1. A world without nuclear weapons: fantasy or necessity?

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I. Introduction

The history of the nuclear era shows that from time to time states have changed their doctrinal approaches to nuclear deterrence and how to manage the 'ultimate weapon'. This suggests that the outlook for a world without nuclear weapons will be influenced as much by political thinking as by the military and technical considerations that will arise in the process of eliminating warheads and missiles. 'Thinking about the unthinkable' in Herman Kahn's day referred to the analysis of nuclear war.[1] The unthinkable today for some experts is a world without nuclear weapons, but thinking about this idea is now becoming a higher priority, and it is not a moment too soon.

Reluctance to change the status quo lessened after the publication of two articles by George Shultz, Henry Kissinger, William Perry and Sam Nunn, in January 2007 and January 2008.[2] They argued that the world was at a dangerous tipping point and that international responses to nuclear dangers had not risen to meet the threat. The articles challenged the states that possess nuclear weapons to adopt as a serious policy goal a world without nuclear weapons and to accept near-term steps that would make the world a safer place and create the conditions for achieving a world without nuclear weapons.[3]

How can this be done? Russia and the United States have sharply reduced their arsenals of nuclear weapons. The process began under Soviet leader Mikhail Gorbachev and US President Ronald Reagan in the 1980s. It continues under Russian President Dmitry Medvedev and US President Barack Obama in 2010. Will it proceed further, perhaps all the way to zero? Both presidents say they favour a world without nuclear weapons. Many analysts have shown how Russia and the USA could reduce nuclear warheads to a thousand or so apiece, while limiting the associated delivery

[1] Kahn, H., *Thinking about the Unthinkable* (Horizon Press: New York, 1962); and Kahn, H., *Thinking about the Unthinkable in the 1980s* (Simon & Schuster: New York, 1984).

[2] Shultz, G. P. et al., 'A world free of nuclear weapons', *Wall Street Journal*, 4 Jan. 2007; and Shultz, G. P. et al., 'Toward a nuclear-free world', *Wall Street Journal*, 15 Jan. 2008.

[3] The states that possess, or are widely believed to possess, nuclear weapons are China, France, India, Israel, Pakistan, Russia, the United Kingdom, the United States and possibly North Korea. See chapter 8 in this volume.

vehicles to a few hundred for each country. Several recent studies have gone still further by identifying steps that would include not only Russia and the USA but also all other states that currently possess nuclear weapons.[4] The end state that these studies envisage is zero nuclear weapons, or close to it.

These hypothetical models are useful for analytical purposes if for no other reason than to identify the practical problems that will have to be confronted in a global enterprise to eliminate all nuclear weapons. They show, among other things, that the process of eliminating nuclear weapons cannot stand alone. It must be accompanied by ancillary agreements that will limit other weapons.

Furthermore, a number of essentially political issues, quite separate and apart from what the late Sir Michael Quinlan called 'disarmament mechanisms', also need careful study.[5] These issues go to the heart of whether eliminating nuclear weapons from the world's arsenals is a practical proposition. Nuclear deterrence has become a seemingly indispensable component of relations between states. If all the world's nuclear-armed states believe that their interests will be served by eliminating nuclear weapons, then the process will gain traction. However, a single hold out could block the whole process.

In order to examine both the 'mechanical' and 'political' issues of nuclear disarmament in a new age of arms control, section II of this chapter discusses general approaches to medium-term Russian–US nuclear arms reductions. Other nuclear-armed states will have to join in making the elimination of nuclear weapons a truly global enterprise, and the content of multilateral negotiations is examined in section III. Programmes to eliminate nuclear weapons cannot be free standing: other military capabilities will also have to be constrained and those are identified in section IV. Nuclear deterrence will not disappear even if all nuclear weapons are eliminated but will take other forms; that concept is explored in section V. World government is not a requirement for achieving a world without nuclear weapons but governance issues at various levels must be addressed, and regional arrangements will be especially important. Both are assessed in section VI. It is important to understand that political and doctrinal changes, as much as or perhaps more than technical changes, have affected how governments view nuclear weapons and what they are willing to do to constrain them. The US experience in this regard is briefly

[4] In Sep. 2009 the 5 permanent members (P5) of the UN Security Council met in London for a wide-ranging discussion of confidence building, verification and compliance challenges associated with achieving further progress towards disarmament and non-proliferation. British Foreign and Commonwealth Office, 'P5 statement on disarmament and non-proliferation issues', 4 Sep. 2009, <http://www.fco.gov.uk/en/news/latest-news/?view=News&id=20804873#>.

[5] Quinlan, M., *Thinking about Nuclear Weapons: Principles, Problems, Prospects* (Oxford University Press: Oxford, 2009), pp. 161–63.

reviewed in section VII. Section VIII concludes by discussing the idea of a world without nuclear weapons as a necessary component of every responsible state's national security policy.

