Strategic Weapons in the 21st Century

"Continuity and Change in U.S. Nuclear Deterrence Strategy"

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Workshop Summary[1]

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The 19th annual Strategic Weapons in the 21st Century (SW21) workshop aimed to sustain high-level focus on key deterrence challenges and to promote well-informed discussion of them on a non-partisan basis. It brought together interested stakeholders from the national security laboratories, federal government, military, think tank, and academic communities, as well as allied counterparts, to share perspectives in an unclassified setting. The agenda was designed to examine the following key questions:

- What are the Trump administration's nuclear policy priorities?
- What effect is the Strategic Posture Commission (SPC) likely to have on that policy?
- How can the nuclear enterprise finally break from business as usual?

All remarks and discussion were on a non-attribution basis.

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Panel 1: The Initial Policy Trajectory

- What early markers has the Trump administration put down about its nuclear policy?
- What process has it put in place to make and implement policy?
- What impact can the SPC be expected to have?

The Trump administration's second-term nuclear policy has been marked by strong rhetorical commitments to nuclear modernization, nonproliferation, and strategic deterrence. President Trump has emphasized that nuclear war is the greatest threat facing the United States. This Trump administration has prioritized efforts to prevent nuclear war while ensuring allies contribute more to conventional defense. The U.S. retains its mission to provide extended nuclear deterrence (END), underscoring the importance of maintaining global stability.

Key early markers of this administration's abovementioned goals include Secretary of Defense Hegseth insulating nuclear modernization programs from large cost saving measures in the DOD, and strong support for the submarine-launched cruise missile (SLCM-N) during confirmation hearings. The administration's introduction of the "Golden Dome" initiative is compatible with the missile defense objectives laid out in the Strategic Posture Commission (SPC). It signals a strategic approach to competition with Russia and China—focused on rebalancing offense and defense, enhancing missile defense capabilities, and adapting nuclear posture to address evolving threats.

Despite these markers, some uncertainties remain. The Administration is still working to get senior officials in place and has yet to establish a clear process for decision-making and implementation. Although Congress has seen the top line of the budget, it has yet to see how defense priorities will play. To navigate these uncertainties policy makers and defense planners are pursuing a base strategy through programmatics. Uncertainty persists over how strategic offense and defense will be rebalanced with Golden Dome; what the nonproliferation stance will be as the United States rebalances responsibilities for defense at the regional level; how that rebalancing will affect allies; whether allies will seek nuclear weapons; and how this administration thinks about nuclear security when the problem doesn't involve the United States in its initial stages.

Additionally, the process for implementing nuclear policy under the Trump administration faces challenges. Experts have emphasized the urgency of adapting the Program of Record (POR) to address the gravity of the nuclear threat, particularly the increased concern around China and Russia's theater capabilities. The SPC mentions the word "urgent" more than 40 times, many in reference to theater nuclear force adaptation. However, key capabilities like the SLCM-N may not be available until the mid-2030s, raising concerns about whether this timeline is fast enough.

To accelerate progress, the administration should direct the national laboratories to explore alternative solutions that could deliver similar capabilities sooner. Interim capabilities can be developed to reinforce regional deterrence in the pacific and Europe while longer-term systems are in development. One panelist suggested developing a regional triad in Europe to convince Russia that it cannot prevail in a nuclear conflict. The DOD has the capacity to move faster if prioritized, but this depends on how the administration resources and prioritizes these efforts.

This administration must also decide whether to undertake a full Nuclear Posture Review (NPR). While a comprehensive NPR could provide long-term strategic guidance, experts argue that it could waste precious time. However, however the nuclear complex needs direction. One panelist suggested a kind of "mini-NPR" that could provide early direction for the enterprise and enable planning and progress while allowing for a longer NPR process looking over the horizon. The SPC builds effectively on the 2018 NPR, suggesting that the administration could achieve similar benefits through the National Security Strategy (NSS) and National Defense Strategy (NDS) processes.

The SPC has played a pivotal role in shaping U.S. nuclear policy, emphasizing the need for urgent adaptation to deter both Russia and China simultaneously or sequentially. The SPC highlighted regional deterrence as more fragile than strategic deterrence, warning that China and Russia are seeking to erode U.S. influence by undermining alliances in Europe, Asia, and beyond. To counter these threats, the SPC recommends both implementing and adapting the POR, increasing theater capabilities, and enhancing missile defense systems.

The SPC has stressed that while the U.S. does not necessarily need more nuclear warheads, it must adapt its posture to meet emerging challenges. The Asian theater, in particular, requires significant adjustments, with the SLCM-N identified as a critical capability. The SPC has urged the administration to explore faster alternatives to close capability gaps and increase presidential options.

Missile defense has also been emphasized as a key component of deterrence. Russia and China seek to threaten the U.S. homeland by paralyzing decision-making and preventing the U.S. from aiding its allies. To reduce this coercive leverage, the SPC recommends increasing ballistic missile defense (BMD) capabilities.

