



INSTITUTE FOR DEFENSE ANALYSES

**Presidential Decision Time Regarding
Nuclear Weapons Employment: An
Assessment and Options**

William A. Chambers
John K. Warden
Caroline R. Milne
James A. Blackwell

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Executive Summary

Congress raised the issue of limited decision time for nuclear weapons employment in the John S. McCain National Defense Authorization Act for Fiscal Year 2019, which called for a study on “the potential benefits and risks of options to increase the time the President has to make a decision regarding the employment of nuclear weapons.”

There are those who are worried about the possibility that the United States might decide to launch nuclear weapons on false warning. Others are concerned that if an adversary were to use nuclear weapons, the United States would face pressure to respond quickly, which would stress the U.S. nuclear weapons employment decision-making process, risking miscalculation. The common apprehension is that the U.S. nuclear weapons employment decision-making process may make it difficult for a president to make an adequately informed decision about whether or not to order a specific employment of nuclear weapons in constrained time windows.

In response to the Congressional requirement, the Institute for Defense Analyses (IDA) conducted an independent study with three objectives: 1) to characterize the *benefits* of the U.S. capability to promptly employ nuclear weapons; 2) to characterize the *risk* associated with making U.S. nuclear employment decisions within constrained time windows; and 3) to develop and analyze *options* for reducing time pressure on U.S. nuclear weapons employment decision making.

A. Benefits and Risks of a U.S. Capability to Promptly Employ Nuclear Weapons

The United States hopes never to be put in a position where it has to employ nuclear weapons promptly. But credibly signaling that it is able and willing to do so complicates adversary planning, making it less likely that an adversary will employ nuclear weapons against the United States or its allies and partners in the first place. And if deterrence fails, U.S. nuclear forces would provide the president with flexible options that could be tailored to achieve U.S. objectives.

Although the consideration of nuclear weapons employment would be situation-dependent, the degree of time urgency would likely hinge on the U.S. ability to achieve certain objectives before its position worsens or an option is no longer available. There are at least three types of circumstances under which the United States may benefit from the capability to promptly employ nuclear weapons: to reestablish deterrence after the

adversary conducts nuclear strikes; to limit adversary nuclear forces before they are employed; and to employ U.S. nuclear forces before they are destroyed or U.S. command and control is incapacitated.

Time pressure under these circumstances might be *constrained* to some number of hours or days or *highly constrained* to a number of minutes. A president always has the option not to employ nuclear weapons and instead continue to gather information and deliberate or commit to an alternative course of action. But in certain circumstances, not conducting nuclear strikes may leave the United States in a graver situation.

Making a decision to employ nuclear weapons under the challenge and stress of a constrained time window might, however, increase the risk of miscalculation. There would be less time to gather information about the situation, develop and evaluate response options, consult with advisors and allies, and assess the likely benefits and risks of various courses of action.

B. Options to Reduce Time Pressure in Nuclear Weapons Employment Decision Making

The benefits and risks of being ready to employ nuclear weapons promptly depend on the capabilities and processes that enable U.S. decision making. Any U.S. nuclear employment decision would ultimately be the product of three phases: 1) situation assessment; 2) course of action development and evaluation; and 3) direction of the force.

1. Situation Assessment

The first phase in U.S. decision making regarding nuclear weapons employment is understanding the situation. An external threat would trigger a process of deliberation and then possibly execution. The earlier key stimuli can be accurately identified and characterized, the more time there is to develop courses of action, consult with advisors, and weigh options.

There are four ways the United States can improve its situation assessment capacity to relieve time pressure:

- *Pre-tactical warning*: Improving the U.S. ability to identify key indicators of impending adversary actions that would require consideration of a prompt nuclear response would allow for earlier development of potential courses of action. Activating processes related to adaptive planning at all levels of government on the basis of such indicators could energize the system sooner, potentially providing additional time for deliberation and discussion once tactical warning has been received or an attack has occurred.
- *Air and missile warning*: To reduce time pressure, the United States could upgrade its warning capabilities through the development of new resilient sensors

or by leveraging the information collected by the existing sensor network. From a decision-time perspective, the most worrisome threat is an adversary attack aimed at national leadership.

- *Post-attack assessment*: The United States might face time pressure to respond after adversary nuclear strikes. If specific information requirements and timelines are established in advance, the United States would have a better chance of conducting an efficient and reliable post-attack assessment, allowing more time for development of courses of action.
- *Decision support*: Better tools to present critical information to a president in the midst of a nuclear crisis could promote efficiency in decision making by more quickly building situational awareness. The depiction provided should complement voice conferencing and be detailed enough to accurately reflect a complicated scenario while meeting reasonable information requirements.

2. Course of Action Development and Evaluation

The second phase in U.S. nuclear weapons employment decision making is developing and evaluating courses of action. Time pressure will in part be generated by external factors, such as a deteriorating military situation, a window of opportunity to strike adversary nuclear forces, or a risk to U.S. nuclear forces. But the United States can relieve the level of pressure that external circumstances would impose on its decision making in two ways.

First, the United States can improve its ability to make the best use of time available. Whether a decision window spans minutes, hours, or days, time pressure is less likely to be detrimental if those involved in assessing the situation, developing options, and choosing a course of action are well prepared and supported by effective processes.

- *Nuclear crisis compendium*: A contingency operations handbook to be referenced at the outset of an emerging conflict with a nuclear-armed adversary could establish a baseline process for gathering and presenting information, developing courses of action, and making decisions. It could improve decision making by increasing interagency preparation and tailoring the process to presidential preferences.
- *Conference procedures for highly constrained circumstances*: Continued modifications of conference procedures for the most time-constrained scenarios could focus on providing succinct information in a way that bridges the gap between the language of military advice and that of an elected official. The process should continue to defer to and support a president's sole decision-making authority and not be structured in a way that would pressure the president to make a decision.

- *Training and exercises for principal advisors:* For the underlying system to have the best chance of giving a president the maximum amount of available time, trusted advisors must be ready to perform their functions. Training and exercises could orient principals to the unique aspects of nuclear weapons employment decision making, increasing the likelihood that they can provide effective advice.
- *Conference connectivity:* In whatever time is available, a president will benefit from being able to consult with trusted advisors. The United States could prioritize maintaining conference connectivity regardless of the scenario.

Second, the United States can reduce the perceived need to make nuclear employment decisions in constrained time windows. If the consequences of refraining from nuclear employment are lower or if other options can achieve U.S. objectives, then a president will, in principle, face less pressure to make a prompt nuclear employment decision.

- *More survivable nuclear posture:* If U.S. nuclear forces are survivable, the consequences of riding out a large-scale attack would be lower, reducing the urgency for a nuclear employment decision upon receipt of an attack assessment. The U.S. nuclear posture is highly survivable, but the United States could take steps to plan for and exercise enhanced postures in case they are needed.
- *Non-nuclear strike options:* To relieve the pressure to employ nuclear weapons promptly, the United States could develop additional ready non-nuclear strike options to provide a non-nuclear alternative to nuclear employment in a limited number of circumstances.

3. Direction of the Force

If deemed necessary, the next phase in U.S. nuclear weapons employment decision making is transmitting a president's orders to the force. A potential source of time pressure in the most dangerous scenario of a large-scale adversary attack against the United States is the risk that a president will lose connectivity to the force, preventing an effective response after absorbing the adversary's attack. The United States could ensure that there are no circumstances under which any perceived vulnerability of its nuclear command, control, and communication invites a disarming strike by an adversary or pressures a president to authorize a launch.

4. Eliminate the Option to Promptly Employ Nuclear Weapons

An alternative approach to reducing time pressure would be to abandon prompt nuclear employment in some or all circumstances. This could reduce the risk of time-induced miscalculation in circumstances where a president was considering nuclear employment, but at the cost of not having the option available in extreme circumstances, and signaling as much to adversaries, allies, and partners.

IDA does not recommend this option. As long as there are credible scenarios of adversary aggression and nuclear escalation against the United States and its allies and partners, the United States should prioritize enhancing deterrence and assurance and maintaining capabilities that provide options to achieve U.S. objectives should deterrence fail.

C. Findings and Recommendations

The IDA study team judges that maintaining the U.S. capability to employ nuclear weapons within constrained time windows has benefits that should be preserved. The United States should, however, continue to pursue measures to reduce the likelihood of miscalculation.

The most important improvements that should be considered are:

- Ensuring that senior advisors who would be involved in nuclear weapons employment consultations are well prepared and supported by effective processes.
- Prioritizing the survivability of U.S. nuclear forces and nuclear command, control, and communications capabilities to further reduce the low probability that a president would face pressure to employ U.S. nuclear forces before they are disabled or destroyed.
- Upgrading pre-tactical warning and post-attack assessment to allow more time for course of action development and evaluation.

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1. Introduction

Deterrence and assurance have been central tenets guiding U.S. nuclear policy and practice since 1945. The United States has maintained nuclear forces designed to deter nuclear and non-nuclear aggression by communicating to potential adversaries that aggression against the United States or its allies and partners would result in intolerable costs and unacceptable risks. It has also sought a nuclear arsenal that is safe, secure, and effective. It has imposed safety and security features on its nuclear arsenal to ensure that nuclear weapons detonate only if the president has given a lawful order that they should. It has also configured its nuclear arsenal and attempted to shape the arsenals of its nuclear-armed adversaries to reduce the likelihood that leaders on either side would initiate a nuclear war.

In many cases, the United States has been able to improve the safety, security, and effectiveness of its nuclear posture without having to balance among forms of risk. Design features to make nuclear weapons one-point safe, for example, have reduced the likelihood of accidents and enhanced military effectiveness. But in other instances, changes to U.S. nuclear policy and force posture have required trade-offs among competing objectives; the United States has had to balance between enhancing deterrence of intentional war or escalation, maintaining flexible options to achieve U.S. objectives should deterrence fail, and reducing the likelihood of inadvertent nuclear use or escalation. During the Cold War, for example, the United States balanced between enhancing the credibility of its commitment to defend Western Europe and reducing the likelihood that first-strike instability would incentivize early escalation by either the Soviet Union or the United States.

One issue that exists at the nexus of deterrence and flexibility *benefit* and miscalculation *risk* is the U.S. capability to promptly employ nuclear weapons. The United States maintains forces, supported by policies, systems, and procedures, that allow it to threaten and, if necessary, employ nuclear weapons promptly. With this capability, the United States seeks to strengthen deterrence and assurance by signaling that it is ready and willing to employ nuclear weapons in extreme circumstances to defend its vital interests and those of its allies and partners. It also provides options so that, should deterrence fail, the United States can end the conflict at the lowest level of damage possible and on the

best achievable terms.¹ But the capability to employ nuclear weapons promptly requires a process for making expeditious decisions within constrained time windows, which entails some level of risk.

The issue of limited decision time for nuclear weapons employment was raised by Congress in the John S. McCain National Defense Authorization Act (NDAA) for Fiscal Year 2019 (FY19). Section 1669 of the Act mandated:

[T]he Secretary of Defense shall seek to enter into a contract with a federally funded research and development center to conduct a study on the potential benefits and risks of options to increase the time the President has to make a decision regarding the employment of nuclear weapons...Not later than 270 days after the date of the enactment of this Act, the federally funded research and development center shall submit to the Secretary a report containing the study... includ[ing] the findings and recommendations of the center...[It] shall be submitted in unclassified form, but may include a classified annex.²

Unease regarding decision time in nuclear weapons employment decision making comes from two perspectives.³ There are those who worry that the United States might decide to launch nuclear weapons on a false warning. They argue that, because of the short timeline between when the United States would detect a large-scale adversary nuclear strike and the time a president would have to decide whether to respond, there is an unacceptably high risk of a mistaken decision that would trigger accidental nuclear war. Others are concerned that if an adversary were to use nuclear weapons against the United States or one of its allies and partners, the United States would face pressure to respond quickly to achieve its objectives. They say that in these extreme circumstances, making a nuclear employment decision on a short timeline would stress the U.S. nuclear weapons employment decision-making process, risking either miscalculation or being unable to reach a decision in time to meet U.S. objectives.

The common apprehension is that the U.S. nuclear weapons employment decision-making process may make it difficult for a president to make an adequately informed decision about whether or not to order a specific employment of nuclear weapons in certain

¹ Office of the Secretary of Defense, *Nuclear Posture Review 2018* (Washington, DC: Department of Defense, February 2018).

² H.R.5515 (115th), John S. McCain National Defense Authorization Act for Fiscal Year 2019, Public Law No: 115-232, August 13, 2018, <https://www.congress.gov/bill/115th-congress/house-bill/5515/text>.

³ Indications of both perspectives are evident in the legislative history of FY19 NDAA. The original House version called for a study focused on “the potential benefits and risks of reducing the role of the launch-under-attack option in U.S. nuclear weapons planning.” The final version that emerged from conference was the product of compromise with the Senate, leading to a requirement for “a report on options to increase presidential decision-time related to employment of each leg of the nuclear triad.” Joint Explanatory Statement of the Committee of Conference, John S. McCain National Defense Authorization Act for Fiscal Year 2019, <https://rules.house.gov/sites/democrats.rules.house.gov/files/JointExplanatory%20Statement.pdf>.

constrained time windows. In this study, a “constrained time window for nuclear weapons employment” is defined as a situation in which the United States may perceive a window of opportunity to employ nuclear weapons to achieve certain objectives before its situation worsens or a course of action is no longer available. The study addresses potential “constrained time windows” that may be hours or a few days and “highly constrained time windows” that are a limited number of minutes. In both types of situations, there is limited time available to gather information, develop courses of action, consult with advisors and allies, and make a decision, and thus potentially a greater likelihood of miscalculation.

The key issue, therefore, is not just increasing decision time as such, but rather reducing the likelihood that the pressure to quickly decide to employ nuclear weapons leads to unsatisfactory outcomes. The IDA study team identified four mechanisms by which the United States could help relieve time pressure on nuclear employment decision making:

1. Increase the time available for information gathering and deliberation in plausible constrained time windows;
2. Improve the ability to make the best use of time available within constrained time windows;
3. Reduce the perceived need to make nuclear employment decisions in constrained time windows; and
4. Remove the option of making nuclear employment decisions in some or all constrained time windows.

While limited decision time is an important source of risk that may lead to undesirable nuclear weapons employment decisions, it is just one potential contributor. There is also a risk of miscalculation based on bad assumptions, groupthink, information overload, cognitive biases, and a variety of other factors. Though these other causes of potential miscalculation are not addressed in detail in this study, it is important to note that relieving time pressure is not an end in itself; rather, it is a means to improve nuclear weapons employment decision making.

The objectives of this study are threefold:

1. To characterize the *benefits* of the U.S. capability to promptly employ nuclear weapons;
2. To characterize the *risk* associated with making U.S. nuclear employment decisions within constrained time windows; and
3. To develop and analyze *options* for reducing time pressure on U.S. nuclear weapons employment decision making.