II. Staged reductions in Russian and US nuclear weapons

Russia and the United States together possess about 90 per cent of the world's inventory of nuclear weapons. Understandably, these states have taken the lead in reducing their nuclear arsenals. The next phase of Russian–US nuclear arms reductions would follow the implementation of the 2010 New START Treaty, the successor treaty to the 1991 Treaty on the Reduction and Limitation of Strategic Offensive Arms (START Treaty) and the 2002 Strategic Offensive Reductions Treaty (SORT).[6] This phase might be concluded in the medium-term but it is better to define this by a functional, rather than a time-bound measure. That construct is more meaningful than a guess about the time it would take to get there. The next phase of reductions will bring Russian and US nuclear forces to the lowest level that the two countries can accept in the absence of binding limitations on the nuclear forces of other states.

What that level might be is a rather subjective question but several private studies have coalesced around several hundred bombs and warheads for each side and delivery vehicles amounting to about half that number.[7] Much ambiguity must remain about future counting rules for warheads, bombs and missiles. Non-deployed bombs and warheads will be difficult to verifiably limit, and the limits may be less rigorously defined initially as a result. The increasing use of missiles and bombers for conventional weapons introduces additional complexities into the counting of delivery systems.

The New START Treaty defines a framework, including verification provisions, that will ease the future work of US and Russian negotiators, but the process will not be easy. Several difficult issues were set aside for future decision and an agreed framework for subsequent detailed negotiations would likely be the first step.

Several technical issues will have to be addressed in the next phase. In addition to the question of how to count and verify non-deployed bombs

[6] For a summary and other details of the START Treaty, SORT (also called the Moscow Treaty) and the New START Treaty see annex A in this volume.

[7] Global Zero Commission, 'Global Zero action plan', Feb. 2010, <http://static.globalzero.org/files/docs/GZAP_6.0.pdf>; Evans, G. and Kawaguchi, Y., *Eliminating Nuclear Threats: A Practical Agenda for Global Policymakers*, Report of the International Commission on Nuclear Non-proliferation and Disarmament (International Commission on Nuclear Non-proliferation and Disarmament: Canberra, 2009); Shultz, G. P. et al., *Reykjavik Revisited: Steps Toward a World Free of Nuclear Weapons* (Hoover Press: Stanford, CA, 2008); and Drell, S. D. and Goodby, J. E., *A World Without Nuclear Weapons: End-State Issues* (Hoover Press: Stanford, CA, 2009).

and warheads, they include: how to limit and reduce short-range (tactical) nuclear weapons; how to verify the dismantlement of nuclear warheads and ensure that this process is irreversible; and how to relate ballistic missile defence systems to further reductions in offensive systems.

These are not insurmountable issues. Solutions are readily available and under optimum conditions probably could be accepted by both sides. More difficult to assess is whether Russia and the USA will have the political will to proceed with deeper reductions of nuclear weapons. The outcome will depend primarily on two factors: (*a*) how the New START Treaty is implemented, and (*b*) whether other nuclear-armed states act in a way that encourages the process of Russian–US nuclear negotiations.

III. Broadening the circle: involving other nuclear-armed states in a campaign to eliminate nuclear weapons

One barrier to rapid, sustained Russian–US reductions in nuclear weaponry is the nuclear weapon programmes of other countries. These programmes are cited again and again in critical commentary on the goal of elimination. If other states that possess nuclear weapons were to join in a reduction and elimination programme, the effect on both Russia and the United States would be catalytic. It would energize their efforts to move towards deep reductions and, ultimately, to elimination of nuclear weapons.

The days when the interests of two superpowers dominated the world's strategic nuclear agenda are over. As Russian and US nuclear forces are reduced, other countries' nuclear arsenals will loom larger in security calculations. Regional conflicts also generate their own sets of impulses that affect nuclear decisions. Asia and Europe are rife with political dynamics that were suppressed or totally absent during the cold war. Eliminating the threat posed by nuclear weapons requires that many states actively participate in negotiations to reduce all nuclear weapon programmes anywhere in the world.

The level of nuclear forces that Russia and the USA may try to reach in the next phase could, in theory, be achieved without the participation of other nuclear-armed states. Russia and the USA will still have by far the greatest numbers of nuclear weapons in their arsenals even after additional reductions. In practice, however, unless there is a widely, and preferably universally, shared commitment to progressively eliminate all nuclear weapons, the momentum necessary to sustain further Russian–US negotiations will be lost.

Initial commitments by other nuclear-armed states

UN Security Council Resolution 1887 calls on all states to help create the conditions necessary for a world without nuclear weapons.[8] The resolution envisages concrete actions by many states. It was not intended that only Russia and the USA would act to reduce their nuclear arsenals while other states looked on.