Congress has demonstrated strong support for the SPC's recommendations, incorporating them into defense authorization acts and public discourse. By bringing discussion of these threats from the classified into the public domain, the SPC has enabled policymakers and constituents to understand the value of nuclear modernization, its role in global stability, and the resulting benefits for the national and international communities.

Despite the SPC's recommendations, significant challenges and uncertainties remain. The future of arms control post-New START is unclear, as neither Russia nor China has shown an interest in formal agreements. China seeks parity in nuclear capabilities and regional domination in conventional forces, creating structural impediments to constructive arms control. While risk reduction measures and dialogues may be more promising, formal agreements appear unlikely.

The expiration of New START without a follow-up agreement further complicates the strategic landscape. The administration's sequence for addressing these challenges appears to involve a ceasefire, followed by a peace deal, a security architecture, and then opportunities for U.S.-Russia engagement. However, Russia and China are hostile to Golden Dome, given its expected impact on their confidence in the credibility of their deterrents .

The administration's focus on China's rise has also shifted to Europe the responsibility for addressing Russia's threat to Europe. This raises questions about when the U.S. will adopt an industrial policy to address both adversaries effectively. The discussion stressed that the U.S. must place its industry on a war footing to rebuild naval capacity and address strategic deterrence challenges. Delaying these investments until 2035 is not an option.

The modernization of U.S. nuclear forces is projected to cost over $1 trillion, presenting significant budgetary challenges. Rising debt and proposed tax cuts further constrain resources, while U.S. shipbuilding capacity remains minimal compared to China's. Rebuilding this infrastructure will require bipartisan commitment, stable funding, and clear priorities—there are no shortcuts or budget tricks that will fix this. Furthermore, without sustained commitment, industry won't have the confidence to invest in recapitalizing the defense industrial base. If the U.S. continues to defer investments it will not have the capabilities necessary to continue deterring adversaries in the future and prevent them from crossing the nuclear threshold.

Decades of deferred investments have created a backlog of modernization needs. On both the DOD and National Nuclear Security Administration (NNSA) sides, investments have been delayed for years, leaving aging systems in need of urgent upgrades. Deferring investments further will only exacerbate the challenges, making it a political choice to address these issues now or face the consequences later.

Diplomacy and alliance management remain critical components of nuclear policy. The Department of State (DOS) plays a key role in deterrence campaigning and assurance, ensuring that allies feel secure and contribute to collective defense. Allies must articulate their needs clearly, providing tangible examples of security benefits rather than focusing solely on percentage-based contributions.

The administration must ensure that diplomatic tools remain available to support deterrence objectives. Proposed cuts to the Department of State could undermine alliance management and reduce options for addressing global security challenges. Experts argue that offering more options to the president, rather than fewer, is essential for maintaining deterrence and stability.

Panel 2: The Changing Security Environment and Its Implications

- What has changed—and what has not changed—since the 2021 Nuclear Posture Review?
- How consequential for nuclear deterrence is the deepening cooperation among U.S. adversaries?
- What changes in U.S. nuclear policy and posture are required?

The United States is not on the brink of nuclear war, but it is essential to recognize the stakes involved. The current program of record (POR) was designed with only one key adversary in mind, Russia, leaving some flexibility for unforeseen challenges. However, the emergence of China as a nuclear peer is unprecedented and unexpected. Unlike previous assumptions, China is rapidly advancing its nuclear arsenal, developing a significant stockpile of warheads and early warning systems, which presents a more aggressive nuclear posture. Russia continues its conventional aggression under a nuclear shadow. Actions such as the deployment of nuclear weapons to Belarus, shifts in nuclear doctrine, expanding nuclear use cases while supporting Iran and North Korea are destabilizing and eroding the nuclear taboo . While there are opportunities for risk reduction and baseline measure that can preserve crisis stability, meaningful strategic arms control is unlikely in the near term due to irreconcilable differences with Russia and China. Despite efforts by the Biden administration, the relevance of nuclear weapons in advanced strategies and capabilities continues to grow, with adversaries using nuclear coercion and attempting to undermine U.S. alliances. This has led allies to question the credibility of U.S. security commitments, necessitating a united front and a recommitment to alliances and extended nuclear deterrence (END). Transparency in U.S. nuclear strategy must be enhanced, and END software requires continuous upgrades. The Department of Defense (DOD) must rethink its strategy to address China's nuclear buildup and its implications for U.S. strategy in conventional conflicts. Understanding China's evolving views on nuclear capabilities is critical, as is modeling U.S. nuclear forces to simultaneously engage Russia in Europe and deter China and North Korea in the Indo-Pacific. Deploying more submarines in the Pacific may be worth considering.

The United States must recognize that Europe and Asia are distinct regions and evaluate near- and mid-term options for regional deterrence. Ground-launched capabilities and sea-launched cruise missiles (SLCM-N) must be considered coherently. Allies require visible assurances rather than non-visible capabilities, and their perspectives must be incorporated into U.S. strategies. Although nuclear weapons are not a perfect solution, collaboration with allies is essential. Despite challenges, the foundation of U.S. nuclear strategy remains strong.

