A Challenge to Nuclear Deterrence

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By Edward Ifft

Seventy years into the nuclear age, something revolutionary is about to occur. It is likely that, within the next year or so, the United States and other countries with nuclear weapons will no longer accept nuclear deterrence as a valid concept in international relations. This will be the result of a nuclear weapons ban treaty, which is due to be negotiated beginning this month as authorized by the UN General Assembly on December 23, 2016, by a vote of 113-35, with 13 abstaining. Negotiating sessions in 2017 are scheduled for March 27-31 and from June 15 to July 7.

The purpose of this treaty will be to prohibit but not eliminate nuclear weapons. In doing so, the intent will be to delegitimize nuclear deterrence, a concept that has been used to justify the possession of nuclear weapons among the five nuclear-weapon states, as well as the rationale for others inclined to seek their own nuclear arsenals. This will be an attempt to overturn what has been a central tenet of every U.S. administration since that of President Harry Truman, that nuclear deterrence is fundamental to international peace and security, at least until a safe, effective, and verifiable way to eliminate these weapons can be found.

The United States and other countries with nuclear weapons regard nuclear deterrence as a key factor in the prevention of major warfare among the leading powers. Yet, this is not the only view. Nuclear deterrence has been under attack for some time on pragmatic and moral grounds. One view is that although nuclear deterrence has been effective in the past, it has become dangerous and unnecessary now and must be carefully replaced in a step-by-step process. Others maintain that the nuclear “balance of terror”—a phrase heard during the Cold War—has never been effective or
morally acceptable and must be eliminated immediately. Understanding these radically different views of the world and their implications for world peace, even survival, should be a high priority.

Dealing with this movement toward a ban treaty will be among the most interesting and important issues facing the Trump administration and key U.S. allies in Europe and Asia, who live under the U.S. nuclear security umbrella. The new Nuclear Posture Review (NPR), which President Donald Trump requested in a January 27 executive order, could be a major vehicle for addressing these issues. In any case, responding to this movement will be complicated if there continues to be a lack of U.S.-Russian talks on further nuclear reductions and both sides continue their costly modernization of nuclear forces.

Since the advent of the nuclear age in 1945, the concept of deterrence and its related military and political expressions have gone through a number of stages in U.S. thinking: massive retaliation, mutual assured destruction, flexible response, essential equivalence, escalation control, deterrence by denial, intrawar deterrence, tailored deterrence, minimum deterrence, no first use, launch on warning, launch under attack, detargeting, de-alerting, and so on, not all of which have become official U.S. policy.

The interactions among strategic and tactical nuclear forces, conventional forces, civil defense, and active defense have contributed to and sometimes complicated efforts to design a coherent and effective policy. One constant principle has been that these policies should contribute to stability and make war less likely. There is general agreement that any use of nuclear weapons would be extremely dangerous and that an all-out nuclear war could end civilization. As McGeorge Bundy, national security adviser to Presidents John Kennedy and Lyndon Johnson, put it years ago, one nuclear weapon on one city would be a catastrophe; 10 nuclear weapons on 10 cities would be a disaster beyond history.

At the same time, nuclear deterrence has generally been considered fundamental to the prevention not only of such a nuclear disaster, but also of general conventional war among the major powers, at least on the scale of the two world wars, along with the use of other weapons of mass destruction, namely chemical and biological weapons, by these powers. All states that acknowledge possessing nuclear weapons, even North Korea, say that their purpose is for deterrence. Effective deterrence, however, rests on the credible threat to actually use such weapons, at least in extreme circumstances. This creates the dilemma in which leaders proclaim that such weapons cannot and must not be used, but this policy itself rests on the possibility of such use. Nuclear deterrence has a strong psychological component in that what leaders believe is probably more important than the actual technical facts.

It is important to distinguish nuclear deterrence from deterrence in general. The concept that bad behavior will be punished, making any possible gains from such behavior not worth the risk, will surely continue to be a central part of international relations with or without nuclear weapons. Deterrence by denial, as advocated by supporters of large ballistic missile defenses, is an interesting companion concept, but not one that could realistically eliminate punishment from the equation. The issue at hand is whether, by holding nuclear weapons as an instrument of deterrence, one risks destroying the planet in order to save it.