The study was not intended nor resourced to be a comprehensive review of U.S. nuclear posture and policy, nor does it address all aspects of nuclear risk. There are

numerous actions that the United States can take to reduce the likelihood of being in a situation to contemplate nuclear employment. There are, for example, important steps the United States could take to strengthen regional deterrence architectures, expand dialogue and arms control, and improve other crisis management mechanisms. This study was not scoped to, and thus does not, evaluate those approaches. Instead, it focuses narrowly on nuclear weapons employment decision making within constrained time windows.

Consistent with the requirement of the NDAA, this paper presents the study's findings and recommendations in unclassified form, supported by a classified annex. While an unclassified paper cannot describe some technical and operational details of nuclear employment decision making, it can address the study's key objectives. An unclassified paper has the added benefit of contributing to a broader, more transparent debate on these important issues.

The remainder of the paper is organized as follows:

- Chapter 2 recounts the study's methodology.
- Chapter 3 lays out the benefits and risks of a U.S. capability to employ nuclear weapons within constrained time windows.
- Chapter 4 describes and evaluates U.S. nuclear weapons employment decision making.
- Chapter 5 assesses the benefits and risks of options to reduce time pressure in nuclear weapons employment decision making.
- Chapter 6 outlines the study's findings and recommendations.

2. Methodology

Pursuant to congressional direction in Section 1669 of the FY19 NDAA, the Office of the Secretary of Defense for Policy tasked the Institute for Defense Analyses (IDA) in December 2018 to provide an independent assessment of the “potential benefits and risks of options to increase the time the President has to make a decision regarding the employment of nuclear weapons.” The IDA study team implemented a four-phase research design.

First, the team established a baseline understanding of the current requirements related to presidential decision making regarding nuclear weapons employment and key strategy, policy, and operational drivers underlying those requirements. The team performed a literature review of documentation from the Office of the Secretary of Defense, U.S. Strategic Command, and the Joint Staff on the systems and procedures that support presidential decision making regarding nuclear employment. The team also reviewed existing analyses and literature, including reviews conducted during previous administrations.

Second, the IDA study team conducted 33 interviews with subject matter experts (SMEs) to supplement the written record with the perspectives of those who are or were involved in U.S. nuclear weapons, policy, strategy, and operations or who have engaged directly with a president or other high-level principals. Interviewees included retired Commanders of U.S. Strategic Command and current and former officials from the Office of the Under Secretary of Defense for Policy, the Joint Staff, the White House Military Office, the National Security Council, and the State Department.⁴ The full list of SMEs consulted for this project can be found in Appendix C. All SME contributions were on a non-attribution basis.

⁴ To elicit diverse perspectives, the IDA study team interviewed experts with operational and policy experience in different parts of government, both serving and former officials, and Democrats and Republicans. However, as with all studies, there were limits to what interviews were feasible in the time available. Follow-on research would benefit from more engagement with regional combatant commands, the intelligence community, and former senior political leaders.

Third, premised on and informed by these many inputs, the study team developed ideas for relieving time pressure on nuclear weapons employment decision making. The team employed a few general principles to assess potential benefits and risks posed by each idea. Those criteria were:

- The extent to which the idea would alleviate time pressure;
- The degree to which the idea supports or detracts from other U.S. policy objectives; and
- The relative cost and feasibility to implement the idea.

Ideas were selected for their hypothesized impact on presidential decision making in constrained scenarios, but they were not evaluated solely on that basis.

Fourth, preliminary options for relieving time pressure were subjected to two further rounds of SME assessment. The IDA team conducted a workshop to vet and refine ideas, and then convened two table-top exercises (TTXs) to explore the nature and degree of improvement gained by each idea in the context of a plausible scenario. These venues leveraged a variety of viewpoints to ensure that each idea received robust scrutiny. While many of the study's conclusions are subjective, they were derived from extensive consultation with SMEs and the subsequent judgements of the study team. That said, the results of the study are the IDA team's own, and are not endorsed by any of those who participated in an interview, workshop, or TTX.

The core IDA study team was Major General (retired) William A. Chambers, Mr. John K. Warden, Dr. Caroline R. Milne, and Dr. James Blackwell. The study also benefited from the input of Admiral (retired) John C. Harvey, Jr., General (retired) Larry D. Welch, Dr. Richard Ivanetich, Ms. Priscilla Guthrie, Dr. Michael Fitzsimmons, Dr. Victor A. Utgoff, Dr. Robert L. Bovey, and Dr. Michael O. Wheeler.

3. The Benefits and Risks of a U.S. Capability to Promptly Employ Nuclear Weapons

Maintaining the capability to employ nuclear weapons within constrained and highly constrained time windows contributes to deterrence of adversaries and assurance of allies and ensures that a president would have a flexible set of options to achieve U.S. objectives should deterrence fail. But those benefits come with the risk of potentially having to decide whether or not to employ nuclear weapons on short order, which increases the likelihood of miscalculation. This chapter puts the benefits and risks of a U.S. capability to promptly employ nuclear weapons in context.

A. The Deterrence Benefits of a Capability to Promptly Employ Nuclear Weapons

Unfortunately, potential U.S. adversaries such as Russia, China, and North Korea are pursuing multi-faceted upgrades to their military capabilities in hopes that they will be able to counter U.S. military advantages.⁵ Perhaps more important, U.S. adversaries are also developing concepts and capabilities for threatening and potentially employing nuclear weapons to coerce the United States and its allies.⁶ To meet these challenges, the United States must ensure that its nuclear posture is fit for purpose; that is, able to provide the president with options to convince adversaries that the costs and risk of nuclear employment exceed any potential gains.⁷ Doubt about U.S. resolve or capabilities may

⁵ Office of the Secretary of Defense, *Summary of the 2018 National Defense Strategy of the United States of America* (Washington, DC: Department of Defense, 2018); Defense Intelligence Agency, *China Military Power: Modernizing a Force to Fight and Win* (Washington, DC: Defense Intelligence Agency, 2019); Defense Intelligence Agency, *Russia Military Power: Building a Military to Support Great Power Aspirations* (Washington, DC: Defense Intelligence Agency, 2019); Office of the Secretary of Defense, *Military and Security Developments Involving the Democratic People's Republic of Korea 2017*, Annual Report to Congress (Washington, DC: Department of Defense, 2017).

⁶ Office of the Secretary of Defense, *Nuclear Posture Review 2018*; Brad Roberts, *The Case for Nuclear Weapons in the 21st Century* (Palo Alto, CA: Stanford University Press, December 2015); Dave Johnson, "Russia's Conventional Precision Strike Capabilities, Regional Crises, and Nuclear Thresholds," *Livermore Papers on Global Security* 3 (February 2018); Eric Heginbotham et al., *China's Evolving Nuclear Deterrent: Major Drivers and Issues for the United States* (Santa Monica, CA: RAND Corporation, 2017).

⁷ U.S. Strategic Command, *Deterrence Operations Joint Operating Concept*, Version 2.0 (Offutt AFB, NE: U.S. Strategic Command, December 2006); Secretary of Defense Task Force on DOD Nuclear Weapons Management, *Report of the Secretary of Defense Task Force on DOD Nuclear Weapons*

increase the likelihood that adversaries pursue aggression against U.S. allies and partners or choose nuclear escalation once a conflict is underway.⁸ There is also risk that allies and partners will question the reliability of U.S. security guarantees and seek alternate means or arrangements to protect their interests.⁹

The capability to employ nuclear weapons within constrained time windows contributes to deterrence and assurance and enhances the U.S. ability to achieve its objectives should deterrence fail.¹⁰ While the United States hopes to never be put in a position where it has to employ nuclear weapons promptly, credibly signaling that the United States has the capability and willingness to do so complicates adversary planning, making it less likely that they will see a path to improving their prospects through nuclear escalation.

Although consideration of nuclear weapons employment would be situation dependent, the degree of time urgency would likely hinge on the U.S. ability to achieve certain objectives before its position worsens or an option is no longer available. There are three types of circumstances in which the United States benefits from having the capability to employ nuclear weapons within a constrained time window:

1. To reestablish deterrence after the adversary conducts nuclear strikes;
2. To limit adversary nuclear forces before they are employed; and
3. To employ U.S. nuclear forces before they are destroyed or U.S. command and control is incapacitated.

Depending on the circumstance, the time window might be constrained to some number of hours or days or highly constrained to a number of minutes. This is not to say that the United States would have to employ nuclear weapons in any of these circumstances; a president always has the option *not* to employ nuclear weapons and instead either continue to gather information and deliberate or commit to an alternative course of action. But in certain circumstances, not conducting nuclear strikes within a

Management: Phase II: Review of the DOD Nuclear Mission (Washington, DC: Department of Defense, December 2008).

⁸ There are limits to the rational model of deterrence. Each adversary will weigh costs and benefits according to its own biases and decision-making mechanisms. Particularly under conditions of extreme importance and compressed time urgency, adversary decision-makers are apt to rely as much or more on mental shortcuts and cognitive biases as on rational calculations. See Keith Payne, "Understanding Deterrence," *Comparative Strategy* 30:5 (2011), 393-427; National Research Council, *U.S. Air Force Strategic Deterrence Analytic Capabilities: An Assessment of Tools, Methods, and Approaches for the 21st Century Security Environment* (Washington, DC: The National Academies Press, 2014).

⁹ Office of the Secretary of Defense, *Nuclear Posture Review 2018*, 22-23.

¹⁰ The 2018 Nuclear Posture Review describes the need for a responsive nuclear force that has "the capacity to deploy and employ forces as promptly as is necessary to pose credible threats." Office of the Secretary of Defense, *Nuclear Posture Review 2018*, 44.

constrained time window may leave the United States in a graver situation. A president would have to consider: What is likely to happen if I do not employ nuclear weapons within this window? How would that impact U.S. interests and objectives?

1. Reestablish deterrence

The most likely of the extreme circumstances in which the United States would consider promptly employing nuclear weapons is after an adversary has used nuclear weapons against the United States or one of its allies or partners in a regional conflict. An adversary may, perceiving its core interests threatened and worried about not being able to achieve its objectives, decide to employ nuclear weapons in an attempt to generate an advantage.¹¹ An adversary's theory for achieving its objectives with this act may depend on a belief that the United States and its allies either will not respond or will respond too slowly. An adversary may think that by employing nuclear weapons it can incite decision paralysis in U.S. and allied capitals or alter the local military balance and fortify its position before the United States and its allies respond—a version of a *fait accompli*.¹²

Following adversary nuclear use, the United States could potentially achieve its objectives through a combination of non-military and conventional military means.¹³ But in some situations, the United States may require retaliatory nuclear strikes to reestablish deterrence. U.S. nuclear strikes could potentially help signal U.S. resolve to stand by its objectives, restore the political and military situation in the United States' favor, and

¹¹ Roberts, *The Case for Nuclear Weapons in the 21st Century*; John K. Warden, "Limited Nuclear War: The 21st Century Challenge for the United States," *Livermore Papers on Global Security* 4 (July 2018); Andrew J. Coe and Victor A. Utgoff, *Understanding Conflicts in a More Proliferated World* (Alexandria, VA: Institute for Defense Analyses, 2008); Victor A. Utgoff and Michael O. Wheeler, *On Deterring and Defeating Attempts to Exploit a Nuclear Theory of Victory* (Alexandria, VA: Institute for Defense Analyses, April 2013); Kier A. Lieber and Daryl G. Press, *Coercive Nuclear Campaigns in the 21st Century: Understanding Adversary Incentives and Options for Nuclear Escalation* (Monterey, CA: Naval Postgraduate School Center on Contemporary Conflict, January 2013).

¹² In a conflict over the Baltics, for instance, Russia may think that by employing nuclear weapons it can generate fear in the United States and allied countries, divide the North Atlantic Treaty Organization (NATO), and convince Western leaders to capitulate. Russian decision makers may believe that the longer political pressure builds, the less likely NATO will be able to hold together and muster the will to fight on. Alternatively, Russia may target ports, air bases, headquarters, or aircraft carriers with nuclear weapons to significantly reduce the U.S. ability to project power to the front lines. Then, as NATO regroups, it could move additional forces into contested territory in the Baltics, making it costly and risky for NATO to dislodge them. Russian decision makers may believe that the United States and NATO will be too slow to respond with nuclear strikes of their own, giving them a window of opportunity to alter facts on the ground.

¹³ The United States would likely have a continued interest in restoring the pre-war territorial arrangement, preserving the U.S.-led alliance system, and terminating the war in a way that would minimize loss of life and treasure, and a new interest in shaping perceptions to reestablish the international consensus on the non-use of nuclear weapons. See Vince A. Manzo and John K. Warden, "After Nuclear First Use, What?" *Survival* 60:3 (June-July 2018), 133-160; Mark Fitzpatrick, "The World After: Proliferation, Deterrence and Disarmament if the Nuclear Taboo is Broken," *Proliferation Papers*, Ifri (Spring 2009).

demonstrate the heightened costs and risks of further adversary escalation. The United States would face pressure to act somewhat quickly, both because of its increased stakes in the conflict and the heightened risk of escalation.

Time pressure to employ nuclear weapons after adversary nuclear employment might stem from three factors:

1. The need to change the calculus of the adversary's leadership before it decides to conduct follow-on nuclear strikes;
2. A deteriorating military situation that will be more difficult to overturn as the adversary reinforces its positions and for which the United States does not have adequate conventional military options; and
3. Wavering domestic or international political support for the U.S.-led campaign that might further erode as allies lose confidence in the United States and the adversary continues aggressive saber-rattling, propaganda efforts, and other information operations.

These pressures might generate urgency to respond within hours or a few days, but there would not be a clearly defined, specific time window where a nuclear employment decision would have to be made. A president would always have the option to pursue a non-nuclear course of action or take as much time as he or she desires. But if these factors were present and a U.S. nuclear response is deemed appropriate to achieve U.S. objectives, the United States would take on greater political and military risk the longer it waited to act.

If an adversary determines that the United States and its allies and partners will remain united and respond quickly, it will be less likely to see nuclear escalation as advantageous. And if the adversary miscalculates, a timely nuclear response may be an important element of a broader U.S. strategy to achieve its political and military objectives, including reducing the likelihood of additional adversary nuclear strikes. Having the capability and willingness to use nuclear weapons promptly in a regional conflict thus helps to deter adversary nuclear first use and ensures that the United States has a robust capability to restore nuclear deterrence should it fail.

