Summary for Policy Makers

Fifty Years after the Cuban Missile Crisis: Science in Support of Nuclear Arms Control and Security

October 4, 2012

A roundtable workshop co-organized by the Center for International Strategy, Technology, and Policy (CISTP) at Georgia Tech and the Center for Science Diplomacy at the American Association for the Advancement of Science (AAAS) held in Atlanta, GA, USA, on October 4, 2012.

About the meeting

The Cuban Missile Crisis fifty years ago not only marked a definitive moment during the Cold War when the superpowers were closest to initiating a hot war, but it also marked the acceleration of efforts to control the use of nuclear weapons as their destructive power and fallout dramatically increased. Agreements to control the testing, proliferation, and numbers of nuclear weapons put in place over the past fifty years have reduced the risk of nuclear war and the health and environmental impacts of testing. These agreements rely on a vast array of technical tools to verify compliance, without which the signatories have little trust.

In the post-Cold War era, nuclear risk remains of paramount concern to national security of many countries with the rising threat of nuclear terrorism, proliferation of nuclear weapons states, and weakened Cold War nuclear arms control structures. New arms control strategies and new verification and monitoring tools are needed for the twenty-first century. Georgia Tech and AAAS convened experts in a not-for-attribution setting to address two key areas to seed new research: the technical challenges and opportunities for treaty verification; and the lessons from cooperative nuclear security for verification and confidence-building.

Technical Challenges and Opportunities for Treaty Verification

Nuclear arms control treaties rely on technical tools for treaty verification. These range from remote monitoring technologies like imaging sensors from air and space to seismic and infrasonic sensors to close-in monitoring technologies to account for nuclear materials. As

nuclear weapons become smaller, nuclear materials with dual-use are more widely dispersed, and non-state actors are involved, new monitoring tools are needed.

- Current national highly enriched uranium stocks are larger and plutonium stocks are even larger than before.
- Technical challenges and opportunities include determining baselines for the number of weapons, materials and delivery systems; determining locations of warheads and delivery systems; nuclear forensics; sequestering warheads; verifying cutoff in fissile material production, absence of nuclear weapons and nuclear-armed missiles, configuration of dual-use military equipment, dismantlement of nuclear warheads, and ability of dual-use nuclear facilities to divert materials for weapons use.
- New monitoring technologies need to balance between security and intrusiveness (i.e., protect technology knowledge and intellectual property).
- Society verification technologies (e.g., social media, commercial data, etc.) are being explored to complement existing tools. These technologies may be passive analysis of existing data or active probing using such tools as crowd-sourcing (e.g., lessons from approaches used in emergency response). Among questions and challenges of these technologies are: reliability of information; methodology to sort through massive and diverse data sets; defining the objectives of their use (e.g., identifying patterns, shifts in patterns, outliers, blind spots, or signals); and moral and legal considerations (e.g., privacy issues). How can these new technologies best complement established ones, and how do decision-makers incorporate the information from these new approaches? What is the role of commercial entities involved in developing and contributing to crowd-sourcing or social networking tools?
- Important lessons from the Comprehensive Test Ban Treaty, especially during its build-up stage, include: considerable technical constraints of complex on-site inspections (e.g., need for massive personnel training simulations) and substantial time to stand up verification system apparatus; and need open-source verification systems, where, like open-source software, the processes are transparent (e.g., availability of algorithms) and many countries are included as partners, including non-nuclear weapon states, and can contribute to data gathering and processing.
- Need to harness community of people, not just data.

Verification & Confidence-Building: Lessons from Cooperative Nuclear Security

Before formal arms control arrangements can be put in place, oftentimes the countries involved need to first build confidence and trust in each other. This can be engendered through various types of cooperative activities either at the governmental or non-governmental levels.

While there are numerous examples of confidence-building measures during the Cold War between the Soviet Union and the United States, the more complex set of actors and issues today require cooperative approaches tailored to the specific circumstances and relationships.

- Cooperation in science scientific activities can serve to support global security. Cooperation may be directly related to security issues, such as technical consultations prior to and in preparation for arms control agreements, or it may be indirect engagement on alternative scientific activities (e.g., cooperative threat reduction) or on general scientific collaborations.
- Start with non-security matters in engagement with certain countries.
- What is the role of non-governmental sector? They may help foster communication, generate new ideas or prioritize areas for cooperation, or initiate cooperation that can be later be built upon by government. Non-governmental scientists, for example, can help by serving on government advisories committees of the U.S. Department of State.
- Cooperative activities will depend on domestic circumstances, including political considerations. For example, following the 9/11 terrorist attacks, there continues to be limits on scientists and students from sensitive countries being funded in the United States to research or study certain fields.
- In any type of technical cooperation, need to ensure the capacity, in particular the development of people, to sustain these activities over the long-term.
- Besides bilateral engagement, multi-lateral approaches are also possible. One approach, with the United States and Russia being still the major players in arms control, is to rely on trust built in the U.S.-Russia relationship and find ways to allow for others to be incorporated.
- What is the role of business and the broader private sector?

Disclaimer
The summary provides highlights of the main discussion points of the meeting; it is neither a consensus view of the participants nor does it necessarily represent the views of CISTP or AAAS.