The Current Situation

The theory of nuclear deterrence was originally formulated in the years after World War II by such seminal thinkers as Bernard Brodie, Thomas Schelling, and Herman Kahn. As the Cold War became more threatening, many others have grappled with these issues. Today, one could imagine the current situation—far from ideal but reasonably stable and familiar—continuing for an indefinite period.

Yet, patience in fulfilling the promise to eliminate nuclear weapons, made in the nuclear Nonproliferation Treaty (NPT) and elsewhere, is running thin; and the prospects for further movement using traditional diplomatic methods seems bleak, at least in the near term. This has led to questioning the foundations on which nuclear deterrence is based, along with a serious uprising by a large number of non-nuclear-weapon states calling for a legally binding instrument prohibiting
such weapons—a ban treaty.

With some oversimplification, countries fall into five groups.

**The Big Five.** The five nuclear-weapon states recognized in the NPT (China, France, Russia, the United Kingdom, and the United States) each endorse the concept of nuclear deterrence and use this as justification for having such forces. This general view would hold that the remarkable fact that no major armed conflict has occurred among the major powers since 1945 is almost certainly due primarily to nuclear deterrence. Those espousing this view generally recognize the legal and moral obligation to eliminate nuclear weapons, but reject the concept of immediately negotiating a ban treaty. “A safe, secure and reliable nuclear arsenal is part of the American security structure as far into the future as I can see,” Secretary of Defense Ash Carter said last year. Secretary of Defense James Mattis has said that nuclear weapons are fundamental to U.S. security.

**The Rising Four.** There are four states outside the NPT that hold views on the deterrent value of nuclear weapons generally similar to the big five powers. Nuclear-armed rivals India and Pakistan, which are expanding their capabilities, abstained on the UN vote, although it is doubtful they would support a ban treaty as currently envisioned. Israel, which voted against the ban negotiations, is unique with its purposely ambiguous “nuclear potential.” North Korea, which announced its withdrawal from the NPT in 2003, voted for the ban negotiations, though it is outside most arms control activities and is currently expanding its nuclear-weapons capabilities in defiance of the UN Security Council.

**The Hosts.** North Atlantic Treaty Organization (NATO) states such as Germany may host U.S. nuclear weapons but are non-nuclear-weapon states under the NPT. Although most are strong advocates of arms control and support the eventual elimination of nuclear weapons, they accept and depend on nuclear deterrence and therefore reject a ban treaty.

**The Other Allies.** These are NATO states not included in the first two categories, along with other states with arrangements that place them under the so-called nuclear umbrella of U.S. extended deterrence, such as Australia, Japan, and South Korea. These states tend to be strong advocates of arms control and the eventual elimination of nuclear weapons. Thus far, they have not supported the concept of a ban treaty, and such support would be surprising because they look to the United States for security.

**The Others.** These constitute a majority of the world’s countries. Nearly all are non-nuclear-weapon states located in nuclear-weapon-free zones, such as in South America or Africa. Support for a ban treaty comes largely from this group, among whose leaders are Brazil, Indonesia, Mexico, and the Philippines. Also included in this category are advanced European countries with strong histories of support for arms control but no direct relationship to nuclear weapons, for example Austria, Finland, Sweden, and Switzerland. A widely held view in this group is that nuclear weapons had little or nothing to do with ending World War II and deserve little or no credit for what is sometimes called the “Long Peace” since 1945. Some view the use of nuclear weapons through accident or design as almost inevitable and consider the possession of such weapons morally wrong.

**Views on Nuclear Deterrence**

A variation on the above views is one that holds that nuclear deterrence, although probably still necessary for an extended period, remains at dangerous, overkill levels. The range of circumstances for which nuclear deterrence is relevant has become extremely narrow. “Minimum deterrence”—not defined but perhaps 100 to 500 weapons—would still be effective and would be a logical plateau on the way to zero. Many analysts are concerned that going to low levels or zero without effective verification and agreed elimination procedures would be highly dangerous. Still others worry about making the world safe for conventional war if the restraint provided by nuclear deterrence is removed.

