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Contents

Introduction and summary

Since the size of the U.S. nuclear arsenal peaked in the 1980s, American presidents—Democrat and Republican alike—have limited the development of new nuclear weapons. Whether the restriction was written into law, was included in U.S. nuclear policy, or was the result of specific decisions not to pursue new procurement projects, the United States has not built a new nuclear warhead since the late 1980s. This policy decision has generated significant cost savings, restrained strategic competition, and helped to support other stabilizing policies.

With Republicans now in control of Congress and the White House, this policy is at risk. As Russia and China expand their territorial claims as well as their own nuclear arsenals, a growing chorus of U.S. politicians and strategists argue that it is not sufficient to simply replace nuclear systems as they wear out. Instead, they insist that the United States must procure new systems with qualitatively new capabilities. In some cases, appeals for new nuclear weapons are motivated by a sophisticated but mistaken argument about their necessity for deterring potential adversaries from employing nuclear weapons in limited conflicts. Other advocates endorse these programs as a way of winning future arms races or achieving supremacy over other nuclear powers.

Although it has not been specific about its plans, the Trump administration has promised to "greatly strengthen and expand its nuclear capability."[1] This seems to conflict with the assessment of Gen. John E. Hyten, the commander of U.S. Strategic Command, who has argued that "we don't need more nuclear weapons, we just need to modernize."[2] Are the two statements consistent? What exactly is nuclear modernization? Where should the United States draw the line as it embarks on a program to replace nearly every bomb, missile, submarine, and warhead in its arsenal?

Constructive debate over these plans is often obstructed by imprecise vernacular. The term modernization is variously used to refer to existing programs that refurbish current weapons systems, existing programs that update current systems with

improved versions, and to proposals that would create qualitatively new capabilities. Responsible modernization that refurbishes and replaces existing systems with improved variants is necessary in order for such systems to continue to carry out their missions safely and reliably. However, establishing programs that would enable the United States to hold targets at risk in qualitatively new ways would be destabilizing, unnecessary, and irresponsible. Specifically, developing new nuclear capabilities would likely increase global nuclear competition, accelerating a new arms race; create uncertainty for existing modernization programs in the Pentagon budget and also at the national laboratories that maintain the nuclear stockpile; increase the likelihood that new countries could seek to acquire nuclear weapons; and do little to improve the ability of the U.S. armed forces to deter and defend against aggression around the world. As the new administration begins its Nuclear Posture Review, the decades-old bipartisan prohibition against the development of new nuclear capabilities is more important than ever.[3]

This analysis is informed by a tabletop exercise that was carried out at the Center for American Progress in the autumn of 2016. In it, a bipartisan group of former officials and experts in nuclear weapons policy—including both proponents and opponents of new nuclear options—investigated the role of U.S. nuclear forces in the defense of NATO's Baltic members. Although the participants were not asked to endorse the findings of this report, their deliberations are instructive in evaluating the case for new nuclear weapons.[4]

U.S. policy on new nuclear capabilities

In the 1980s, the radical expansion of technological options for delivery vehicles and warhead designs led to concern that fielding these capabilities would be destabilizing to the U.S.-Soviet nuclear balance. Many feared that exuberance in nuclear modernization and the quest for a technological edge were creating an unrestrained arms race that would inevitably lead to these systems being used.[5] A major international advocacy movement urged the superpowers to freeze the production and testing of nuclear arms.[6]

This proposal was enormously popular: Most U.S. polls pegged public support for a nuclear freeze between 70 percent and 82 percent, and successful votes in state, city, and town governments made it "the largest referendum on a single issue in the nation's history."[7] In 1982, the U.S. House of Representatives passed a resolution in favor of a nuclear freeze by a vote of 273 to 125, but the Senate version failed to win approval.[8] Although the White House objected vehemently to the proposal, the movement may have helped convert President Ronald Reagan to the cause of arms control, a shift that occurred around the same time.[9]

Arms control initiatives placed limits on certain types of nuclear systems—particularly intermediate-range weapons—but for the most part, the 1980s saw dramatic innovation in each leg of what is popularly known as the nuclear triad: land-based intercontinental ballistic missiles, or ICBMs; strategic bombers; and submarine-launched ballistic missiles, or SLBMs.[10] The Pentagon fielded a new generation of nuclear-capable delivery vehicles, including the MX ICBM, the B-1 and B-2 bombers, the Trident SLBM, and other systems.

At the same time, the United States began development programs on a new generation of strategic and nonstrategic munitions. The 1980s saw the development of a new low-yield artillery shell, the W82; a warhead for naval aviation to be used for land attack as well as anti-submarine missions, the B90; and two warheads for surface-to-ground missiles, the W89 and the W91.[11] While the MX ICBM and both bombers were deployed in the course of the 1980s—albeit

in lower numbers than had been requested—the warheads were not. Prototype rounds of each were produced, but none entered full production before the end of the Cold War, and President George H.W. Bush cancelled these programs as part of the Presidential Nuclear Initiatives, or PNI, of 1991–1992.[12] The most recent new warhead is the W88, which first entered the stockpile for use on the Trident II D5 SLBM in 1988.[13] The most recent warhead model is the B61-11—a variable-yield gravity bomb that adds ground-penetration capabilities to a physics package developed for the earlier B61-7 variant—which was first produced in 1997.[14]

In the fall of 1993, Congress attached the Spratt-Furse Amendment to the National Defense Authorization Act for fiscal year 1994, which prohibited "research and development which could lead to the production by the United States of a new low-yield nuclear weapon," meaning warheads of fewer than 5 kilotons.[15] The Spratt-Furse Amendment did not prohibit all nuclear weapons research and development, but it did inhibit work on the cutting edge of nuclear design and on the systems that critics considered most destabilizing. Coming less than a year after the first President Bush signed a unilateral moratorium on nuclear testing, the amendment also helped to support the case for the Comprehensive Nuclear Test Ban Treaty, or CTBT, which prohibited those systems that critics worried would be most difficult to detect if they were tested in violation of the treaty. For these reasons, the amendment can safely be said to have established a presumption against new nuclear weapons in the United States.

Glossary of abbreviations

NPR	Nuclear Posture Review
HDBT	Hard and Deeply Buried Targets
RRW	Reliable Replacement Warhead
SSP	Stockpile Stewardship Program
LEP	Life-Extension Program
NNSA	National Nuclear Security Administration
RNEP	Robust Nuclear Earth Penetrator
ICBM	Intercontinental Ballistic Missile
SLBM	Submarine-Launched Ballistic Missile
SLCM	Submarine-Launched Cruise Missile
SSBN	Ship Submersible Ballistic Nuclear
CTBT	Comprehensive Test Ban Treaty
PLYWD	Precision Low-Yield Weapon Design
NATO	North Atlantic Treaty Organization
CAB	Combat Aviation Brigade
APS	Army Prepositioned Stocks
VJTF	Very High Readiness Joint Task Force
TKA	Tailkit Assembly
LRSO	Long Range Standoff Option
GAO	Government Accountability Office
INF	Intermediate-range Nuclear Forces
GLCM	Ground Launched Cruise Missile
FY	Fiscal Year
GBSD	Ground Based Strategic Deterrent
ISR	Intelligence, Surveillance, and Reconnaissance
START	Strategic Arms Reduction Treaty
ROK	Republic of Korea
DCA	Dual Capable Aircraft
ABCT	Armored Brigade Combat Team

New nuclear weapons proposals in the George W. Bush administration

The election of President George W. Bush posed the first challenge to the presumption against new nuclear weapons.[16] The new Bush administration's 2001 Nuclear Posture Review, or NPR, took a significant step away from White House policies under President Bill Clinton and the previous President Bush.[17] Citing an increased difficulty of tailoring deterrence to dissimilar adversaries,

the NPR called for the capacity to "modify, upgrade, or replace portions of the extant nuclear force or develop concepts for follow-on nuclear weapons systems better suited to the nation's needs."[18] Specifically, the George W. Bush administration identified a requirement for earth-penetrating precision nuclear munitions to defeat hard and deeply buried targets, or HDBT, which it would call the Robust Nuclear Earth Penetrator, or RNEP.

The stated rationale was that a low-yield warhead could burn out underground facilities that housed biological or chemical weapons while limiting collateral damage to the surrounding area.[19] In an early attempt to study these requirements, the Bush administration's fiscal year 2004 request asked Congress to repeal the Spratt-Furse Amendment, to provide small quantities of funding for a feasibility and cost study of the RNEP, and to shorten the time it would take the labs to prepare and conduct a nuclear test—the "rest readiness posture"—from 24–26 months to 18 months.[20] After a contentious fight, Congress rescinded the Spratt-Furse Amendment's limit on research of new nuclear warheads but preserved the prohibition on development.[21]

Although the George W. Bush administration insisted that it was only studying the RNEP, it requested that the prohibition on development be lifted for fiscal year 2005 and requested a large sum for the system—$484.7 million over five years.[22] Instead, Congress declined to appropriate funding for fiscal year 2005 or in any year thereafter and the National Nuclear Security Administration, or NNSA, soon abandoned its RNEP teams.[23]

Both the NPR and the legislative proposals were subject to considerable criticism. Many observers expressed concern that the document would lower the threshold for nuclear use, making the weapons "more useable."[24] Several experts drew parallels to debates two decades earlier in which European allies and arms control groups successfully prevented deployment of a neutron bomb, a specialized warhead that could kill invading Soviet troops in armored formations without destroying European cities.[25] Furthermore, many argued that development of new warheads would raise proliferation pressures around the world, especially if certifying the RNEP meant returning to nuclear testing in violation of the CTBT, which the Clinton administration had signed but the Senate had declined to ratify.[26]

At the same time, opponents argued that a low-yield earth penetrator would be ineffective against a wide range of HDBT, including those that were too deep, too hard, located in populated areas, or about which intelligence agencies had imperfect information.[27] In the case of the RNEP, the country, on balance, found that the cost of holding at risk this specific class of facilities was not worth it. However, the broader debate was a strong demonstration that development of new nuclear weapons, especially those that produced new capabilities to make them more usable in limited circumstances, required special justification and heightened scrutiny. Developing new warheads that were intended not for deterrence of a nuclear attack but to destroy targets on the battlefield was a bright line that many correctly refused to cross.