A wide array of actions is available to other nuclear-armed states and many of these could be pursued without delay. Those states that possess nuclear weapons should adopt a verifiable and politically binding agreement in which they would declare that: 'fissile materials removed from nuclear weapons being eliminated and excess to national security requirements will not be used to manufacture nuclear weapons; no newly produced fissile materials will be used in nuclear weapons; and fissile materials from or within civil nuclear programmes will not be used to manufacture nuclear weapons'. This language appears in a declaration issued by Russian President Boris Yeltsin and US President Bill Clinton.[9] Early agreement on these points by all states that possess nuclear weapons would be a powerful signal that they are determined to create the conditions for a world without nuclear weapons. It would accelerate agreement by Russia and the USA on deeper cuts in their nuclear arsenals. The agreement would be open to all states that chose to join, although no special effort need be made to pressure them to join in. Not all the points would be relevant to states that had no nuclear weapons or fissile material production facilities. Discussions about a treaty with a similar intent that would be applicable even-handedly to all nations have been under way in the Geneva-based Conference on Disarmament, the UN forum for multilateral arms control negotiations, for several years. These talks should continue and a treaty should be negotiated as soon as possible. A less powerful agreement that would be binding on nuclear-armed states, as described above, would be one in which those states agree not to increase the number of nuclear weapons each may have and to offer greater transparency, in the form of data sharing. Measures to increase the length of time available for decision making before launching nuclear weapons would also be desirable.

Other near-term measures include: (*a*) establishing more nuclear weapon-free zones; (*b*) exchanging data on all nuclear programmes and holdings of fissile materials; (*c*) carrying out unilateral or parallel reductions in nuclear weapons; (*d*) making all uranium enrichment programmes

[8] UN Security Council Resolution 1887, 24 Sep. 2009.

[9] Woolley, J. T. and Peters, G., American Presidency Project, 'Joint statement on the transparency and irreversibility of the process of reducing nuclear weapons', 10 May 1995, <http://www.presidency.ucsb.edu/ws/index.php?pid=51341&st=&st1=>.

multilateral; (*e*) placing all spent nuclear fuel elements in internationally supervised interim storage sites; and (*f*) working to reduce regional tensions that drive nuclear weapon programmes.

Russian and US leadership will be required in measures such as these but initiatives in regional actions obviously must come from states in those regions. The three other permanent members of the UN Security Council—China, France and the United Kingdom—will have to assume leadership roles if the global enterprise is to become a reality. To varying degrees, their interests may encourage them to do so.

Longer-term multilateral nuclear arms reductions

Models of deep Russian–US reductions well below the 1000-warhead level have been developed and these are useful, but only for analytical purposes. The content of the actual stages might differ significantly from the models. The process of reductions will generate feedback that will provide a learning experience. All of the models of Russian–US reductions will be part of a multilateral framework. No longer will Russia and the USA proceed with nuclear reductions in the absence of limits on the nuclear forces of other countries.

One model, for analytical purposes, would proceed in three basic steps. First, Russia and the United States would reduce operationally deployed warheads and bombs of all types to low numbers (200–500); China, France and the UK would accept ceilings below 200; and India, Israel and Pakistan would freeze at then-current levels (assumed not to exceed 100). Second, each nuclear-armed state would reduce deployed warheads to zero and non-deployed warheads to no more than 200, after which each nuclear-armed state might reduce the latter category to an interim number of 50–100 apiece. A variant could have a mix of 50–100 operationally deployed or declared reserve warheads retained by each state while all other warheads would be eliminated. Finally, each nuclear-armed state would reduce warheads to zero while retaining monitored reconstitution capabilities within agreed parameters and for a period of agreed duration.

Although those numbers are hypothetical, they provide a framework for examining key security issues that the countries will face as they approach and enter the end state.

A pause for stocktaking would be in order when states had reduced to the level of 50–100 warheads apiece or less. The following conditions, among others, should have been met.

1. Procedures for challenge inspections to search for concealed warheads should have been established and satisfactorily exercised.

2. Warheads scheduled for elimination should be able to be dismantled under conditions that would assure their actual dismantling, with the nuclear components placed in secure and monitored storage pending final disposition.

3. Delivery vehicles scheduled for elimination should have been verifiably destroyed, and procedures should be in place to confirm that dual-use systems have not been armed with nuclear warheads.

4. Compliance mechanisms should have been established to enforce nuclear agreements.

5. Beyond the nuclear aspects, advances should have been made in creating and maintaining regional confidence-building regimes and restraints regarding conventional forces; progress should have been made in addressing and resolving regional disputes that threaten to trigger military actions; and international mechanisms to provide more effective compliance with nuclear agreements should have been put in place.

Verification is a major issue, but a less formidable obstacle than many think. Russia and the USA have had years of experience in successfully verifying numbers of operationally deployed nuclear warheads. The numbers and locations of the principal means of delivering warheads—bombers and missiles—can be monitored, which also provides insight into the status of non-deployed warheads.

The task of verification may become easier as progress towards zero is achieved. The rules of behaviour will be well established by then, which should make anomalies easier to spot and encourage whistle-blowers to speak out. Enforcement should be easier to obtain than under present circumstances. States that gave up their nuclear arsenals are not apt to be tolerant of those that defy a ban on acquiring nuclear weapons. A preventive attack would become a more realistic option than it is today.

