Professional Ethics and Public Awareness: Lessons for the Nuclear Security Community

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Diplomatic delegations from 47 countries gathered here in Washington last April to discuss strategies aimed at securing fissile materials that could be used to build nuclear weapons or radiological "dirty bombs." In October 2009, the International Panel on Fissile Materials reported that countries around the world possessed around 1,600 tons of highly enriched uranium (HEU) and 500 tons of plutonium.[1] That's enough material to build around 120,000 weapons of equivalent power to "Little Boy," the atomic bomb that destroyed Hiroshima. But since the Nuclear Security Summit, among other activities, efforts have been made to secure HEU in Belarus and Ukraine, to convert reactors in places like Mexico to LEU fuel, and to conduct vulnerability assessments of nuclear facilities in the developing world.

However, securing fissile materials around the globe will not be easy. It will take considerable time, funding, and domestic and cross-border collaboration among governments, industry, and the academic community to meet this lofty goal. Accordingly, this presentation focuses on an often overlooked facet of nuclear security: professional ethics, best practices, and public outreach. What can nuclear security professionals do to educate the public about securing fissile materials? And how can we build the sustainable base of human capital that will be necessary to prevent illicit acquisition of materials that could be used in a nuclear terrorist attack?

Looking at the Nuclear Security Summit Communiqué

Like most consensus documents that come out of short international summits, the Nuclear Security Summit Communiqué appears to be fairly basic, offering just 12 points on what states can do to enhance fissile material security.[2] Nevertheless, these points

[1] International Panel on Fissile Materials, "Global Fissile Material Report 2009: A Path to Nuclear Disarmament," October 29, 2009, available from: http://www.fissilematerials.org/ipfm/site_down/gfmr09.pdf.
[2] For the full text see White House, "Communiqué of the Washington Nuclear Security Summit," April 13, 2010, available from: http://www.whitehouse.gov/the-press-office/communiqu-washington-nuclear-security-summit.

provide a foundation for beginning a dialogue on the development of a robust nuclear security culture.

The first point in the document essentially reaffirms UN Security Council Resolution 1540 in an exclusively nuclear context.[3] As such, the 47 states have pledged to take steps toward securing nuclear materials by implementing physical security measures and strong national regulatory frameworks. Meanwhile, the second point calls for international cooperation in nuclear security efforts and the provision of assistance to states that lack the finances or know-how to protect sensitive materials. And the third point emphasizes accounting measures and the need to move away from civilian HEU applications toward more proliferation resistant materials and technologies.

The eighth and tenth points have particular relevance to our panel discussion today. Number eight discusses capacity building "for the promotion of nuclear security culture through technology development, human resource development, education, and training." And finally, point ten recognizes the role of both the public and private sector nuclear industry in developing and maintaining physical security measures, material accounting procedures, and a pervasive and lasting global nuclear security culture.

While short on text, this framework for nuclear security has the potential to generate far-reaching initiatives combating fissile material smuggling and nuclear terrorism. If implemented properly, the international community has a real opportunity to construct an occupational nuclear culture that prioritizes education of young professionals, consistency in training security specialists, pronounced bilateral and multilateral cooperation, and a strong security role for the nuclear industry.

Other professional fields: Examples for nuclear security?

When interpreting and implementing the final document from the Nuclear Security Summit, it is important to consider how these points might translate into a guide for the establishment of professional codes of ethics, pragmatic technical solutions, and public outreach initiatives. And for that, I now turn to some examples from other scientific and technical fields.

The Institute of Electrical and Electronics Engineers (IEEE) is an international non-profit that—according to its mission statement—seeks "to foster technological innovation and excellence for the benefit of humanity."[4] IEEE is a membership-based organization that has 400,000 members across 160 countries, over 100,000 of which are science and engineering students.[5]

Admittedly, organizations serving the nuclear security community are substantially smaller, but the IEEE's activities provide numerous examples to emulate. The IEEE

[3] For the full text see UN Security Council, "Resolution 1540," April 28, 2004, available from: http://daccess-dds-ny.un.org/doc/UNDOC/GEN/N04/328/43/PDF/N0432843.pdf?OpenElement.
[4] IEEE, "Mission & Vision," 2011, available from: http://www.ieee.org/about/vision_mission.html.
[5] Ibid., "IEEE at a Glance," available from: http://www.ieee.org/about/today/at_a_glance.html#sect1.

engages in public outreach campaigns, disseminates press releases, and holds seminars on engineering and technology issues. Topics range from green building construction to the mechanics of search-and-rescue robots now operating on the ground in Japan. Members must also subscribe to a code of ethics requiring honesty, realism, acceptance of criticism, efforts to educate the public, and a pledge to protect public welfare.[6]

Furthermore, the IEEE maintains a Standards Association that develops and promulgates codes for safe and durable engineering practices. The organization currently endorses over 2,000 active standards. These codes address topics such as the installation, inspection, and testing of Class 1E electrical power sources that are critical to the functioning of nuclear fuel cycle facilities.[7]

Being an IEEE member brings credibility to engineers that subscribe to the organization's standards for design, construction, and ethical practices. Additionally, the association's reputation and membership base allow it to facilitate crosscutting dialogue among industry, academia, and governments.