Over the course of several Nuclear Posture Reviews (NPRs), the need to reduce bureaucratic obstacles in industrial policy has been emphasized. Preventing proliferation requires both ambitious nuclear capabilities and a strong Non-Proliferation Treaty (NPT). Delpeche's *Savage Century* made three bets about the world in 2025; all three are ongoing challenges: terrorism, increased proliferation, and China's rise and regional ambitions. These issues can no longer be deferred, as the pace of change is accelerating. The war in Ukraine has marked a turning point in the cooperation between Russia, China, North Korea, and Iran. Iran has provided Russia with short-range ballistic missiles (SRBM) in exchange for technology. Allies' concerns about U.S. credibility are longstanding. Discussions about shifting responsibilities to Asia have stretched over the last decade, a the concept of a Euro-deterrent dates back to de Gaulle. Despite these fears, the United States remains a committed NATO ally. A noteworthy change is European allies loose talk about proliferation, stemming from perceived volatility in U.S. policy. An emerging theme in expert discussions with allies is desire for commitments in both words and actions. The breakdown of arms control and norms is not new, as Russia has suspended treaty participation before.

Experts warn the NPT is at risk of irrelevance due to fewer countries sending delegations. The NPT is under mounting strain, and the panelists warned of a gradual erosion rather than a sudden collapse. This is attributed to the security environment and the failure to hold states accountable when they violate laws and norms. Some Non-Nuclear Weapon States (NNWS) may view the NPT's slow decline as progress toward disarmament. At the 2022 Review Conference (RevCon), U.S. POR was mentioned as a threat to the NPT more frequently than Russia's nuclear threats, while China's nuclear buildup was not mentioned at all. The Treaty on the Prohibition of Nuclear Weapons (TPNW) remains silent on Russia's threats. The next RevCon is unprecedented due to two consecutive failures, making it imperative to strengthen the NPT. The international community must respond to these challenges, calling out Russian and Chinese disinformation and obstructionism.

A more flexible nuclear arsenal is required, as emphasized in Congressional testimony. Preparations must be made now for the expiration of New Start, including enhanced laboratory capacity, diversification of nuclear forces, expansion of the NATO DCA mission, and encouraging the United Kingdom to rebuild its airleg. A flexible force requires skilled experts across all aspects of the nuclear enterprise, including hardware, software, and personnel. Presidential agreement on retaining New Start central limits is crucial, and the P5 process within the NPT remains the only avenue to engage China. The United Kingdom's role as coordinator of the P5 process offers opportunities for progress.

Delpeche's work on the role of nuclear weapons in the 21st century suggests that while their importance may decline compared to the Cold War, the risk of nuclear use will be higher. To avoid nuclear blackmail, a flexible force is essential, and arms control must be pursued to strengthen the NPT. In recent months, seven of nine Nuclear Weapon States (NWS) have engaged in combat operations. While this is not a gamechanger, it is concerning, as interstate conflicts could increase the likelihood of nuclear involvement. Key measures include assessing threats to U.S. treaty allies and monitoring China's movements toward Taiwan. The increasing reliance on nuclear weapons and the erosion of guardrails is a new development. Lessons from Ukraine must be analyzed to understand their implications for China and North Korea's military preparations.

The United States should explore alternative weapon effects rather than nuclear options, as there is no current technological need to resume testing. The administration must demonstrate continuity in commitment to all three pillars of the NPT. The global south is critical to holding Russia and China accountable, with nations such as Ghana, South Africa, Brazil, the Philippines, and Kenya expressing interest in engaging with the United States. Emphasizing the benefits of peaceful uses within the NPT is crucial, particularly in areas such as development and clean energy. Next year's Review Conference as a critical juncture for the survival of the NPT. The United Kingdom's P5 presidency should launch ambitious initiatives leading up to the RevCon. Political leadership is vital, as demonstrated by the G20 statement on the inadmissibility of nuclear threats, which engaged the global south. Advancing all three NPT pillars and combining nonproliferation efforts with disarmament is necessary.

The discussion highlighted that the DOD could leverage arms control to address specific challenges that would otherwise require new capabilities to demonstrate to Russia and China that no advantage can be gained. Risk management in outer space and regional deterrence must be prioritized. The Golden Dome initiative presents an opportunity to discuss homeland and regional missile defense capabilities with Russia and China. Building leverage and buying time are essential, as the United States currently lacks negotiable assets. Scaling up laboratories and dialogues with China should be pursued, pausing engagement with Russia while bringing China into the process. Strengthening counterproliferation goals requires increased investment in the intelligence community and cooperation with allies. Balancing deterrence and restraint is challenging, but the United States remains the most transparent NWS, painstakingly communicating stockpile intentions and modernization efforts. While modernization is scoped to a different security environment, transparency is critical, especially regarding China's nuclear activities.