However, the issue of new warhead development was not closed. In fiscal year 2005, the year that RNEP funding ceased, Congress appropriated funding to develop a Reliable Replacement Warhead, or RRW. Reflecting concerns that the Stockpile Stewardship Program, or SSP, could not guarantee the surety of the stockpile in perpetuity, NNSA and the armed services proposed a program to construct a new warhead optimized to simplify maintenance and provide confidence in the stockpile without the need for testing.[28] NNSA got as far as selecting a design for the warhead from an internal competition.[29] Expert studies commissioned to evaluate the concept tended to find that it was technically practicable but carried its own risks.[30] However, the project never found sound political footing. Many saw the debate as an extension of the one over the RNEP and applied many of the same arguments: The House Appropriations Committee, then under Democratic control, said "there exists no convincing rationale for maintaining the large number of existing Cold War nuclear weapons, much less producing additional warheads," while *The New York Times* editorial board called it a "public-relations disaster in the making overseas" and expressed concern over the cost.[31]

In the end, continued accumulation of experience with the SSP convinced most experts that the labs could sustain the stockpile in perpetuity through surveillance, simulation, and periodic life-extension programs, eliminating the need for RRWs.[32] The ability of RRWs to increase confidence in the stockpile did not, in the end, outweigh the diplomatic and fiscal costs of breaking the moratorium on new warhead development. Congressional funding for the program varied between fiscal year 2005 and fiscal year 2008, after which no further funding was appropriated and the RRW program was closed.[33]

In short, resistance to the development of new nuclear warheads proved remarkably resilient during President George W. Bush's first term. Although the 108th Congress included only 49 Democratic Senators and 207 Democratic Representatives, they succeeded in attracting enough Republican support to defeat the RNEP and RRW proposals.[34] Neither the problem of HDBTs nor concerns about stockpile surety were sufficient to overcome entrenched resistance. The limited benefits of the new warheads did not justify the fiscal, diplomatic, and stability costs.

Importantly, accumulation of experience has put to rest concerns about the Stockpile Stewardship Program, or SSP, which monitors the stockpile and is required by Congress to certify annually that the arsenal remains safe and effective.[35] Directors of the national laboratories routinely report that science-based SSP activities have yielded a greater knowledge of the physics of nuclear explosives than ever before and that the program has proven effective at detecting and correcting faults with the systems.

After President Barack Obama took office, his administration moved to make the moratorium on nuclear warhead development an affirmative policy, stating in its Nuclear Posture Review:

> *The United States will not develop new nuclear warheads. Life Extension Programs (LEPs) will use only nuclear components based on previously tested designs, and will not support new military missions or provide for new military capabilities.*[36]

In taking this step, the new Obama administration effectively truncated debate in the United States about RRWs and the RNEP, thus allowing the NPR to cover more important questions of arms control and strategic stability. The policy was sometimes explained in public as establishing three limits on new warhead development, or three "no's": no new nuclear warheads, no new military missions, and no new military capabilities for existing weapons.

The no-new-warheads policy was an integral piece of a broader approach to U.S. nuclear weapons policy and helped to support and enable other elements of U.S. nuclear policy. Specifically, it helped to limit international concerns among both allies and potential adversaries over U.S. nuclear modernization by announcing that upcoming programs would only replace current capabilities—not expand them. Potential adversaries faced less pressure to modernize their arsenals and were deprived of a public rationalization for the systems they did develop. Allies concerned with the pace and scope of nuclear modernization were reassured that the United States was attempting to avoid a new arms race. In Congress and at the labs,

the policy helped to avoid major fights over the cost and structure of the modernization plans before they began. Although the no-new-capabilities policy did not extinguish the concerns of any of these audiences, it did help to enable the armed services to begin research and development work on the administration's program of record.

Foregoing the development of new capabilities also supported efforts by the Obama administration to define deterrence requirements and set force levels. The general objective was to develop new operational plans that would permit "significantly lower nuclear force levels . . . with reduced reliance on nuclear weapons."[37] To facilitate this, the U.S. Department of Defense was directed to "conduct deliberate planning for non-nuclear strike options."[38] The decision not to seek new missions for nuclear weapons was a natural corollary. At the same time, increasing requests to Congress for nuclear enterprise funding supported SSP and assuaged concerns that the stockpile could deteriorate. In effect, the Obama administration was able to meet the targeting demands for new warheads with adjustments to military plans and the stockpile sustainment concerns by investing directly in these programs.

Interpreting capabilities in the Obama years

Since the 1960s, the term "nuclear modernization" has harbored a deep ambiguity in that it is used to refer both to programs that are needed in order to sustain the existing capabilities of the nuclear arsenal as well as to those that provide new capabilities. This ambiguity can sometimes be used to conceal the extremity of certain positions for nuclear weapons or can inadvertently obfuscate moderate arguments.

In a recent example of the latter, a letter signed by several retired four-star U.S. Air Force and Navy officers who had commanded strategic forces that called for "modernization" of the nuclear arsenal was published in *The Wall Street Journal* under the headline "The U.S. Nuclear Triad Needs an Upgrade."[39] In fact, the letter did not recommend qualitatively new capabilities or new missions for the arsenal, but it was difficult to tell as much due to an imprecise vernacular. In another example, Linton Brooks, former U.S. ambassador and former administrator of the NNSA, argued for continuing "the policy of not developing new nuclear weapons with new military capabilities," but suggested "interpret[ing] this policy in a way that permits sensible modifications to current weapons during the life extension process (for example, by fielding some primary-only ballistic missile warheads)."[40] It is not clear whether this proposal would run afoul of the policy on new capabilities that was set by the Obama administration, which underscores the need to define these terms precisely.

In general, the Obama administration understood nuclear modernization as a means of sustaining the existing capabilities of the nuclear arsenal by directly replacing aging systems with new versions that are capable of conducting the same missions. President Obama explained his modernization policy as representing a balance between "making sure that the triad and our systems work properly" and guarding against "new and more deadly and more effective systems that end up leading to a whole new escalation of the arms race."[41]

In fact, the Obama administration's modernization plan did require that the new generation of delivery vehicles meet higher performance specifications with respect to survivability, precision, and surety. The Air Force has declared that the B-21 Raider bomber will gain new stealth capabilities that enable it to "penetrate the increasingly dense anti-access/area denial environments developing around the world."[42] Similarly, the new Columbia-class ballistic missile submarine, or SSBN, will be equipped with a quieter electric drive and a variety of other improvements to enhance its survivability.[43] Each of these innovations—as well as similar enhancements to the Long-Range Standoff Weapon, or LRSO, (an air-launched cruise missile) and the Ground-Based Strategic Deterrent, or GBSD, (the program to replace the Minuteman III ICBM)—certainly improve the effectiveness of these nuclear delivery vehicles by increasing their ability to accurately deliver warheads to their targets.

Although Obama administration officials sometimes gave the impression in public remarks that nuclear modernization would not increase the capability of the nuclear triad, this was not the actual policy. The NPR only prohibited new capabilities in the warheads themselves, which could be life-extended but not modified in a way that would improve their effectiveness or that provided for new military missions.

Matters become even more complicated when one considers a series of upgrades to existing weapons systems authorized by the Obama administration. For example, the B61 life-extension program, which is sometimes explained as a program to extend the life of the warhead, is more properly understood as an effort to consolidate four of the five existing variants of the B61 gravity bomb into a single variant, the B61-12.[44] The NNSA hoped that the program would allow for significant reductions in the number of B61s retained in the stockpile, as well as the retirement of the B83 gravity bomb.

Although this program did not modify the explosive package of the B61 gravity bomb, it did provide for the development of a new guided tail kit assembly that will improve the free fall accuracy of the weapon: According to the Government Accountability Office, "The guided capability will enable the weapon to meet military requirements with a lower nuclear yield."[45] Hans Kristensen and other civil society critics have argued that the B61-12 represents "an upgrade that will also increase military capabilities to hold targets at risk with less collateral damage."[46] As the first guided nuclear gravity bomb, the lower yield may also reduce collateral damage estimates and may make it more usable in certain contingencies.[47] Moreover, if the weapon is deployed to Europe as part of the NATO extended deterrent as planned, it would be able to hold targets at risk that were previously beyond the capability of the Mod-3 and Mod-4 nonstrategic B61 variants deployed there.[48]

Although the life-extension program does not modify the explosive package of the B61, it clearly provides the weapon with a new ability to hold targets at risk and offers new options to planners tasked with nuclear targeting and escalation control. In this instance, the Obama administration interpreted its policy against new warhead capabilities to pertain only to the explosive effects, not to upgrades to the guidance system.

Modifications to the fuzing and precision of the Trident II D5 SLBM have also dramatically increased the lethality of U.S. strategic forces. For example, in an article in *Bulletin of the Atomic Scientists*, Hans Kristensen, Matthew McKinzine, and Theodore Postol report that "deployment of the new MC4700 arming, fuzing, and firing system on the W76-1/Mk4A [SLBM warhead] significantly increases the number of hard target kill-capable warheads on US ballistic missile submarines."[49] The new fuze allows the W76 to detonate at a variable height within a lethal column of space over a target, where previous iterations of the warhead may have fallen short or long of the zone necessary to destroy a hard target. Kristensen, McKinzine, and Postol argue that this improves the U.S. capability to execute a disarming first strike of an adversary and increases the risk that "Russian nuclear forces will be used in response to early warning of an attack—even when an attack has not occurred."[50]

The cumulative effect of these upgrades is that President Obama left his successor an arsenal that is far more capable than the one he inherited, even before a single new system is procured. The consequences of these new capabilities on strategic stability are considerable. However, although quantitative performance upgrades to existing systems are likely to raise tensions considerably, they will not be as destabilizing as qualitatively new warheads or delivery systems.

Past debates about new nuclear weapons are instructive for the current discussion. Facts about stockpile sustainability and the substantial diplomatic and fiscal costs of new warhead development remain just as salient today as when they were learned in the course of the years that George W. Bush and Barack Obama were in office, even if the magnitude of these effects may have changed. Yet the political and geostrategic context of the debate has evolved in the last four years: A fracturing consensus on nuclear policy at home, combined with increased tensions with Russia and China, mean that the current debate over new nuclear capabilities will be fought between different coalitions contesting different ground.

For most of the past three decades, the main imperative of nuclear strategists has been to prevent the inadvertent use of a nuclear weapon. Whether from theft, accident, or unintended escalation by two nuclear powers, the United States carried out several valuable policy initiatives to improve transparency and communication between the nuclear powers, as well to improve as the safety and surety of strategic forces around the world. Fears that an adversary could employ a nuclear weapon for coercive or military aims seemed inappropriate in the bright years that directly followed the Cold War. Now the pendulum has swung back in the other direction. Since the invasion of Crimea in 2013 and an attendant rise in the likelihood of limited war, strategists are increasingly concerned that an adversary could employ a nuclear weapon to coerce the United States or an ally to capitulate to aggression.

Recent calls for new nuclear weapons

Since 2014, calls for new nuclear capabilities have surfaced at an accelerating rate. Russia's invasion of Crimea, China's expanding territorial claims in the South China Sea, and major nuclear modernization programs in nearly every nuclear power have convinced many to return to nuclear weapons as an indispensable solution to security challenges. Arguments for new nuclear weapons are not directed at specific classes of targets such as HDBT or the need to ensure the surety of the stockpile. Instead, proponents claim that the United States must develop new systems in order to have credible nuclear options that can dominate every rung of the escalation ladder in limited contingencies with nuclear-armed adversaries.

