Announce the first caucus after the students discuss each proposal and appear ready to make edits to their proposals.
- Depending on how long your simulation will run, you probably want to keep the first caucus to 10–20 minutes.
- During the caucus, students should talk to each other, working together to make edits to their proposals. They will want to move around the room, form groups around whoever is editing a proposal, and have conversations about the simulation.

PRESENTATION OF REVISED PROPOSALS, MORE SPEECHES (10–20 MINUTES)

- Once the caucus is over, the students should return to their original seats. Any students who have changed their proposal should be prepared to present those changes. Encourage students to combine proposals to make more comprehensive documents.

SECOND CAUCUS (5–10 MINUTES)

- After a full-class discussion of the revised proposals, announce another caucus in which students need to finalize any proposals for the final summit statement. Students should work toward one final consensus document. This will entail modifying language, merging proposals, and discussing points of contention. Encourage students to combine their proposals as much as possible. The goal at the end is to have two or three proposals to vote on.

FINISHING THE SIMULATION (20 MINUTES)

- Bring the class together again to wrap up the simulation. If time permits, allow a short discussion of the revised proposals, with students indicating which proposal their country prefers and why.

RESOURCES

- At the very end of the session, ask the students to vote on the proposals. You can do this by show of placards or by calling out the name of every participating country. Students can vote “Yes,” “No,” or “Abstain” (neutral vote). Any “no” vote prevents a proposal from being adopted, but students can abstain if they don’t like the proposal but don’t want to block it from being adopted.

DEBRIEF AND DISCUSSION (15–20 MINUTES)

- Be sure to leave 15–20 minutes at the end of class to debrief the experience. This is an important part of the learning process of a simulation, which helps students understand what they experienced and what they learned.

DISCUSSION QUESTIONS

- Where did you see the biggest differences and similarities in nuclear security policy?
- What do you think about the threat?
- What are some of the challenges to establish a global nuclear security system?
- What was your impression of the agreed commitments from the past summits?
- Where do you think the international community can make the most progress on nuclear security?
- Were you surprised about your country’s policies?
- Does your country have higher priorities than nuclear security? Would the summit offer leverage for making progress on these issues?
- What struck you most about the negotiation process?
- What were some of the challenges that you encountered?
- What was the most challenging part of preparing for the simulation?
- What helped you the most in preparations?

ONLINE

The NTI website offers extensive resources related to nuclear, biological, and chemical weapons and terrorism. You and your students can learn more by visiting www.nti.org.

LEARN

If students want to continue to track these issues, they can subscribe to the free, e-daily Global Security Newswire at www.nti.org/signup or through Twitter (@NTI_GSN). Read it online at www.nti.org/gsn.

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1747 Pennsylvania Avenue, NW

Seventh Floor

Washington, DC 20006