2. Limit adversary nuclear forces

A second circumstance in which the United States would consider employing nuclear weapons in a constrained time window would be to limit strategic threats against the United States and its allies. Whereas the goal of reestablishing deterrence is to convince the adversary not to continue to employ nuclear or other weapons, the goal of limiting adversary military capabilities—sometimes referred to as “damage limitation”—is to deny the adversary the capability to conduct certain military activities by destroying or degrading its capabilities. In the most obvious case, the United States could consider

conducting “counterforce” nuclear strikes against adversary nuclear forces before they are employed to limit the number of nuclear strikes that the adversary could subsequently conduct. But the United States might also consider nuclear strikes against other targets, such as chemical and biological weapons capabilities, if there are no available conventional options that could effectively mitigate the threat.

There are a number of scenarios in which the United States might consider attempting to limit adversary nuclear forces. The most likely is a conflict with a country that has a moderately sized nuclear force of modest sophistication. In the midst of a growing conflict with North Korea, for example, the United States and its allies may determine that there is too much risk associated with a strategy centered on deterring Pyongyang and instead opt to destroy or disable as much of North Korea’s nuclear force as possible.¹⁴ If the United States is not confident in its combination of conventional strikes and missile defenses to mitigate the threat—a distinct possibility, particularly regarding mobile and hard and deeply buried targets—then it could consider the benefits and costs of using nuclear weapons.¹⁵

Because Russia and China have nuclear forces that are quite survivable and capable of penetrating U.S. homeland missile defenses, the United States could not be confident that it would comprehensively destroy or disable either country’s nuclear force and prevent significant retaliation against the United States.¹⁶ Therefore, the costs and risks associated with a large-scale counterforce nuclear strike against Russia or China would most likely be incommensurate with U.S. interests and objectives in a conflict.

There are, however, two extreme circumstances in which the United States might consider counterforce nuclear strikes against Russia or China. First, counterforce nuclear strikes do not have to be comprehensive. The United States may consider nuclear strikes

¹⁴ The United States would be most likely to pursue nuclear strikes to limit North Korea’s nuclear forces as part of a campaign to dislodge the Kim Jong-un regime after North Korea has already conducted nuclear strikes. Indeed, the 2018 Nuclear Posture Review explicitly threatens that the United States will pursue regime change in response to any North Korean nuclear attack. See Office of the Secretary of Defense, *Nuclear Posture Review 2018*, 33. But the United States also could carry out damage-limitation nuclear strikes before North Korea has crossed the nuclear threshold, particularly as a form of anticipatory self defense upon receiving tactical warning that North Korea is preparing to conduct nuclear strikes. See Alex Potcovaru, “The International Law of Anticipatory Self-Defense and U.S. Options in North Korea,” *Lawfare*, August 8, 2017, <https://www.lawfareblog.com/international-law-anticipatory-self-defense-and-us-options-north-korea>.

¹⁵ Austin Long, “U.S. Strategic Nuclear Targeting Policy: Necessity and Damage Limitation,” H-Diplo/ISSF Policy Roundtable 1–4 (2016) on US Nuclear Policy, December 22, 2016, <https://issforum.org/roundtables/policy/1-4-nuclear>.

¹⁶ See Charles L. Glaser and Steve Fetter, “Should the United States Reject MAD? Damage Limitation and U.S. Nuclear Strategy toward China,” *International Security* 41:1 (Summer 2016), 49-98. However, the survivability of China’s nuclear forces is debated. See Brendan Rittenhouse Green, Austin Long, Matthew Kroenig, Charles L. Glaser, and Steve Fetter, “Correspondence: The Limits of Damage Limitation,” *International Security* 42:1 (Summer 2017), 193-207.

designed to destroy or disable a subset of Russia's or China's nuclear forces before they are employed.¹⁷ Second, it is plausible that a conflict between the United States and Russia or China escalates further than either side thought possible at the outset. If the United States suffered millions of casualties as a result of adversary nuclear strikes and thought more strikes were forthcoming and could not be deterred, it would likely contemplate attempting to disarm or disable as much of the adversary's remaining nuclear forces as possible. While this is a low-probability scenario, the risk to the United States would be existential and therefore must be accounted for in planning.

The time pressure to conduct counterforce nuclear strikes would stem from the perceived need to destroy or disable some or all adversary forces before they are used. In some circumstances, the United States might have explicit tactical warning that an adversary is about to employ nuclear weapons, making the time constraint clear, potentially minutes or hours. But in other circumstances, intelligence about adversary intent and likely actions would be far more ambiguous. The risk associated with delaying a nuclear employment decision in these circumstances would be an increase in the probability of additional adversary nuclear strikes.¹⁸

The capability to threaten adversary nuclear forces before they are employed contributes to deterrence and assurance. If an adversary knows that the United States can preempt a significant portion of its nuclear forces, it may be less likely to escalate crises or conflicts, fearing that doing so would result in its ruin rather than U.S. capitulation.¹⁹ If the United States has a viable means to limit potential damage, it would take on less risk in

¹⁷ For example, if China conducted a nuclear first strike against the United States or one of its allies and partners in an attempt to terminate a war over Taiwan, the United States might respond with nuclear strikes against China's remaining theater nuclear forces before they are employed. In essence, the United States would seek to reestablish deterrence by limiting China's available nuclear strike options, while attempting to convince Beijing to seek a negotiated end to the conflict by keeping U.S. conflict objectives limited.

¹⁸ U.S. leaders may also perceive a constrained or highly constrained time window based on the availability of targeting information about key adversary capabilities. For example, the United States might have intelligence that North Korea is preparing to send its nuclear-armed transporter erector launchers out of garrison to dispersed locations where they will be more difficult to target. Another possibility is that, in an escalating conventional conflict, Russia or China begins to degrade U.S. systems used to collect and disseminate targeting information, making counterforce nuclear strikes against the adversary's nuclear forces progressively less viable. See James M. Acton, "Escalation through Entanglement: How Vulnerability of Command-and-Control Systems Raises the Risks of an Inadvertent Nuclear War," *International Security* 43:1 (Summer 2018), 56-99. In both instances, U.S. leaders may perceive a window in which U.S. nuclear counterforce strikes would be far more effective.

¹⁹ Matthew Kroenig, *The Logic of America Nuclear Strategy: Why Strategic Superiority Matters* (New York, NY: Oxford University Press, 2018); Vince A. Manzo and John K. Warden, "The Least Bad Option: Damage Limitation and U.S. Deterrence Strategy toward North Korea," *Texas National Security Review* (February 7, 2018), <https://tnsr.org/roundtable/policy-roundtable-good-choices-comes-north-korea/#essay6>.

intervening to defend its allies and partners, making it easier for the United States to signal its resolve to meet its commitment to both allies and partners and potential adversaries.

3. Employ before destruction

The most dangerous but least likely extreme circumstance in which the United States might consider prompt nuclear employment is when U.S. nuclear forces or command and control are under threat. The United States would face such a decision anytime it 1) received warning that a portion of its nuclear forces was under threat, 2) had no way of moving the targeted assets to safety, and 3) had the means to order and carry out a strike with vulnerable forces before they were destroyed or disabled. In other words, the United States could face a decision to employ a portion of its nuclear forces before they are destroyed.

In principle, the United States could face time pressure with any of its nuclear-capable delivery platforms: land-based intercontinental ballistic missiles (ICBMs), ballistic missile submarines (SSBNs), and nuclear-capable bombers and fighter-bombers. But in practice, the United States would most likely face time pressure with its ICBMs. Given current technologies, SSBNs are highly survivable when conducting deterrent patrols. Moreover, if a deployed SSBN does face a credible threat, it can take a range of counteractions to protect itself. Bombers and fighter-bombers are more vulnerable, particularly when staged at known air bases. But if there were sufficient warning of an attack, the United States would likely have an option to relocate its assets, rather than ordering them to conduct a nuclear strike. With silo-based ICBMs, however, the United States has the means to detect incoming threats, no way to move the missiles to safety, and a nuclear command, control, and communications system designed to provide the option of prompt execution.

Even with ICBMs, the circumstances in which the United States would choose to employ its missiles before they were disabled or destroyed are remote. While maintaining the option—sometimes referred to as “launch on warning,” “launch under attack,” or “launch from under”—the United States has, across multiple administrations, had a policy to not rely on its capability to launch on the receipt of tactical warning to achieve its deterrence objectives.²⁰ The United States has postured its nuclear forces and designed its

²⁰ The IDA study team chose to use the term “employ before destruction” for two reasons. First, it accurately and concisely describes a type of time pressure related to nuclear weapons employment. Second, this term does not come with the conceptual baggage of terms like “launch under attack” and “launch on warning.” For a discussion about confusion over the definition of “launch on warning” and related terms, see Steven Starr, Robin Collins, Robert Green, and Ernie Regehr, “New terminology to help prevent accidental nuclear war,” *Bulletin of the Atomic Scientists*, September 29, 2015, <https://thebulletin.org/2015/09/new-terminology-to-help-prevent-accidental-nuclear-war/>.

retaliatory plans so that there would be little pressure to launch ICBMs before they were destroyed in most circumstances.²¹

The pressure to employ nuclear weapons before they are destroyed is connected to the degree to which the targeted forces are needed to achieve U.S. objectives. If a small number of ICBMs were targeted, the United States would still have hundreds of remaining ICBMs and even more survivable bombers and SSBNs, so there would likely be scant pressure to conduct nuclear strikes with the targeted forces on such short notice. The pressure to decide to employ ICBMs and other nuclear forces in the short window between when they are targeted and when they are destroyed would only be high if the adversary were conducting a massive counterforce strike that appeared to have a high probability of success—an extremely unlikely circumstance. In that scenario, the time window would be highly constrained; a president would have a limited number of minutes to order a nuclear strike before ICBMs were destroyed or disabled.

A related issue is the potential vulnerability of U.S. nuclear command and control, including a president and his or her successors. It is possible that, rather than nuclear forces, it is the U.S. NC3 system that is the target of an adversary attack, or both could be targeted concurrently. If a president feared that the NC3 system was fragile, he or she might feel pressure to order nuclear strikes before the system degrades, particularly in a situation where a president thought that he or she might not survive.

The possibility that an adversary would attempt a comprehensive counterforce strike against the United States is the least likely of the extreme circumstances for prompt nuclear employment, but also the most consequential—the existence of the United States would be at stake—making deterring it a core priority. In a protracted nuclear conflict, Russia may reach a point where it thinks that large-scale escalation is inevitable and chooses to go first to secure an advantage.²² Having the capability to launch ICBMs before they are disabled

²¹ Department of State Bureau of Arms Control, Verification, and Compliance, “U.S. Nuclear Force Posture and De-Alerting,” Fact Sheet, December 14, 2015, <https://2009-2017.state.gov/t/avc/rfs/250644.htm>; Franklin C. Miller, “De-alerting Strategic Missile Forces,” in Taylor Bolz (ed.), *In the Eyes of the Experts: Analysis and Comments on America’s Strategic Posture* (Washington, DC: United States Institute of Peace Press, 2009), 288; U.S. Strategic Command, “Text of Nov. 28 E-mail from Strategic Command responding to ACT’s questions on the alert status of U.S. nuclear weapons,” *Arms Control Association*, November 2007, https://www.armscontrol.org/interviews/20071204_STRATCOM; Department of Defense, *Report on Nuclear Employment Strategy of the United States Specified in Section 491 of 10 U.S.C.* (Washington, DC: Department of Defense, June 12, 2013), 5.

²² Currently, Russia is the only potential adversary that has a large enough nuclear force to contemplate a disarming counterforce strike against the United States. However, Russia would almost certainly not be able to destroy a large portion of U.S. nuclear forces absent a dramatic improvement in its capability to track and destroy SSBNs on deterrent patrols, leaving it vulnerable to significant retaliation. Russia’s counterforce strike would be even less effective if the United States had generated more of its nuclear forces, sending additional SSBNs to sea and increasing the survivability of bombers.

or destroyed helps to deter Russia, or any other adversary, from attempting a disarming counterforce strike in two ways. First, it complicates an adversary's calculus about the likely effectiveness of its strikes. If Russia were confident that it will be able to destroy U.S. ICBMs on the ground, along with fixed bomber, fighter-bomber, and SSBN bases, it would be more optimistic about its chances of leaving the United States with a small nuclear force after the attack and no choice but to capitulate. Second, the capability to launch ICBMs promptly adds an element of speed and unpredictability that makes adversaries less self-assured that they can favorably manage escalation. Before conducting a large-scale nuclear strike on the United States, Russia would likely require confidence that it could convince U.S. leaders to back down, rather than comprehensively retaliate against Russia. However, if Russia knows that the U.S. president has minutes to contemplate ordering a nuclear strike, potentially with hundreds of nuclear weapons, the possibility of an escalatory U.S. response would make it less likely to risk a disarming first strike.

B. Challenges and Risks Associated with Making Nuclear Employment Decisions in Constrained Time Windows

If the nuclear threshold is breached, the United States will have enormous stakes and face the potential for further, perhaps catastrophic, adversary escalation.²³ At the same time, U.S. retaliatory nuclear strikes would likely come with risk of noncombatant casualties, international backlash, retaliation, and escalation. Therefore, choosing whether to employ nuclear weapons and in what way, to achieve what objectives, and accepting what risk would be challenging; having to make that decision within a constrained time window would add to the difficulty.

Making a decision to employ nuclear weapons within a constrained or highly constrained time window might increase the risk of miscalculation. There would be limited time to gather information about the situation, develop and evaluate response options, consult with advisors, and assess the benefits and risks of various courses of action. The degree of risk associated with having limited time available would depend on the scenario, with more risk associated with making a decision within minutes than within days.

There are two types of miscalculation that are possible in constrained and highly constrained time windows. First, there is risk that false warning, inaccurate information, or

²³ The United States has a practical and moral obligation to consider how it would achieve its objectives while limiting damage, should nuclear deterrence fail. See Department of Defense, *Report on Nuclear Employment Strategy of the United States Specified in Section 491 of 10 U.S.C.*; Andrew J. Coe and Victor A. Utgoff, *Restraining Nuclear War* (Alexandria, VA: Institute for Defense Analyses, June 2011); Leon Wieseltier, "When Deterrence Fails," *Foreign Affairs* 63:4 (Spring 1985), 827-847; Brad Roberts, "Rethinking How Wars Must End: NBC War Termination Issues in the Post-Cold War Era," in Victor Utgoff (ed.), *The Coming Crisis: Nuclear Proliferation, US Interests, and World Order* (Cambridge, MA: MIT Press, 2000), 266-272.

insufficient deliberation could lead U.S. decision makers to misunderstand the situation and choose a nuclear employment option that is disproportionate, strategically unjustified, or does not achieve U.S. objectives. The prototypical worst-case scenario for miscalculation is that the United States assesses that there is a massive Russian counterforce attack against the United States, when in fact there is no real threat and, without time to improve situational awareness, chooses to launch ICBMs against Russia.²⁴ There have been examples of false alarms caused by human error (in 1979, the missile warning system was loaded with a test scenario simulating a Soviet attack) and technical malfunction (in 1980, a faulty computer chip caused the missile warning system to incorrectly display a Soviet attack) that underlie this risk.²⁵ Today, there is the additional risk that a third-party might attempt to trigger a false alarm by hacking the U.S. missile warning systems and injecting false information.²⁶

But while there is always some chance of human and technical error, the probability of the United States conducting a massive ICBM strike when there is truly no threat is extremely low. All past false missile warnings were correctly characterized before they rose to a presidential employment decision.²⁷ And over time, additional safeguards have been put in place to reduce the likelihood of false warning and ensure that, even if there is a false alarm, it will not result in a mistaken attack assessment.²⁸ Among other things, an attack assessment would gauge the likelihood that a warning is false based on the context of the international situation.²⁹ Moreover, even if the president were presented with an incorrect attack assessment, there are still *very* few circumstances in which choosing to launch a massive counterforce strike with ICBMs would be the logical U.S. response (as explained above).