Yet another view agrees that nuclear deterrence played an important role during the Cold War but is
now an unnecessary and dangerous policy. That is, sooner or later, if nuclear weapons are retained indefinitely, they will be used, or serious accidents will occur. In addition, their continued retention undercuts nonproliferation policies and makes acquisition by terrorists more likely. A careful, step-by-step approach, however, is the only responsible path to zero. Based on their published writings, leading advocates of a version of this view might be the four statesmen George Shultz, William Perry, Henry Kissinger, and Sam Nunn.4

The nuclear proliferation argument is made both ways. On the one hand, failure of the nuclear-weapon states to give up their advantage may lead to proliferation by non-nuclear-weapon states. On the other hand, the removal of extended deterrence from non-nuclear-weapon states may also speed proliferation. A new and interesting twist on the morality debate is a claim that going to very low levels of nuclear weapons would actually be less moral than is the case at the current levels. The argument contends that a country with very few weapons would be forced to aim them at cities and civilians in order to achieve meaningful deterrence.

The ban movement has understood that, in order to eliminate nuclear weapons, it is first necessary to eliminate nuclear deterrence. Efforts to do this have been underway for some time.5 If nuclear deterrence exists and is to be eliminated, it must be replaced by something at least as effective. If it does not exist, then there is no requirement to design an alternative system, making the problem far easier. Peace groups have difficulty talking about any form of deterrence because it involves the capability and willingness to kill large numbers of people.

Useful Precedents
A useful precedent can be found in how the world dealt with another type of weapon of mass destruction. Chemical weapons went from being considered an essential part of the U.S. deterrence arsenal to being considered useless and dangerous. Other countries followed the same path, banning and eliminating this entire class of weapons in the 1993 Chemical Weapons Convention (CWC).

Nuclear weapons could follow this same route to oblivion, but there are some important differences. While banning chemical weapons, the CWC did not leave the 71,000 metric tons of existing chemical weapons in limbo. It provided agreed procedures and timelines for elimination, put in place an elaborate and effective verification regime, and established a large international organization to implement the agreed procedures. None of this would be true for the nuclear ban treaty as currently envisioned.

As far as process is concerned, a precedent often cited is the 1999 Mine Ban Treaty, also known as the Ottawa Convention. This treaty demonstrated that a determined coalition of countries and nongovernmental organizations can produce an effective legal measure without the participation of several relevant major countries. The treaty has been effective in removing thousands of dangerous, abandoned landmines and has affected in a constructive way the policies of states that are not yet parties. Yet, the parties to this treaty were themselves producers of landmines or had them on their territory and could remove them without any cooperation from nonparties.

**Historical Record**

Over the years, there has been strong support from historians and military experts for the proposition that nuclear weapons played a key role in ending World War II, with each side avoiding a very costly invasion of the Japanese mainland. (The use of this historical example is a bit off the mark, in any case, because this was an example of compellence, not deterrence.) Likewise, it would be difficult to sustain an argument that nuclear deterrence has not had a powerful restraining influence on the major powers. During the Cuban missile crisis, it is clear that Kennedy and Soviet leader Nikita Khrushchev were very much aware of the danger of nuclear war and that this had a powerful restraining effect on them.

More recently, U.S. military leaders came back from the 1991 Persian Gulf War saying that the United States could not have acted as it did if Iraqi leader Saddam Hussein had possessed nuclear weapons. This is an example of nuclear deterrence, although such statements were probably unwise and unhelpful to the cause of nonproliferation. Clearly, the acquisition of nuclear weapons by North Korea has reduced the military options available for dealing with that country. This also is nuclear deterrence.

At the same time, grandiose claims regarding the effectiveness of nuclear deterrence are not justified. These weapons have not prevented non-nuclear-weapon states from attacking and provoking nuclear-weapon states, nor did they eliminate regional conflicts among non-nuclear-weapon states. The Korean and Vietnam wars were major conflicts that were not prevented by nuclear weapons.

**Legal and Moral Dimensions**

The International Court of Justice in its famous 1996 advisory opinion found that

the threat of use of nuclear weapons would generally be contrary to the rules of international law applicable in armed conflict, and in particular the principles and rules of humanitarian law; however, in view of the current state of international law, and of the elements at its disposal, the Court cannot conclude definitively whether the threat or use of nuclear weapons would be lawful or unlawful in an extreme circumstance of self-defence, in which the very survival of a State would be at stake.6

The campaign against nuclear deterrence leans heavily in its arguments on international humanitarian law, specifically the 1949 Geneva Conventions and their 1977 protocols. These address, among other things, the distinction between combatants and civilians and the principle that
force should only be used to achieve the legitimate purpose of the conflict.²

Another point of legal interest is that a ban treaty would only obligate those countries that adhere to it. Early claims by some advocates that the treaty would become international law and thus bind parties and nonparties alike are clearly not correct.⁸

Many religious groups have opposed nuclear weapons, but perhaps none have engaged in serious systematic thought as deeply or for as long as the Roman Catholic Church. That faith has been at the forefront of thinking matters of war for centuries, going back at least to St. Augustine and St. Thomas Aquinas and the concept of just war. In 1982, Pope John Paul II, in a famous message to the UN Special Session on Disarmament, said that “[nuclear] deterrence based on balance” could be judged “morally acceptable,” provided it was a provisional measure “on the way to progressive disarmament.”