A second example for outreach and ethics pertains to the field of biosecurity. As some of you may know, our team of specialists at FAS working in the biological sciences recently launched the Internet's first Virtual Biosecurity Center in collaboration with several partner institutions.[8] This website provides a one-stop-shop for news links, event information, and official documents to biosecurity professionals, policymakers, and the general public. The Virtual Biosecurity Center team also focuses on organizations that play a role in developing biosecurity codes and best practices, such as the International Union of Microbiological Societies (IUMS).

The IUMS is one of the 29 constituent unions of the International Council of Science and is comprised of national and international members like the American Society for Microbiology. Its Executive Board and General Assembly strive to develop and promote policies that increase interest in the study of microorganisms.[9] To that end, the organization produces easily accessible summaries of major microbiology conferences and holds outreach seminars addressing subjects ranging from food safety practices to advanced virology research techniques.

Like the IEEE, this global microbiology union also focuses on ethics, as it encourages its member organizations to adopt professional codes of conduct. In particular, these codes emphasize the need for control and oversight of cultures and technologies with dual-use applications.[10] Through their drive to prevent theft and weaponization of biological specimens, IUMS member organizations are oftentimes at the forefront of national and

[6] Ibid., "IEEE Code of Ethics," available from: http://www.ieee.org/about/corporate/governance/p7-8.html.
[7] See IEEE Standard 336-2010.
[8] See Virtual Biosecurity Center, 2011, available from: http://virtualbiosecuritycenter.org/.
[9] IUMS, "Overview," 2011, available from: http://www.iums.org/.
[10] Ibid., "IUMS Code of Ethics against Misuse of Scientific Knowledge, Research and Resources," August 10, 2008, available from: http://www.iums.org/about/Codeethics.html.

international campaigns to improve lab safety and physical security measures during culture transport and storage.

Lessons for nuclear security

So what can professional organizations and groups working on nuclear security learn from these examples in biosecurity and engineering? And how can these lessons shape U.S. and international interpretations of the Nuclear Security Summit Communiqué?

It is clear that different groups focusing on nuclear security issues must come together more frequently to discuss fissile material protection and accounting efforts. In the United States, nuclear security professionals are dispersed; they include experts at the National Nuclear Security Administration (NNSA) and the State Department, scientists at the national labs, technical specialists working with the Institute of Nuclear Materials Management, academics maintaining the University of Maryland's research reactor here inside the beltway, and engineers working at nuclear power plants run by Exelon and Dominion. Just as organizations focusing on biology and engineering have often facilitated dialogue in their respective fields, groups like the American Nuclear Society, the World Nuclear Association, and the Nuclear Energy Institute must be prepared to make greater efforts to do so. And although several nuclear organizations maintain codes and charters of conduct, they should follow the example of IUMS by placing a greater emphasis on the inherent risks of dual-use materials and technologies. Professional codes of conduct for nuclear security professionals must further embrace the need for public outreach, the values of the nonproliferation regime, efforts to phase out risky HEU fuel sources, and an overarching commitment to fissile material security.

Like the previous two case studies, the goal of securing nuclear materials requires a significant investment in educating the next generation of young professionals. Although educational opportunities in nuclear security have steadily increased over the years, recent research by analysts at the Center for Nonproliferation Studies revealed that "more than one-third of America's top college and university undergraduate programs did not include a single specialized course concentrating on [nonproliferation]."[11] To develop the critical human capital necessary to sustain a global nuclear security culture, much work must be done in this area. Professional nuclear organizations in the United States have an ethical obligation to expand contacts with academic institutions, assist in curriculum development, and lobby Congress for the creation of a National Nonproliferation Education Act as my colleague Bill Potter has often suggested.[12] Furthermore, American universities with such programs should work with foreign partners to develop study

[11] Richard Sabatini, Deborah Berman, Lisa Sanders Luscombe, and Leonard S. Spector, "Undergraduate Nonproliferation Education in the United States: A *Nonproliferation Review* Survey of Teaching at Leading US Colleges and Universities," *Nonproliferation Review*, Vol. 18, No. 1 (March 2011): pp. 263-295. See also Elena Sokova for the Fissile Materials Working Group, "Prioritizing investment in nuclear security education," *Bulletin of the Atomic Scientists* online, April 1, 2010, available from: http://www.thebulletin.org/web-edition/columnists/fissile-materials-working-group/prioritizing-investment-nuclear-security-educ.