There is ample evidence that this position is becoming orthodoxy within the Republican Party.[51] The first suggestions for new nuclear weapons policies occurred prior to the 2016 presidential election. In 2015, Rep. Mac Thornberry (R-TX), the chairman of the House Armed Services Committee, asked, "Can we have a national conversation about building new nuclear weapons?"[52] Yet these proposals were relatively few and were generally ignored. Since the election, the increasing frequency and prominence of calls to expand the standing modernization program to develop qualitatively new capabilities has raised the possibility that the new administration might pursue the proposals.

Air Force Chief of Staff Gen. David Goldfein told reporters that he is "absolutely" open to considering development of different types of nuclear weapons and alternative means of delivering them, saying that he expected to have "discussions about munitions" and "yield."[53] In February 2017 these calls received still more momentum when *The New York Times* reported that Russia had deployed two battalions of a new intermediate-range ground-launched cruise missile, or GLCM, the SSC-8, in violation of the 1987 Intermediate-Range Nuclear Forces, or INF, Treaty.[54] Two days later, Sen. Tom Cotton (R-AR) and four other Republican Senators introduced a bill that would, among other provisions, establish "a program of record for a dual-capable road-mobile ground launched missile system with INF ranges" in order "to bring Russia back into compliance."[55]

The simplest and most frequent argument in favor of new nuclear weapons is simply: "Our adversaries are improving their own nuclear capabilities. It is time we do the same."[56] Sen. Tom Cotton (R-AR), in a speech to the American Enterprise Institute, a conservative think tank, noted Russia's, "10-to-1 advantage over us and our NATO allies in tactical nuclear warheads," as well as Chinese and North Korean advancements. His recommendation: "Given these provocations and threats we must at a minimum study new nuclear capabilities, while we fully fund current modernization plans."[57] Similarly, Vice Admiral Robert R. Monroe (Ret.) cited these and other development programs, as well as instability in the Middle East, in recommending underground nuclear testing of "advanced and specialized warheads" and eventual replacement of "our entire current stockpile with new-design weapons."[58]

In simply indicating the advancements of other countries, authors may be limited by time or classification restrictions and are unable to explain the more sophisticated analyses that underwrite these positions. However, these types of arguments are not in themselves very useful shorthand. They may leave audiences with the mistaken impression that strict qualitative or quantitative parity is a necessary requirement of an effective U.S. nuclear policy. These kinds of arguments also distract from the more important discussion about whether, where, and why new nuclear capabilities are needed.[59] For these reasons, facts about the procurement programs of other countries are insufficient in and of themselves to make the case for a new capability.

Simple indications of foreign modernization programs often lead to false claims that the United States is falling behind in a nuclear arms race. In fact, the U.S. nuclear arsenal today is more than sufficient to meet its deterrence requirements; it is robust, flexible, and reliable and benefits from U.S. advantages in stealth, networked communications, and intelligence, surveillance, and reconnaissance, or ISR. This is why Air Force General Paul J. Selva, vice chairman of the Joint Chiefs of Staff, told the House Armed Services Committee in March that despite the age of the nuclear triad and the modernization of foreign arsenals, the United States does "have a qualitative advantage at this time."[60]

It is also worth pausing to recognize that some calls for new nuclear capabilities—sometimes called "modernization"—are motivated by a desire to supersede a condition of mutual vulnerability in order to attain nuclear supremacy. Claims about U.S. inferiority often end up as demands for "unsurpassed nuclear weapons strength" or to keep the U.S. arsenal "at the top of the pack."[61] Again, these kinds of recommendations are dangerously imprecise. These arguments might be interpreted as equivalent to President John F. Kennedy's one-time informal yardstick that the U.S. arsenal be "second to none."[62] However, claims from the current occupant of the White House that the United States will not "yield its supremacy"

or military "dominance" have a different connotation in nuclear matters.[63] Attempts to achieve nuclear supremacy would not suggest additional capabilities to defend national or allied territory; instead, they would be seen as attempts to limit exposure to an adversary's nuclear capability in order to be able to act with impunity. In effect, they would be perceived as a sign of aggressive intent.

The more considered arguments for new warheads justify their recommendations as necessary to dissuade Russia and other peer competitors from initiating and escalating a limited conflict. In accordance with this view, the end of the Cold War and consequent adjustments in the structure and posture of Russian strategic forces have caused the threat of a major nuclear exchange to recede. However, as potential nuclear-armed adversaries, specifically Russia and China, expand their territorial claims to encroach upon the interests of U.S. allies, the likelihood of limited regional conflict increases.[64] Deterring these conflicts requires the United States and its allies to jointly retain the capability to achieve their military and political objectives on acceptable terms.

There is growing evidence that nuclear-armed U.S. adversaries plan to posture or employ their nuclear forces as part of a strategy to prevail in a limited conflict.[65] To take the most alarming case, Russia has acknowledged deploying nuclear-capable Iskander missiles to Kaliningrad on the pretense of exercises, has simulated nuclear attacks on NATO members, and its leadership has made repeated references to the possibility of a nuclear alert or nuclear employment in response to subconventional operations.[66]

For these reasons, the United States must ensure that it retains the capability not only to deter a limited conflict but also to deter an adversary from escalating that conflict once it has begun—to deter a conventional conflict from going nuclear or a limited nuclear employment from leading to a wider or more destructive nuclear attack. For many strategists, this imperative requires the United States to retain nuclear forces that can credibly be employed at each level of escalation. For example, Elbridge Colby, a senior fellow at the Center for a New American Security, has argued that "escalation advantage or superiority, the position in which one can escalate more effectively, controllably, and decisively than one's opponent, is crucial for determining who will come out ahead in a limited conflict."[67] This theory underwrites Colby's belief that "[t]he United States should want to make its nuclear forces more usable and its threats credible."[68]

In the literature on limited nuclear war, for a nuclear threat to be credible at low levels of conflict, it must:

- Be capable of discrimination between its intended target and other civilian, military, and political objects, so that employment is not unintentionally escalatory and is politically and morally sustainable
- Be perceptibly distinct from a major employment of strategic nuclear forces that could endanger the enemy's ability to maintain control of its own arsenal or the state
- Signal a willingness to continue to escalate the conflict, while at the same time communicating a desire to exercise restraint so that escalation does not occur

An increasing number of observers believe that the United States lacks nuclear options that can meet these standards but that it is within our power to develop capabilities that would. In a recent National Institute for Public Policy report, some argue that Russia perceives a lack of resolve and capability in NATO deterrence posture and that this "constitutes a perceived exploitable advantage that threatens deterrence."[69] In short, Russia believes that it has "force posture advantages over the West" that "range from much greater local conventional force capability and readiness in the short-run, to nuclear escalation options to which NATO is thought to have no acceptable response."[70] While conventional advantages can be redressed by prepositioning materials and deploying conventional forces, perceived gaps in the U.S. nuclear structure require new nuclear capabilities.

Although most calls for new nuclear capabilities draw on similar assessments of the strategic environment, they vary in the specific capabilities recommended. There are few detailed analyses of the role that specific prospective systems would play in potential contingencies. Some sources recommend new warheads but do not specify which types of warheads are necessary or why.[71] Most calls for new nuclear capabilities fall into six categories: enhancements to existing systems, new special-effects warheads, force posture changes to existing systems, qualitative upgrades to new versions of delivery platforms, entirely new systems, and development of new warhead designs as part of a flexible infrastructure program.

The simplest recommendations entail adding new options to existing systems. For example, adding new variable yield options to ballistic missiles and cruise missiles would allow these systems to serve new missions without the need to produce new delivery vehicles from scratch. The most common proposal suggests modifying a two-stage thermonuclear warhead in which a fission primary

normally detonates a fusion secondary by replacing the secondary with an inert dummy and firing only the primary.[72] Arming each SSBN with some number of Trident II D5 SLBMs with single primary-only warheads would produce a prompt nuclear strike capability in the low kiloton range without the need to construct a new warhead or flight-test the missile.

Some calls for new nuclear capabilities recommend what are referred to as special-effects warheads. This category includes warheads that are optimized to emit energy in nonstandard ways. An enhanced radiation weapon, or ERW, or neutron bomb, sacrifices explosive blast radius in favor of enhanced neutron radiation, which was originally developed for use against an enemy's ballistic missiles as well as armored formations. So-called clean or low-radiation warheads may help to threaten advancing enemy forces while lowering the risk of civilian casualties or contamination of allied territory, including advancements toward pure fusion weapons that do not rely on nuclear fission.[73]

Nuclear warheads can also be configured to optimize the electromagnetic pulse, or EMP, they emit. Some observers believe that detonating an EMP weapon could retaliate in kind to a Russian employment, disable or attrite enemy forces in a limited conflict, or signal a willingness to escalate to the nuclear level in a non-lethal way. Though each system was explored or produced during the Cold War, the United States does not retain weapons optimized for these special effects. In recent years, each has been recommended for development.[74]

A related proposal recommends new forward deployments of existing or new weapons.[75] In recent years, observers have called for basing nuclear systems in Guam and South Korea or resuscitating the small inventory of U.S. tactical weapons deployed to Europe through NATO sharing agreements either by deploying new systems or by improving the readiness and survivability of those weapons and the dual-capable aircraft, or DCA, that carry them.[76] A handful of voices have called for returning the nuclear strike mission to the carrier fleet. During the Cold War, U.S. aircraft carriers routinely carried a complement of gravity bombs for delivery by tactical aircraft, but this practice ended in 1993 on the order of President George H.W. Bush.[77] Restoring this mission would entail major new training requirements for naval surface officers and aviators but would potentially allow delivery of nonstrategic weapons on tactical aircraft from more locations, especially in Asia.[78]

The most ambitious proposals envisage acquiring new types of nuclear-capable delivery vehicles. Especially following the news that Russia is deploying a nuclear GLCM in violation of the INF Treaty, some observers have called for new intermediate-range nuclear missiles that could be deployed to Europe as part of a response.[79] There is also increasing discussion about fielding a nuclear submarine-launched cruise missile, or SLCM, to replace the Tomahawk Land Attack Cruise Missile, or TLAM-N.[80] Removed from service by President George H.W. Bush in 1991, each successive U.S. president declined to refurbish or redeploy the missile, and its W80-0 warheads were dismantled in 2013.[81] TLAM-N was retired in part to prevent adversaries from misperceiving conventional U.S. SLCMs as nuclear, enabling Tomahawks to be used in more contingencies.[82] Two sources recommend deploying a short-range land attack nuclear-capable cruise missile deployable on NATO tactical aircraft.[83] One recommends that the United States "re-field tactical nuclear weapons in existing 155-mm howitzer battalions in the Baltics."[84]

An alternative line of argument that strains the boundaries of current policy calls for national labs to design, prototype, and—in some cases—to test new nuclear warheads as a way of shaping the nuclear enterprise itself. Many studies express concern over the retirement of Cold War nuclear weapons designers and the loss of "flexibility" in the enterprise. For example, in early 2016, the Defense Science Board, a committee of technical civilian advisors to Defense Department senior leadership, recommended steps to hedge against future uncertainties. These steps included the development of "advanced manufacturing to support timely modifications" to the stockpile and to undertake "concept and advanced development and prototype, placing options 'on-the-shelf' should they be needed rapidly," including "lower yield, primary-only options."[85]

The proposal was articulated in more detail by former Pentagon officials John Harvey and Thomas Scheber, who recommended several steps to improve the readiness and responsiveness of the nuclear enterprise and its ability to rapidly field new systems.[86] Because the life-extension program approach focuses only on refurbishment, "important NNSA nuclear warhead development skills are not being exercised," and the expertise of the workforce of scientists, designers, and engineers is deteriorating.[87] The duo conclude that "a more comprehensive approach is needed—one that exercises the entire design, development and manufacturing enterprise and advances a modern warhead design from initial concept through prototype development and flight testing to the point where one or a few are built, but not fielded."[88]

What is a new capability?