Russia's deployment of nuclear weapons to Belarus has minimal impact on the United States but poses challenges for allies and the NPT. Arms control with Russia may need to address the Belarus issue, which holds symbolic and operational significance. Efforts to convince allies to deploy long-range fires must consider the importance of conventional deterrence. Ground-based medium-range nuclear capabilities may be more affordable but could trigger domestic political risks for allies, reminiscent of the Euromissile crisis. Balancing arms control and deterrence is crucial, with modernization necessary to reduce risks of misperception and miscalculation. While formal treaty-based bilateral reductions are not advisable, broader arms control measures, such as risk reduction, remain valuable. Senior policy officials must deepen their subject matter expertise to effectively address these challenges. Defining terms and understanding the implications of arms control and deterrence is essential for informed decision-making.

Panel 3: Extended Deterrence in the New Context

- What changes in the global security environment are most consequential for US extended deterrence?
- Is the US extended nuclear umbrella fit for purpose?
- What should be done now to strengthen and adapt regional deterrence architectures?

The discussion started with the recognition that the United States has an obligation to extend its nuclear deterrent to Europe and Asia against strategic attacks, nuclear and nonnuclear. Washington extends its nuclear deterrent not out of charity, but out of self-interest. Extended nuclear deterrence (END) gives the U.S. foreign base access . Fewer allies can start war, let alone nuclear war, against Washington's will. END is our best nonproliferation tool. Since the mid- to late 1950s, only one ally has chosen to pursue its own nuclear weapons because it thought END wasn't credible, France. That is a remarkable success story. END further gives Washington the ability to keep markets open and allies free.

The discussion focused on how to strengthen the credibility of END. Panelists agreed that credibility does not hinge on convincing allies that an American president would sacrifice a U.S. city for an allied one. Instead U.S. extended deterrence is made credible through sufficient conventional and nuclear capabilities to save Berlin without risking Boston. The United States' ability to limit damage on the homeland and allied territories are both credible. Historically, the U.S. was able to assure both allies and adversaries that it could manage escalation is challenged while also defending the homeland.

Central deterrence capabilities, such as ICBMs, are critical to convince an adversary that it cannot achieve its objectives through force. Damage limitation and trip wires are the core of END. Panelists made the analogy of separating the components of END into software and hardware. On the software side, the U.S. needs to convince allies that it would be willing to fight on their behalf. Additionally, it needs to address that allies give insights and contribute to the extended deterrence architecture instead of just being price takers. The last administration worked hard in increase contributions from NATO and Pacific allies. These software upgrades were critical in last 5 years with the emergence of China, North Korea, and Russia as revisionist states. However, the software must be married to the hardware (the capabilities) to make END more credible.

At present, the U.S. is facing END challenges on both the hardware and software sides. On the hardware side, a revisionist Russia, a second quantitative peer China, and North Korea are leading allies to question whether the U.S. is capable with its current force posture to deter and assure allies in both theaters and limit damage to allies and homeland. The current answer is no. On the software side, for the last 75 years, there was bipartisan agreement that END was a core U.S. objective. For first time, the question is not how to extend deterrence, but whether we should do it in the first place?

The U.S. needs to think hard about whether its regional and central deterrence capabilities are fit for purpose and assurance. Washington has never had to assure allies against a peer in the Indo-Pacific. Does the US have the maritime capabilities (SLCM-N or other) to deter China and/or North Korea if it is losing in a conventional conflict? Does it have the capabilities to manage escalation without risking the US homeland? The U.S. needs to urgently think about what capabilities should follow the B51-12.

There is a strong case for a new air-launched or ground-launched capability for Europe, perhaps in conjunction with SLCM-N. The U.S. must not lose focus on central deterrence missions. Regional deterrence escalation tools are only good if they are backstopped by central deterrence forces. The U.S. will need more deployed capabilities to deter effectively in a two-peer world. Several options exist for providing additional capacity on the triad. For the sea leg, the U.S. could extend the lifespan of Ohio class submarines or order additional Columbia class submarines. To hold the new Chinese ICBM silos at risk, for which the sea leg is particularly useful, Washington needs additional options quickly due to production and innovation timelines.

Strengthening regional deterrence against Russia is the most urgent goal for the U.S. government today. There is no alternative to U.S. extended nuclear deterrence. For 76 years, no state has launched an attack against NATO because NATO's nuclear deterrence has been effective. The central challenge today then is preparation for a conflict with Russia, in which Moscow could fight under the nuclear shadow and/or use nuclear weapons to fracture alliance unity during the conflict. If Russia crosses the nuclear threshold, NATO needs diverse options to respond. NATO has done a lot on the software side, improving its ability to coordinate all 33 members to make a decision during a conflict.

On the hardware side, NATO has its own triad: conventional, theater nuclear weapons, and strategic nuclear weapons. The Alliance's ability to deter and defend itself relies on having the appropriate mix of conventional and nuclear forces. What that "appropriate mix" looks like and how it balances between U.S. and European contributions is in flux. European allies are spending more on conventional forces and enhancing societal resilience so NATO can implement the plans of the Supreme Allied Commander Europe (SACEUR) if needed. Conventional capabilities are important enablers of nuclear capabilities (such as ISR) which deterrence rests upon. Improvements in missile defense and deep precision strikes will also have deterrence gains against Russia. However, conventional forces alone are insufficient to deter Russia, and need to be backed by theater and strategic nuclear forces.