During the time that it will take to negotiate and implement the steps towards the end state, a steady accumulation of vital information will occur. For example, the history of production of fissile materials will become better understood as time goes on. With that information, the upper limits of warhead production can be calculated more accurately. So, by the time the end state is reached, an accurate base of information about arsenals that have been built and about materials that will remain subject to restraints and elimination will be in hand.

All states that possess nuclear weapons would participate in some way in a verification process. It would not be a ‘one size fits all’ approach. Nuclear-free zones, with appropriate verification, might be more effective than a global approach in some cases. The standards of verification should be essentially equivalent, although the specific modes of verification might differ from zone to zone.

IV. Ancillary agreements necessary to support and sustain a world without nuclear weapons

There are two categories of supporting agreements that should be in force before and after the goal of eliminating nuclear weapons has been achieved. The first category consists of nuclear-related agreements that will form the essential building blocks of a world without nuclear weapons. The second category are those non-nuclear agreements necessary to forestall conflict and the resort to force by any means, such as confidence-building measures (CBMs) and constraints on conventional, biological and chemical weapons.

Nuclear-related agreements include the 1996 Comprehensive Nuclear-Test-Ban Treaty (CTBT), a fissile material cut-off treaty (FMCT) and measures to regulate uranium enrichment and plutonium separation.[10] Without such agreements nuclear weapon development programmes could continue, defeating the purpose of reductions in the world's nuclear stockpiles. Agreements that would strengthen the infrastructure of nuclear non-proliferation will also be necessary. These would include strengthening the International Atomic Energy Agency (IAEA), monitoring compliance with the 1968 Treaty on the Non-proliferation of Nuclear Weapons (Non-Proliferation Treaty, NPT) and enforcing measures to disrupt illicit trafficking in fissile materials.[11] Each of these nuclear-related agreements would make the world a safer place.

In the context of a world without nuclear weapons, confidence-building measures are necessary to sustain the basic contract to renounce nuclear weapons. CBMs generally provide for transparency, some types of constraint and means of rapid, secure communications regarding military activities. They are useful in defusing the regional conflicts that spur decisions to acquire nuclear weapons.

It is already clear that balanced restraints on conventional forces will be necessary if nuclear weapons are to be reduced significantly, let alone eliminated. The 1990 Treaty on Conventional Armed Forces in Europe (CFE Treaty) was concluded near the end of the cold war by states that were still adversaries at the time.[12] Soviet–US nuclear arms reduction treaties were concluded at about the same time. Europe will not be alone in requiring parallel actions of this type. Countries in the Middle East, South Asia and East Asia are almost certain to raise the issue of limiting con-

[10] For a summary and other details of the CTBT see annex A in this volume. On recent developments in the FMCT negotiations see chapter 12, section VI, in this volume.

[11] For a summary and other details of the NPT see annex A in this volume.

[12] For a summary and other details of the CFE Treaty see annex A in this volume. For recent developments in the CFE regime see also chapter 11, section II, in this volume.

ventional forces if nuclear weapons are to be eliminated. Limits on dual-use delivery vehicles may also figure in these negotiations.

In a world without nuclear weapons, it will be more important than ever to ensure that the bans on the development, possession and use of chemical and, especially, biological weapons remain in force. Biological weapons have been called the 'poor state's atom bomb' because they are cheaper and easier to produce than their nuclear counterparts. States that agree to give up or forgo the nuclear option may be tempted to develop biological weapons as their ultimate deterrent. This would clearly undermine efforts to achieve a nuclear-free world. For this reason, high priority should be given to negotiating a verification protocol to the 1972 Biological and Toxin Weapons Convention (BTWC) at the earliest possible date to match the verification measures of the 1993 Chemical Weapons Convention.[13] Verification machinery should be in place on a global basis long before nuclear-armed countries enter the end state of a nuclear-reduction programme.

V. Deterrence in a world without nuclear weapons

Nuclear deterrence after zero

Deterrence in its original meaning existed long before nuclear weapons were invented. It has always relied on a variety of diplomatic, economic, and military skills and capabilities. These tools will continue to exist after nuclear weapons are eliminated. It is arguable that the imponderables, the non-quantifiable elements of the psychological condition that is called deterrence, are more potent than the physical presence of weapons, including nuclear weapons.

Nuclear deterrence will not disappear even if nuclear weapons are eliminated—a point which is too often overlooked. Nuclear deterrence will be manifested in a new form: the ability to reconstitute small nuclear arsenals. A quarter of a century ago Jonathan Schell, and later Michael Mazarr, pointed out that nuclear deterrence based on 'virtual' nuclear arsenals will exist even if nuclear weapons are eliminated.[14] Banning the existence of a ready-to-use arsenal does not eliminate the capability to build one. That capability would act to deter large-scale conventional war.

[13] For summaries and other details of the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction and of the Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on Their Destruction see annex A in this volume. See also chapter 10, sections III and IV, in this volume.