Calibrating nuclear modernization is a difficult endeavor. Too little investment could lead to vulnerabilities from an unreliable or unsafe stockpile and a nuclear arsenal that is not sufficiently survivable. On the other hand, too much innovation could force potential adversaries to accelerate their own nuclear acquisitions to preserve the survivability of their strategic forces, consume scarce resources, and set off alarms throughout the diplomatic community. As a way of managing these costs, the United States has, since the end of the Cold War, deliberately eschewed the development of new nuclear capabilities.

Now, as relations with Russia have declined to depths not seen since the Cold War ended, and U.S. allies in Asia face sophisticated new threats from China and North Korea, it is appropriate to consider whether the policy should continue or whether new capabilities are necessary. However, no incarnation of the policy has given a clear distinction about what constitutes a new capability. In 2009, the bipartisan Strategic Posture Commission noted that the RRW debate "revealed a lot of confusion about what was intended, what is needed, and what constitutes 'new.'" It recommended that the nation be clear about "what makes a weapon 'new' and what does not."[89] Although the Obama administration made significant progress on this front, ambiguities remain. Drawing a clear distinction between new nuclear weapons is critical to evaluating proposals for new systems and the existing program of record for nuclear modernization.

The Spratt-Furse Amendment drew its line at the 5 kiloton level, effectively prohibiting research into and development of the low-yield options that were then at the top of many shopping lists for new capabilities. While the Obama administration eschewed programs that would design lower yield or special effects warheads from scratch, the B61 life-extension program did allow tactical fighter platforms to hold new targets at risk from forward bases. Furthermore, the administration placed no formal restriction on improvements to delivery platforms. So while the Obama administration observed significant limits on nuclear modernization, it is inaccurate to think of the administration as eschewing new nuclear capabilities entirely.

Many of the same considerations that underwrote the proscription of new warheads also pertain to delivery vehicles. In most cases, the fiscal, diplomatic, and stability costs of developing advanced new missile and bomber platforms exceed those for new warheads. To extend the proscription on new capabilities from warhead life extension to also cover delivery vehicles would be a highly stabilizing measure. It would demonstrate to allies and adversaries alike that deterrence can be sustained with a survivable second-strike capability and does not require a technological edge over opponents or symmetrical escalation options; that the United States and its allies can defend their national interests in limited contingencies without resorting to nuclear escalation; and that these interests do not include aggressive war aims that would force an adversary to so escalate. At the same time, it would enable the United States to allocate scarce resources toward the conventional forces required to deter and defend against aggression.

Yet attempting to restrict new capabilities is even more difficult with respect to delivery vehicles than warheads. Some modernization programs are clearly necessary to maintain the safety and effectiveness of the stockpile. Life-extension programs that replace degraded components in warheads are clearly permissible and in no way upset the strategic balance. The same could be said for programs that replace delivery vehicles with new versions of the same capabilities. At the same time, counterforce technologies have evolved significantly since the current generation of systems entered service—remote sensing, including from autonomous platforms; precision, standoff, and hypersonic munitions; and cyber capabilities have all improved by leaps and bounds.

To accomplish their current missions in an increasingly competitive battlespace, next-generation nuclear systems must receive multiple upgrades in order to reliably deliver their warheads to the same class of targets. A prime example is survivability enhancements, including stealth on submarines and aircraft, resilience to cyberattacks, and the ability to communicate safely in degraded areas of operation. Given the rapid proliferation of advanced air defense systems, increased range on aircraft and missiles also may be required to reliably hold the same targets at risk. While these kinds of upgrades might unsettle potential adversaries who think of nuclear weapons as sources of national pride, they will not substantively upset the strategic balance.

That said, it is an altogether different matter to acquire nuclear delivery vehicles and munitions that represent new ways to hold targets at risk. There are two primary ways a new system could do so. New systems may appear to provide new nonstrategic employment options, whether because they are forward-deployed

or because they have shorter operational ranges, low yields, or special effects that may allow them to be more effective for use on the battlefield. Upgrades that improve the discrimination of U.S. nuclear forces clearly fall into this category because they afford leaders concerned with minimizing civilian casualties new options for nuclear employment. Alternatively, a new system may threaten an adversary's ability to retaliate to a nuclear first strike. For example, cruise missiles with hypersonic velocity or those that are deployed close to an adversary's territory may decrease the warning time that an adversary has of a nuclear attack or be more able to strike at mobile ballistic missile launchers before they can fire.

Capabilities of this kind are destabilizing not only because they may negate an adversary's second-strike capability or lower the threshold for nuclear use but because they imply a change in U.S. nuclear strategy. Both, in different ways, would be seen as a move away from thinking of nuclear weapons as primarily useful for deterring an adversary's first use toward an embrace of what is sometimes called nuclear warfighting, which refers either to the belief that one could actually fight and prevail in a nuclear exchange or that nuclear weapons could be employed during an essentially conventional conflict for tactical purposes. Acquiring capabilities of this kind would also call into question the carefully calibrated language in the 2010 Nuclear Posture Review regarding the conditions in which the United States would consider first use of nuclear weapons.

The case against new nuclear options

As proponents of new nuclear weapons systems are rediscovering theories of escalation control developed during the Cold War, opponents are reminding us why the United States retired or refused to develop these capabilities in the first place.[90] New nuclear weapons are not required in order to deter conflict or prevail in a war against a nuclear-armed adversary and may in fact harm crisis stability by providing new incentives for adversaries to attack U.S. forces. Procuring new systems would also exacerbate an inchoate global nuclear arms race by causing potential adversaries to accelerate their own nuclear advancements, and at the same time, risk delays or reductions in the core modernization programs necessary to ensure that the U.S. nuclear arsenal can operate safely. Lastly, new weapons programs would alarm U.S. allies and raise proliferation pressures around the world.

Gen. Hyten, commander of U.S. Strategic Command, testified before Congress recently, saying, "The forces that we're projected to have in our budget will provide that nuclear deterrent without a doubt."[91] Even accounting for increased uncertainty and risk in the international environment, the current modernization plans are more than sufficient to meet deterrence requirements.

Crisis stability

Public arguments about nuclear force structure too often take place at a level of abstraction that constrains debate and obscures the real issues at hand. The case for new nuclear weapons depends on the proposed system being uniquely necessary in order to hold at risk a specific set of targets that will help to secure U.S. deterrence and defense objectives in a plausible contingency.

In order to consider the claim that new nuclear weapons are needed for deterrence and warfighting, the Center for American Progress developed a tabletop exercise in the autumn of 2016 to model a limited war with a nuclear-armed adversary. The scenario was structured to encourage participants to consider when and why a U.S.

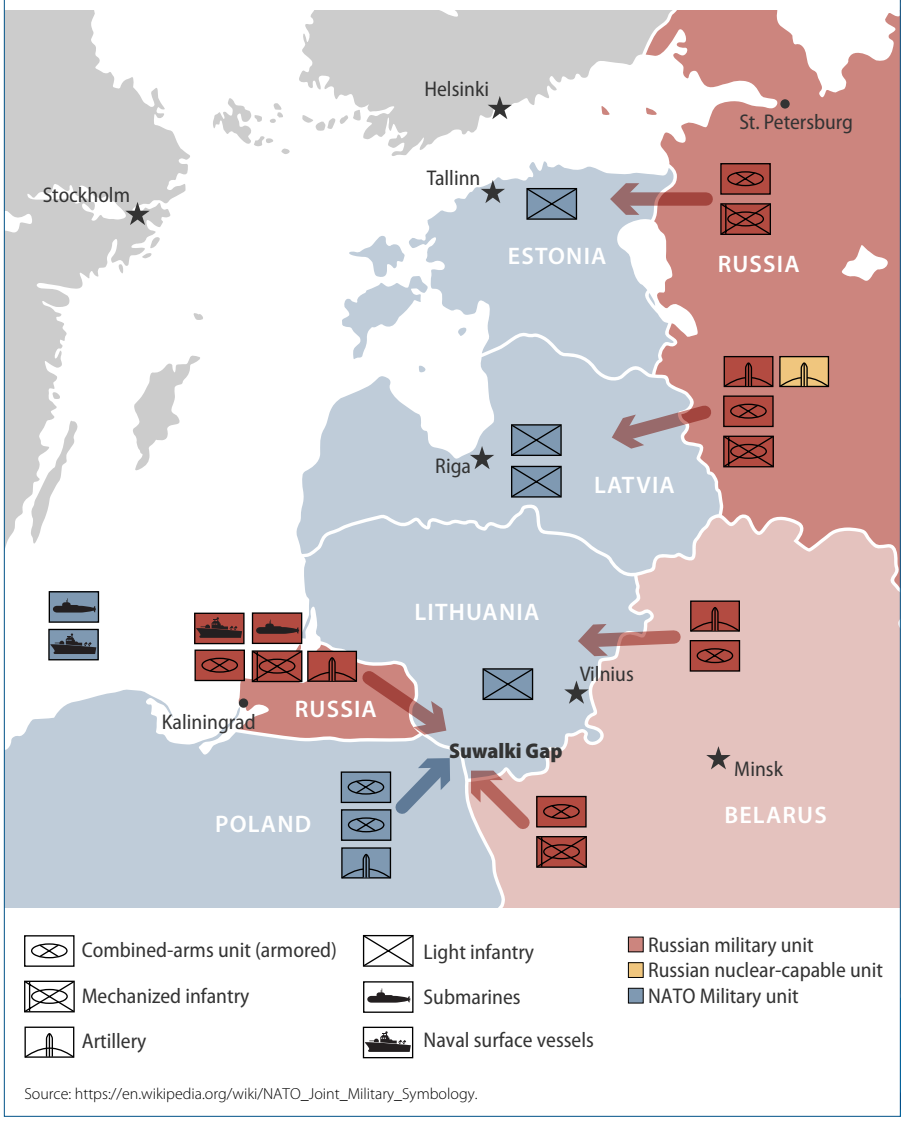
president might order a nonstrategic nuclear strike. Twelve participants took part in the exercise, including current or former officials from Republican and Democratic administrations in the Pentagon, the U.S. Department of State, and the national labs, as well as nongovernmental experts in nuclear policy or Russian military issues. The participants were not asked to endorse the conclusions of this report.