The greater risk is that, in the midst of a conflict, the fog and friction of war, combined with a constrained time window, could lead U.S. decision-makers to order nuclear strikes

²⁴ See Global Zero Commission on Nuclear Risk Reduction, *De-Alerting and Stabilizing the World's Nuclear Force Postures* (Washington, DC: Global Zero, April 2015); Bruce G. Blair, *The End of Nuclear Warfighting: Moving to a Deterrence-Only Posture* (Washington, DC: Global Zero, September 2018); Union of Concerned Scientists, *Reducing the Risk of Nuclear War: Taking Nuclear Weapons Off High Alert* (Cambridge, MA: Union of Concerned Scientists, January 2016); Bruce G. Blair, *The Logic of Accidental Nuclear War* (Washington, DC: The Brookings Institution, 1993).

²⁵ Scott D. Sagan, *The Limits of Safety: Organizations, Accidents, and Nuclear Weapons* (Princeton, NJ: Princeton University Press, 1993), 225-246; General Accounting Office, *NORAD's Missile Warning System: What Went Wrong?* (Gaithersburg, MD: General Accounting Office, May 15, 1981).

²⁶ Page O. Stoutland and Samantha Pitts-Kiefer, *Nuclear Weapons in the New Cyber Age: Report of the Cyber-Nuclear Weapons Study Group* (Washington, DC: Nuclear Threat Initiative, September 2018).

²⁷ Bruno Tertrais, "'On The Brink'—Really? Revisiting Nuclear Close Calls Since 1945," *The Washington Quarterly* 40:2 (Summer 2017), 51-66.

²⁸ Department of State Bureau of Arms Control, Verification, and Compliance, "U.S. Nuclear Force Posture and De-Alerting."

²⁹ Safeguards designed to reduce the likelihood of false warning are discussed in more detail in Chapter 4.

that do not have the intended effects or trigger an unforeseen reaction. With little time to gather information, the United States may misunderstand the tactical situation or the adversary's strategic intent: What effect did the adversary's nuclear employment have? What did the adversary hope to achieve by employing nuclear weapons? With little time to develop, coordinate, and assess response options, the United States may miscalculate either the effects of its nuclear strikes or the likely reaction by the adversary, its allies, or the international community. The United States could, for example, conduct a nuclear strike that it intended to cause limited collateral damage and restore deterrence, but in fact resulted in substantial noncombatant casualties and triggered significant adversary escalation.

The second type of possible miscalculation goes in the other direction: there is risk that the U.S. nuclear employment decision-making system would not put a president in a position to order nuclear strikes in the time available when doing so would have helped the United States achieve important objectives. It is possible, for example, that there could be indications that an adversary is preparing additional nuclear strikes against the United States, but the president, because there is too little time available, is not confident enough in either the assessment or the likely effectiveness of the proposed U.S. counterforce option. If the adversary ends up conducting additional nuclear strikes before the United States orders a counterforce strike, then the United States would have committed a grave error by not acting sooner.

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4. U.S. Decision Making for Nuclear Weapons Employment: Process and Capabilities

Pressure to employ nuclear weapons in constrained and highly constrained time windows is likely to depend on both the external international security environment and U.S. capabilities and processes that enable decision making. Responsibility for the latter falls squarely on the U.S. nuclear command, control, and communication (NC3) system and the processes and procedures it supports to link national leadership with nuclear weapon systems.³⁰

An action by an adversary is only one step in a process that *may* lead to consideration of nuclear employment by a U.S. president. Pathways to a potential decision can take many forms and can be characterized by different timelines. Any instance of U.S. nuclear employment would be the product of three phases: 1) situation assessment; 2) course of action development and evaluation; and 3) direction of the force.

The U.S. nuclear employment decision-making process is often portrayed as a sequential, fast-moving pathway to a preferred course of action (depicted below in Figure 1(a)). After an aggressive act triggers an assessment of the situation, options are presented and evaluated; a president then selects his or her choice and U.S. nuclear forces execute.³¹ It is assumed that the operational imperative is to move quickly from one step to the next. Upon closer scrutiny of the U.S. decision making system and plausible circumstances of U.S. nuclear employment, these assumptions break down. Even in a circumstance where the United States receives tactical warning of a large-scale adversary attack on the United States or has confirmed adversary nuclear use in a regional conflict, an employment decision is possible, but not prescribed as the default option.

Figure 1(b) represents a more accurate portrayal of U.S. decision making with respect to the employment of nuclear weapons. This framework differs from the common depiction of presidential decision time in three ways. First, the ordering of the phases is not linear. Much of the available decision time can be spent alternating between situation assessment and course of action development and evaluation; as a particular situation is better

³⁰ Office of the Deputy Assistant Secretary of Defense for Nuclear Matters, *Nuclear Matters Handbook 2016* (Washington, DC: Department of Defense, 2016), 73-81.

³¹ Dave Merrill, Nafeesa Syeed, and Britney Harris, "To Launch a Nuclear Strike, President Trump Would Take These Steps," *Bloomberg*, January 20, 2017, <https://www.bloomberg.com/politics/graphics/2016-nuclear-weapon-launch/>; Blair, *The End of Nuclear Warfighting*, 8-9.

understood, the nature of the most fitting courses of action is likely to change. Second, a decision to direct the force to employ nuclear weapons is possible, but not the presumptive outcome. Third, this process may be highly iterative, especially when there is less time pressure.

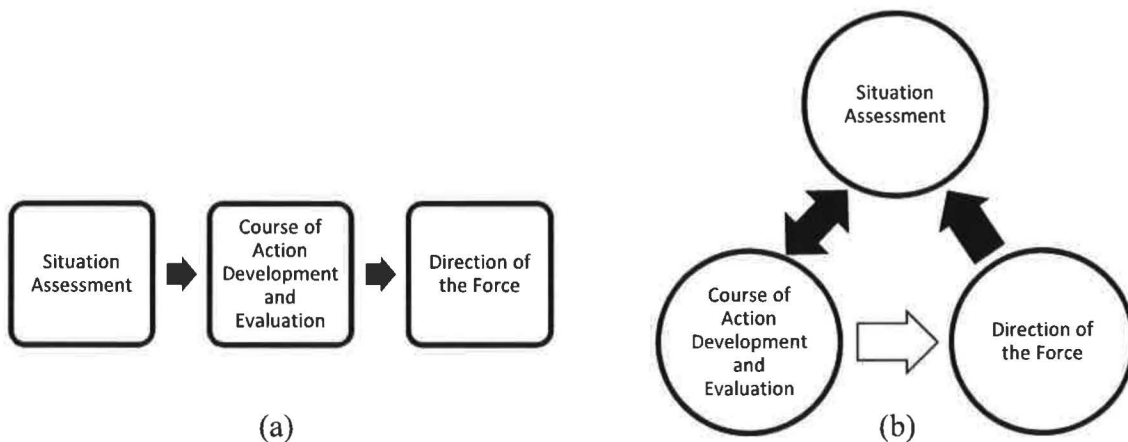


Figure 1. U.S. Decision Making for Nuclear Weapons Employment: (a) Traditional Framework vs. (b) IDA Framework³²

This chapter describes the phases in Figure 1(b) while highlighting the extent to which aspects of current NC3 capabilities and processes affect time-pressure on presidential decision making for nuclear weapons employment.

A. Situation Assessment

The ability of a president to make the best use of the time available for a decision on nuclear weapons employment rests on the ability to quickly and accurately gain awareness of situation at hand. A sound “situation assessment” provides the basis for the development and evaluation of proportionate, strategically justified response options or the selection of an appropriate pre-planned option. But in a constrained or highly constrained time window, there will be limited time available to gather, process, and assess data, potentially increasing the risk that planners, senior advisors, and the president lack sufficient situational awareness.

³² According to the 2018 Nuclear Posture Review, the NC3 system performs five functions: detection, warning, and attack characterization; nuclear planning; decision making conferencing; receiving Presidential orders; and enabling the management and direction of forces. These functions map to the decision making schematic in Figure 1(b), which was organized to provide a conceptual overview of the nuclear employment decision-making process, in the following ways. “Situation assessment” encompasses detection, warning, and attack characterization and enabling the management of forces. “Course of Action Development and Evaluation” includes nuclear planning and decision making conferencing. “Direction of the Force” combines enabling the direction of forces and receiving Presidential orders. See Office of the Secretary of Defense, *Nuclear Posture Review 2018*, 56.

The information traditionally associated with situation assessment for nuclear weapons employment decision making are indications of incoming attacks collected from U.S. warning sensors, like the ground-based long-range radars in Alaska, Greenland, and the United Kingdom; the Defense Support Program (DSP) satellite architecture and its follow-on program, the Space Based Infrared System (SBIRS); the ballistic missile early warning system (BMEWS); and the U.S. Nuclear Detonation Detection System (USNDS).³³ These capabilities and their supporting processes are positioned to provide warning of a ballistic missile attack against the United States. Though some systems are aging, this capability will continue to improve as SBIRS deployment is complete and ballistic missile defense sensors are integrated into the NC3 system.

If warning of a missile launch is provided by any of these systems, the data is analyzed in a series of steps to determine if there is a threat against the United States or its allies and partners. There are a number of checks in place to identify and eliminate false alarms. First, warning data is processed and interpreted by human analysts who evaluate the potential scope of the attack and account for factors like the international situation to assess the likelihood that the warning data presented is accurate. Second, signals related to incoming attacks on the United States must satisfy dual phenomenological criteria to be assessed as a viable threat. This requires confirmation of an event from “two independent information sources using different physical principles, such as radar and infrared satellite sensors.”³⁴ Third, a conference is convened to assess the potential threat, ensuring that multiple sources of independent information are used to develop an overall situation assessment. If the final situation assessment is that there is a significant nuclear threat against the United States, the president would consider response options, including preplanned options for nuclear employment.

However, situation assessment includes more than a missile threat picture developed by warning sensor data. In nuclear employment scenarios, U.S. planners, advisors, and decision-makers will develop situational awareness based on information from whatever sources are available. Air and missile warning data and attack assessments could be supplemented by intelligence reporting, force management information about U.S. nuclear forces, operational reporting from combatant commands, and other relevant information.³⁵ The more constrained the circumstance, the more difficult it would be to incorporate a diverse set of information sources into situational awareness at various levels of the

³³ Office of the Secretary of Defense, *Nuclear Posture Review 2018*, 58.

³⁴ Office of the Deputy Assistant Secretary of Defense for Nuclear Matters, *Nuclear Matters Handbook 2016*, 76.

³⁵ “Force management” refers to information related to the “assignment, training, deployment, maintenance, and logistics support of nuclear forces and weapons before, during, and after any crisis.” Office of the Deputy Assistant Secretary of Defense for Nuclear Matters, *Nuclear Matters Handbook 2016*, 79.

interagency. Having the ability to process, integrate, and transmit actionable information to the people involved in the nuclear weapons employment decision-making process is critical to keeping situational awareness continuously up to date. But this may be difficult in the midst of an ongoing conventional conflict, during the course of which air and missile warning sensors may have been degraded or destroyed.

The emerging international security environment is likely to make it more difficult for the United States to build and maintain sufficient situational awareness to support nuclear employment decision making. Adversaries are developing weapons systems, such as advanced cruise missiles and high-speed maneuvering vehicles, which will generate more complex missile warning demands.³⁶ The inability of the missile warning system to provide timely warning of these threats may compress the time available for developing and executing response options. Aware of this issue, DOD is exploring alternate ways of seeing and assessing evolving threats.³⁷ But detection and tracking of these weapons systems is many years from fruition.

A second challenge is that there is less focus throughout the U.S. government on indications and warning related to nuclear employment by potential adversaries than in the past. During the Cold War, watch cells on duty daily ensured that stakeholders across the U.S. government were tracking analysis of the routine behavior of Soviet nuclear forces. In addition to providing context and reducing uncertainty about Soviet intent, this activity supported awareness of potential nuclear threats before a missile was launched or a bomber track was identified. This culture of vigilance, which raised the level of sensitivity across government, particularly for indications an adversary might be moving toward nuclear employment, has atrophied since the end of the Cold War.³⁸

One positive trend is the development of decision support tools to provide improved situational awareness to a president and his or her key advisors. In its current configuration, situation assessment in the mostly highly constrained circumstances would likely be conveyed by voice or video teleconferencing, potentially falling short of the sophisticated analysis and cognitive aids that support other types of presidential deliberations under

³⁶ The United States had some warning capability against these threats with the Joint Land Attack Cruise Missile Defense Elevated Netter Sensor System (JLENS), but this program was suspended in 2015. For more on adversary weapons systems, see Office of the Secretary of Defense, *2019 Missile Defense Review* (Washington, DC: Department of Defense, 2019), 5-19; Defense Science Board, *Task Force on Defense Strategies for Advanced Ballistic and Cruise Missile Threats* (Washington, D.C.: Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics, January 2017).

³⁷ U.S. Strategic Command, "U.S. Strategic Command Deterrence Symposium Media Roundtable," August 1, 2018, <https://www.stratcom.mil/Media/Speeches/Article/1596012/us-strategic-command-deterrence-symposium-media-roundtable/>.

³⁸ Secretary of Defense Task Force on DOD Nuclear Weapons Management, *Report of the Secretary of Defense Task Force on DOD Nuclear Weapons Management: Phase II: Review of the DOD Nuclear Mission*, 10, 54-55.

pressure (e.g., hurricane models by the National Oceanic and Atmospheric Administration). The need for visual decision aids was underlined by the 2018 Nuclear Posture Review (NPR)'s direction to "continue to adapt new technologies for information display and data analysis to improve support for Presidential decision making and senior leadership consultations."³⁹ As a result, the development of a decision-support tool is now underway.⁴⁰

B. Course of Action Development and Evaluation

As situational awareness is developed, select policy-makers and military planners would develop potential responses, a portion of which may include nuclear weapons employment. The aim of this phase is to generate options with the forces available to match a president's guidance. Depending on the situation, courses of action may be adapted from previous planning or developed from scratch. Accordingly, the effectiveness of this phase depends on four fundamental pieces: 1) a decision maker to decide; 2) ready nuclear forces with which the decision maker can execute nuclear strikes; 3) adaptive nuclear planning; and 4) a real-time iterative consultation and deliberation process.

