



Strategic Weapons in the 21st Century: Rethinking Nuclear and Non-Nuclear Elements of the Deterrent

Implementation Strategy

Narrative for Workshop Discussion

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This topical area is focused on the following question: Within the new Triad concept in the Nuclear Posture Review (NPR), what is required and what obstacles need to be overcome to transform strategic capabilities in order to optimize readiness and responsiveness in the 21st Century?

In addressing our question, we find it important to think beyond strike to a more complete set of capabilities which can achieve a strategic effect and the dynamics associated with them. In particular, we focus our assessment here on the state of readiness and responsiveness of Command and Control, Non-nuclear forces, and Nuclear forces to assure, dissuade, deter, and defeat, as called for in current policy. We identify strengths and weaknesses in the current posture and recommend issues for study and resolution to mend current deficiencies.

Definitions. We begin by defining some of the terms critical for our discussion:

- *Strategic Capabilities* are most succinctly defined as those that provide the ability to decisively alter an adversary's basic course of action.¹ *Strategic Strike Capability* has the added aspect of *promptly* achieving that objective.
- *Readiness* refers to the ability to promptly execute strategic missions with forces in

¹ Defense Science Board (DSB) Report. *Future Strategic Strike Forces, 2004*. Report can be found at www.acq.osd.mil/dsb/reports/fssf.pdf.

- being.
- *Responsiveness* is the ability to augment existing forces with increased numbers and/or improved capability more rapidly than any evolving threat.

The Readiness-Responsiveness Continuum. The NPR and other national security guidance set forth strategic policy objectives of assurance, dissuasion, deterrence, and defeat. Optimal implementation of these objectives involves an ability to shift across the spectrum from readiness to responsiveness in concert with shifts in U.S., ally and adversary environments. Given our task here to address transformation of Strategic Capabilities, we find that modifying the new triad of the NPR helps show that the readiness-responsiveness spectrum is relevant to the three operational capabilities of Strike (nuclear and non-nuclear), Defense, and Command, Control, Communications, Intelligence, Surveillance, and Reconnaissance (C3ISR), as follows:

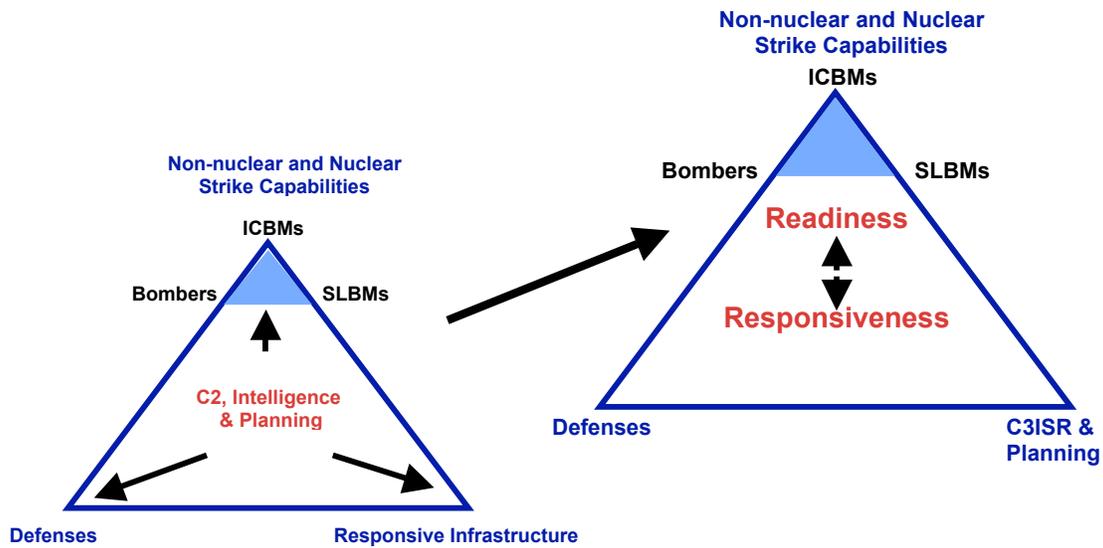


Figure 1. A reinterpretation of the New Triad of the NPR to capture the readiness-responsiveness spectrum.

In modifying the “new triad” of the NPR, we have purposely expanded the “C2I and Planning” element to C3ISR and Planning. Intervening studies² have noted the critical importance of assured and timely communications to support command and control, along with the integrated capabilities of ISR at all levels, from overhead to close-in and HUMINT, to address the often fleeting or ambiguous strategic targets of current and future concern.

Each element of the redrawn triad has dimensions of capabilities “in being” and capabilities that need to be at the ready. Responsive infrastructure is a useful construct for the readiness dimension of strike forces, both nuclear and non-nuclear, and eventually, defenses. C3ISR and Planning have a more routine operational character that also contributes to readiness. Readiness is achieved by exercising the intelligence community on a continuous basis to improve strategic intelligence and targeting, and in upgrading and

² *Ibid.* See also the DSB reports *Nuclear Capabilities 2006* (www.acq.osd.mil/dsb/reports/2006-12-Nuclear_Capabilities.pdf) and *21st Century Strategic Technology Vectors 2007* (www.acq.osd.mil/dsb/reports/xxx.pdf).

integrating surveillance and reconnaissance assets. Both aspects contribute to a continuous planning cycle. An additional critical component of readiness in C3ISR is the exercising of responsible leaders in command and control so that they are well practiced – and therefore responsive - to make the difficult and time critical decisions that might be required for “strategic” strike.