The scenario modeled a short-warning Russian invasion of NATO's Baltic states. This contingency is one of the most challenging threats to U.S. deterrence and defensive postures in the world today and has accordingly been studied in considerable detail. In 2014, an influential RAND wargame found that NATO forces as they were then postured could not defend the Baltic allies; Russia could reach the capitals of these three allied nations in 36 to 60 hours. That analysis recommended maintaining a force of seven brigades for defense of the Baltics, including three armored brigade combat teams, or ABCT, and improved supporting fires.[92] RAND's study helped to raise awareness of NATO's conventional vulnerabilities and received significant attention both within government and in the press.

A related Center for Strategic and Budgetary Assessments exercise identified similar deficiencies in NATO's ability to reinforce its Baltic allies through Poland and recommended additional anti-aircraft, indirect fires, and engineering units to preserve lines of communication.[93] In 2016, a team from the Center for Strategic and International Studies drew on a similar analysis to recommend permanent deployment to Europe of an additional ABCT plus a combat aviation brigade, or CAB, prepositioned equipment for four additional brigades, additional rotational presence in each Baltic state, and improved fires and air-defense assets.[94] Other teams have highlighted the need for better operational planning, sea control, close air support, or CAS, logistics capacity, and teams to improve the alliance's resilience to hybrid operations.[95] The general consensus is that Russia enjoys a local superiority in numbers and firepower for a Baltic contingency.

FIGURE 1

A notional Baltic contingency



Source: https://en.wikipedia.org/wiki/NATO_Joint_Military_Symbology.

This figure illustrates a commonly discussed scenario, in which Russia launches a short-notice invasion of NATO's Baltic allies. Russian advantages in numbers, mobility, and firepower overmatch NATO's light-infantry units. In the north, Russian forces press toward the capitals of NATO's allies from mainland Russia. In the south, forces move from Russia's territorial enclave of Kaliningrad and allied Belarus to prevent NATO from reinforcing the Baltics through the Polish town of Suwalki. This graphic omits the sizes and precise positions of units and only represents the general outlines of the notional conflict.

Move 1: Facing defeat

CAP's scenario built on previous simulations to more closely examine how the hypothetical contingency could result in Russian nuclear employment and how the United States would respond. The exercise did not attempt to duplicate the more comprehensive work of the RAND and Center for Strategic and Budgetary Assessments teams to accurately model the conventional conflict, predict an outcome, or recommend changes to conventional forces.

In a Baltic scenario, geography is critical. The eastern borders of NATO's Baltic members—Estonia, Latvia, and Lithuania—are shared with Russia. Kaliningrad, a noncontiguous enclave of Russian territory on the Baltic Sea, has considerable counter-air, naval, and land forces that can attempt to deny NATO forces, as well as short- and medium-range land attack missiles that can threaten the entire region. The essential problem is a race against time: If Russia succeeds in surprising NATO, its armored forces can bypass or destroy light defending forces and consolidate control over the Baltic states before the alliance can bring its superior forces to bear. If it came to pass, this result would leave NATO in the highly undesirable position of having to either invade captured allied territory or to cede the Baltic states.

The initial move of the CAP exercise occurred at this juncture. Invading Russian forces have marked advantages in mobility and firepower and can quickly overrun the Baltic countries' light defensive emplacements. In the scenario, Russian theater nuclear forces have been alerted and, interspersed with conventional ground attack units, are deploying to firing positions near NATO's Baltic borders and in Kaliningrad. Russia's strategic nuclear forces maintain normal operations. NATO commanders cannot guarantee that its forces can prevent Russia from reaching the Baltic capitals.

At this point, the alliance is in a difficult position and must consider whether resorting to nuclear use is necessary in order to deny Russia victory while assessing the consequences of doing so. Participants in the CAP exercise made the assessment that nuclear use was not necessary in order to achieve NATO's objectives and recommended that a posture of restraint to place the onus of escalation on Russia. Although one participant worried that NATO would lose credibility if it did not resort to nuclear use, on balance, the group believed that any advantage for NATO war aims would be outweighed by the damage that nuclear use would do to NATO cohesion.

While considering nuclear employment, participants in the CAP exercise argued that any resort to nuclear weapons should demonstrate restraint in order to prevent a wider nuclear exchange while still signaling NATO resolve and the gravity of its stakes in the conflict. Participants also expressed a desire for any use of nuclear weapons to not be purely symbolic and rather actually help achieve military objectives on the battlefield. However, at this stage, the group encountered a significant challenge in identifying potential targets for a nuclear strike. Either a NATO nuclear blast would target advancing Russian forces in allied territory, potentially killing friendly civilians and contaminating allied ground, or it would fall on Russian soil, which could be seen as a major escalation of the conflict. Participants were unwilling to endorse a nuclear strike that could hit Russian theater nuclear forces or command and control, as this could precipitate a wider nuclear exchange; at the same time, they were unable to identify concentrations of enemy forces that could not be destroyed with conventional fires.

Because of their assessment of the wider battlespace and their dissatisfaction with available employment options, participants in the CAP exercise declined to recommend a nuclear first strike as a way of halting or blunting the Russian offensive. Instead, they emphasized the need to win the conventional conflict on the ground and in the air, even given the uncertainty about whether this would be possible.

Move 2: Responding to nuclear use

RAND's original 2014 analysis and others like it were critical in convincing U.S. and NATO defense planners to request additional presence in Europe. The European Reassurance Initiative has provided for continuous rotational presence of an ABCT; company-sized forces stationed in NATO's eastern countries, the 4th Infantry Division's mission command element, and the 10th CAB; plus additional Army prepositioned stocks, or APS—stores of equipment that enable rapid deployments.[96] NATO has stood up the Very High Readiness Joint Task Force, or VJTF, a multinational brigade with five maneuver battalions that is rapidly deployable in a crisis, plus additional follow-on forces.[97]

CAP's scenario was set in the summer of 2020 and assumed that these assets plus the additional assets recommended by RAND and the Center for Strategic and International Studies had been deployed to Europe. Participants in the exercise surmised that these additional forces provided sufficient resistance that Russia was unable to achieve a fait accompli within two weeks, at which point NATO's follow-on forces are beginning to arrive in theater, as is a larger second

echelon of Russian units. Russia still has a plausible chance of success but now also must consider the possibility of a protracted engagement as the correlation of forces starts to tilt against it. In an attempt to "escalate its way out of failed conventional aggression,"[98] Russia detonates a 5 kiloton nuclear warhead 5,000 feet above the U.S. forces that are redeploying into the area of operations. The blast produces low numbers of military and civilian casualties but more importantly signals that Russia is willing to resort to nuclear force to prevent defeat.

The participants in the CAP exercise were asked to develop two response options—one that was purely conventional and one that included nuclear use—and then to decide whether to endorse the latter. It should be noted that the group was unanimous in its conclusion that the United States should not deescalate the conflict in response to the invasion; in fact, most participants sought ways to escalate the contingency in order to demonstrate that the alliance's stakes in the conflict had only increased and to prevail in the conflict. All parties recommended that NATO intensify its conventional campaign and authorized more damaging strikes against Russian artillery, lines of communication, and airfields deeper in mainland Russia. The centrality of Kaliningrad in attempting to deny access to allied forces and as the source for Russia's nuclear attack recommended it to the group as a valid target. While players had, on balance, previously been willing to respect the integrity of the enclave, they now gave serious consideration to an attempt to seize it. The group also considered escalating horizontally to strike at Russian forces outside the area of operations, including units deployed in the Middle East.

Participants continued to prioritize the achievement of military objectives over political signaling at the nuclear level. Intensifying conventional operations was seen as the most effective means of prevailing in the conflict and defending NATO's territorial integrity. One participant observed that it would not do to win a competition in nuclear signaling yet lose the war. Most agreed with the principle that a nuclear strike should be relied upon as little as possible to achieve military objectives, but most also were inclined to avoid recommending a purely symbolic nuclear strike that did not have operational benefits.

In considering nuclear employment options, the overriding concern was to avoid interwar escalation or continued nuclear attacks; however, the group was divided over whether nuclear use or a purely conventional response was more likely to prevent future nuclear strikes. Some participants saw refraining from nuclear employment as inviting further Russian aggression, as Russia might perceive NATO as irresolute, while others worried that a tit-for-tat response would provoke an iterative exchange of limited nuclear strikes that would serve Russian interests.

The choice was not between capitulation or retaliation, as all participants recommended an escalation of the conventional war; rather, the disagreement was over whether nuclear employment was necessary in order to achieve allied objectives or whether they could be attained with conventional forces alone. One participant observed that NATO's conventional forces were "where the real message is delivered" regarding its dedication to prevailing in the conventional conflict.

Again, participants expressed a preference for nuclear employment options that would help achieve military objectives rather than those that would serve only political or signaling goals but found it difficult to identify targets that met these criteria. Targets in Baltic territory were judged to be insufficiently consequential to the military outcome, unacceptably destructive, and liable to complicate NATO operations in retaking lost territory. Various Russian naval targets were considered but were judged to be either too far outside the area of operation—and therefore too inconsequential to the conflict—or too close to allied territory.

Charged with formulating a nuclear strike option, the group proposed to strike Russian supply lines in Belarus, which were attempting to close the Suwalki Gap—the 60-mile land border between Poland and Lithuania—in order to prevent NATO's efforts to reinforce the Baltic capitals. This option had the benefit of striking military targets while avoiding nuclear employment on Russian territory, a step thought to be unnecessarily escalatory.[99]

In the end, participants came to understand nuclear retaliation as having primarily political rather than military effects and many saw nuclear weapons as uniquely capable of delivering the necessary signal. The group was evenly divided over whether to authorize the nuclear mission in response to a Russian use of nuclear weapons in addition to conventional response options.

Would new nuclear capabilities provide better options?