1. Decision maker

In the United States, the employment of nuclear weapons can only be authorized by the president.⁴¹ Continuous authority over U.S. nuclear weapons is ensured by the Presidential Succession Act, which stipulates the line of political succession in the event that a president is incapacitated or dies.⁴² In addition to guaranteeing continuity of government operations, this law makes certain that there is always a legitimate decision maker to issue nuclear launch orders.⁴³

³⁹ Office of the Secretary of Defense, *Nuclear Posture Review 2018*, 58.

⁴⁰ The high-level requirements for such a tool were codified in an Initial Capabilities Document and approved by the Joint Requirements Oversight Council in early 2018. The Air Force is leading its development.

⁴¹ The sole authority of the president to employ nuclear weapons is granted by Article II of the U.S. Constitution, which designates the president as commander-in-chief. Walter B. Slocombe, *Democratic Civilian Control of Nuclear Weapons*, Policy Paper No. 12, (Geneva, CHE: Geneva Centre for the Democratic Control of Armed Forces, April 2006), 15. For a cross-national analysis of nuclear launch authority, see Jeffrey G. Lewis and Bruno Tertrais, *The Finger on the Button: The Authority to Use Nuclear Weapons in Nuclear-Armed States*, Occasional Paper 45, (Monterey, CA: Middlebury Institute of International Studies, February 2019).

⁴² The Presidential Succession Act can be found in 3 U.S. Code § 19, "Vacancy in offices of both President and Vice President; officers eligible to act." See also Slocombe, *Democratic Civilian Control of Nuclear Weapons*.

⁴³ Walter Slocombe, "Preplanned Operations" in Ashton B. Carter, John D. Steinbruner, and Charles A. Zraket (eds.), *Managing Nuclear Operations* (Washington, D.C.: Brookings Institution Press, 1987), 132-133.

U.S. presidents have the responsibility to make critical decisions about a wide variety of issues in times of war, peace, and at varying levels of crisis. But given the unique status of nuclear weapons, a decision regarding their employment is distinct from any other choice a president will have to make. In virtually all other military contingencies, presidential direction is fashioned around the concept of mission command, whereby a president provides objectives, intent, and guidance while delegating the authority to execute to military commanders. Though the president can, in theory, delegate nuclear release authority, the expectation of strict positive control requires a president to authorize a specific course of action involving U.S. nuclear strikes at a greater level of operational detail than most other presidential decisions. Moreover, the United States has built a robust infrastructure of systems and procedures to ensure that a president would have advice and information available to support nuclear employment consideration.

A president, as the sole launch authority, can take as much time as he or she needs to make a decision about the employment of nuclear weapons. That said, there are plausible situations in which a president may consider that an adversary decapitation strike may succeed, and thus feel pressure to order nuclear strikes before the system degrades. In an effort to alleviate at least some of the pressure that such concerns may exert on highly constrained decision windows, the United States has taken steps to improve its continuity of government plans, with an emphasis on decision-maker survivability.

2. Ready nuclear forces

Another fundamental component of course of action development and evaluation is a ready force with which the United States can execute nuclear strikes. At some point in an unfolding scenario, the situation may warrant the development, consideration, or selection of an option to respond. That response can take many forms and rely on different kinds of national security tools, including diplomatic or economic measures, military action, or some combination. Courses of action involving nuclear weapons would be a small part of a vast menu of options aimed at furthering U.S. interests and objectives.

Should a president decide that nuclear options are appropriate for the situation at hand, a triad of nuclear-capable delivery platforms—Minuteman III ICBMs, Trident II sea-launched ballistic missiles (SLBMs) aboard Ohio-class ballistic missile submarines, and B-52 and B-2 bombers—as well as dual-capable fighter-bombers are available to execute an employment decision upon receiving an authenticated and encrypted launch order from the president. But only the weapons carried by ICBMs and SSBNs on patrol are available to conduct nuclear strikes on very short notice day-to-day. U.S. nuclear-capable bombers and fighter-bombers are not maintained on alert and require a designated amount of time to be ready to deliver nuclear weapons. In addition, the United States has the option to raise a larger portion of the force to heightened readiness in a crisis.

Like concerns about decision-maker survivability, the perceived vulnerability of U.S. nuclear forces may also, in principle, pressure a president to employ nuclear weapons promptly. The type of threat that would exert the most pressure is a massive counterforce strike against the United States with an apparent high probability of success. To complicate an adversary's potential consideration of such an option, the United States has taken steps to reinforce the survivability of its nuclear forces. To meet New START Treaty obligations, the United States continued the trend of increasing the proportion of its force that is deployed on SSBNs.⁴⁴ With no credible anti-submarine threats at present, SSBNs are survivable on patrol, alleviating worries that an adversary could disarm or disable nearly all U.S. nuclear forces in a surprise counterforce attack. The United States also converted its ICBM payloads from multiple warheads to one, making them less lucrative targets for an adversary.⁴⁵

The United States has also improved its non-nuclear strike options, which could, in a limited number of circumstances, provide a president with a credible alternative to nuclear strikes.⁴⁶ DOD has pursued a number of long-range conventional strike options, the most prominent of which are the Air Force-Defense Advanced Research Projects Agency (DARPA) effort to develop a hypersonic glide vehicle (HGV) that could deploy on a modified Peacekeeper land-based ballistic missile, and the Navy's Prompt Strike Mission program.⁴⁷ Both programs, however, are still relatively immature; thus, the United States has few prompt non-nuclear options to conduct strikes on strategic targets.

3. Adaptive nuclear planning

One of the most challenging aspects of a nuclear employment decision is likely to be the translation of situational awareness into response options to achieve U.S. objectives. Options can be pulled from U.S. Strategic Command (USSTRATCOM)'s family of nuclear employment plans, which vary according to objective and timeframe, among many

⁴⁴ Department of State Bureau of Arms Control, Verification, and Compliance, "U.S. Nuclear Force Posture and De-Alerting."

⁴⁵ Office of the Secretary of Defense, *Nuclear Posture Review Report* (Washington, DC: Department of Defense, April 2010), 23.

⁴⁶ In an effort to reduce U.S. reliance on nuclear weapons, the Obama Administration directed DOD to "assess what objectives and effects could be achieved through integrated non-nuclear strike options, and to propose possible means to make these objectives and effects achievable." See Department of Defense, *Report on Nuclear Employment Strategy of the United States Specified in Section 491 of 10 U.S.C.*, 5.

⁴⁷ Congressional Research Service, *Conventional Prompt Global Strike and Long-Range Ballistic Missiles: Background and Issues* (Washington, DC: Congressional Research Service, January 8, 2019). See also National Research Council, *U.S. Conventional Prompt Global Strike: Issues for 2008 and Beyond*, (Washington, DC: The National Academies Press, 2008).

other criteria.⁴⁸ Preplanned options are most likely to be drawn upon in the most time-constrained circumstances. But in less time-urgent situations, the United States would likely adapt preplanned options to the specific situation; a president might task USSTRATCOM and regional combatant commands to formulate revised options to match his or her guidance.

USSTRATCOM routinely develops and refines preplanned options and has the ability to adaptively plan if directed. Regional combatant commands also have robust planning capabilities, but are less prepared to develop courses of action that involve nuclear weapons. Since the end of the Cold War, regional combatant commands have not prioritized planning for integrated operations by nuclear and non-nuclear forces.⁴⁹ The 2018 NPR directs greater coordination in this area, tasking combatant commands and service components to “plan, train, and exercise to integrate U.S. nuclear and non-nuclear forces and operate in the face of adversary nuclear threats and attacks.”⁵⁰ While the participation of some regional combatant commands in recent USSTRATCOM exercises is encouraging, adaptive planning under constrained circumstances would likely be a challenge.

4. Iterative consultation and deliberation process

A final component of course of action development and evaluation is a process whereby a president can consult with advisors, repeatedly if necessary, about a particular situation to develop guidance and decide on the most fitting course of action. There are two types of forums where most high-level collaboration takes place: conferences and National Security Council (NSC) policy coordination committees.

Conferences are consultations using specific communications links that are leveraged when principals need to rapidly understand a particular situation, proffer or solicit advice, and deliberate over how to respond. Core capabilities include the Military Strategic and Tactical Relay (MILSTAR) satellite constellation and its follow-on; the Advanced Extremely High Frequency (AEHF) constellation; the Take Charge and Move Out (TACAMO) system; ground-based transmission systems; and the emergency satchel carried by a president’s military aide.⁵¹

There are many types of conferences, depending on the triggering event, degree of situational awareness, and level of participants, among other factors. Conferences are

⁴⁸ Paul I. Bernstein, “Post-Cold War US Nuclear Strategy,” in Jeffrey Larsen and Kerry Kartchner (eds.), *On Limited War in the 21st Century*, (Palo Alto, CA: Stanford University Press, 2014), 89.

⁴⁹ Robert Peters, Justin Anderson, and Harrison Menke, “Deterrence in the 21st Century: Integrating Nuclear and Conventional Force,” *Strategic Studies Quarterly* 12:4 (Winter 2018), 15-43.

⁵⁰ Office of the Secretary of Defense, *Nuclear Posture Review 2018*, 21.

⁵¹ Office of the Secretary of Defense, *Nuclear Posture Review 2018*, 56; Slocombe, *Democratic Civilian Control of Nuclear Weapons*, 22

simultaneously flexible (any principal, including the president, can convene a conference whenever it is deemed necessary) and hierarchical (only the most serious of situations warrants a conference with the president) crisis management tools. Conferences among just advisors will likely have occurred before the president is involved. They can lead to a number of subsequent actions, ranging from a higher level of conference (possibly one with the president or one without) to curtailing the conversation because the stimulus was determined to be the result of false warning. A significant amount of conference communications do not involve the president or result in the consideration of nuclear employment. But the conference system is also structured so that a president would be able to make a quick decision in a highly-constrained employ-before-destruction scenario.

Progress has been made over the past few years in the set of procedures that governs how senior-level conferences are run. In the interest of tailoring conferences related to nuclear weapons employment to a language to which presidents are accustomed, the tone of conference scripts has shifted to enable a discussion that is more conversational and less interrogative. Conference managers have been trained to facilitate such discussions, and military aides, with whom a president is likely to have developed a sense of trust, are better prepared to assist the president with the process. Furthermore, training scenarios for the NC3 system are now more balanced, focused less intently on a large-scale nuclear attack against the United States.

NSC policy coordination committees may serve as the forum for consultation and deliberation under less time-constrained circumstances, since they function as the interagency hub for whole-of-government deliberation. The structure of NSC operations varies by administration; one of the first tasks a president will take on at the start of his or her tenure is determining how the NSC should be organized.⁵² Outside of the situations in which an attack on the homeland is imminent, NSC meetings would likely act as the regular channel through which a president would increase his or her situational awareness and become familiar with the various courses of action. The NSC process is generally deliberative, while conferences are generally employed for highly-constrained circumstances, but both processes can occur in parallel and can be integrated, depending on the needs of the situation. Furthermore, a president may, in certain situations, prefer informal consultation with a small number of trusted advisors or another ad hoc crisis response process to either of these forums.

For the overall decision-making system to maximize the amount of time a president has available, all of the participants involved in shaping an eventual employment decision must understand and be well exercised in their role. Yet, most people likely to be involved

⁵² For the current directive, see National Security Presidential Memorandum-4, "Organization of the National Security Council, the Homeland Security Council, and Subcommittees," Federal Register Document 2017-07064, Vol. 82, No. 65, Presidential Documents, April 6, 2017.

in such deliberations will have had minimal exposure to the nuclear weapons employment decision-making process.⁵³ At the tactical level, the NC3 system is routinely exercised to ensure that the mechanics function and military personnel are prepared to support decision making and execution. But such training usually only touches principals and personnel that spend the majority of their time focused on nuclear weapons issues. High-level advisors that have broad and demanding portfolios have generally, since the end of the Cold War, not emphasized their role in nuclear weapons employment decision making. Although senior policy makers are skilled at reaching decisions under pressure, the specific requirements, processes, procedures, language, and information that attend the nuclear employment decision-making process may confound policy makers without focused preparation.

C. Direction of the Force

Course of action development and evaluation would lead to the use of the ready nuclear force described above only after meeting specific standards. If necessary, the next phase in U.S. decision making with respect to the employment of nuclear weapons is direction of the force. This refers to the transmittal of authenticated orders for the employment of nuclear weapons from a president to control centers in the field and then the force. Core capabilities include fixed command posts, like the National Military Command Center (NMCC) and the U.S. Strategic Command Global Operations Center; mobile command posts, like the National Airborne Operations Center (NAOC), the E6B Airborne Command Post (ABNCP), and linkages to U.S. forward-deployed forces; ground mobile systems; and the emergency satchel carried by a president's military aide.⁵⁴

Force direction would be carried out through the U.S. NC3 system, a capability composed of numerous interconnected subsystems that together enable continuous, survivable, and secure presidential direction, even under conflict conditions or when a president is on the move.⁵⁵ An essential element of the NC3 system is the communications "thin-line," which is designed to ensure connectivity even under the stress of an adversary nuclear attack. The NC3 system ensures that U.S. nuclear weapons will operate under positive control, only when and in the manner ordered by the president. While a conduit through which nuclear launch orders—known as Emergency Action Messages (EAMs)—can be issued is required for any nuclear employment decision to be executed, a lack of

⁵³ James Blackwell, "Deterrence at the Operational Level of War," *Strategic Studies Quarterly* 5:2 (Summer, 2011), 49.

⁵⁴ Office of the Secretary of Defense, *Nuclear Posture Review 2018*, 56-57; Slocombe, *Democratic Civilian Control of Nuclear Weapons*, 22

⁵⁵ David A. Deptula, William A. LaPlante, and Robert Haddick, *Modernizing U.S. Nuclear Command, Control, and Communications* (Arlington, VA: The Mitchell Institute for Aerospace Studies, February 2019); Office of the Secretary of Defense, *Nuclear Posture Review 2018*, 56-58; Office of the Deputy Assistant Secretary of Defense for Nuclear Matters, *Nuclear Matters Handbook 2016*, 73-81.

confidence in the survivability of NC3 or the integrity of its information may stress decision making in constrained time windows.

The Commander of U.S. Strategic Command has confirmed that the NC3 system is “ready, reliable, and effective at meeting today’s strategic deterrence requirements.”⁵⁶ But it faces growing challenges. The NC3 system is optimized for responding to a large-scale ballistic missile and bomber attack against the United States, the Cold War scenario for which it was originally designed, not more likely scenarios involving protracted conventional conflict with the possibility of limited nuclear use and escalation. The requirements for command and control that derive from these circumstances differ. The short timeline that characterizes a large-scale ballistic missile attack drives an emphasis on prompt decision-making and swift execution; in contrast, functioning effectively amidst a drawn-out conflict, including counter-space and cyber attacks against command and control potentially punctuated by nuclear use, would require an extremely resilient NC3 system.