Yet, the Roman Catholic Church has been rethinking this position. Pope Francis, in a message to the 2014 Vienna Conference on the Humanitarian Impact of Nuclear Weapons, declared, “Nuclear deterrence and the threat of mutually assured destruction cannot be the basis of an ethics of fraternity and peaceful coexistence among peoples and states.” Although the tone appears categorical, the intent may be to leave the door ajar for some form of nuclear deterrence until the world is better prepared to live securely without nuclear weapons.⁹ The Holy See’s October 2016 statement to the UN General Assembly First Committee appeared to offer nuanced support to beginning negotiations on a ban treaty.¹⁰
Humanitarian Initiative

Recent research into the effects of the use of nuclear weapons showed that a moderate-sized nuclear exchange not even involving the five nuclear-weapon states could have devastating effects on the world environment, with global cooling leading to serious damage to agriculture and large-scale starvation.\textsuperscript{11} This became the catalyst that led to the so-called humanitarian initiative, now joined by about 127 countries and many nongovernmental organizations, calling for urgent progress on nuclear disarmament.\textsuperscript{12} The campaign held three international conferences in 2013-2014 and had a major presence at the 2015 NPT Review Conference.

An open-ended working group was authorized by the UN General Assembly and held three sessions in Geneva in 2015 and 2016. It brought its case to the General Assembly in October 2016. As noted above, the General Assembly authorized ban treaty negotiations to begin this year. Such a treaty would presumably be a rather short document making nuclear weapons illegal.\textsuperscript{13} The actual elimination of these weapons would await a later, much more complicated agreement containing agreed elimination procedures and an effective verification regime.

Thus far, all states with nuclear weapons oppose this approach. If only non-nuclear-weapon states joined, they would presumably have no new legal obligations because they are already prohibited from acquiring nuclear weapons by the NPT. This could result in a curious legal situation. If a state with nuclear weapons joined such a treaty, it would face a complicated situation regarding what it would be required to do with its now illegal objects and exactly what activities with respect to them would be legal and illegal. This situation could continue for an extended period.

Deterrence Policies

There are more similarities than differences in the stated deterrence policies of the United States (Nuclear Posture Review), NATO (Strategic Concept) and Russia (Military Doctrine). Since the number of U.S. and Soviet/Russian nuclear weapons reached a maximum of more than 70,000 in about 1986, the year of the summit in Reykjavik between U.S. President Ronald Reagan and Soviet leader Mikhail Gorbachev, their numbers have come down by about 85 percent, and U.S. policies have steadily reduced the role of nuclear weapons, while maintaining the fundamental theories of deterrence and of extended deterrence covering allies. Achieving a goal of zero nuclear weapons would be extremely difficult to attain and would require “a fundamental transformation of the world political order,” according to a 2008 U.S. congressional commission.\textsuperscript{14}
The NPR Report issued by the Obama administration in April 2010 cited five key objectives: prevent nuclear proliferation and nuclear terrorism, reduce the role of nuclear weapons, maintain strategic deterrence at reduced nuclear force levels, strengthen regional deterrence, and sustain a safe, secure, and effective nuclear arsenal. The report said that the “fundamental” role for nuclear weapons is to deter a nuclear attack but that the United States will seek to strengthen conventional capabilities in order to make this the “sole” purpose for these weapons. This would be problematic for extended deterrence, such as deterring a massive conventional attack on a U.S. ally or partner. A key statement in the report is that the United States “wishes to stress that it would only consider the use of nuclear weapons in extreme circumstances to defend the vital interests of the United States or its allies and partners.” An “implementation study” that followed the NPR considered and rejected a minimum deterrence posture for the United States.

