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State's Gottemoeller on Science to Improve Arms Control

U.S. Department of State
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Committee on International Security and Arms Control, National Academy of Sciences Annual Meeting

Washington, DC
April 29, 2012

Science, Scientists, and International Security

Thank you so much for having me today. I am so pleased to be here at your grand reopening. The building looks beautiful and I am so glad to have you so close by again. As you have heard, I am now the Acting Under Secretary for Arms Control and International Security, as well as the Assistant Secretary for Arms Control, Verification and Compliance. I think I win the prize for the longest title in Washington.

While wearing my various hats, I spend a lot of time thinking about the application of science and technology to arms control and international security. As we watch the successful implementation of the New START Treaty, we are now thinking about the next steps.

Negotiators worked hard to find innovative new mechanisms to aid in the verification of the New START Treaty and the results of that work are already evident. Our experience so far is demonstrating that the New START Treaty's verification regime works, and will help to push the door open to new types of inspections. Such inspections will be crucial to any future nuclear reduction plans.

And there is no doubt that we are facing new challenges, such as monitoring smaller and smaller units of account, e.g. warheads, or items that are inherently dual use in chemistry or biology.

Nowadays, we verify that countries are fulfilling their arms control treaty obligations through a combination of information exchange, notifications of weapon status, on-site inspections, and National Technical Means (NTM). When these elements work together we have an effective verification regime.

Ambassador Paul Nitze's definition for effective verification, devised several decades ago, still stands – "if the other side moves beyond the limits of the treaty in any militarily significant way, we would be able to detect such violations in time to respond effectively and thereby deny the other side the benefit of the violation."

That definition continues to be the benchmark for verifying compliance; but the world is changing, as is the nature of what we need to monitor and verify.

For example, if we are looking for ways to design a verifiable treaty that regulates the number of non-strategic nuclear weapons, we come across a problem we have not dealt with before: tactical weapons are small, easy to hide, and hard for an inspector to inventory; what is worse, we don't all have the same definition of a non-strategic weapon.

If we move beyond looking at non-strategic nuclear weapons to examine overall reductions to our nuclear forces, we need to take a long, hard look at the entire nuclear enterprise, from production to deployment and storage, and finally to dismantlement, and identify greater opportunities to create novel monitoring regimes that bring us closer to the goal of that President Obama has set of a world without nuclear weapons.

We need to find new signatures that are measurable and help us to verify treaty obligations, while not divulging sensitive information that may compromise mutual security and deterrence. After all, we will be accepting such obligations for our nuclear weapons, too. In a treaty setting, all obligations will be totally reciprocal.

As we move forward towards an approach to nuclear monitoring that looks at the entire cradle to grave lifecycle of warheads, the dichotomy between controls on fissile materials and strategic arms control disappears. Previously, one set of experts might consider strategic nuclear missiles, another might analyze only naval nuclear reactors, and a third group might analyze fissile material. Eventually, we will need to merge the thinking in all of these diverse areas.

We also need to look at ways to expand the applications of existing agreements. For example, we are exploring opportunities to capitalize on the success of the Open Skies Treaty verification regime. For those of you unfamiliar with the Treaty, it establishes a regime of unarmed aerial observation flights over the territories of its signatories. Open Skies is one of the most wide-ranging international arms control efforts to promote openness and transparency in military forces and activities.

New ideas for the Open Skies Treaty involve both the possibility of applying the current regime to a wider array of treaty concerns, and the design of possible new cooperative aerial reconnaissance regimes that might be included to support verification of future agreements. We are also looking at possible novel applications for the Open Skies infrastructure. One example would be in the area of disaster relief.

Further, while we spend a lot of time focusing on nuclear weapons, the other weapons of mass destruction—particularly biological weapons—pose even greater challenges for arms control policy, because they are inherently dual use assets and, thus, difficult to disentangle from normal industrial or commercial processes.

Here, too, we need creative thinking about how to facilitate transparency in the biotech sector without compromising sensitive or proprietary information. Another problem with biotech transparency is that findings are potentially easy to misinterpret. There are legitimate reasons to study many pathogens, as we will discuss further on this panel. The risk of opening the US biotech industry to false accusations is a real concern, as is the inherent difficulty of unambiguous detection of foreign offensive BW activity. We

need to be creative in our thinking here, as so far we have concluded simply that meaningful monitoring of biological activities that can clearly distinguish peaceful uses from weapons is not possible. We hope that some clever team will prove us wrong.

There are similar concerns about chemical weapons in the wake of advances in science and technology and the chemical industry. A modern chemical weapons production facility may look exactly like a typical civilian chemical production facility. A country could use the same facilities for both legitimate and weapon purposes with a relatively simple "swap out" of piping and equipment. Unless you happen to detect the effluent while they are processing a chemical weapon batch, it is possible you would not know what is being produced.