Potential adversaries like Russia and China have developed sophisticated counter-space and cyber capabilities that can corrupt, disrupt, or even destroy U.S. early warning and communications satellites.⁵⁷ They are also steadfastly pursuing the capability to wage offensive cyber campaigns against the supporting networks of the NC3 architecture, including Internet Protocol-based subsystems.⁵⁸ Though efforts to modernize NC3 are ongoing, they are in the early stages; the system will require significant investment in the near- to mid-term to cope with the changing security context.

A lack of a clear structure for governance of NC3 operations, program management, and capability development has been underlying incremental NC3 updates over the past 50 years. To remedy the diffusion of NC3 authority and the resultant system engineering problems, DOD developed a Governance Improvement Implementation Plan for NC3 in 2018.⁵⁹ This directive elevated the priority level of the NC3 system and appointed the Commander of U.S. Strategic Command as the NC3 enterprise lead.⁶⁰ In April 2019, the Commander announced that USSTRATCOM’s NC3 Enterprise Center had achieved initial

⁵⁶ John E. Hyten, Statement of John E. Hyten Commander United States Strategic Command Before the Senate Committee on Armed Services, February 26, 2019, https://www.armed-services.senate.gov/imo/media/doc/Hyten_02-26-19.pdf.

⁵⁷ Office of the Secretary of Defense, *Nuclear Posture Review 2018*, 57; Office of the Secretary of Defense, *2019 Missile Defense Review*, 20-21.

⁵⁸ Deptula, LaPlante, and Haddick, *Modernizing U.S. Nuclear Command, Control, and Communications*, 27. See also Stoutland and Pitts-Kiefer, *Nuclear Weapons in the New Cyber Age*.

⁵⁹ Government Accountability Office, *Defense Nuclear Enterprise: DOD Continues to Address Challenges but Needs to Better Define Roles and Responsibilities and Approaches to Collaboration*, GAO-19-29, (Washington, DC: Government Accountability Office, November 2018), 41.

⁶⁰ Barbara Starr, “Mattis and Dunford call for classified nuclear changes,” *CNN*, July 19, 2018, <https://www.cnn.com/2018/07/19/politics/mattis-dunford-nuclear-changes/index.html>.

operational capability.⁶¹ The Enterprise Center will provide a cohesive focal point for NC3 modernization; it will, however, take time for this reorganization to have an impact on how effectively the system functions.

⁶¹ U.S. Strategic Command Public Affairs, "USSTRATCOM announces initial operational capability of NC3 Enterprise Center," April 3, 2019, <https://www.stratcom.mil/Media/News/News-Article-View/Article/1805006/usstratcom-announces-initial-operational-capability-of-nc3-enterprise-center/>.

5. Options to Reduce Time Pressure in Nuclear Weapons Employment Decision Making

The United States should continue to evaluate its capability to promptly employ nuclear weapons and appropriately balance between supporting deterrence and assurance, maintaining options to achieve objectives should deterrence fail, and reducing the likelihood of miscalculation in the extreme circumstances in which a president is considering nuclear employment.

Relieving time pressure is not an end in and of itself, and proposed changes to U.S. strategic posture, decision-making processes and procedures, or policy must be evaluated in terms of their broader impact on U.S. interests and objectives. Among the questions that policymakers should consider when evaluating options are:

- How would the proposed change alleviate time pressure in plausible constrained time windows? How significant is the improvement?
- Does the proposed change support or detract from other U.S. policy objectives?
- Is implementing the proposed change feasible and affordable?

A change to U.S. policy that marginally reduced the risk of miscalculation in a narrow set of circumstances but weakened deterrence and removed critical options that would allow the United States to achieve its objectives should deterrence fail would not be desirable. Neither would a change that slightly strengthened deterrence of a very unlikely adversary action at substantial financial cost and with significant increased risk of miscalculation.

This chapter evaluates the benefits and risks of various options for relieving time pressure in nuclear weapons employment decision making. In the first three sections, options are grouped according to the nuclear weapons employment decision-making functions described in the previous chapter. The final section evaluates a more sweeping option: removing the option for a president to make nuclear employment decisions in constrained time windows by restricting or eliminating the U.S. prompt nuclear employment capability.

A. Improve Situation Assessment

The first phase in U.S. nuclear weapons employment decision making is understanding the threat situation. For each circumstance in which the United States might consider prompt nuclear employment there is an external stimulus (an adversary's first nuclear strike, adversary preparations for nuclear strikes, or confirmation of incoming nuclear strikes against U.S. nuclear forces) that triggers a process of deliberation that may lead to execution. The earlier key stimuli can be identified and characterized, the more time that is available to develop courses of action, deliberate with advisors, and weigh options.

This section describes four categories of improvement to U.S. situation assessment capabilities: pre-tactical warning, air and missile warning, post-attack assessment, and decision support.

1. Pre-tactical warning

One option is improving the U.S. ability to identify situations that might eventually energize a quick U.S. nuclear-use decision. There is much that the United States can do to lay the groundwork for a swift and effective decision-making process before the window for constrained nuclear employment decision making has opened.

The goal would be to identify key indicators that the adversary is about to take an action that would require a swift U.S. nuclear response. A state with the intent to conduct a nuclear attack would probably try to camouflage its preparations as much as possible, but it is likely to emit some actionable signatures. Indicators might include observable movements of adversary nuclear forces or intercepts of adversary deliberations or orders. These signs are more likely to be discernible if a baseline for the adversary's routine activities has been established.

Significant Strategic Air Command and Joint Staff resources were devoted to tracking indications and warning in the Cold War. U.S. analysts had a robust view of what routine behavior by Soviet nuclear forces looked like and could discern deviations from normal as early indications that something might be about to change. But such U.S. capabilities and focus have atrophied, and the United States faces new potential adversaries with improving capabilities. U.S. Strategic Command has assumed the role of watching potential adversaries' nuclear forces, currently serving as the tasking authority and de facto clearinghouse for intelligence collection and analysis. But there is a need for higher quality information and better dissemination to the parts of government inside and outside of DOD that do not spend the majority of their time focused on nuclear weapons issues.

To be effective, pre-tactical warning information has to be distributed to and trusted by high-level civilian and military advisors to the president. Activating processes related to nuclear weapons employment decision making at all levels of the interagency on the basis of key indicators could better prepare the United States to develop and evaluate

courses of action once tactical warning has been received or an attack has occurred. In addition to quantitative returns to decision time, there could be qualitative benefits. By providing context, pre-tactical warning considerations could reduce uncertainty about the intent behind certain adversary actions.

There is some risk associated with this approach. First, the time, energy, and resources of the intelligence community are finite. Dedicating resources to identifying, exploiting, and processing intelligence information regarding adversary nuclear forces and activities would come at some trade off with other priorities. Second, there is risk that, with a pre-tactical warning capability, the United States would read too much into adversary actions and reach the wrong conclusions.

Both of these risks are manageable. Resources could be dedicated to pre-tactical intelligence based on its marginal benefit, weighing the value of the information and various costs. Some information that may be useful for pre-tactical warning of situations are likely to be of broader interest to U.S. planners and decision makers, making it worth gathering even at a somewhat increased cost. In addition, any pre-tactical intelligence should be carefully vetted, validated, and sourced and presented with appropriate guards on bias, confidence levels, and reliability. Given that this process is meant to spur planning and deliberation, rather than execution, the downside to false positives would be limited.

2. Air and missile warning

A second way to improve situation assessment is to improve air and missile warning capabilities designed to detect and assess potential nuclear attacks against the United States and its allies and partners. This improvement would aim to start the decision-making process sooner in worst-case employ-before-destruction scenarios; the time saved through enhanced sensing could be redistributed to other critical activities, such as consulting with advisors and assessing courses of action. In addition, for circumstances in which a president's location is targeted, whether by an offshore cruise missile, a ballistic missile, or an HGV, he or she would have a greater chance of evacuating with extra minutes of warning.

The U.S. ability to collect information about adversary nuclear attacks relies on a suite of radars and infrared satellites for integrated tactical warning and attack assessment. This set of capabilities is well positioned to provide warning for ballistic missile attacks in peacetime, but could be degraded by adversary cyber or kinetic attack in a conflict. As a result, they will likely be operating at diminished capacity when an adversary—at present, only realistically Russia—would be most likely to attempt a disarming counterforce strike against the United States. In addition, warning radars and satellites are not well positioned to detect and characterize high-speed maneuvering vehicles and cruise missiles.

To reduce time pressure, the United States could upgrade its warning capabilities through the development of new resilient sensors and new ways of leveraging the information collected by the existing sensor network. Significant efforts are being made to upgrade the U.S. sensor capabilities to support intelligence collection, conventional military operations, and missile defense; those capabilities could be leveraged to support nuclear attack warning as well.

From a decision-time perspective, the most worrisome threat is an adversary cruise missile or HGV attack aimed at decapitating national leadership in Washington, D.C., or elsewhere. The 2019 Missile Defense Review notes that, “More complex offensive missile threats to the homeland, such as HGV and advanced cruise missiles, are on the horizon. DOD is enhancing ways to collect and process information from existing space-based and terrestrial sensors to track current and emerging cruise missile and HGV threats.”⁶² If a decapitation attempt were combined with a broader counterforce strike against the United States, a president might feel pressure to order nuclear strikes. To the extent that the extra minutes gained by better air and missile warning capabilities can increase the chance that a president can survive a decapitation attempt, and thereby assuage some of that concern, the pressure to launch for fear of decapitation could be relieved.

Outside of the narrow circumstance of a decapitation attempt, improved warning would be of only limited utility as a means to relieve time pressure on nuclear weapons employment decision making. The United States needs resilient capabilities to provide sufficient warning to enable an employ-before-destruction decision in the event of a large-scale attack on the United States. But in this scenario, decision time is limited by the flight time of adversary missiles; even a perfect detection capability would buy only additional seconds or minutes. Requirements for air and missile warning, therefore, could be primarily driven by intelligence collection, conventional military operations, and air and missile defense, not a need to increase decision time for nuclear weapons employment. Moreover, because of the relatively low utility of marginally improving warning time, the United States could prioritize reducing the risk of false alarms in its warning system, including by increasing the resilience of the system to cyber attack and continuing to rely on multiple, independent sources of information for warning and attack assessment.

3. Post-attack assessment

A third way to improve situation assessment is to improve the U.S. ability to conduct rapid and reliable post-attack assessments of adversary nuclear strikes. In the traditional concept of NC3, situation monitoring focuses exclusively on air and missile warning. The most likely scenario for U.S. nuclear employment today, however, is in reaction to nuclear strikes by an adversary in a regional conflict. In this circumstance, the United States would

⁶² Office of the Secretary of Defense, *2019 Missile Defense Review*, xiii.

require situational awareness of the intent behind and effects of the adversary's nuclear strikes.

The information requirements for situational awareness after adversary nuclear use exceed what would be provided by air and missile warning capabilities. Warning capabilities might provide information about where the strike originated and the location of impacts. But decision-makers would likely want additional information about the status of U.S. and adversary nuclear forces, the adversary's motivation for conducting the nuclear strikes, the scope and consequences of the attack, and the reaction of the U.S. public, allies and partners, and the international community. This information would likely come from a number of different sources, which would make updating it quickly a challenge. But if specific information requirements and timelines are established ahead of time, the United States would have a better chance of conducting an efficient and reliable post-attack assessment, thus buying more time for development and evaluation of courses of action.

4. Decision support

A decision support tool that can visualize critical information for a president in the midst of a nuclear crisis could allow for an improved understanding of the situation more quickly, thereby freeing up decision time. If the tool is robust enough to provide a reliable, uninterrupted picture to the president and updates as a crisis unfolds, it would create more time for deliberation and evaluation.

Programs intended to develop visual aids for the decision maker in crisis, to supplement the advisors' advice, could be accelerated. The challenges this program must address include the need to assure the fidelity of the data behind the visualization tool, the capacity to have the tool available in all situations, overcoming inherent latency, and ensuring that the tool is tailorable to the decision maker. The picture provided must be detailed enough to accurately reflect a complicated scenario while meeting reasonable information requirements, and it must be simple enough to inform choices about courses of action.

B. Improve Course of Action Development and Evaluation

The second phase in U.S. nuclear weapons employment decision making is developing and evaluating courses of action. For each circumstance in which the United States might consider prompt nuclear employment, there is an external stimulus that triggers a process of deliberation and then possibly execution. Time pressure will be primarily generated by external factors, but the United States can relieve the pressure that external circumstances would impose on U.S. nuclear weapons employment decision making in two ways.

First, the United States can improve its ability to make the best use of time available within constrained and highly constrained time windows. Whether a given decision window is minutes, hours, or days, time pressure is less likely to result in miscalculation if those involved in the process of assessing the situation, developing options, and choosing a course of action are well-prepared and supported by effective processes.

Second, the United States can relieve pressure by reducing the perceived need to make nuclear employment decisions in constrained and highly constrained time windows. If the consequences of not making a nuclear employment decision are lower or if there are other attractive options to achieve U.S. political and military objectives, then a president would face less pressure to make a prompt nuclear employment decision.

This section considers options to improve course of action development and evaluation in each of these ways. Four options would improve the best use of time available; two would reduce the perceived need to conduct nuclear strikes.

1. Nuclear crisis compendium

One way to relieve time pressure is better preparation. While there will always be a limit to what preparation can be done ahead of time because it is impossible to predict the precise circumstances that will lead to consideration of nuclear employment, setting the groundwork for decision making ahead of time can improve the process once a constrained decision window presents itself. If a president and his or her key advisors, supported by the interagency, have already thought through key issues in a systematic way and established processes for adaptive planning and decision making, the likelihood that the president miscalculates or fails to arrive at a timely decision would be reduced.

To be effective, processes for decision making in constrained time windows must be in place at all levels of the interagency up through the NSC and the president. The U.S. military excels at planning, and U.S. Strategic Command frequently refines nuclear employment options to ensure that the United States has pre-planned courses of action to deal with various scenarios. However, if the United States seeks to reestablish deterrence or limit adversary nuclear forces, it is likely to rely on integrated conventional and nuclear operations.⁶³ There remains a need to improve the integration of deliberate planning between U.S. Strategic Command and regional combatant commands.

⁶³ Peters, Anderson, and Menke, "Deterrence in the 21st Century," 15-43; Robert Scher, Statement before the Senate Armed Services Subcommittee on Strategic Forces, February 9, 2016, http://www.armed-services.senate.gov/imo/media/doc/Scher_02-09-16.pdf; Vincent A. Manzo and Aaron R. Miles, "The Logic of Integrating Conventional and Nuclear Planning," *Arms Control Today* (November 2016), https://www.armscontrol.org/ACT/2016_11/Features/The-Logic-of-Integrating-Conventional-and-Nuclear-Planning.