Strategic nuclear forces on their own are not a credible deterrent even with more conventional lethality. Strategic nuclear forces should be reserved for deterring strategic attacks. Meanwhile, theater nuclear forces should respond to a crisis in Europe in a proportionate way. The war in Ukraine shows that NATO needs to prepare for a sustained conventional conflict against Russia to avoid NATO nuclear use. If NATO can't sustain a conventional conflict, then it may need to fall back on nuclear weapons. More theater nuclear options are needed. In a protracted conventional fight, the DCAs might be used and lost in conventional air-land battle operations. NATO will also need more tankers that can survive a protracted conventional war to enable DCA nuclear operations if and when required.

At present, the U.S. only has one option in theater from a NATO perspective. An additional option is needed. NATO needs a theater nuclear posture that is more robust (increasing DCA survivability, drones, and cyber). One additional capability NATO needs is a standoff missile for the F35s in a conventional and nuclear form. This could be bought through multinational procurement so the allies can share costs. Similarly, Britain and France have substrategic options, with France having decided to expand the number of its DCAs. The UK could reconstitute its air leg. It was discussed that it may also make sense for NATO consider SLCM-N and a nuclear-armed ground-launched cruise missile or ballistic missile or hypersonic capability. This presents an opportunity for burden shifting. NATO could consider joint procurement of missile systems, giving allies more ways to contribute to nuclear deterrence. The group also discussed that NATO could benefit from deep-precision strike capabilities for a range of purposes. These capabilities would complicate Russian targeting and strategy.

In the Indo-Pacific, the emergence of the two-peer or three-body nuclear deterrence challenge raises credibility concerns over the U.S. nuclear umbrella. South Korea is concerned about the extent to which U.S. bilateral commitments may be compromised during contingencies. From a South Korean perspective, the biggest concern is that structural changes in the security environment could diminish U.S. resolve to defend South Korea in a militarized crisis with the North. The U.S.-ROK alliance has consisted of conventional pillar and an END pillar to deal with the DPRK. Recent enhancements to the alliance include the statement that any use of North Korean nuclear weapons would result in the end of the Kim regime, the Nuclear Consultative Group, new exercises, and conventional-nuclear integration (CNI).

The concern now is that the DPRK is constitutionalizing its offensive nuclear doctrine while also venturing into an unprecedented mutual defense arrangement with Russia. The DPRK has supplied 70%+ of Russian munitions used in Ukraine. Against this backdrop, South Korea worries that the second Trump administration might not perceive the DPRK as the primary threat in the Indo-Pacific because Washington's public statements thus far have focused on the PRC, not on the DPRK. To many in South Korea, it appears that the administration seeks to shift the burden of deterring the DPRK to Seoul. For the first time, therefore, South Koreans ask not whether U.S. END is fit for purpose but instead if the United States has the will to provide an END umbrella that is fit for purpose?

Strengthening the END architecture would go a long way in reassuring allies and enhancing deterrence by signaling resolve. Reinforcing U.S. commitments to South Korea would also check proliferation pressures. Options to this end include forward-basing U.S. nuclear weapons to South Korea (either with U.S. pilots flying the mission or a NATO-style sharing arrangement with South Korea, whereby South Korean pilots would fly the mission) and giving allies in the Indo-Pacific an option to join Support of Nuclear Operations with Conventional Air Tactics (SNOWCAT)/ conventional support for nuclear operations (CSNO) missions; that is, to integrate their conventional forces into U.S. nuclear operations in the region. Although SLCM-N will go some way in mitigating the present lack of U.S. nuclear forces in the Indo-Pacific, SLCM-N alone is insufficient because it is not visible. South Korea has not yet been offered these options. Adversaries must not believe that the U.S. has an END hierarchy, which prioritizes NATO over the Indo-Pacific. This why strengthening the regional END architecture and deepening CNI is so beneficial; these efforts depart from the hierarchical conceptualization of options and enable flexibility.

For their part, Asian allies have to work on conventional deterrence. The group discussed that debates within the Indo-Pacific tend to be heavy on the nuclear side; conventional deterrence isn't discussed enough. Allies in this region should discuss their confidence and means so that they do not always talk or rely on nuclear weapons. At the same time, allies see modernization delays as concerning. The transparency of the discussion itself leaves room for credibility questions. Thus, mitigating transition risk should be an urgent priority by deploying additional warheads.

Panel 4: Implementing the Program of Record

- What are the principal challenges to successful implantation?
- Are there opportunities to improve performance

In an era marked by heightened global tensions and the rapid expansion of nuclear arsenals, the United States faces unprecedented challenges in maintaining a credible and effective nuclear deterrent. During the panel discussion on "Implementing the Program of Record," experts explored the urgency of modernizing the U.S. nuclear enterprise, the limitations of legacy systems, and the critical decisions required to address emerging threats. The conversation underscored the need for decisive action, innovation, and leadership to adapt to the evolving security environment.