NATO policy, along with that of individual NATO countries, is generally consistent with U.S. policy. The current NATO Strategic Concept was issued in November 2010, eight months after the NPR Report. The first revision of the NATO policy in 11 years, it states that “deterrence, based on an appropriate mix of nuclear and conventional capabilities, remains a core element of our overall strategy.... The circumstances in which any use of nuclear weapons might have to be contemplated are extremely remote.... As long as nuclear weapons exist, NATO will remain a nuclear alliance.” The July 2016 NATO summit in Warsaw made no significant changes in this policy. NATO Secretary-General Jens Stoltenberg has stated that, for the alliance, nuclear weapons are only for political deterrence.

Parliaments in the Netherlands and Norway have shown some sympathy with the humanitarian initiative and a ban treaty, and the Netherlands was the only NATO country to abstain from the ban treaty vote. Yet, Dutch and Norwegian government policies have not otherwise deviated from the NATO consensus.

Russian deterrence policy is found in its Military Doctrine, last promulgated in 2010 and updated slightly in 2014. In language probably drawn from the International Court of Justice advisory opinion, it says that the Russian Federation reserves the right to use nuclear weapons in response to the use of nuclear weapons or other weapons of mass destruction against it or its allies or in response to aggression using conventional weapons that “threatens the very existence of the state.”

In years of bilateral arms control discussions, U.S. experts had some success in persuading their counterparts to adopt their views of nuclear deterrence. For example, in 2015, Russian Ministry of
Foreign Affairs Special Envoy Grigory Berdennikov stated, “The entire system of mutual relations in the nuclear sphere is based on deterrence. In other words, you have to have the capability, having survived a first strike, to retaliate, and in such a way that the retaliatory strike is so terrible that nobody would dare to launch the first one.”

Although not yet reflected in official documents, recent comments by Russian officials have hinted that they now view the use of tactical nuclear weapons as possibly not as remote as previously stated. In addition, their concept of “escalate to de-escalate” has produced some alarm in the West. This concept envisions a limited use of tactical nuclear weapons in a conventional war, presumably one that is going very badly for Russia. Apparently intended to terminate a war before it gets much worse, this could indicate a dangerous lowering of the nuclear threshold. Notably, the U.S. reluctance to adopt a no-first-use doctrine, a policy shift considered most recently by President Barack Obama, could be viewed as the desire to preserve the options, including to escalate to nuclear use to de-escalate a conventional conflict.

Off the Tiger’s Back

Assuming the world does get serious about prohibiting and eliminating nuclear weapons, the problem becomes how to get off the tiger’s back without being eaten. There are several serious problems to be solved in attempting this feat. They principally involve reaching agreements on definitions, verification, elimination procedures, and timelines; how much latent capability to recreate nuclear weapons to allow and to whom; and a new system of deterrence that does not rely on nuclear weapons.

While acknowledging the major contributions of past nuclear arms control treaties, it is important to recognize that none of them actually required any reduction in the number of nuclear weapons, contrary to popular belief. The reductions and other constraints in these agreements were focused on launchers, missiles, bombers, and the weapons deployed on them. Not a single nuclear weapon has ever been dismantled under procedures internationally agreed and verified. This is frequently overlooked by those who claim getting to zero can simply use existing agreed reductions procedures. No such procedures exist.

The great powers might find the transition less difficult than they may have thought. With advancing technology, many of the tasks formerly assigned to nuclear forces can be performed by advanced, precision-guided conventional forces, including drones in some cases. One should be cautious in
drawing conclusions about whether this emerging capability would be more effective in preventing wars among these powers than the current situation. Another factor is that precisely this growing conventional capability, which appears to favor the United States, is making the elimination of nuclear weapons more difficult, notably in the view of Russia.

The situation for the host nations and other allied countries may be the most difficult. The world may be forced to pay more attention to what has been called “the survival strategies of small nations.”

For each of such countries to build up sufficient military capabilities to feel secure from possible threats would be neither feasible nor conducive to a peaceful world. It is probably no accident that those countries most disruptive to the nuclear order have been those most isolated and lacking in allies and protectors, due to geography, misfortune, or their own misguided policies, for example North Korea and Iran. An expansion of alliances and security guarantees would seem to be at least part of the answer. The United Nations or some other trusted international body would also need to play a central role in maintaining security and stability.

What Happens Now?