Participants in the CAP Baltic exercise identified a number of impediments and disadvantages to the use of a nuclear weapon on the battlefield. Proposals for new nuclear weapons may alleviate some of these concerns, but not all. The primary constraint in the CAP exercise was target selection: Participants struggled to identify targets that would convey the right escalatory signal while also assisting in the achievement of operational objectives. Participants did not lack confidence in the ability of the existing U.S. nuclear forces to destroy potential targets; they did, however, lack confidence in the coercive value of striking those targets.

Furthermore, in the Baltic scenario, there is little indication that new types of systems would expand the set of potential targets. However a nuclear munition is to be delivered, the dispersal of enemy forces, the proximity of allied territory, the need to continue to operate in the theater, and the escalatory potential of striking enemy territory remain ineliminable challenges.

Nonstrategic nuclear weapons were shown to have distinct disadvantages. Russia's sophisticated area denial capabilities, including theater ballistic missiles and counter-air capabilities, raise serious survivability questions for nonstrategic nuclear delivery platforms. Analysts widely doubt that a tactical aircraft can reliably deliver a gravity bomb against an adversary armed with sophisticated counter-air capabilities.[100] Short- and medium-range missiles, including cruise missiles, face a similar risk of being defeated before they can reach their targets, either by being struck prior to launch or intercepted in flight.[101]

To a large extent, the decision to employ a nuclear weapon depends on a single question: If the United States is struck with a nuclear attack, will retaliating in kind prevent or precipitate further nuclear attacks? Unfortunately, there is no way to know for sure.[102] Many experts have expressed skepticism about whether the United States could reliably control escalation in a limited war. In 2015, Deputy Secretary of Defense Robert Work and Adm. James Winnefeld, then-vice chairman of the Joint Chiefs of Staff, told the House Armed Services Committee, "Anyone who thinks they can control escalation through the use of nuclear weapons is literally playing with fire. Escalation is escalation, and nuclear use would be the ultimate escalation."[103] More recently, Gen. Hyten told the same committee, "I just fundamentally disagree that there is such thing as a tactical nuclear weapon. I believe that anybody that employs a nuclear weapon in the world has created a strategic effect and all nuclear weapons are strategic."[104] Alarmed at recent calls for nonstrategic weapons, Sen. Diane Feinstein (D-CA) and former Secretary of Defense William Perry have argued that "there's no such thing as 'limited' nuclear war."[105]

Participants in the CAP exercise were critically concerned with presenting a nuclear option able to demonstrate restraint in order to prevent the opponent from escalating to future nuclear strikes that were of higher yield, more damaging, or outside the area of operations. But in the context of a specific scenario, the challenge of target selection overshadowed more nuanced considerations about restraint and escalation control, including the size, yield, and delivery method of the warhead. A strike on Russian territory was judged, on balance, to be unacceptably escalatory, irrespective of the yield of the weapon or its method of delivery.

Participants also declined to authorize use of NATO's nonstrategic weapons, citing concerns about the survivability of the tactical aircraft that would deliver them as well as the operation's potential to erode alliance cohesion.

In short, participants seemed satisfied in their ability to signal restraint with the existing nuclear arsenal, although they were uncertain whether that signal would prove sufficient to limit the exchange. Having a more diverse arsenal with different types of warheads or delivery vehicles would not have created a more abundant set of targeting options. The deficiencies of identified targets would not have been solved by lower yields, different delivery trajectories, or special effects options.

There was, however, one specific request for an additional capability. One participant noted that it would be beneficial to have a nuclear weapon capable of preventing the advancement of enemy forces into allied territory. While most of the group was concerned about the humanitarian effects of detonating a weapon on allied territory, it also was noted that an ally being invaded might prefer this outcome to capitulation. However, technological advancements have not rectified a basic conundrum about such capabilities. The radius of the blast and radiation effects of existing nuclear warheads is limited. With a mobile enemy dispersed along a 750 kilometer front overland and multiple arteries, multiple blasts may be needed to have a decisive military effect. An enhanced radiation weapon might prove more successful at disabling an advancing enemy force but would increase the damage to allied territory. On the other hand, a low-radiation warhead might limit contamination, but would do so at the expense of stopping power. If enemy forces are not directed into a geographical choke point—for example, Germany's Fulda Gap, a pass northeast of Frankfurt—the military effectiveness of a battlefield nuclear use declines.

On the other hand, increasing reliance on tactical nuclear capabilities may degrade crisis stability. Imagine if Russian intelligence signaled to its leadership that NATO had alerted and possibly deployed the stocks of B61 munitions in Europe and the DCA that carry them. Any sorties of tactical aircraft could deliver a nuclear yield and could appear to be a counterforce strike against Russian nuclear forces.[106] Russian leadership would face incentives to strike these bases preemptively to prevent further deployments, to make major signals with their own nuclear forces that could then be misinterpreted, or even to release their own nuclear forces if they believed them to be at risk.

The effect would be the same if the United States were to generate new nuclear capabilities for warfighting purposes—whether a cruise missile on tactical aircraft, a nuclear SLCM, nuclear munitions on naval aviation, or others, it would dramatically exacerbate the problem of distinguishing a conventional strike from a nuclear one, raising the possibility that an adversary could act in ways that would increase the possibility of a nuclear exchange. In short, whether or not the United States would employ such a system first, deploying new capabilities for nuclear warfighting increase the probability of actual nuclear use.

Increasing reliance on nonstrategic nuclear forces might also vitiate NATO's ability to deter and prevail in limited conflicts. As Olga Oliker of the Center for Strategic and International Studies has pointed out, "A lower U.S. threshold would lead Russia to doubt Washington's faith in its own conventional capabilities, damaging the value of the conventional deterrent."[107] Attempts within a conflict to signal alliance resolve by posturing nonstrategic nuclear weapons could not only be highly risky but could also dilute the efficacy of signaling with conventional forces. Nuclear planning within the alliance or within the United States might detract from planning for conventional deterrence signaling or conventional operations. Given the uncertainty inherent in how an adversary might react to nuclear employment, it is unwise to rely on nuclear use to prevail in a conflict, especially if there are available and effective conventional options.

The CAP tabletop exercise was an attempt to simulate a conceivable engagement in which the United States would seriously consider employing a nuclear weapon.[108] In other words, the scenario was selected and construed to facilitate discussion on U.S. nuclear planning. Although this scenario captured a large proportion of the discussion about European deterrence, it is worth considering how much weight it should be accorded in deliberations about force structure and modernization. There is good reason to be skeptical that this highly pessimistic scenario is probable or even possible. Proponents of the scenario have not offered a compelling explanation for why Russia would perceive an interest in occupying the Baltic states in light of the risks that this operation would entail nor have they provided evidence that the option is under consideration.[109]

If Russia were interested in military action to damage NATO cohesion, it may have better options than an outright invasion of the Baltics, including cross-domain provocation to force NATO to move first, limited annexation, or an attack to create a Belarus-Kaliningrad corridor to close the Suwalki Gap and isolate the Baltics.[110] Furthermore, the common belief that Russia's nuclear doctrine

plans for early use of nonstrategic nuclear weapons in a conflict is based on scant evidence.[111] Observers might also question the common assumption that NATO would have only 10-days notice of an invasion. For these reasons, arguments for new nuclear systems that depend on scenarios of this sort should be weighted in proportion to their estimated probability.

In summary, CAP's Baltic exercise provides one piece of evidence that U.S. nuclear options are constrained less by gaps in U.S. nuclear force structure than by facts about this specific contingency as well as the inherent features of nuclear weapons that will constrain any decision to employ them.[112] The scarcity of constructive targets for nuclear use, the primary importance of conventional action, the escalatory risk associated with nuclear use, and alliance cohesion concerns cannot be alleviated by developing and deploying new nuclear systems. Nonstrategic nuclear weapons are simply not a necessary or reliable means of defending allies against a nuclear-armed adversary or of preventing future nuclear attacks. Many of the assumptions that characterize the abstract public debate about new nuclear weapons can break down when tested in a specific scenario. If the debate over new capabilities does continue, advocates should be pressed to demonstrate the logic of their proposals with reference to specific hypothetical contingencies.

Arms race stability

Advocates for new nuclear weapons rarely discuss the implications of their proposals for arms race stability. They tend to underestimate the likelihood that potential adversaries will respond with their own new programs as well as the risks and costs of engaging in competitive modernization. It is unrealistic to think that the United States could field new nuclear capabilities without incurring a response from potential adversaries. For example, the Kremlin has repeatedly threatened to respond to NATO's deployment of the B61-12. A Kremlin spokesman told reporters in 2015 that the deployment "without a doubt would demand that Russia take necessary countermeasures to restore the strategic balance and parity."[113]

As discussed earlier, many of the nuclear modernization programs in Russia and China are clearly attempts to maintain a secure second-strike capability given the fact that the U.S. conventional strike capabilities and missile defenses possess significant capability to limit damage from an adversary's nuclear forces, especially in limited conflicts.[114] And because Russia is clearly willing to posture its nuclear forces in more provocative and reckless ways, it is difficult to argue that deploying new U.S. systems would be stabilizing in the aggregate.

In fact, Russia has every interest in shifting competition away from the conventional domain, where it is weak, and into the strategic domain, where it is relatively stronger. Nuclear competition would focus attention on Russia's formidable strategic deterrent and away from the subconventional grey zone tactics that have terrorized its neighbors. It would divide NATO between allies who support new nuclear capabilities and those who disapprove. Although Russia faces severe fiscal constraints to military modernization, an arms race would help its leadership to justify their defense expenditures at home and to inflame anti-American sentiment in the country's near abroad. The new systems would reinforce Russian propaganda that the United States has aggressive intentions with respect to Russia.

Lastly, Russia clearly has a greater interest in provoking an arms race in intermediate-range systems—as it has done by violating the INF Treaty—and in nonstrategic weapons, given its proximity to potential adversaries and its large arsenal of these systems.[115] In order to deploy these systems, the United States would have to pay the extra cost of having to consult with reticent allies and, when it did, emplacements of U.S. missiles in Europe would be more susceptible to preemptive attack than would launchers in Russian territory.

The total effect of new warheads depends not just on their effect in the near term but also the costs incurred from the inevitable response of potential adversaries. It is difficult to see why the United States would want to acquiesce in Russia's attempt to shift the playing field to more advantageous ground.

Effects on modernization

Calls for new nuclear weapons also underestimate the effects these programs would have on the modernization program of record. Replacing or refurbishing every warhead, missile, and aircraft in the nuclear triad over the next 30 years will be a monumental task. Last year, Brian McKeon, then-principal deputy undersecretary of defense for policy, noted that the Pentagon was "wondering how the heck we're going to pay for it.[116] Although military and civilian officials have consistently said that nuclear modernization is their top priority, many are concerned that scarce resources will force them to make difficult choices between nuclear and conventional modernization priorities and even within the nuclear triad.[117]

Establishing programs for new nuclear weapons would significantly exacerbate fiscal challenges, especially given the uncertainty that would accompany estimates of the costs of new programs. In March, Gen. Selva told the House Armed Services Committee that "any disruption in the current program of record for future acquisition plans will introduce . . . significant risk to our deterrent."[118] Adding programs for new capabilities would be a major source of disruption.