The scale and speed of China's growing nuclear arsenal, combined with persistent threats from Russia and North Korea, have created a strategic environment as complex and dangerous as the Cold War. The group highlighted the urgency of addressing these challenges, emphasizing that deterrence is not static. The U.S. must adapt its nuclear posture to confront multiple nuclear adversaries simultaneously. There was agreement that the post-Cold War mindset—characterized by a focus on risk elimination and an assumption that there is always more time—has left the U.S. ill-prepared for the realities of today's threats. This mindset must be unlearned to meet the demands of the current security landscape.

The discussion reinforced this point, as attendees underscored that the strategic environment of today is unprecedented. The U.S. now faces two nuclear peers in China and Russia, alongside North Korea's unpredictable nuclear ambitions. To meet this moment, policymakers need to think creatively about what can be done today to address these challenges, while also preparing for the long-term future. Assumptions made 15 years ago, when the program of record was established, must be reassessed to ensure the U.S. nuclear enterprise remains effective in deterring increasingly capable adversaries.

The program of record, created nearly 15 years ago through the 2010 Nuclear Posture Review (NPR), has served as a foundational framework for the U.S. nuclear enterprise. However, it was acknowledged that the POR has limitations in addressing emerging threats. While the program of record represents necessary progress, it is insufficient to meet the demands of the current strategic environment. There was additionally a robust discussion that the program of record has become overly revered, treated as sacred and immutable, which limits flexibility and innovation. Instead, there was advocacy for creating a new focus on the nuclear force the nation needs to meet strategic objectives, regardless of whether it aligns with the program of record.

Some participants argued that the program of record is a useful decision framework but criticized its lack of adaptability and agility. The group agreed that there is a need to sustain the legacy stockpile of warheads while simultaneously developing new capabilities and rebuilding production infrastructure. This dual focus relies on decisive action today to ensure readiness well into the future.

Modernizing the U.S. nuclear enterprise is essential to maintaining a credible deterrent, but progress has been slow. The U.S. nuclear enterprise has been characterized as "reawakening," driven by clear requirements, swift decision-making, and congressional support. However, "business as usual" is no longer an option. Bureaucratic lethargy and strategic malaise must be overcome through innovation and decisive action. There were calls for simplifying requirements, balancing risks, and prioritizing timely delivery, even if it means accepting trade-offs.

There have been recent successes in modernization, such as the rapid development of the B61-13 nuclear bomb and modifications to existing capabilities like the W76-2 warhead. These projects demonstrate the value of leveraging proven technologies to create innovative solutions. There was acknowledgement within the group that it is acceptable to develop new nuclear weapons. By modifying and enhancing existing capabilities, the U.S. can move quickly to address near-term needs while preparing for future challenges.

There was strong emphasis on the importance of sustained investment in science capabilities and production infrastructure. Recently there has been a positive cultural shift within the National Nuclear Security Administration (NNSA), where risk tolerance and streamlined processes are increasingly common. For example, the NNSA has built quality tests in parallel with production—a significant departure from traditional practices. This approach is critical for timely delivery of new capabilities and represents a major paradigm shift within the enterprise.

Despite progress, the U.S. nuclear enterprise faces significant obstacles. Some major obstacles that were identified are the atrophied industrial base, supply chain issues, and cultural resistance to risk as major challenges. The NNSA's role resembles conducting a symphony, coordinating dozens of locations across the country to modernize, repair, and innovate simultaneously. Therefore, it is important to have reliable budgets, construction performance, and coordination across the NNSA and its partners to overcome these coordination challenges.

Policy inefficiencies also hinder progress. Turning over one policy "rock" often reveals additional layers of bureaucracy that slow decision-making. Streamlining processes and accepting risk can help to accelerate modernization efforts. Self-inflicted bureaucratic processes are currently a major barrier to timely delivery.

A recurring theme throughout the discussion was the need to make hard choices about the future of the nuclear enterprise. There should be a recognition of the importance of proactive decisions about capacity, capability, and modernization. Also, some legacy decisions should be interrogated to determine if these capabilities are appropriate for current needs. These decisions, made over a decade ago, may no longer align with the realities of today's strategic environment. Failing to make hard choices now will leave the nation in a worse position.

The discussion stressed the importance of balancing near-term actions with long-term investments. Some advocated for a broader roadmap for warhead and reentry systems, while others called for decisions that send the right signals to those involved in delivery. Meanwhile there was agreement that whole-of-government deliberation will be necessary to evaluate all angles and ensure alignment across agencies.

Strong leadership and education are critical to addressing nuclear deterrence challenges. Senior leaders have the tools and information to make informed decisions when provided with the right information. However, professional military education should be improved to enhance fluency in nuclear issues across all levels of leadership. A panelist noted that in the 1970s and 1980s deep understanding of nuclear deterrence was a prerequisite for leadership roles. The panelist argued that restoring this level of fluency is essential for effective decision-making.

It was acknowledged that leaders often come into their roles with varying levels of nuclear expertise. However, strong leaders who know how to process information quickly can make good decisions when supported by knowledgeable staff. Regardless, it is important to raise the overall capabilities of new leaders to ensure they are prepared to address complex nuclear challenges.