[14] Schell, J., *The Fate of the Earth* (Knopf: New York, 1982); Schell, J., *The Abolition* (Picador: London, 1984); and Mazarr, M. J. (ed.), *Nuclear Weapons in a Transformed World: The Challenge of Virtual Nuclear Arsenals* (St Martin's Press: New York, 1997).

This is not just a hypothetical model of nuclear deterrence. In 2008 the US secretaries of Defense and Energy issued a report in which they suggested that a 'responsive nuclear infrastructure' would make it possible, over time, for the USA to rely less on non-deployed nuclear warheads.[15] A responsive nuclear infrastructure means functioning nuclear laboratories and some capacity to produce nuclear weapons, if needed, in a timely way. This may be what nuclear deterrence will look like in the future. For the purists, it is not ideal, but it is a big improvement over what exists today.

Thus the question 'What takes the place of nuclear deterrence?' does not arise in the way the question is usually posed. The current two-tier system created by the NPT will be vastly changed but power imbalances of various types will remain, as they have throughout history. One example of this is that those countries that have built nuclear weapons will have advantages over those that have not, but inevitably disparities in nuclear capabilities will decrease over time.

Could conditions of stable deterrence be developed under such conditions? Would a world arms race take the form of a reconstitution race? New forms of arms control will have to be invented to deal with this risk. In order to minimize the risk of instability, agreement on five key questions will be necessary.

1. What are the elements of a responsive nuclear infrastructure, that is, one with a capacity for limited and timely reconstitution of a deterrent, and how might that be phased out over time?
2. What activities, facilities or weapon-related items should be limited or prohibited?
3. What can be done to assure early and reliable warning of a breakout attempt to develop nuclear weapons?
4. Can effective and plausible enforcement measures be devised and put in place?
5. How closely could a civil nuclear programme resemble a responsive nuclear infrastructure in the case of states that had not previously built nuclear weapons?

Extended deterrence in a world without nuclear weapons

The idea of eliminating nuclear weapons is frequently criticized on the grounds that without the protection of the US 'nuclear umbrella' some states that count on it for their security will find it necessary to acquire nuclear weapons of their own. Japan is the country usually mentioned in this context but other US allies are sometimes cited as well.

[15] US Department of Energy and US Department of Defence, 'National security and nuclear weapons in the 21st century', Sep. 2008, <http://www.defense.gov/pubs/>.

There are at least three problems with this theory. As pointed out above, nuclear deterrence will endure even if nuclear weapons are eliminated; second, deterrence and reassurance can and do exist in forms other than nuclear weapons; and third, there will be no 'nuclear deterrence gap' en route to zero: US nuclear weapons would continue to exist so long as the nuclear weapons of other states also existed.

These factors raise serious issues that will need to be examined and discussed between allies. One such issue is clarity regarding the maintenance of a 'virtual' nuclear arsenal. In a world without nuclear weapons, a robust nuclear infrastructure, civil as well as military, can give many countries the capacity to build, or reconstitute, a nuclear weapon arsenal. That capacity would be circumscribed by several factors: first, previous experience, or the lack of it, in building nuclear weapons; second, prohibitions on certain activities so that rapid breakout would not be possible; third, a deterrent against breakout in the form of a responsive nuclear infrastructure possessed by another state; and fourth, credible means of enforcement. Shultz, Kissinger, Perry and Nunn in another article in January 2010 spoke forcefully about the need for a robust US nuclear infrastructure and stated unequivocally that it could be maintained given adequate support.[16] This is consistent with their earlier articles appealing for an end to the threat posed by nuclear weapons. The Obama Administration proposed a significant increase in funding for nuclear infrastructure. If allies of the United States believed that reconstitutable US nuclear forces were an essential part of the US extended deterrent, they would want reassurance that reconstitution is possible in a timely way.

VI. Governance and institution building: how much must change?

Will the world have to become vastly different before the global elimination of nuclear weapons can be achieved? Changes in some aspects of international relations would certainly be necessary. However, this probably does not require any form of world government or even the universal acceptance of democratic principles and institutions. There is room for interesting academic debate on those questions. After all, reaching the goal of a nuclear weapon-free world lies several years in the future, and the precise contours of the political and security arrangements do not have to be settled now. However, a brief discussion of political change is useful now, if only to demonstrate that a world without nuclear weapons is not a sheer fantasy.

[16] Shultz, G. P. et al., 'How to protect our nuclear deterrent', *Wall Street Journal*, 19 Jan. 2010.

Governance at the global level

Schell pointed out in his seminal work in the 1980s that nuclear deterrence based on the ability to reconstitute or create nuclear weapons is not a prescription for a world government. It is a prescription for nation states and for a system based on them as the main actors on the international stage.