The same is true for the civilian side of the nuclear enterprise. The NNSA is already facing serious challenges with respect to the existing modernization plan. From now until fiscal year 2025, the NNSA will undertake four concurrent life-extension programs, at which point the figure will drop to three.[119] The national laboratories will be hard pressed to recruit, train, and retain qualified personnel as its workforce ages. Adding programs for new weapons would represent a major disruption to the complicated 3+2 plan that has provided a framework for NNSA's activity into the coming decades.

At the same time, the logistical and fiscal effects of adding to the modernization program of record may be compounded by increased political contestation. Initiating programs for new nuclear warheads would likely fracture the bipartisan agreement on nuclear policy that provided for nuclear modernization funding as well as continued efforts to reduce the size and role of nuclear weapons in the United States.[120] This centrist consensus was struck in 2009 as the outcome of three discussions: the informal agreement between the Obama administration and Congress by which the latter would ratify the 2010 New START treaty if the former would support modernization;[121] the 2010 Nuclear Posture Review that endorsed this balanced approach;[122] and the 2009 bipartisan Strategic Posture Commission, which had suggested the compromise.[123] Many in Congress would rightly understand the pursuit of new nuclear capabilities as abrogating this compact, especially if it were accompanied by a move to resume nuclear testing or a deviation from the arms control process. These steps would likely erode congressional support for other elements of nuclear modernization, especially the Long-Range Standoff, or LRSO, weapon and the ICBM replacement.

In summary, calls for new nuclear weapons endanger existing nuclear modernization programs. Critical priorities such as the Columbia-class SSBN, modernization of the nuclear command and control system, and necessary life extensions of existing warheads should not be held at risk by irresponsible proposals for superfluous capabilities.

International political effects

It is not only potential adversaries that scrutinize U.S. nuclear force structure. Allies and nonaligned states also closely follow developments in nuclear modernization.

Just as the prohibition on new nuclear capabilities enabled other aspects of U.S. nuclear policy, it also assisted the Obama administration in its efforts to strengthen U.S. alliances around the world. Allies vary considerably in their views of U.S. nuclear weapons—and a country's executive leadership, foreign affairs ministry, defense ministry, and public will often hold differing views. While many support the nuclear modernization plans, several close NATO and Asian allies have exhibited skepticism.[124] Many U.S. allies care deeply about the Article VI commitment in the Non-Proliferation Treaty, or NPT, to move toward nuclear disarmament; some would fear being caught up in a new arms race or worry that the United States is moving toward a nuclear warfighting strategy that could create new risks in their regions. Friction over the role of nuclear weapons could complicate alliance deterrence planning or coordination during a crisis.

On the other hand, pursuit of new nuclear weapons, combined with rising fears of U.S. abandonment, may strengthen the hand of the small but growing coalitions in allied countries that advocate developing nuclear weapons of their own.[125] If the conventionally superior U.S. military is thought to need nonstrategic nuclear weapons to deter adversaries, it will become difficult to convince allies that they do not. Scattered and unrealistic calls from some on the political right in support of these ambitions only exacerbate the risk that an ally could proliferate.[126]

Nonaligned countries have also grown concerned about U.S. nuclear modernization. A large block of nonaligned countries is pushing hard to link the nonproliferation and disarmament agendas closer than ever before. The push to ban nuclear weapons has distracted attention from NPT reform and other pressing nonproliferation priorities.[127] If the United States was seen to be reversing its injunction against new nuclear capabilities, many of these countries would be rightly concerned that Washington was walking away from its NPT commitments. It could deal a mortal blow to a treaty that is already on tenuous ground, to U.S. credibility on nonproliferation issues in international organizations, or to the next multinational effort to prevent a would-be proliferator from going nuclear.

Although difficult to measure, the international political effects of acquiring new weapons should not be underestimated. Where the United States leads, others follow. There are severe risks in leading toward a world with increased reliance on nuclear weapons.

Recommendations

It is important to draw a distinction between responsible and irresponsible nuclear modernization. Due to the aging of delivery vehicles and warheads, responsible modernization is necessary to ensure that the U.S. nuclear arsenal remains safe, secure, and effective. Although it is not without significant risks to both crisis stability and arms race stability, the net effect of responsible modernization is positive, especially if accompanied by clear and consistent public diplomacy.

Irresponsible modernization includes those programs that attempt to supersede a condition of mutual vulnerability or to provide new ways to hold targets at risk. In a time of significant global instability, the United States must exemplify the highest standards of responsible nuclear stewardship by not acquiring qualitatively new nuclear capabilities, avoiding new deployments and missions for its nuclear forces, emphasizing conventional deterrence, and explicitly accepting mutual vulnerability with Russia and China.

No qualitatively new capabilities

In light of their unpredictable consequences for strategic stability, their disutility for defending allied territory, and their heavy opportunity costs for other national priorities, the United States should refrain from the development or deployment of nuclear capabilities that provide new ways of holding targets at risk. It should avoid developing weapons systems that provide new nonstrategic employment options, including those with lower yields, shorter operational ranges, or special effects. It also should forego additional forward deployments of U.S. nuclear forces into allied territory or international waters near to the shores of potential adversaries.

Ideally, a limitation on new nuclear capabilities should be a matter of policy that is declared as part of the next Nuclear Posture Review. This statement could clarify existing policy by clearly delineating responsible nuclear modernization programs that replicate existing capabilities from those that would provide new ways of holding targets at risk, as well as explicitly repudiating the recommendation of the Defense Science Board to consider increasing the number of low-yield weapons in the U.S. nuclear arsenal. The statement could extend the stabilizing logic of the existing prohibition against new warheads to cover new nuclear-capable delivery vehicles. In issuing a statement of this kind, the administration would improve NATO cohesion, limit domestic debate on core modernization priorities, and improve strategic stability by stating as a matter of policy what is very likely to occur in any case.

However, if the next NPR lacks statements of this sort or—worse—endorses the development of new capabilities, Congress should step in. Budget items that provide for the research and development of new nuclear capabilities, whether as part of an existing or new warhead or as part of new delivery platforms, should be rejected.

No new deployments

The White House should also reject calls for new deployments of U.S. nuclear forces, whether by deploying nonstrategic systems to new locations on allied territory or by expanding the Navy's nuclear mission.

After a distressing election cycle, there is an urgent need to reassure allies about the general outlines of U.S. foreign policy, about America's commitment to their security, and about U.S. nuclear planning in particular.[128] Amid widespread concern that the United States is considering reducing its commitments to allies, now is not the time to introduce uncertainty into U.S. nuclear policy or to push for new deployments. With NATO under strain from the administration's misguided arguments about burden-sharing and troubling ties between U.S. officials and Russian intelligence, pressing countries to accept new deployments of nuclear systems would deal a serious blow to alliance cohesion.[129] South Korea's new government is likely to stake out ground to the left of the departing Saenuri Party government. After many on the political left in South Korea expressed skepticism of U.S. deployment of theater ballistic missile defenses, plans to introduce new nuclear weapons into Northeast Asia would certainly strain the U.S.-Republic of Korea relationship as well.[130]

Perhaps most importantly, forward deployments of nonstrategic nuclear weapons would not meaningfully contribute to deterrence. For example, deploying B61 bombs and DCA aircraft to South Korea would not bring new targets in range or even necessarily increase the likelihood that the United States would employ nuclear weapons in a conflict. The vulnerability of DCA means that these systems are unlikely ever to be used.

On the other hand, such a deployment would legitimate the nuclear ambitions of the North Korean regime and provoke a grave crisis with China and likely also Russia.[131] Rather than strengthen the alliance between the United States and the Republic of Korea, it would put South Korea in a perilous position between outraged larger powers.[132] Both because leadership in Beijing and Pyongyang would consider any nuclear use on the peninsula to be highly inflammatory, and because neither country has the sensing capability to determine how the United States delivered a nuclear weapon, there is little possibility that either would distinguish between a nonstrategic and a strategic U.S. nuclear strike. The priority on the peninsula has to be in developing conventional options that can resist North Korean aggression while demonstrating limited intent.[133]

Forward deployments of nuclear weapons, including nonstrategic systems, would only feed into perceptions among potential adversaries and nonaligned states that the entire nuclear modernization plan is an attempt to achieve escalation dominance and to lock in a condition of nuclear supremacy. It would also reinforce narratives that the United States is attempting to encircle and contain Russia and China with military forces stationed around their peripheries. Both factors would raise the likelihood that the relatively restrained modernization plans erupt into a highly unstable arms race.

Plan for conventional deterrence

Increasing reliance on nuclear weapons is especially unwise at a time when America's adversaries are becoming increasingly adroit at operating and aggressing at low levels of escalation. In Ukraine, in the South China Sea, in Syria, and along the 38th parallel that divides the two Koreas, allied forces are increasingly pressed to find ways to respond to aggressive actions that fall well below the threshold of conventional war—to say nothing of nuclear war. Special operations forces, cyberattacks, gradually expanding territorial claims, and other tactics are all ways of achieving national objectives by consciously manipulating and exploiting escalation thresholds.

While it is certainly true that allied forces must be prepared for the possibility that a contingency that begins at the subconventional level could escalate to nuclear use, the first priority ought to be in finding ways to deny and defeat aggression in the gray zone between war and peace. Nuclear weapons are not credible deterrents for this kind of activity and consume funds that conventional forces need to defeat aggression.

Emerging work on cross-domain deterrence shows considerable promise as a framework for deterrence at lower levels on the escalation ladder. This concept seeks to exploit the complex interdependencies between different domains of statecraft and avoid being backed into a position where the only response to a provocation is a reciprocal action. These concepts, according to academics Erik Gartzke and Jon Lindsay, seek "to counter threats in one arena by relying on unlike capabilities in another area where deterrence may prove more effective."[134] Provocations in outer space or in the maritime environment may find a more credible and more effective response in cyberspace, with conventional forces, or with diplomatic or economic leverage.

This framework opens the possibility that the optimal response to a limited nuclear detonation may rely on conventional, cyber, or nonmilitary actions rather than a reciprocal nuclear response. In fact, there may be a strategic advantage in refraining from nuclear retaliation and continuing to press a conventional fight if doing so can demonstrate to an adversary that it cannot succeed in eliciting a nuclear response that might transform a conflict.[135] Simulations that model cross-domain deterrence have helped strategists to anticipate the full context of potential contingencies, but more work is required to learn how these kinds of interdependencies can be used to deter—not just to fight. Furthermore, more work is needed in the unclassified space to simulate how to respond to a limited nuclear strike with nonnuclear means. It is entirely possible that a president refuses to authorize a nuclear retaliation to a small nuclear strike but still insists on prevailing in the conflict.