To help meet all these new challenges, a question that I've been asking myself, my staff and experts around the world is: what are some new tools and technologies that we could incorporate into arms control verification and monitoring for all weapons of mass destruction? I am particularly interested in how we can use the astonishing advancements in information technologies over the past decades, and how they can aid in the verification of arms control treaties and agreements.

Right now we are in the brainstorming stage, and I have been particularly keen to speak to young people about these challenges. But I have also been eager to speak to the broad scientific community, bringing these ideas to our national laboratories and last year, before the JASONs. I greatly appreciate this opportunity to speak to the NAS. It is people like you who will help us turn these ideas into policy.

Our new reality is a smaller, increasingly-networked world where the average citizen connects to other citizens in cyberspace hundreds of times each day. They exchange and share ideas on a wide variety of topics, why not put this vast problem solving entity to good use?

New concepts, I recognize, are not invented overnight, and we don't understand the full range of possibilities inherent in the information age. Today, any event, anywhere on the planet, has the potential to be broadcast globally in mere seconds. The implications for arms control and verification are interesting. It is harder to hide things nowadays. When it is harder to hide things, it is easier to be caught. The neighborhood gaze is a powerful tool.

Open source information technologies improve arms control verification in at least two ways: either as a way of generating new information, or as analysis of information that already is out there.

The DARPA Red Balloon Challenge is an example of the first. It demonstrated the enormous potential of social networking and also demonstrated how incentives can motivate large populations to work toward a common goal. Applying such ideas to arms control, a country could, for example, establish its bona fides in a deep nuclear reduction environment by opening itself to a verification challenge.

A technique like this — I call it a "public verification challenge" — might be especially valuable as we move to lower and lower numbers of nuclear weapons. Governments, in that case, will have an interest in proving that they are meeting their reduction obligations, and may want to engage their publics in

helping them to make the case. It will then be incumbent on all of us to ensure that they cannot spoof or manipulate the verification challenges that they devise.

This kind of public verification challenge would augment standard international safeguards or verification of a country's nuclear declaration. We have to bear in mind that there could be significant limitations based on the freedoms available to the citizens of any given country — an issue to tackle in thinking through this problem.

The Information Age is also creating a greater talent pool of individuals. Garage tinkerers, skunk works scientists, technologists and gadget entrepreneurs can reach a broader, diverse market for their products and services. These private citizens can develop web-based applications for any touch pad communication device. This "crowd sourcing" lets everyday people solve problems by getting innovative ideas out of their heads and onto the shelves.

The DOD, through DARPA, is now using crowd source competitions for the development of drones. We believe that this is also an approach that could work for arms control and nonproliferation verification, both technologies and concepts.

Open source technology could be useful in the hands of inspectors. Smart Phone and tablet apps could be created for the express purpose of aiding in the verification and monitoring process. For example, by having all safeguards and verification sensors in an inspected facility wirelessly connected to an inspector's iPad, he or she could note anomalies and flag specific items for closer inspections, as well as compare readings in real time and interpret them in context. Some of this is already happening on an ad hoc basis.

My Bureau intends to pursue such ideas through competitions, posing challenge questions with arms control applications to the information community.

Through our Key Verification Assets Fund (V Fund) Program, we are seeking ambitious, innovative research proposals to address requirements outlined in an unclassified Verification Technology Research and Development Needs Document. This is the first time that our "Needs Document", as we call it, has been available in unclassified form. We are inviting researchers and project managers to submit white papers with ideas for sustaining, researching, developing, or acquiring technologies relating to the verification of chemical, biological, nuclear and missiles arms control, nonproliferation, and disarmament agreements or commitments.

This is not just a paper exercise. Congress created the V Fund so that we could provide "seed money" to encourage the development of new technologies, or to adapt existing projects to the needs of arms control verification. We intend to use the resource well.

You can find more information by going to www.state.gov/t/avc/vtt. We look forward to seeing your ideas.

In the end, the goal of using emerging technologies and social networks should be to augment our existing arms control verification capabilities, and we will need your help to think about how it can be

done. For example, could the CTBTO's International Monitoring System's ability to monitor for nuclear tests be supplemented by social networks? Could new information technologies help us to monitor for the cheating scenarios that concern us – like the ones involving very small nuclear explosions? This is a timely consideration. Your organization just published a comprehensive study on the verifiability of the CTBT, and we at State thank everyone who was involved in the hard work of producing that study, including Micah Lowenthal, Ben Rusek and two of my esteemed fellow panelists – Raymond Jeanloz and Dick Garwin.

Going forward, it is only with the ideas from inside and outside the government that we will find better tools to mine, fuse and analyze both classified and unclassified data, in order to compensate for situations where on-site inspection and/or national technical means are unavailable or need to be supplemented.

These are exciting challenges and I look forward to working with you to tackle them.

Thank you.