Militarily, a world free of nuclear weapons means that the use of nuclear weapons would not be immediately available even to those who have the proven capacity to build them. Politically, a higher degree of cooperation among the permanent members of the UN Security Council than exists today would surely be necessary. Their role in a world without nuclear weapons would be to enforce compliance with the norms concerning non-production of nuclear weapons. If that role turns out to be beyond their capacity to fulfil, then getting to zero would have to wait for another day.

Clearly, as the process of making negotiations on nuclear arms reductions multilateral proceeds, there will be a greater need for management mechanisms. The Conference on Disarmament will not be capable of handling the multiple tasks involved in achieving a world without nuclear weapons. These include global nuclear negotiations dominated by a few big powers, regional negotiations in several different parts of the world, and developing and overseeing the variety of international mechanisms that are a part of the world's non-proliferation infrastructure (e.g. monitoring a comprehensive ban on nuclear testing).

A new system of nuclear governance is likely to be centred on the UN Security Council, relying on two important existing resolutions: 1540 and 1887.[17] The former was intended to improve national controls over sensitive nuclear, biological and chemical (NBC) materials. The apparatus set up to implement Resolution 1540 needs significant strengthening. Resolution 1887 was the product of the UN Security Council Summit meeting of 24 September 2009, chaired by President Obama. Resolution 1887 included a variety of ways to strengthen the international non-proliferation regime. Its call for conditions that would permit a nuclear-free world to be attained makes it a useful complement to Resolution 1540, and like that earlier resolution, it calls for strengthening controls over NBC materials. Together, the two resolutions have created a potential charter for a significant UN Security Council management role, which would give the countries of the world the tools they need to integrate their joint efforts to rid the world of nuclear weapons. Obviously, there will be tensions generated by this arrangement because states that are not members of the Security

[17] UN Security Council Resolution 1540, 28 Apr. 2004; and UN Security Council Resolution 1887 (note 8).

Council already have reacted against what they regard as big-power domination. If a better system can be invented it should be.

Impact on the United Nations Security Council

Reducing the world's inventories of nuclear weapons will be a wrenching experience for a number of countries, perhaps more so for the five permanent members of the UN Security Council than for the newer, de facto nuclear weapon states. The five did not become permanent members of the Security Council because they possessed nuclear weapons. However, the special status of these states has become almost as much associated with their being the only legally recognized nuclear weapon states, under the NPT, as with their permanent Security Council membership. Complicating this painful withdrawal from the ranks of 'legitimate' nuclear weapon states will be the expectation that, in return for surrendering its nuclear arms, India will also become a permanent member of the Security Council. If that happens, Japan would certainly demand entry, and so probably would Brazil. Both states, not coincidentally, have uranium enrichment facilities.

The politics of Security Council membership exemplify the ways in which a 'level playing field' in nuclear arms will have a levelling effect in other areas as well, a complex political–psychological challenge, requiring policies that will compensate for a sense of lost pride of place.

Regional arrangements

Although governance issues tend to focus on the UN Security Council, much of the process of eliminating nuclear weapons will in fact be based on regional arrangements, particularly in the Middle East, South Asia and North East Asia. In these cases, regional organizations will be important, and generally they will have to be created since they do not now exist.

Regional organizations would initially be limited to containing or resolving disputes and managing confidence-building measures. Eventually, such organizations should develop monitoring mechanisms in connection with nuclear weapon-free zone agreements. They would probably also develop links with the IAEA and the UN Security Council in order to cope with the task of supporting improved national control mechanisms to protect fissile material, as Security Council Resolution 1540 envisaged.

VII. How political and doctrinal changes pave the way for international agreements: the US case[18]

Nuclear disarmament

The prospects for reducing the threat of nuclear weapons are affected by doctrinal changes within states. In the years following the first nuclear explosions in 1945 the elimination of nuclear weapons was described by governments as necessary to the survival of the human race. Many of the atomic scientists of that day, Soviet as well as US, believed that, or came to believe it after the tests of hydrogen bombs. Political leaders at least went through the motions of trying to do something about it. UN resolutions endorsed the abolition of nuclear weapons and UN committees discussed methods and plans aimed at accomplishing that goal.

A nuclear arms race was a nightmare that must be avoided, it was thought, and proposals for eliminating nuclear weapons included plans for preventing the acquisition of national capabilities for manufacturing nuclear weapons. The best known of these was derived from a study launched in the USA at the end of World War II, led by Under Secretary of State Dean Acheson and the head of the Tennessee Valley Authority, David Lilienthal.[19] Their chief scientific advisor, Dr J. Robert Oppenheimer, had been scientific leader of the Manhattan Project to develop a US atomic bomb at Los Alamos, New Mexico. The onset of the Soviet–US cold war confrontation did not stop talks about eliminating nuclear weapons, but these became exercises in public posturing, not serious efforts to reach an accord.

