The contribution of arms control to fighting nuclear terrorism

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Since 11 September 2001, the world has developed a heightened awareness of the security threat posed by terrorists. Scenarios of terrorists using nuclear weapons or radiological devices have been widely discussed by media pundits, researchers, heads of state, specialists and generalists alike.

The global fight against terrorism requires efforts in many areas, from strengthened border controls to better coordination among numerous government agencies at the local, national, regional and international levels. As the international community attempts to come to terms with the threat of terrorism, it should build upon already existing foundations as well as develop new responses. Despite the fact that arms control predominantly involves commitments between states—not non-state actors—it can make a necessary and useful contribution to preventing terrorists from acquiring the capability to launch nuclear and radiological attacks (and in some cases has already done so).

Arms control is based upon cooperative approaches taken by national governments to strengthen national security, to protect civilians, or to allocate resources to other objectives, such as social development rather than military build-up. Following the end of the Cold War, global arms control efforts were very successful and a series of arms control agreements, such as the Comprehensive Test-Ban Treaty and the Chemical Weapons Convention, were concluded or reinforced around that time. However, in recent years arms control has been frustrated due to a multitude of reasons—from the rise of unilateralism to a false sense of security emerging after the end of the Cold War. Nowhere is this inactivity more evident than in the stalemate in the Conference on Disarmament. Today, the new common enemy—terrorism—could stimulate innovative arms control initiatives and lead to more cooperation rather than unilateralism in arms control and disarmament.

There is a synergistic relationship between arms control and anti-terrorism initiatives. Because arms control tends to constrain the possession, transfer or use of weapons and their components, it is certainly helpful in blocking terrorist access to these weapons. The cooperative nature of arms control can also encourage better coordination and confidence among national governments. A wide range of intergovernmental, national and non-governmental arms control fora exist that could be used to address the issue of nuclear terrorism. At the international level, the Conference on Disarmament and the United Nations Security Council should be at the lead. Although not specifically designed for this purpose, some agreements and organizations dedicated to the control of nuclear weapons, their components and radioactive materials, such as the Nuclear Non-Proliferation Treaty (NPT) and the International Atomic Energy Agency (IAEA), also make important contributions to reducing the terrorist threat.

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Nuclear terrorism

If terrorists were to acquire nuclear or radiological weapons, it would be a catastrophic event. A terrorist group would be much less cautious than a national government in launching a nuclear attack. Unlike governments, terrorists do not have to worry about protecting their citizens or national territory from a retaliatory attack. Even the mere threat of use of these weapons by terrorists could cause panic and social chaos.

We can imagine three kinds of nuclear terrorism. The first is to *disperse radioactive materials* (a radiological weapon or 'dirty bomb'). The second is to intentionally cause the leakage of radioactive materials by *attacking nuclear facilities*. These threats are also known as radiological attacks or nuclear blackmail.[1] Studies undertaken concerning the risk and potential for such attacks have been widely publicized and for the most part agree that efforts are needed to strengthen the safety and control of radioactive materials, waste and facilities.[2] The third option for terrorists would be to *explode a nuclear weapon*.

This article will focus specifically on how arms control approaches can help prevent terrorist action involving nuclear weapons and their components (such as weapon-grade fissile materials). Other articles in this issue address radioactive materials and nuclear facilities.

The risk of already existing fissile materials—and even nuclear devices—falling into the hands of terrorists is real and must be addressed.

It is important that all nuclear-weapon states and emerging nuclear-weapon states maintain and strengthen their capabilities to protect their nuclear weapons and materials, and convey a sense of confidence in such measures. In general, this requires three responses. First, there must be a robust protection system against loss of existing nuclear devices. Second, a quick and regular accounting system must be used to detect any loss in real time. Third, the capability to prevent unauthorized detonation should be included in all weapon designs. At present, however, national standards and practices vary considerably in these regards.

Obviously, meeting these requirements would be easier if there were fewer nuclear weapons, fewer deployment and stockpile sites, less frequent shipments and exercises with live weapons, and a lower state of readiness. The greater the number of existing weapons and the more widely they are deployed makes protection difficult and slows accounting. There are also significant concerns about 'loose nukes'. Small, easily transported nuclear weapons are technically feasible. Fears that terrorists might acquire 'suitcase bombs' from the Russian nuclear arsenal—or already have done so—continue to worry specialists.[3] Frequent shipments and exercises increase the chance of loss to terrorists. Fully assembled and on-alert weapons prepared for launch make unauthorized use of the weapons easier.