Panel 5: Adapting the Program of Record

- What adaptations are necessary, if any?
- What are the challenges and opportunities associated with such adaptation?

The discussion on how to adapt the program of record focused on the evolving global security landscape, emphasizing the challenges posed by nuclear-armed adversaries and the urgent need for the United States to adapt its strategic posture, capabilities, and alliances. The emergence of two nuclear peers—Russia and China—alongside an increasingly provocative North Korea and uncertain dynamics involving Iran and the India-Pakistan relationship, has created a "new normal" in global security. This shift demands a recalibration of U.S. policies to address the growing risks associated with these adversaries.

Russia, China, and North Korea are accelerating their chosen trajectories, reshaping global power dynamics. Russia has replenished its military capabilities surprisingly quickly despite significant losses in Ukraine, while China continues to expand its dual-capable theater-range nuclear capabilities at an unprecedented pace. North Korea remains troubling, and Iran's intentions remain unclear. The collaboration between Russia and China, particularly in military and strategic domains, warrants closer scrutiny, as their partnership could significantly impact global stability. The strategic setting facing the U.S. has changed and requires different responses, including expanding its global system of partnerships and alliances.

The United States faces the critical challenge of deterring war in two theaters simultaneously or sequentially. This posture will require substantial investment, which may face resistance alongside goals of reducing government spending. However, risks of inaction are high, particularly as China may perceive the cost of inaction regarding Taiwan as greater than the risks of action, even with the possibility of nuclear escalation. The U.S. must be prepared to address the "two-peer problem" seriously and comprehensively.

Discussion emphasized the need to leverage both military and non-military tools, such as economic measures like tariffs and sanctions, and adopting a whole-of-government approach. Participants agreed that the U.S. must expand its capacity for airlift, sealift, and space systems, including survivable space-based sensors and offensive and defensive capabilities. Additionally, defenses for critical infrastructure, particularly ground-based systems, must be strengthened to reduce vulnerability. Enhanced intelligence capabilities are also vital for understanding adversary strategies, conventional and nuclear deployment plans, and cultural factors that influence their decision-making.

Some participants argued that Congress should prioritize passing appropriations bills rather than relying on continuing resolutions, as continuing resolutions hinder progress towards ensuring that the U.S. program of record is fit for purpose. Sustained investment in modernization and expansion of the industrial base, including scientific and intellectual infrastructure, is necessary to ensure long-term readiness. Participants discussed the need for manpower and investment to ensure that the U.S. industrial base is prepared to deliver the necessary capabilities to deter aggression in two theaters.

The U.S. is currently at a disadvantage in non-strategic nuclear weapons, with a 10-to-1 disparity compared to RussiaIn Europe, integrating Poland and Finland into NATO's Dual-Capable Aircraft (DCA) mission could strengthen deterrence. Similarly, exploring a NATO-style nuclear-sharing agreement with South Korea and deploying standoff munitions for platforms like the F-35 could bolster defenses in the Indo-Pacific. Forward-deploying weapons from ready stockpiles and working with allies to supply necessary capabilities are critical steps to address assurance and deterrence challenges in regional theaters.

The urgency of addressing these challenges cannot be overstated. The U.S. is experiencing significant delays in its nuclear program, with projections showing continued lagging until 2035 unless immediate action is taken. Strategic complacency must be replaced with strategic urgency to address the risks posed by adversaries deploying nuclear weapons in regional conflicts. Immediate steps include modernizing existing systems, such as the Minuteman III ballistic missiles and Ohio-class submarine missile tubes, while accelerating the production of new capabilities like the B-21 bombers and Sentinel ICBMs. Doubling production rates and considering enhancements, such as increasing the number of warheads carried by Sentinel missiles, are necessary to ensure readiness.

On the non-strategic side, adversaries are increasingly fielding weapons optimized for nuclear warfighting, underscoring the need for aggressive adaptation of existing programs and technologies. The U.S. must move beyond the current pace production of demanded capabilities, energizing industrial-level production to sustain long-term readiness.

The discussion also highlighted the importance of adapting the defense industrial base to meet challenges in readiness. Ideas around different investment models such as a "CHIPS Act" equivalent to nuclear modernization and defense infrastructure is intriguing, though legal and logistical hurdles would need to be addressed. Successful past investments provide a foundation for future efforts, but sustained investment and analysis of the current regulatory environment are necessary to ensure progress.

The group emphasized that U.S. allies play a critical role in shaping the program of record, both collectively and individually. NATO's collective approach is essential, but there is room for individual contributions as well. In the Indo-Pacific, collaboration may need to be more individualized, though opportunities for collective efforts should not be overlooked. In both spheres allies should communicate their concerns and contributions clearly and concisely in order to better understand how to incorporate them into the program of record.

In conclusion, the discussion surrounding adapting the program of record underscores the urgency of addressing the evolving global security landscape and the threats posed by nuclear-armed adversaries. Strategic complacency must be replaced with strategic urgency, supported by modernization, expanded capabilities, and strengthened alliances.