The death of Joseph Stalin in 1953 and the rise of a more pragmatic Soviet leader, Nikita Khrushchev, coincided with the first term as US President (1953–57) of Dwight D. Eisenhower, who had been the Supreme Allied Commander in Europe in World War II. President Eisenhower saw nuclear weapons as apocalyptic devices that spelled the end of large-scale war as a rational instrument of policy. Yet he also saw them as key to reducing defence budgets and so adopted the doctrine of early use of nuclear weapons in the event of a war with the Soviet Union. 'Massive retaliation' was not his phrase, but it was an apt description of the strategy.

[18] US declaratory policies are sometimes expressed in the form of presidentially approved internal government documents. See e.g. 'A report to the National Security Council on basic national security policy', Washington, DC, 30 Oct. 1953, <http://www.fas.org/irp/offdocs/nsc-hst/nsc-162-2.pdf>. They may also be presented in presidential speeches. See e.g. 'Excerpts from major presidential speeches regarding missile defense', Missilethreat.com, <http://www.missilethreat.com/resources/pageID.264/default.asp>. President Obama's nuclear weapon policies are laid out in a US Department of Defense report. US Department of Defense (DOD), *Nuclear Posture Review Report* (DOD: Washington, DC, Apr. 2010).

[19] US Department of State, *Report on the International Control of Atomic Energy* (US Government Printing Office: Washington, DC, 16 Mar. 1946).

Limited nuclear war and 'partial measures'

By Eisenhower's second term, which began in 1957, he was convinced that a sterile propaganda exchange about nuclear weapons was not the right way to deal with the threat that they presented to life on earth. On the military side, experiments with low-yield 'tactical' nuclear weapons began. However, Eisenhower also authorized his chief disarmament advisor, Harold Stassen, to explore first steps towards controlling the arms race, so-called partial measures, with the Soviet Union. The Soviet leaders showed serious interest in this approach but little was accomplished. Some of the measures that are still being discussed or negotiated today in international forums come from that period. They include the CTBT, an FMCT and the idea of transparency in military activities as a confidence-building measure.

Prior to the transition from Eisenhower to President John F. Kennedy in January 1961, a Soviet–US agreement on a comprehensive test-ban treaty was almost within reach, with Khrushchev strongly supporting the effort. Unfortunately, the effort failed, but the groundwork had been laid for agreement on a multilateral limited test-ban treaty a few years later.[20]

Arms control

The nuclear disarmament paradigm, created in the immediate aftermath of World War II, had been seriously discredited by the late 1950s. It was seen as impractical. It had also become an 'all or nothing' approach that blocked any headway in controlling the threat posed by growing numbers of nuclear weapons. Eisenhower's partial measures responded to the need to make a beginning in the control of nuclear arms, but the idea lacked a unifying concept.

Another paradigm, that of 'arms control', was popularized by a summer study conducted by US scholars and published just as Kennedy was coming to power in the USA.[21] It advocated stability as the most important objective of Soviet–US negotiations and, indeed, of the nuclear postures of the two countries.

This paradigm was agnostic about the idea of reducing or eliminating nuclear weapons and instead focused on advising the Soviet and US governments on how to construct and operate their military equipment in a way that would minimize temptations to launch a nuclear attack. The idea was to ensure that retaliatory nuclear strikes would always be available, even after a first strike by an enemy. This would be a strong deterrent to any political or military leaders who might be considering a nuclear war.

[20] On the 1963 Partial-Test Ban Treaty see annex A in this volume.
[21] *Daedalus*, vol. 89, no. 4 (fall 1960).

During the 1960s, 1970s and much of the 1980s, the arms control paradigm was the prevailing doctrine influencing US and, to a lesser extent, Soviet negotiators. 'Stability', however, never became a useful formula by which to gauge the utility of Soviet–US agreements because each side had different ideas about that concept.

A return to the vision of a world free of nuclear weapons

Even at the height of classical arms control and its intellectual companion, 'assured destruction', there were those who questioned the morality and the logic of a doctrine based on a threat to commit mutual national suicide. US President Ronald Reagan, who came to power in 1981, was one of them. Reagan was an unusual politician, who brought to mind a favourite quotation of President Kennedy's brother Robert: 'Some people see things as they are and say why? I dream things that never were and say, why not?'[22]

Reagan was fortunate in having Gorbachev as his negotiating partner for the last few years of his administration, a man who was a revolutionary within his own system. Between them, they began the reversal of the more pernicious effects of the arms control and mutual assured destruction doctrines that had led to massive build-ups in nuclear weapons and what became, during the 1977–81 term of President Jimmy Carter, a concomitant preparation for 'protracted nuclear war'.[23]

The most notable of all the Soviet–US summit meetings of the cold war period was the summit meeting held in Reykjavik, Iceland, in October 1986, where Reagan and Gorbachev seriously contemplated and unreservedly endorsed the idea of eliminating all nuclear weapons. The US Secretary of State, George Shultz, strongly supported and encouraged Reagan's efforts to turn the page to a new era in Soviet–US nuclear relationships. In fact, a new chapter in the relationship really did begin at Reykjavik.