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It is almost impossible for a terrorist group to produce fissile materials by itself. The infrastructure for the production of fissile materials is hard to disguise and could be detected, for example through analysis of satellite imagery.[4] Building a production facility would be lengthy process, which would also increase the chance of detection. Therefore, the first step for a terrorist group wanting to build a nuclear device would most likely be to acquire a significant amount of fissile material.[5]

Very large inventories of fissile materials exist around the world—enough to produce tens of thousands of nuclear devices. Attempts at stealing fissile material have already been discovered.[6] To thwart future diversion attempts, solutions similar to those outlined for nuclear weapons need to be applied to weapon-grade fissile materials: a robust protection system against loss and a quick and accurate accounting capability to detect loss of a significant amount of fissile material. Reducing the overall amount of fissile material and the number of stockpile sites would also simplify its protection and accounting systems.

Some current arms control processes and initiatives are aimed at reducing nuclear arsenals, the frequency of exercises or manoeuvres with live weapons, and fissile material stockpiles. The following sections discuss four specific arms control efforts that could be useful to fighting nuclear terrorism: reducing both tactical and strategic nuclear weapons, negotiating a Fissile Material Cut-off Treaty (FMCT), and strengthening the non-proliferation regime and export controls.

Reducing TNWs

Tactical nuclear weapons (TNWs) are short-range weapons designed for use on the battlefield. Reducing the number of TNWs is an important arms control objective to prevent accidental or intentional nuclear war.

From the perspective of confronting nuclear terrorism, the existence of TNWs poses a significant problem. TNWs are at greater risk than strategic weapons to be lost or detonated because of their widespread deployment and high state of readiness. TNWs have been deployed around the world, even in areas affected by terrorist activities.[7]

In 1991 the United States and the Soviet Union announced unilateral reductions in their TNWs, feeling that the use of nuclear weapons on the battlefield is not realistic. Most American and Russian TNWs have been withdrawn from deployment. However, some TNWs remain deployed[8] and the United States is interested in developing new TNWs or modifying existing ones to attack deeply buried targets.[9]

Most state-built nuclear weapons are believed to have locks, such as a Permissive Action Link (PAL).[10] The objective of the lock is foil an attempt at unauthorized detonation; some locks go as far as disabling the warhead if too many false attempts are made. In the worst-case scenario, locks help to 'buy time' to recover the warhead. The case for TNW reductions is strengthened by the fact that it is not clear if all TNWs, especially those developed for quick use on battlefields, have this type of security feature. If not, a TNW might be ‘ready to use’ and therefore an attractive terrorist objective.

Existing arms control arrangements concerning TNWs are informal and are not legally binding. There is therefore little confidence in the thoroughness and irreversibility of tactical nuclear reductions. Fighting terrorism is an additional and pressing incentive for the United States and the Russian Federation to continue their tactical nuclear reductions. A first step would be to make their 1991 unilateral declarations legally binding; other nuclear-weapon states should be encouraged to enact similar agreements. In the longer term, to prevent a terrorist nuclear attack, nuclear-weapon states could formally commit to reducing TNWs to zero, which would include complete withdrawal and dismantlement of all existing TNWs, no development of new TNWs, and transparency arrangements to build confidence.

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Strategic nuclear weapons: deeper reductions and de-alerting

Thousands of strategic nuclear weapons are still deployed or stockpiled around the world. The 2002 Moscow Treaty signed by Presidents Putin and Bush offers little of substance on actual reductions, for example by not requiring that warheads taken out of operational deployment are dismantled. More disturbingly, the treaty lacks any verification or inspection provisions. Although strategic nuclear weapons are more strictly controlled than TNWs, the risk of loss still exists, especially during shipment

and exercises with live weapons.[11] While statistically rare occurrences, accidents have happened and might permit terrorists to obtain nuclear weapons or their components.

Arms control approaches could make valuable contributions to preventing terrorist attacks involving strategic nuclear weapons. Deep reductions are an obvious step, including the withdrawal of most strategic nuclear weapons from deployment, the dismantlement of those nuclear warheads reduced, and verification and transparency arrangements. Similar to the case of TNWs, reductions will make the protection of the remaining strategic nuclear weapons easier and the accounting quicker. Besides the Moscow Treaty, no other strategic reductions are currently being discussed.