The challenge of integrated conventional-nuclear planning would be even more acute in conflict, when combatant command plans would need to be adapted to the specific situation. The mechanism for conducting adaptive planning between combatant commands, overseen by civilian leadership, should be established and exercised ahead of time. In addition, because of the unique status of nuclear weapons, employment decisions will require a president and his or her advisors to engage with more operational detail than in most other wartime decisions. This requires having high-level advisors that are well positioned to offer advice and a process that coordinates planning, consultation, and decision making at the political level with adaptive military planning occurring at relevant combatant commands.⁶⁴

To facilitate decision making in constrained nuclear employment decision-making scenarios, the U.S. government could develop a nuclear crisis compendium: a contingency operations handbook to be referenced at the outset of an emerging conflict with a nuclear-armed adversary. The goal of the compendium would be to establish a baseline process across a set of plausible contingencies for gathering and presenting information, consulting with allies and partners, developing options, and making decisions regarding nuclear weapons employment. For each nuclear-armed adversary, it could, among other things, present the U.S. government's understanding of the adversary's nuclear weapons capabilities, describe the roles and functions that nuclear weapons perform in the adversary's strategy, depict what the United States knows about how the adversary would employ nuclear weapons, and lay out potential pathways to nuclear escalation. It could also, through an examination of the spectrum of relevant stimuli for U.S. nuclear employment decision making, act as a rough guide to potential decision points that may arise during a conflict, what information would be required to make decisions, and what process should be followed.

The compendium would contribute to improved decision making in three ways. First, it would force the entire interagency system to be better prepared for potential scenarios of U.S. nuclear weapons employment. The compendium could be developed as part of a new administration's process of reviewing U.S. nuclear posture and employment guidance and updated as necessary. Producing the content would force the interagency to prepare for nuclear risk and potential nuclear employment scenarios that might arise in conflicts with nuclear-armed adversaries.

Second, it would allow the interagency to shape the process to match the president's approach to decision making. The process of developing the compendium would afford the

⁶⁴ In many situations, a president would likely want to consult with allied and partner heads of state before making a nuclear employment decision. It is also possible that the United States would need to coordinate with allies and partners at the operational level. Establishing mechanisms for consultation and coordination with allies is an important component of U.S. nuclear employment decision making.

opportunity to explore situations in which a president might contemplate nuclear use and establish information requirements and decision criteria for those situations. Information priorities could provide guidance for intelligence collection. The compendium could also provide direction about the types of responses the president would, or would not, be likely to consider in various circumstances, which would provide guidance for military planning.

Third, it would facilitate a faster, higher quality decision-making process if a president ever had to contemplate promptly employing nuclear weapons. The baselines for information and process laid out in the compendium could be adapted to the situation, rather than starting from scratch. There would be a clearer understanding of roles and responsibilities, and advisors would be better prepared to offer prudent counsel. As a result, there would be less risk that time constraints would result in miscalculation or a squandered opportunity.

The cost for this option would be the time required for the interagency to implement it and keep it up-to-date. That is a small cost for the benefit of improved decision making in a potential conflict with a nuclear-armed adversary.

2. Conference procedures for highly constrained circumstances

While reviewing its plans for nuclear employment decision making, the United States could also continue to update its conference procedures for the most highly constrained employ-before-destruction scenario. Continued modifications of conference procedures should aim to increase the likelihood that a president is able to reach a decision in the event that Russia attempts a large-scale counterforce strike against U.S. nuclear forces and NC3, while ensuring that the process is not configured in a way that would contribute to miscalculation in the event of false warning.

Conference procedures have improved over the past few years, increasing the likelihood that a president would be able to make an adequately informed decision about whether or not to order a specific employment of nuclear weapons in an employ-before-destruction scenario, but there will always be opportunities for refinement. Conference tactics, techniques, and procedures should focus on providing succinct information that places the threat in context, and advice that highlights the benefits and risks of alternate courses of action in a way that bridges the natural gap between the language of military advice and that of an elected official.⁶⁵ The process should defer to and support a president's sole decision-making authority and not be structured to pressure a president to make a decision or encourage nuclear employment.

⁶⁵ For a more general discussion of the friction between military advisors and the president, see Janine Davidson, "Civil-Military Friction and Presidential Decision Making: Explaining the Broken Dialogue," *Presidential Studies Quarterly* 43:1 (March 2013), 129-145.

As with the compendium, the conference process would benefit if senior leaders—the president if possible, but at the very least his or her senior advisors—engage with the system to ensure that it matches the president’s policy preferences and decision-making style. If senior leaders are difficult to schedule, conference procedures could also be improved through thoughtful use of role players. Using a former elected official or close confidant of the president to play the president in exercises would help train the system to better serve principal advisors and the president.

3. Training and exercises for principal advisors

An underappreciated source of time pressure on decisions about nuclear use is the readiness level of principals who will likely be consulted for opinions and advice. For the underlying system to have the best chance of giving a president all of the decision time the circumstances afford, trusted advisors cannot be starting to become familiar with nuclear weapons and operations in the midst of a crisis. Consequently, a relatively simple path to maximizing presidential decision time focuses on preparing principals for a type of decision or situation that will be different than anything they have encountered previously in their careers.

Decision making under pressure is a skill that most professionals who have reached the highest levels of government have developed and honed; the goal of nuclear employment focused preparation would be to ensure that these abilities are not encumbered by the specific requirements, processes, procedures, language, and information that would accompany this unique circumstance. Preparation of senior leaders could occur during presidential transitions or by putting principal advisors in nuclear employment table-top exercises or wargames on an annual basis.⁶⁶ Providing principals with information and experience would increase the likelihood of efficient and effective decision making in a nuclear employment scenario.⁶⁷

The potential participants in these activities could vary. Theoretically, a president and his or her top advisors—a circle that will change from administration to administration — could derive some utility from participating in whatever opportunities can be made available to them. But given the severe demands on their time, getting top leaders to participate in any preparatory exercise will be difficult. There are also some methods of preparation that might be more appropriate for the members of a president’s staff who support him or her most closely on defense matters, such as the national security advisor, the secretary of defense, and the chairman of the Joint Chiefs of Staff.

⁶⁶ Nuclear weapons issues are generally covered in presidential transitions, but the focus is on capabilities and procedures not crisis decision making.

⁶⁷ The key value of exercises is providing the participants with the vicarious experience of confronting the time pressures and uncertainties that accompany real-world crisis and conflict situations.

Moreover, the results or lessons learned from exercises involving senior advisors could be fed back into the decision making system in order to shape processes and procedures to better suit the manner in which each president will most efficiently assimilate information and make decisions. These techniques could thereby increase the chances that in a nuclear crisis, decision makers will have the people and information required to make an adequately informed decision within the time available.

There are two challenges to implementing a training and exercise program. First, given their broad portfolios, it will be difficult to get senior advisors to participate regularly. If a senior official only fits in one exercise, he or she will be prone to drawing too heavily on that singular experience if a real crisis occurs. Second, there will likely be concern that negative information about the performance of officials in an exercise could become public, causing embarrassment and potentially weakening deterrence and assurance. Both of these risks are manageable. If a president and his or her national security advisor prioritize preparation for nuclear weapons employment decision making, other cabinet officials are likely to follow their lead. In addition, part of the development of a training and exercise program would involve finding a way to make it innocuous for a president and a small number of trusted advisors to take part.

4. Conference connectivity

In whatever time is available in a constrained or highly constrained time window, a president would benefit from being able to consult with his or her advisors. The NC3 system contributes to senior leader conferencing by connecting a president to key advisors when they are not collocated, whether principals are at key fixed locations or on the move. For time-constrained decisions involving nuclear weapons employment, there is no way of knowing in advance where a president or his or her advisors will be located. Having the ability to sustain a conference with fidelity no matter the situation would enable a president to gather information and advice from a trusted set of advisors, increasing the chance that he or she can reach an adequately informed decision.

Different technological solutions would come with different price tags. Where possible, the United States could attempt to build on commercial capabilities and take advantage of systems being developed for general crisis communications. In some cases, expensive, niche capabilities will be needed to meet the requirements for operating in a nuclear environment. But the United States can also build resiliency through redundant communications pathways.

5. More survivable nuclear posture

The amount of time pressure associated with a U.S. decision to employ nuclear forces before they are destroyed is a function of the size and scope of the adversary attack, the capability to execute before destruction, and the consequences of choosing not to use

certain assets before they are destroyed. If U.S. nuclear forces are more survivable, the consequences of riding out a large-scale attack will be reduced, lessening the urgency for a president to make a nuclear employment decision upon receipt of an attack assessment.

The U.S. nuclear posture is highly survivable today, with a number of SSBNs on continuous deterrent patrols and the capability to send additional SSBNs to sea and increase the survivability of bombers. Even silo-based ICBMs are hardened and armed with a single warhead, which makes the consequence of riding out an attack on them much lower. Changes in technology or the security environment, however, could make U.S. nuclear forces more vulnerable and thus increase pressure to launch silo-based ICBMs in response to an attempted disarming first strike.

There are a number of options that the United States could pursue to further increase the survivability of its nuclear forces, each with its own benefits and costs.

First, the United States could pursue a mobile ICBM. The Obama administration considered a mobile ICBM as a way to increase decision time for nuclear employment, but ultimately decided on replacing the Minuteman III rather than a new concept.⁶⁸ A mobile ICBM is the most straightforward option for significantly increasing the survivability of the U.S. nuclear posture, but incorporating a mobile capability into the Ground Based Strategic Deterrent (GBSD), which is in development, could be disruptive and costly, not to mention the difficulty of overcoming the political aversion to mobile ICBMs in the United States. It would be prudent, however, for the United States to continue to develop the GBSD in a way that allows for a mobile variant if the United States becomes more concerned about the survivability of its nuclear posture.

Second, the United States could explore adjustments to the posture of its nuclear-capable bombers and SSBNs that would allow for enhanced readiness and survivability in conflict. The United States retains a capability to generate additional survivable nuclear forces in a crisis; bombers can return to heightened alert and additional SSBNs can be sent to sea. But there are ways the United States could reduce the time required to generate its forces or increase survivability once forces are generated. Taking prudent steps to plan for and exercise enhanced postures would position the United States to increase the survivability of its nuclear force, if needed.

6. Non-nuclear strike options

To relieve the pressure to employ nuclear weapons promptly in a select number of reestablish-deterrence and limit-adversary-forces scenarios, the United States could develop additional, ready non-nuclear strike options and supporting intelligence, surveillance, and reconnaissance capabilities. If the United States has the option to disable

⁶⁸ Office of the Secretary of Defense, *Nuclear Posture Review Report*, 26.

or destroy high-value targets, such as nuclear-armed transporter erector launchers (TELs), with prompt non-nuclear strike capabilities, it would, in certain circumstances, relieve pressure to use nuclear weapons to destroy the same targets.⁶⁹

There are a number of options for prompt conventional strike that range from modifications to current systems to the development of new HGVs. Each has a different price tag and different associated risks.⁷⁰ Potential adversaries, for example, might react to the U.S. deployment of what they perceive as more usable strategic assets by expanding their nuclear forces to increase survivability. Non-nuclear options, therefore, would only contribute to deterrence if they cannot be easily countered by potential adversaries.

C. Improve Direction of the Force

The next phase in U.S. nuclear weapons employment decision making is transmitting a president's orders to the force. A potential source of time pressure in a worst-case employ-before-destruction scenario is the risk that a president will lose connectivity to the force, preventing an effective response after absorbing the adversary's attack. If the president is confident that the U.S. NC3 system is sufficiently resilient to survive conventional and nuclear attacks, this source of time pressure would be alleviated.

NC3 modernization efforts are ongoing, but they need to be prioritized to succeed.⁷¹ The United States could develop an NC3 architecture that can deal with a range of possible nuclear employment scenarios in the face of adversaries that are likely to use improved cyber and counter-space capabilities to degrade it.

The NC3 system should be resilient against sustained conventional, cyber, counter space, electronic warfare, and nuclear attack. In most plausible scenarios for U.S. nuclear employment, the United States will reach a position where it is contemplating nuclear strikes well into a conventional conflict. Given the dual-use nature of the majority of U.S. NC3 capabilities, many capabilities and communication paths will likely be under attack in multiple domains. An adversary then might attempt to further degrade U.S. NC3 by conducting limited nuclear strikes or an all-out assault.

To relieve pressure, the NC3 system could continue to be improved to ensure that its perceived vulnerability does not invite a disarming strike by an adversary or pressure a president to authorize a launch. This requires the communications network and key assets like alternate command centers, whether fixed, airborne, ground-, or sea-based, to be

⁶⁹ Department of Defense, *Report on Nuclear Employment Strategy of the United States Specified in Section 491 of 10 U.S.C.*, 5-9.

⁷⁰ Congressional Research Service, *Conventional Prompt Global Strike and Long-Range Ballistic Missiles: Background and Issues* (Washington, DC: Congressional Research Service, January 8, 2019).

⁷¹ Deptula, LaPlante, and Haddick, *Modernizing U.S. Nuclear Command, Control, and Communications*.

sufficiently resilient and redundant to survive attack and operate for an extended period of time.

The challenge will be balancing among the competing requirements for NC3. While surviving a large-scale nuclear attack after a sustained non-nuclear assault on U.S. NC3 is required to relieve pressure to employ nuclear weapons in a worst-case employ-before-destruction scenario, it is not the only requirement for the NC3 system. The United States also needs an improved force direction capability to enable integrated conventional-nuclear operations in response to adversary nuclear employment in a regional conflict. While such capabilities may not be required to relieve time pressure, they are essential to enable response options in reestablish-deterrence and limit-adversary-forces scenarios. Depending on the resources available, the United States may have to prioritize certain missions over others in its development of next-generation NC3.

D. Eliminate the Option to Promptly Employ Nuclear Weapons

A final way that the United States could reduce time pressure for nuclear weapons employment would be to remove the option of making nuclear employment decisions in constrained or highly constrained time windows. The three previous mechanisms attempt to manage the risk of miscalculation by reducing time pressure while preserving the benefits associated with being able to threaten and, if necessary, conduct prompt nuclear strikes. A more sweeping option would be to forswear prompt nuclear employment in some or all plausible constrained time windows. This would reduce risk based on time-induced miscalculation in circumstances in which a president is considering nuclear employment, but at the cost of accepting risk associated with not having the option available in extreme circumstances, thus weakening deterrence and assurance and removing an option for achieving U.S. objectives should deterrence fail.