There are several scenarios for what lies ahead, but a likely scenario would be that a substantial group of non-nuclear-weapon states and nongovernmental organizations will succeed in negotiating a ban treaty within the next year or two. A significant number of countries will join the treaty, but no nuclear-weapon states, NATO members, or states under formal extended nuclear deterrence arrangements will join although some segments of society in these states will be sympathetic to it.

This process could lead to better understanding between the nuclear-weapon and non-nuclear-weapon states, but it could also harden and widen their differences, with damage to the NPT regime. For example, NPT review conferences would almost certainly become even more contentious, with agreed final documents almost impossible to attain. In the states opposed to the ban treaty, there would probably be some progress in reducing the numbers and roles of nuclear weapons in response to pressure from the non-nuclear-weapon states. The capabilities of conventional weapons and drones would be steadily increased, partly in order to reduce reliance on nuclear weapons. Multilateral discussions might begin on dealing with verification issues and other problems associated with the elimination of nuclear weapons, but these will not be fully resolved to the satisfaction of all the relevant states within a foreseeable time horizon.

A nuclear weapons convention that actually eliminates nuclear weapons cannot be negotiated until these problems are resolved. Nevertheless, the long-standing promise to eliminate nuclear weapons might be sufficient to drive a slow and careful process, separate from a ban treaty that includes states with nuclear weapons, toward zero. Some non-nuclear-weapon states that oppose a ban treaty might play an important role in this process. Throughout this process, it seems unlikely that the views on nuclear deterrence of the states with nuclear weapons would change, at least until very low levels were reached. For their part, parties to a ban treaty would neither ask for nor receive extended nuclear deterrence.

If this scenario is at all plausible, the world can look forward to a bumpy and dangerous ride but a ride that at least is probably moving in the right direction. No authoritative analysis exists comparing the risks of a world with and without nuclear weapons, and any such analysis would rest on a series of assumptions and hypothetical situations. Those committed to eliminating nuclear weapons immediately need to understand that this situation is fundamentally different from earlier struggles against, for example, smoking and pollution. In those campaigns, groups with no connection to tobacco companies or polluting industries could essentially overpower them by amassing sufficient political power and forcing major changes without their permission or cooperation. In the case of nuclear weapons, not a single weapon can be eliminated without the cooperation of the states that possess and control them.

Because there is no way to force the changes demanded, cooperation, not confrontation, is essential. There is a risk that the ban campaign increasingly will resort to condemnation and ridicule of the nuclear-weapon states and their allies, making its goals even more difficult to achieve. Past instances, such as calling President Obama a hypocrite or labeling states that rely on extended deterrence “weasel states,” are examples of counterproductive rhetoric. For their part, those
determined to stay with the status quo on nuclear deterrence need to understand the risks to civilization of that approach and that they cannot continue to ignore the demands from the majority of citizens on Earth.

ENDNOTES


8. Article 34 of the Vienna Convention on the Law of Treaties specifies that “[a] treaty does not create either obligations or rights for a third State without its consent.”


11. See Ira Helfand, “Nuclear Famine: Two Billion People at Risk?” 2nd ed., Physicians for Social Responsibility, November 2013, http://www.psr.org/assets/pdfs/two-billion-at-risk.pdf. This new understanding was essentially an extension of the understandings about nuclear winter because many aspects of these findings had been known for some time. With respect to the recent research cited above, the specific scenario studied involved “only” 100 nuclear explosions; but these were on Indian and Pakistani cities, resulting in huge fires, which led to the drastic atmospheric effects in the models used. Thus, claims that “any” use of nuclear weapons or use of a tiny percentage of the world’s arsenal in any scenario would inevitably lead to these same conclusions are clearly not justified by the science. The use of a nuclear weapon against a naval vessel in the Pacific or against a few missile silos in North Dakota or Siberia would not lead to a catastrophic change in the earth’s climate or mass starvation. Yet, such use could lead to a general nuclear exchange, which would have even worse consequences than the scenario studied.


24. Proposals for a UN “Legion” were put forward as long ago as 1948 by Trygve Lie, the first UN secretary-general.

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Edward Ifft, an international relations officer at the U.S. Department of State and adjunct professor in the Walsh School of Foreign Service at Georgetown University, has been involved in negotiating and implementing nuclear arms control agreements for the past 45 years. The views expressed are
those of the author and do not necessarily reflect the policies of the U.S. State Department or Georgetown University.

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