Nuclear de-alerting[12] is usually considered as a way to reduce nuclear tension or suspicion among countries and to prevent accidental nuclear war. De-alerting is also a way to reduce the chances of nuclear weapons being obtained and used by terrorists. This could be achieved by reducing the frequency of exercises with live strategic nuclear weapons; reducing the number of strategic nuclear weapons on mobile launchers and the frequency of their movement; deploying nuclear components separately, for example, tritium and rest of the warhead. Additionally this approach will significantly reduce the probability of accidents that could cause nuclear weapon loss and will make the unauthorized detonation of these weapons more difficult.

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Strengthening fissile material control

According to the IAEA, 25kg of weapon-grade uranium is defined as a 'significant amount', while only 8kg of weapon-grade plutonium is considered a 'significant amount'. If the IAEA were to find a discrepancy equal to or greater than these amounts during fissile material accounting in a non-nuclear weapon state, the authority responsible for the materials would be immediately notified and requested to respond.

It should be noted that all nuclear-weapon states have uncertainties in the accounting of their total fissile materials that are much greater than the aforementioned amounts. These uncertainties accumulated over time as large amounts of fissile materials have been produced. Today this lack of precise baseline data makes the detection of material loss difficult. The more fissile materials are produced, transformed and transported, the greater these uncertainties will be. Maintaining large stocks of fissile material makes their protection problematic because they are spread among many different sites and are in different forms.

To make the protection of fissile materials more reliable and the accounting quicker and more accurate, it is necessary to dispose of excess fissile materials and therefore reduce the total amount and the number of deposit sites. Transparency arrangements concerning fissile material disposal might encourage confidence in safeguards and reduce the fear of diversion. To support fissile material reductions, the negotiation of a FMCT[13] as a universal and formal commitment not to increase fissile material stocks, would be the most obvious step—if the Conference on Disarmament could surmount its impasse. Until then, at a minimum, the nuclear-weapon states should maintain their *de facto* moratoria on fissile material production.

Strengthening the non-proliferation regime and export controls

The NPT was originally negotiated to address the concern over the transfer of nuclear technology and hardware between countries. In practice, the NPT (together with IAEA safeguards) has played an

important role in preventing nuclear terrorism in different ways. First, the NPT formally prohibits all but five nations from developing nuclear weapons, which has helped to control the number of permitted nuclear-weapon states. Second, the NPT's strong restrictions over the transfer of nuclear weapon technology and components also pose a barrier for terrorists to acquire nuclear weapons. Third, IAEA safeguards help many countries to establish fissile material accounting and protection systems that deny terrorists access to nuclear technology and materials from civilian industry.

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In addition to near-universal agreements and institutions like the NPT and the IAEA, there are cooperative regimes—such as the Nuclear Suppliers Group and the Zangger Committee—that regularize the transfer of dual-use technologies. As most export control regulations and regimes require the suppliers to identify both the end use and end users of their dual-use products, these regulations can significantly reduce the chances of terrorists acquiring nuclear technology and components through international trade. Although control regimes can slow the proliferation of potentially dangerous technology, they are open to criticism as they are not universal and are considered by some non-members to be discriminatory.

National controls are also important. For example, before it promulgated its first nuclear export control law on 1 August 1997, China took an administrative approach to manage exports in this area by monopolizing international trade. As China moved towards a market economy over the last twenty years, it began to take legal approaches to regularize export in this area. Now China has a series of laws for nuclear and related technology export control. These laws are similar to those in other countries and they help China to coordinate with other countries in managing export control.

Although the existing non-proliferation regimes and regulations have played important roles in preventing nuclear terrorism, more efforts are necessary. First, most export control regimes and regulations were designed to prevent nuclear proliferation among countries and therefore they focus on monitoring international trade. As these laws cannot prevent terrorists from buying dual-use technology in domestic markets, domestic legislation should be enacted or strengthened.

Second, the situation of IAEA safeguards in threshold nuclear-weapon states is not completely satisfactory. As there is very little transparency in the nuclear programmes of these countries, there is insufficient confidence in the IAEA being able to detect discrepancies. It is therefore important that as many countries as possible adopt the enhanced safeguards of the IAEA.