There are a number of ways that the United States could move away from a prompt launch capability.⁷² One possibility is an internal change to policy or procedure that would disavow prompt launch in some or all circumstances. A related option would be to make a similar change and declare it publicly. A more disruptive option would be to de-alert some or all U.S. nuclear forces by making some physical change to the weapon system to make it impossible to employ for a defined period of time.⁷³ Physical changes could be of varying levels of observability to potential adversaries.

⁷² For arguments in favor of this approach, see Global Zero Commission on Nuclear Risk Reduction, *De-Alerting and Stabilizing the World's Nuclear Force Postures*; Blair, *The End of Nuclear Warfighting*; Union of Concerned Scientists, *Reducing the Risk of Nuclear War*.

⁷³ Another potential change would be eliminating U.S. silo-based ICBMs. The fundamental reason for continued deployment of the ICBM leg of the triad is that it creates a nearly insurmountable targeting challenge for any adversary who would consider attempting a disarming strike against the United States. Without U.S. ICBMs, an adversary could potentially destroy all U.S. strategic nuclear forces by

Proposals to reduce the alert rates of U.S. nuclear forces, and ICBMs in particular, have been considered on numerous occasions inside and outside of government. The 2010 NPR considered adjusting U.S. alert posture and concluded that reducing alert rates for ICBMs would “reduce crisis stability by giving an adversary the incentive to attack before ‘re-alerting’ was complete.”⁷⁴ A year prior, the independent, bipartisan commission on *America’s Strategic Posture*, co-chaired by William Perry and James Schlesinger, reached a similar conclusion; it rejected de-alerting and instead recommended that:

The proper focus really should be on increasing the decision time and information available to the U.S. president—and also to the Russian president—before he might authorize a retaliatory strike. There were a number of incidents during the Cold War when we or the Russians received misleading indications that could have triggered an accidental nuclear war. With the greatly reduced tensions of today, such risks now seem relatively low. The obvious way to further reduce such risks is to increase decision time for the two presidents.⁷⁵

In principle, there are two conditions that could have changed since these studies were concluded that would make it worth revisiting their assessments. First, the risk of miscalculation triggering an accidental nuclear war could have increased over the past decade. Second, the security environment could have improved, such that it is now less important to have a capability to promptly employ nuclear weapons. But neither of those changes occurred, and, in fact, both trends are moving in the opposite direction. The IDA study team, therefore, endorses the assessments of the 2010 NPR and the Perry-Schlesinger commission that the United States should maintain its prompt launch capability while continuing to reduce pressure on a president to make hasty nuclear weapons employment decisions.

Policy changes would accept different levels of risk, depending on which circumstances of potential prompt nuclear employment they disavowed and how public the

attacking a small set of targets, rather than hundreds of targets dispersed over several thousand square miles, and have a substantial force remaining to deter U.S. retaliation. ICBMs are also relatively cheap to operate relative to other nuclear delivery platforms. See Office of the Secretary of Defense, *Nuclear Posture Review 2018*, 45-46; Roger W. Burg, *America’s Nuclear Backbone: The Value of ICBMs and the New Ground-Based Strategic Deterrent* (Arlington, VA: The Mitchell Institute for Aerospace Studies, January 2017). For an alternative perspective, see Jon Wolfsthal, “The political and military vulnerability of America’s land-based nuclear missiles,” *Bulletin of the Atomic Scientists* 73:3 (2017), 150-153; Ryan Snyder, “The Future of the ICBM Force: Should the Least Valuable Leg of the Triad Be Replaced?” Policy White Paper, *Arms Control Association*, March 2018, https://armscontrol.org/sites/default/files/files/PolicyPapers/PolicyPaper_RS_2018_0319.pdf.

⁷⁴ Office of the Secretary of Defense, *Nuclear Posture Review Report*, 26. See also Department of State Bureau of Arms Control, Verification, and Compliance, “U.S. Nuclear Force Posture and De-Alerting.”

⁷⁵ William J. Perry and James R. Schlesinger, *America’s Strategic Posture: The Final Report of the Congressional Commission on the Strategic Posture of the United States* (Washington, DC: United States Institute of Peace Press, 2009), 69.

pronouncement. The benefits of a prompt launch capability for deterrence and assurance and achieving objectives should deterrence fail are described in Chapter 5. In theory, the United States could make an internal change to its nuclear policy, ruling out nuclear employment in some set of constrained circumstances while maintaining an outward policy of ambiguity to preserve flexibility, but there would be a significant risk that adversaries would learn of the change.

Similarly, the costs and benefits of de-alerting proposals would depend on the specifics. Key factors would include which forces are de-alerted, how long it would take to re-alert, and how observable re-alerting would be by potential adversaries. The United States has already reduced risk by adopting a default of open-ocean targeting; this ensures that an inadvertent launch would go to the ocean. But targets can be expeditiously reprogrammed, so there is little downside. In general, de-alerting proposals are designed to eliminate the possibility of making a nuclear employment decision in constrained or highly constrained circumstances, so they involve more substantial barriers that would impose re-alert timelines of many hours or days.

For advocates of de-alerting, the primary benefits are reducing the risk of nuclear war by mistake and providing assurance to adversaries that the United States is not contemplating a disarming nuclear first strike. Both are valid concerns, but they are often overstated and can be mitigated in other ways. The likelihood of nuclear war by mistake has been reduced by safeguards and adjustments to U.S. nuclear posture described in Chapter 5 and Chapter 6. Nonetheless, the United States should continue to prioritize reducing the risk of miscalculation, including by pursuing efforts along the lines of the options described in this chapter.

Regarding adversaries, there is little evidence that adversaries are concerned about a U.S. nuclear first strike. Both Russia and China keep the majority of their mobile nuclear forces in garrison and port during peacetime, making it clear that they are not particularly worried about a bolt-from-the-blue U.S. attack. Proposals to reduce launch readiness would be much more attractive if implemented bilaterally with Russia, and are therefore potentially worth pursuing. But Russia has shown little interest in such a proposal in the past and, given its reliance on land-based ICBMs, would be unlikely to support a bilateral agreement that included just those systems.⁷⁶ There are also other options available to reduce the risk of Russian miscalculation, such as the long-standing proposal for the United States to help improve Russian missile warning capability to reduce the risk of false alarms and continued strategic arms control.

⁷⁶ Miller, "De-alerting Strategic Missile Forces," 288-289.

In addition, there are two primary risks of de-alerting that outweigh potential benefits.⁷⁷ First, de-alerting creates incentives for re-alerting races. Even if the United States de-alerted some or all of its nuclear forces, there would be a strong incentive to re-alert in a crisis to increase the survivability of its nuclear posture. In a conflict with Russia, this situation would create crisis instability: Moscow would have an incentive to attempt a disarming first strike before the United States is able to generate its forces. In addition, the race to re-alert would cause crises to take on a nuclear dimension earlier, potentially increasing the risk of escalation at a time when the likelihood of miscalculation is much higher. Second, de-alerting would likely reduce the readiness of crews operating U.S. nuclear forces. Without the urgency to train to meet day-to-day mission requirements, proficiency would likely drop. As a result, when forces were re-alerted, personnel would be less adept, increasing the risk of a mistake.

⁷⁷ For a more detailed discussion of the risk of de-alerting, see Walter B. Slocombe, "De-Alerting: Diagnoses, Prescriptions, and Side-Effects," discussion paper presented at the seminar on "Re-framing De-Alert: Decreasing the Operational Readiness of Nuclear Weapons Systems in the U.S.-Russia Context" in Yverdon, Switzerland, 21-23 June 2009, <https://www.eastwest.ngo/sites/default/files/events-downloads/Slocombe%2C%20Walter.pdf>; Christopher A. Ford, "Dilemmas of Nuclear Force 'De-Alerting'," presented to the International Peace Institute Policy Forum, October 7, 2008, https://www.ipinst.org/wp-content/uploads/2008/10/pdfs_ford.pdf; Robert Rudney and Willis Stanley, "Dealerting proposals for strategic nuclear forces: A critical analysis," *Comparative Strategy* 19:1 (January-March 2000), 1-34.

6. Findings and Recommendations

A. Findings

The IDA study team judges that maintaining the credible capability to promptly employ nuclear weapons provides important benefits that should be preserved. This capability complicates adversary calculus in a number of plausible scenarios, contributing to deterrence of adversaries and assurance of allies and partners. It also ensures that a president would have a diverse set of options to achieve U.S. objectives should deterrence fail.

The United States has instituted changes to its force posture, processes, and procedures to mitigate risk in the most constrained time windows, including a gradual shift to a more survivable and stabilizing nuclear posture and updates to nuclear employment conference procedures. These steps have reduced the already low likelihood that a false alarm could rise to the level of an erroneous attack assessment and have made it even less likely that the president would be advised to employ ICBMs before he or she thinks they will be destroyed.

But there are additional steps that United States should take to further reduce the likelihood of miscalculation if it were to contemplate nuclear employment in a constrained time window.

B. Recommendations

1. The measures that would produce the most benefit at the lowest cost are improvements to the decision-making process and the preparation of principals. The decision-making process for nuclear weapons employment must support the spectrum of potential decision windows. The existential risk of an adversary counterforce strike against the United States provides sound rationale for maintaining a capability to make decisions in a highly time-limited scenario. However, this is perhaps the least likely of the extreme circumstances in which the United States might contemplate nuclear employment, and should be treated as such. The decision-making process also needs to support other intra-conflict scenarios, such as reestablishing deterrence and limiting adversary nuclear forces, in which decision windows may be constrained to hours or days rather than minutes.

2. Despite diverse national security challenges and severe demands on their schedules, presidents, principal advisors, and their staffs should devote more time and energy to training, exercises, and rehearsals to improve their ability to proffer and absorb sound

advice if the United States has to contemplate nuclear employment. Such preparations could be intensified or built upon when needed. During the early stages of a crisis or conflict an agile decision-making process should emphasize deliberate preparation of principals via the exploration of paths the burgeoning crisis might take, especially those paths that might lead to the United States considering nuclear employment.

3. To further reduce the already low probability that a president would face pressure to employ U.S. nuclear forces before they are disabled or destroyed, the United States should prioritize fielding a robust, resilient NC3 capability. The degree to which a president and his or her advisors have confidence in their ability to stay linked and communicate to the forces is directly related to their confidence in the decision-making process itself. Resilient NC3 capabilities would reduce pressure during highly constrained employ-before-destruction scenarios and facilitate rapid communication and consultation in other constrained scenarios. NC3 modernization efforts are underway, but the United States needs to sustain investments in order to overcome years of neglect and increasingly serious and diverse adversary threats.

4. Renewed attention is also needed on developing plans for increased survivability of U.S. nuclear forces. The current U.S. nuclear posture is survivable and stabilizing, and thus likely to relieve much of the potential pressure to employ nuclear weapons quickly in employ-before-destruction scenarios. But the United States should prepare for changes in technology and the security environment that could make U.S. nuclear forces more vulnerable and take prudent steps to plan for and exercise enhanced postures if adjustments are needed to sustain a sufficient degree of survivability.

5. The United States should also upgrade its pre-tactical warning and post-attack assessment capabilities to allow more time for course of action development and evaluation. Improving the U.S. ability to identify actions by nuclear competitors that portend potential nuclear employment would allow for additional time for deliberation and discussion once tactical warning has been received. Establishing processes for rapid post-attack assessment would similarly generate more decision time. Improving U.S. pre-tactical warning and post-attack assessment has greater potential to promote decision time than material upgrades of current tactical warning capabilities. Though improvements in tactical warning are possible, many are relatively costly and likely to increase the number of time units available by a small measure.

6. Changes to policy, such as forswearing a prompt nuclear weapons employment capability or de-alerting nuclear forces, would result in inordinate risk in the current strategic setting. If the international security environment improves, these steps may become more realistic. However, as long as there are credible scenarios of adversary aggression and nuclear escalation against the United States and its allies and partners, the United States should prioritize reinforcing deterrence and assurance and maintaining capabilities that provide options to achieve U.S. objectives should deterrence fail.

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Appendix B.

Acronyms

ABNCP	Airborne Command Post
AEHF	Advanced Extremely High Frequency
BMEWS	ballistic missile early warning system
DARPA	Defense Advanced Research Projects Agency
DOD	Department of Defense
DSP	Defense Support Program
FY19	Fiscal Year 2019
GBSD	Ground Based Strategic Deterrent
HGV	hypersonic glide vehicle
ICBM	intercontinental ballistic missile
ITW/AA	Integrated Tactical Warning/Attack Assessment
JLENS	Joint Land Attack Cruise Missile Defense Elevated Netted Sensor System
MILSTAR	Military Strategic and Tactical Relay
NAOC	National Airborne Operations Center
NATO	North Atlantic Treaty Organization
NC3	nuclear command, control, and communications
NDAA	National Defense Authorization Act
NMCC	National Military Command Center
NPR	Nuclear Posture Review
NSC	National Security Council
SBIRS	Space Based Infrared System
SLBM	sea-launched ballistic missile
SME	subject matter expert
SSBN	ballistic missile submarines
TACAMO	Take Charge and Move Out
TEL	transporter erector launcher
TTX	table-top exercise
USNDS	U.S. Nuclear Detonation Detection System
USSTRATCOM	U.S. Strategic Command

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Appendix C. Study Participants

Mr. Paul Bernstein	Lt Gen (ret) Frank Klotz
Dr. Bruce Blair	Mr. Brian McKeon
Amb. Linton Brook	Mr. Vincent Manzo
Ms. Maren Brooks	ADM (ret) Richard Mies
Mr. Curt Buckles	Mr. Franklin Miller
Ms. Elaine Bunn	Dr. James Miller
Maj Gen (ret) Roger Burg	COL Buck O'Day
Gen (ret) James Cartwright	ADM John Richardson
Gen (ret) Henry Chiles	Dr. Brad Roberts
Gen (ret) Kevin Chilton	Mr. Frank Rose
Mr. Brad Clark	Ms. Lynn Rusten
Ms. Madelyn Creedon	Mr. Walter Slocombe
Dr. JD Crouch	Dr. Robert Soofer
Maj Gen SL Davis	Maj Gen Fred Stoss
Maj Gen Jim Dawkins	Mr. Michael Urena
Ms. Paula DeSutter	USSTRATCOM J3/5/7
Ms. Lisa Disbrow	Dr. Richard Wagner
Mr. Michael Elliott	Mr. Greg Weaver
Mr. Doug Feith	Gen (ret) Larry Welch
Maj Gen (ret) Sandra Finan	Maj Gen (ret) Robert Wheeler
Brig Gen (ret) Jonathan George	ADM (ret) Sandy Winnefeld
Dr. Thomas Geyer	Lt Gen (ret) John Wissler
Dr. George Miller	Mr. Jon Wolfsthal
Dr. John Harvey	Mr. John Wood
Joint Staff J33/36	Dr. Christopher Yeaw
Gen (ret) Robert Kehler	

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