By adapting the program of record and adopting a comprehensive approach, the U.S. can position itself to deter and counter threats in an increasingly complex and dangerous world.

Panel 6: Breaking from Business as Usual

- What breaks are needed?
- What lessons can be learned from past efforts?

The discussion on breaking from business as usual reflects a comprehensive exploration of the challenges and opportunities facing the United States' defense and scientific enterprise, particularly as it pertains to stockpile science, organizational processes, cultural shifts, and the integration of advanced technologies. Participants communicated a sense of urgency for the nuclear modernization program but emphasized the need to adapt the program and maintaining flexibility, creativity, and efficiency in the face of evolving global threats and technological advancements.

The overarching theme is the need for a paradigm shift in how the U.S. approaches its deterrence mission. Historically, the focus has been on minimizing risk, which has led to rigid processes, excessive documentation, and a culture that prioritizes compliance over innovation. However, the current moment demands bold changes. Advances in stockpile science, such as the achievements at the National Ignition Facility (NIF), offer unprecedented opportunities to explore intense environments and leverage cutting-edge tools like artificial intelligence, new computing methods, and manufacturing technologies. NIF's ignition milestone is highlighted as a transformative achievement, demonstrating the potential to access environments previously unattainable and signaling the power of scientific innovation.

Organizationally, the defense enterprise is constrained by business processes designed for a different era. These processes, while effective in minimizing risk, are now barriers to creativity and agility. There is a call to reimagine the system holistically, shifting the focus from generating paperwork to delivering tangible products like warheads. This requires fostering an environment that encourages creativity and risk-taking, enabling the kind of "big swings" necessary for transformative progress. The cultural challenge is particularly emphasized, as years of prioritizing risk elimination have diluted authority and responsibility, stifling innovation and eroding the collective purpose that drove earlier development eras. Restoring a sense of urgency and embracing "unreasonable expectations" is seen as vital to achieving ambitious timelines and goals.

The historical lessons discussed underscore the importance of continuous modernization and adaptability. The cessation of production in certain areas for extended periods has proven detrimental, as reconstitution is difficult and resource-intensive. Instead, the enterprise must embrace ongoing modernization, integrating new technologies and work continuously to avoid stagnation. Flexibility is key, as future challenges may differ from current expectations. Decisions made to reshape the enterprise for today's needs must also account for the need to scale programs and maintain agility.

In terms of capabilities, the U.S. needs systems that go beyond current existing capabilities like the DCA and B61-12 for NATO, as well as theater capabilities for Asia. There is an acknowledgment that while legacy parts can be leveraged, trade-offs exist, particularly in terms of longevity and adaptability. The group emphasized the importance of exploring new ideas and conducting tests, even those that may fail, as a means of building on programs like the stockpile responsiveness initiative. Shorter-term, smaller-scale projects are suggested as a complement to longer timelines and higher costs associated with modernization efforts. This approach allows for experimentation and the development of options, ensuring that the enterprise remains agile and responsive to emerging needs.

Efficiency and effectiveness were recurring themes throughout this panel. While there have been changes in project management, the focus is not solely on accelerating timelines or minimizing costs but on doing things correctly. For example, the suggestion to complete designs before proceeding to construction reflects a commitment to thoroughness, though exceptions may be made for certain components. The need to manage projects above reduced thresholds is also noted, with concerns about prolonged studies and revisions potentially hindering progress.

Funding constraints are another critical issue. With flat budgets, the enterprise must find ways to innovate and adapt without relying on increased financial resources. This includes redirecting human capacity from excessive documentation to producing weapons that fill deterrence gaps. The rigidity of procurement processes and the reliance on commercial technology are discussed, highlighting challenges in sourcing high-quality components and the need to train the industrial workforce through initiatives like the Defense Production Act.

Artificial intelligence (AI) also presents the nuclear enterprise with significant opportunities. AI has the potential to streamline bureaucracy, accelerate scientific discovery, and compress development timelines, particularly in areas like materials science and manufacturing. However, the lack of a national-scale AI program is seen as a limitation, with competitors and adversaries advancing rapidly in this domain. The integration of AI into the defense enterprise could revolutionize operations, enabling faster problem-solving and the exploration of new capabilities. For example, additive manufacturing is noted as a transformative technology that changes how problems are approached, creating a more iterative and dynamic development process.

The group emphasized the strategic implications of leveraging science and technology to enhance deterrence. Demonstrating capabilities through rapid development and prototype testing sends strong signals to the international community, showcasing the U.S.'s latent potential and ability to counter emerging threats. Scientific accomplishments, such as NIF's ignition milestone, serve as powerful symbols of U.S. leadership and innovation, reassuring allies and deterring adversaries.

Key takeaways from this panel include the importance of leveraging scientific advancements, fostering creativity, embracing risk, and maintaining flexibility in the face of evolving challenges. The integration of AI and other advanced technologies offers transformative potential, but the enterprise must overcome cultural and organizational barriers to fully realize these opportunities. By prioritizing modernization, efficiency, and strategic signaling, the U.S. can strengthen its deterrence capabilities and maintain its leadership in science and technology.