For example, since joining the NPT in 1985, North Korea has never fully accepted full IAEA safeguards, claiming that American nuclear deployment in South Korea was an obstacle. The unilateral declaration of President Bush in 1991 to withdraw all TNWs abroad provided the first chance for North Korea to consider IAEA safeguard positively. The 1994 Agreed Framework between North Korea and the United States played a role in dealing with the tense situation of 1993. After eight years of recurring disputes about the implementation of the Agreed Framework, the issue of North Korea's nuclear programme has once again become urgent. As North Korea has expelled IAEA personnel, claims to have withdrawn from the NPT, and has restarted its nuclear reactors, there are increasing concerns about a weapons programme, the possibility of the government selling its nuclear technology, and lack of adequate controls to prevent theft or loss.[14]

It is necessary to persuade North Korea to come back to the NPT and adopt full-scope IAEA safeguards. It seems that North Korea wants a formal security assurance from the United States as a precondition to return to the NPT. If the United States makes a negative security assurance to North Korea to exclude both nuclear and conventional attacks against it, it might help to persuade North Korea return to the NPT.

Conclusion

As outlined here, arms control contributes to fighting terrorism by strengthening the safety and security of nuclear weapon installations, institutions and mechanisms. It should not be forgotten that arms control also builds social norms and taboos about weapon use. For example, a treaty banning radiological weapons or military action against nuclear facilities would not be able to directly prohibit terrorists from launching radiological attacks—as they are agreements with states, not non-state actors—but they could arouse social conscience and reduce the support of terrorists if they plan these sorts of attacks.

Notes

1 For an analysis of the threat posed by terrorists, see article by A. Schaper, p. 7.
2 About radiological attacks, see, for example, Bernard Anet, 2002, *Assessing the Risk of Radiological Terrorism: How Real is the Threat*, paper presented at the Fourth International Chemical and Biological Medical Treatment Symposium, Spiez, Switzerland, April, available at <http://www.vbs.admin.ch/ls/e/current/fact_sheet/risk_of_terr/Paper_CBMTS-IV_Nuclear%20Terrorism.pdf>.
3 Brian Ross, 2001, Portable Terror, Suitcase Nukes Raise Concern, *ABC News*, 9 November, available at <http://abcnews.go.com/sections/primetime/2020/ross011108.html>.
4 Hui Zhang and Frank N. von Hippel, 2000, Using Commercial Imaging Satellites to Detect the Operation of Plutonium-Production Reactors and Gaseous-Diffusion Plants, *Science & Global Security*, vol. 8, no. 3.
5 For details, see article by A. Schaper, p. 7.
6 Matthew Bunn and George Bunn, 2002, Strengthening Nuclear Security Against Post-September 11 Threats of Theft and Sabotage, *Journal of Nuclear Materials Management*, Spring, available at <http://bcsia.ksg.harvard.edu/publication.cfm?program=CORE&ctype=article&item_id=521>.
7 See for example, Robert S. Norris, William M. Arkin and William Burr, 1999, "Appendix B" Deployments By Country, 1951–1977, *Bulletin of the Atomic Scientists*, vol. 55, no. 6, November/December, p. 66, available at <http://www.thebulletin.org/issues/nukenotes/nd99nukenote.html>.
8 On the operational tactical nuclear arsenal of the United States, see Robert Norris et al., 2002, NRDC Nuclear Notebook: US Nuclear Forces 2002, *Bulletin of the Atomic Scientists*, vol. 58, no. 6, May/June, pp. 70–75, available at <http://www.thebulletin.org/issues/nukenotes/mj02nukenote.pdf>. On the Russian operational tactical nuclear arsenal see Robert Norris et al., 2002, NRDC Nuclear Notebook: Russian Nuclear Forces 2002, *Bulletin of the Atomic Scientists*, vol. 58, no. 7, July/August, pp. 71–73, available at <http://www.thebulletin.org/issues/nukenotes/ja02nukenote.pdf>.
9 Philipp C. Bleek, 2002, Energy Department to Study Modifying Nuclear Weapons, *Arms Control Today*, April, available at <http://www.armscontrol.org/act/2002_04/nucapril02.asp>.
10 Robert Norris et al., 1991, Nuclear Notebook: U.S. Nuclear Weapons Safety and Control Features, *The Bulletin of the Atomic Scientists*, October, vol. 47, no. 8.
11 U.S. Nuclear Weapons Accidents: Danger In Our Midst, *The Defense Monitor*, vol. X, no. 5, available at <http://www.milnet.com/milnet/cdiart.htm>.
12 For more information about de-alerting, see http://www.fas.org/cusp/alert/
13 See article by T. Shea, p. 39.
14 Ashton B. Carter, William J. Perry and John M. Shalikashvili, 2003, A Scary Thought: Loose Nukes in North Korea, *The Wall Street Journal*, 6 February.