Conventional deterrence remains a vital part of the U.S. arsenal for deterring and defending against attack and also for reassuring allies.[136] Because of their incomparable ability to defend allied territory against attack—and because they enable U.S. and allied forces to plan, train, and operate together on a daily basis—the visible forward presence of U.S. conventional forces is the strongest form of assurance.[137] Allied conventional forces provide more credible and more flexible response options to a wider range of threats, and any response to provocation will certainly entail some reliance on these forces.

Unfortunately, some proposals for new nuclear weapons denigrate the credibility or effectiveness of conventional deterrence. Anxious to establish that nuclear weapons are unparalleled signs of U.S. commitment, these arguments actually serve to undermine a vital element of U.S. deterrence. U.S. defense planners should seek ways to maximize their ability to deter and to signal with conventional forces during a crisis. Military and civilian leadership should ensure that their public statements of deterrence and assurance emphasize the critical role of these forces.

The United States should also consider limiting the frequency and the severity of nuclear exercises. Many observers have rightly noted an alarming increase in the frequency and scale of Russian nuclear exercises.[138] Although Russia's activity is far more alarming, several recent NATO nuclear exercises are also cause for concern. During the Polar Growl exercises in April 2015, four nuclear-capable B-52H bombers flew routes across the Arctic Sea and the North Sea to positions from which they could fire air-launched cruise missile, or ALCMs, into Russian territory.[139] In mid-2016, three B-52 bombers and two B-2 bombers conducted nonstop flights from all three U.S. strategic bomber bases to the North Sea and the Baltic Sea.[140] In late 2016, three nuclear-capable B-52H bombers flew 15 sorties into the South China Sea in a tacit nuclear threat over Chinese territorial claims there.[141]

The exercises, justified as a way of strengthening allied interoperability, bear a disconcerting resemblance to provocative sorties flown by Russian bombers near NATO airspace, some of which reportedly simulated nuclear strikes on NATO allies.[142] Two months later, as the annual U.S.-NATO exercises were occurring, an Ohio-class SSBN conducted four test flights of the Trident II D5 SLBM over three days.[143] While exercises are clearly necessary to sustain operational readiness and interoperability with allies, simulated nuclear attacks add considerably to tensions in the Baltic region and increase the risks of accidents occurring. Given the alarming and contradictory statements from the White House on nuclear issues since the election, there is a greater risk that these exercises could be misinterpreted. Planners should build in wider margins for error and misperception than they are accustomed to.

Lastly, the United States should move away from a nuclear warfighting posture. For example, as academics Jeff Lewis and Scott Sagan suggest, the next NPR could declare "that the United States will not use nuclear weapons against any target that could be reliably destroyed by conventional means."[144] They argue that this policy would better comport with the just war theory and the law of armed conflict, which requires countries to use the minimum amount of military force necessary

to achieve just objectives. "It is hard to imagine," the authors write, "a circumstance in which it would be either ethically responsible or strategically wise to use a nuclear weapon when a conventional one would suffice."

According to Lewis and Sagan, "Placing conventional weapons at the center of debates about the future of deterrence would also help focus the policy discussion on plausible scenarios with realistic plans."[145] Making this commonsense declaration would not preclude the United States from practicing nuclear deterrence or from employing nuclear weapons in a situation of supreme need, but it would place prudent constraints on the use of nuclear weapons for warfighting purposes. It would constrain debate over new nuclear capabilities, especially low-yield capabilities whose effects could be achieved by conventional strikes. The proposal is therefore deserving of serious consideration.

Doctrinal statements are only part of the equation. U.S. planning, exercises, consultations with allies, and nuclear signaling should disavow the use of nuclear weapons to achieve tactical objectives on the battlefield when conventional weapons can suffice. For example, nuclear forces are inappropriate and unnecessary for the suppression of enemy air defenses, which occurs in the early stages of a conflict.[146] The strategic and political effects of nuclear employment will far outweigh any tactical benefit gained. Meanwhile, giving the impression that the United States would consider using a nuclear weapon on the battlefield would create serious instability in militarized disputes as adversaries could perceive themselves as being under nuclear attack, which raises the risk that an enemy could attempt to preempt such a strike.

U.S. interests and deterrence credibility is best served if allies and adversaries alike understand that the United States would consider employment of a nuclear weapon only in the gravest circumstances and that U.S. conventional forces are equipped to prevail over aggression.

Accept legitimate modernization abroad

Drawing a distinction between responsible and irresponsible modernization also provides better footing for assessing foreign programs. There is a tendency in the United States to express alarm at the simple fact that other countries are engaged in modernization while omitting discussion about the stability implications of the specific programs. This includes the more facile arguments surveyed above that claim falsely that potential adversaries are modernizing while we are not. As Carnegie Endowment for International Peace Senior Fellow James Acton has observed, there must be such a thing as legitimate modernization.[147]

Each of the P5 nuclear countries recognized under the NPT are justified in pursuing more capable versions of existing systems if this capability is required to accomplish existing missions or to meet basic standards of survivability. Chinese nuclear modernization is a case in point. Chinese nuclear capabilities have regularly lagged behind U.S. intelligence assessments of their potential and appear subject to significant constraints by political leadership, whether fiscal or peremptory. Many of China's new programs are clearly intended to enhance the country's survivability against U.S. conventional and nuclear strike capabilities. For example, the gradual development of diesel ballistic missile submarines, range improvements to the inventory of mobile ICBMs, and improved penetration aids all seek to raise China's leadership's confidence that they could order a nuclear second strike if necessary. In short, most Chinese nuclear developments are concerned with meeting basic standards of deterrence and survivability and are therefore essentially stabilizing. While China is indeed fielding new capabilities, these are stabilizing attempts to achieve a rudimentary nuclear triad.

China's efforts to upload multiple warheads onto their missiles are more troubling in this regard. Multiple warheads, or MIRV, may improve a missile's ability to defeat a ballistic missile defense system, but they also present a more valuable target for potential adversaries. However, because other P5 countries operate MIRV missiles, this development can probably not be called illegitimate.

Publicly accepting legitimate modernization abroad would help to avoid destabilizing and costly arms races and limit unconstructive debate here at home. Doing so will also enhance the credibility of U.S. officials when they must criticize irresponsible programs in other countries that appear to raise the possibility of nuclear conflict, including Russia's SSC-8 ground-launched cruise missile—which violates the INF Treaty—and North Korea's launching of ballistic missiles. These assessments can be conveyed during bilateral exchanges between defense officials, repeated to allies as part of deterrence dialogues, and issued publicly in testimony before Congress and in congressionally mandated assessments of foreign military programs.

The United States should also publicly and explicitly accept mutual vulnerability with its near-peer potential adversaries. The upcoming Nuclear Posture Review should reiterate the statement of the 2013 Nuclear Employment Guidance that "the United States seeks to improve strategic stability by demonstrating that it is not our intent to negate Russia's strategic nuclear deterrence, or to destabilize the strategic military relationship with Russia."[148] Omitting China from this statement

sends a conspicuous signal. Extending this assurance to China would acknowledge the salient fact that its forces could likely survive a U.S. first-strike attempt and signal that U.S. modernization and military deployments will consciously work to preserve this fact, thereby limiting the potential for arms racing dynamics.[149]

During the Cold War, many American leaders and statesmen understood that their own security depended on the survivability of Russian forces and thus American interests required limitations on U.S. capabilities. With the return of strategic tensions, it is important that this insight is recovered at an early date, lest the country be forced to learn it after replicating the excesses and dangers of the early Cold War.

Conclusion

The injunction against new nuclear weapons is not a transient or cosmetic artifact of the Obama administration's nuclear policy. It is a bright line that has been adhered to since the end of the Cold War. The articulation and preservation of this line has enabled other elements of U.S. nuclear policy, including modernization of the nuclear triad.

Both within U.S. debates over defense budgets and in foreign capitals concerned with the nuclear balance, the deliberate decision to refrain from deploying new nuclear capabilities has constrained debate over nuclear modernization. Domestically, it has enabled the armed services and the NNSA to allocate their resources and attention where they are most needed: in the core capabilities of the nuclear arsenal that are necessary to meet deterrence requirements. Internationally, it has signaled to allies and adversaries that the United States is not interested in competing for escalation dominance, lowering the threshold of nuclear use, or engaging in an open-ended arms race.

The burden is squarely on those who want to overturn the existing policy. In light of the costs and risks of pursuing new nuclear capabilities, advocates must demonstrate not only that the security environment has become riskier but also that existing nuclear and conventional capabilities are insufficient to deter conflict, that the proposed systems are uniquely required to do so, and that the advantages outweigh the costs. They have not done so.

The available evidence indicates that the U.S. nuclear arsenal currently contains sufficient capability, flexibility, and readiness to meet deterrence requirements. Despite its age, the arsenal already possesses a marked advantage over that of potential adversaries, especially in stealth, early warning, and integration with advanced intelligence, surveillance, and reconnaissance. More importantly, U.S. conventional forces continue to enjoy a considerable margin of superiority over conventional adversaries if sufficient force can be brought to bear. The current

modernization program is more than sufficient to meet the country's needs. The disutility of nuclear weapons for deterring and contesting limited conflicts has little to do with gaps in the nuclear triad and everything to do with the inherent properties of the weapons themselves that limit their utility in such contingencies.

The most pressing threat to strategic stability today is the mistaken belief that the consequences of nuclear employment can be predicted or shaped into a tolerable form. The concept of nonstrategic nuclear weapons is an attempt to do just this. The United States, because of its conventional superiority, its commitments to its allies, and its inherent interest in international stability, should have no interest in engaging in competition in nonstrategic nuclear weapons. Though the prospects currently seem slim, every effort should be made to seek negotiated reductions in this class of weaponry.[150] A commitment to seek reductions in nonstrategic weapons stocks was also a condition of the bipartisan agreement that enabled the balanced approach on U.S. nuclear policy.[151]

Fiscal, political, and stability considerations mean that the United States is ultimately unlikely to pursue new nuclear capabilities in the foreseeable future. If this reality is affirmatively embraced as a matter of law or of policy, it could yield significant benefits. On the other hand, even if new weapons are not developed or deployed, proponents should understand that continued advocacy risks incurring some of the costs of actually deploying the systems, including risks to core nuclear modernization plans. U.S. leaders should put these radical and reckless arguments behind them and continue on with the challenging work of finding credible deterrence concepts for the difficult years to come.

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