[12] See, for example, William C. Potter, "Bomb School," *Foreign Policy* online, April 23, 2010, available from: http://www.foreignpolicy.com/articles/2010/04/23/bomb_school.

abroad and guest student programs. They should also provide advice and consultation to other academic institutions seeking to place a greater emphasis on nuclear security.

Alongside education, the implementation of rigorous standardized training regiments would greatly improve the U.S. ability to ensure accurate accounting and material security. While the Nuclear Regulatory Commission (NRC) oversees minimum standards for nuclear security, organizations such as the Union of Concerned Scientists (UCS) have expressed concern about NRC activities. A UCS report released earlier this month noted that were 40 violations of NRC safety procedures in 2010, including security incidents at the Arkansas Nuclear One and Catawba nuclear reactors.[13] Secretary of Energy Steven Chu has said, "Industry lies at the intersection of two most important challenges—energy supply and the need to secure nuclear materials."[14] The Secretary was obviously correct in his statement, and the nuclear power industry bears a shared responsibility for the practical implementation of Resolution 1540. As such, organizations like the Nuclear Energy Institute, which represent this industry, should bring together key players for the creation of training, security, and accounting standards exceeding those of the NRC.

Transparency and public outreach are also critical to securing fissile materials. In the United States, the NRC essentially ceased public discussion of facility vulnerability following the events of September 11.[15] Additionally, a recent report by the National Research Council concluded that—when trying to secure the nation's stockpile—the NNSA lacked a "comprehensive analytical basis for defining the attack strategies that a malicious, creative and deliberate adversary might employ or the probabilities associated with them."[16] However, given the ongoing crisis unfolding in Japan, the U.S. public will likely be more interested in nuclear facility security in the future. For that reason, professional organizations focusing on nuclear security issues must learn from biosecurity and engineering outreach initiatives in order to mobilize the public behind the objectives of the 2012 Nuclear Security Summit in Seoul. With increased transparency and outreach, there may be support for strengthened facility security.

And lastly, the presence of fissile materials around the world necessitates that nuclear professionals think globally about the provision of technical security assistance. Many countries possess nuclear materials that could be used to build a nuclear weapon or "dirty bomb." In some cases, security measures in the developing world are woefully inadequate, drawing to mind horror stories of underpaid scientists and guards, chain-link fences, and smuggling activities in the Caucasus and Central Asia. The U.S. nuclear security community should engage the public and decision-makers in order to galvanize

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[13] David Lochbaum, "The NRC and Nuclear Power Plant Safety in 2010: A Brighter Spotlight Needed," Union of Concerned Scientists, March 2011, pp. 4-5. The nature of these security issues was not disclosed to the public because the NRC ceased public discussion of facility security following 9/11. [Ibid., p. 3.]
[14] Qtd. in Nuclear Energy Institute, "NEI Brings Leaders Together to Discuss Industry Role in Nuclear Security," April 14, 2010, available from: http://www.nei.org/newsandevents/nei-brings-leaders-together-to-discuss-industry-role-in-nuclear-security/.
[15] Lochbaum, "The NRC and Nuclear Power Plant Safety in 2010: A Brighter Spotlight Needed," p. 3.
[16] National Research Council: Committee on Risk-Based Approaches for Securing the DOE Nuclear Weapons Complex, *Understanding and Managing Risk Security Systems for the DOE Nuclear Weapons Complex* (Washington: National Academies Press, 2011), p. 3.

support for vital activities like Cooperative Threat Reduction and the NNSA's Defense Nuclear Nonproliferation account. This funding is integral to the maintenance of a robust domestic and global nuclear security culture.

Conclusion

President Obama's 2010 goal of securing all fissile materials around the globe within four years was ambitious, and skeptics are beginning to question its logistical feasibility. It is an admirable and necessary, but complicated goal. But investments in nuclear security measures and public outreach would be relatively cheap compared to the grave economic and human consequences that could result from a nuclear terrorist attack.

By considering the examples taken from biosecurity and engineering, new and old professional nuclear societies should begin to look to the future. Securing fissile materials and substantially reducing the risk of nuclear terrorism will require an ethical security culture built upon foundations of education, training, crosscutting domestic dialogue, public outreach, and global engagement. And it is in everyone's interests to make sure that this is how we interpret and implement the lessons of the groundbreaking first Nuclear Security Summit.