Two major treaties followed in the wake of that summit meeting. One of these, the 1987 Treaty on the Elimination of Intermediate-Range and Shorter-Range Missiles (INF Treaty), which eliminated an entire class of intermediate-range nuclear delivery system, was concluded before Reagan left office.[24] The other, the 1991 START Treaty, was largely fleshed out during Reagan's term of office and was concluded in the term of his successor, President George H. W. Bush. It has provided much of the

[22] Kennedy, R. F., Remarks, University of Kansas, 18 Mar. 1968, <http://www.jfklibrary.org/historical+resources/archives/reference+desk/speeches/rfk/rfkspeech68mar18ukansas.htm>.

[23] Presidential Directive/NSC-59, 'Nuclear weapons employment policy', 25 July 1980, <http://www.fas.org/irp/offdocs/pd/index.html>. For a discussion see Goodby, J. E., *At the Borderline of Armageddon: How American Presidents Managed the Atom Bomb* (Rowman & Littlefield: Lanham, MD, 2006), pp. 123–24.

[24] For a summary and other details of the INF Treaty see annex A in this volume.

conceptual framework for Russian–US nuclear negotiations down to the present day.

Retreat and renewal

From the end of the Reagan Administration in 1989 until late in 2006 the idea of eliminating nuclear weapons lay fallow, ignored as a negotiating objective by both Russia and the USA. Lack of interest at the top leadership levels in both countries accounted for most of this neglect. They were preoccupied with other issues, to be sure, but basically their perceptions of the peculiar, unique threat posed by nuclear weapons simply did not rise to the levels of concern shared by Gorbachev and Reagan.

Neither Russian nor US public opinion offered any evidence that the leaders of the two countries should do anything more about the nuclear threat than they were doing. The end of the cold war encouraged the view that nuclear war was yesterday's problem. The focus shifted to other issues. To add to the immobility, during the 2001–2009 Presidency of George W. Bush negotiations with Russia were seen as an unnecessary and unwelcome restraint on US policies and actions.

This situation changed after the publication of the two articles by Shultz, Kissinger, Perry and Nunn. The reactions to these articles surprised even their authors. Around the world, political and military leaders rallied to the idea. President Obama adopted the framework as his own. Chairing a meeting of the UN Security Council in September 2009, Obama presided over the unanimous adoption of Resolution 1887, which proclaimed that all states should work to create the conditions for a world without nuclear weapons.

VIII. Conclusions: looking ahead

Nuclear weapons still matter, in ways that defy the imagination. This is a time of danger. Nuclear weapons could be the cause of millions of deaths—on short notice and without any rational cause. Nuclear weapons have not lost their doomsday qualities. However, this may also be a time of opportunity: deep and irreversible reductions in the nuclear stockpiles of Russia and the United States may be possible and that would unlock the door to reductions in the nuclear holdings of other states that possess nuclear weapons.

Russia and the USA have been on a downward trajectory in their holdings of nuclear weapons since the late 1980s. The post-World War II discussions, in contrast, led only to a massive build-up. The Gorbachev–Reagan partnership produced real change and led to serious reductions. Their successors in office lacked the zeal, the opportunities or the interest

to push ahead with the same vigour, but the downward trajectory continued nonetheless. This trend is likely to continue. One of the reasons for this is the radically changed political dynamic that exists between Russia and the USA. The change is like night and day if today is compared with the early cold war years. The course of history changed dramatically after 1986, the year of the Reykjavik Summit, to the point where 'things that never were' became possible.

More change lies ahead. New threats, terrorism among them, have come to preoccupy both Russia and the USA. The bipolar competition that drove the nuclear build-up still exists, but it is much attenuated. The technology of monitoring nuclear capabilities has moved far beyond where it was a quarter century ago, when the last serious effort to move towards elimination of nuclear weapons was launched.

The revival of interest in a world without nuclear weapons extends beyond Russia and the United States. There appears to be a growing conviction among opinion leaders in many countries that, whatever benefits nuclear weapons might have bestowed on those who controlled them during the dangerous years of the cold war, the disadvantages now outweigh any residual benefits. This assessment means that the basic bargain struck in the Non-Proliferation Treaty between the states that possess nuclear weapons and those that do not must be taken seriously; it must become the operational guide for future nuclear weapon policies. In this sense, the idea of a world without nuclear weapons is no longer a fantasy entertained by the dreamers of society but an operational reality, a necessary component of every responsible state's national security policy.

Recognizing that the task of eliminating nuclear weapons will be daunting, President Obama remarked in April 2009 that 'fatalism is a deadly adversary'.[25] The road to zero will not be an easy one: real and serious obstacles lie ahead. But without a genuine global commitment to that goal, preventing nuclear proliferation is a lost cause. The question must be 'How?' not 'Should we?'

[25] White House, 'Remarks by President Barack Obama, Hradcany Square, Prague, Czech Republic', 5 Apr. 2009, <http://www.whitehouse.gov/the_press_office/Remarks-By-President-Barack-Obama-In-Prague-As-Delivered/>.