Figure 2 below illustrates the nuclear strike element in the readiness-responsiveness context and highlights that readiness and responsiveness constitute a continuous spectrum of capabilities from those immediately available to those requiring significant time to provide usable capability, from capabilities already deployed, to those in development, to those requiring a responsive industrial infrastructure to become a reality in response to unanticipated threats.

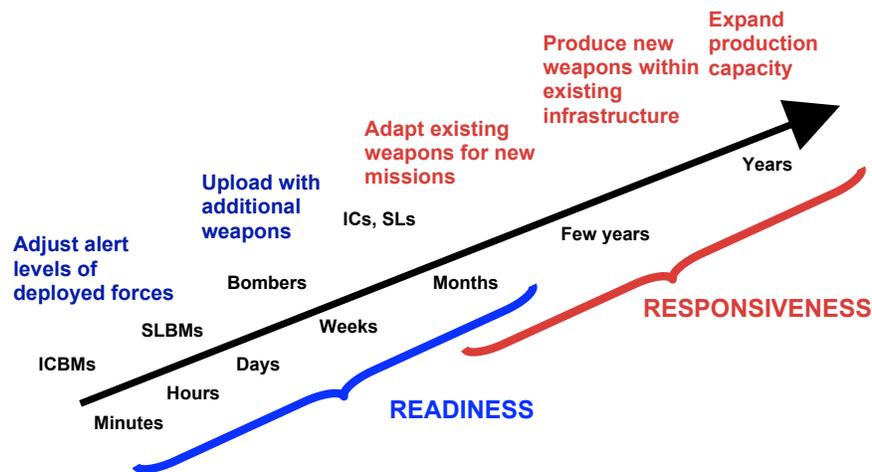


Figure 2. Readiness and responsiveness of nuclear forces.

(Of the three capabilities supported by the Readiness/Responsiveness spectrum our discussion of Defense ends here. We expect to return to the subject at some future time. Our postponement is in part due to the compressed time for workshop preparation, but also our perception that while the goals for defense are clear, defense capabilities at the current time are not technically robust enough to achieve those goals.)

C3ISR. The principal requirements for strategic C3ISR can be characterized by two words: timeliness and accuracy. The strategic environment will likely entail long periods of little action or intelligence of interest, punctuated by small windows within which targets of strategic importance present themselves, probably in cluttered environments. Accurate ISR must inform decision makers, who must in turn decide on a course of action and set in motion mission execution, all of which must occur within a relevant timeframe. Mission execution must be coupled to rapid and accurate “battle damage assessment” that not only identifies whether the effect was delivered to the correct coordinates, but indeed whether that effect created the strategic outcome desired. An important aspect of “accuracy” in the strategic context – in both identifying targets of interest and assessing the effect achieved – is a well honed understanding of what the adversary values and how that can be threatened or undermined.

Non-Nuclear Strike. For planning and execution of strike against strategic targets, non-nuclear assets are not new to “strategic” warfighting, but the explicit acknowledgement of

their use in a strategic context was reintroduced with the NPR. With the dramatic improvements of speed, stealth, and precision in conventional weapons over the last three decades and the maturing of other strategic capabilities, such as information operations, non-nuclear strike has become viable for holding at risk many (but not all) targets previously thought vulnerable only to nuclear effects.

We find many of the characteristics desirable for a ready and responsive capability exist for non-nuclear strike. The choices among deployed capabilities are numerous and have the benefit, in comparison to nuclear forces, of well characterized performance, both technically and operationally, because of use in many different test and warfighting environments. Many weapons have been adapted for delivery on multiple platforms, providing a diversity of options for strike planning. Moreover, the (more or less) continuous military operations of the recent past keeps open a production pipeline and parallel development efforts that improve capabilities as new technology becomes available. The acquisition process, while cumbersome and typically slow, is well tuned to conventional systems.

In a strategic context, however, we worry that the trends in proliferation are introducing a major potential vulnerability to conventional forces, namely nuclear survivability. Conventional systems, which have migrated to more and more COTS based electronics, along with concepts of operations baselined for net centric warfare, could be vulnerable to limited, localized nuclear strike tailored to EMP. Potential adversaries recognize this issue and have stated a willingness to use nuclear weapons on their own territory to stop U.S. forces.

Nuclear Strike. The need for nuclear strike has become more circumscribed with the advances in non-nuclear strike capabilities, but many important strategic targets, which only nuclear weapons can hold at risk, remain. The vision for nuclear strike capabilities is not unlike that for non-nuclear strike – namely the ability to exercise capabilities across the full spectrum from readiness to responsiveness. The challenge is to do this with a force that is not – and hopefully never will be – exercised operationally, but if anticipated for use, the force will likely be brought to bear in the context of more limited strike compared to the planning scenarios of the Cold War. Lacking much precedence for such challenges, we find it no surprise that in contrast to non-nuclear strike capabilities, we see an infrastructure and skill base little exercised since the end of the Cold War, deployed capabilities which are legacies of that same period, and only a part of the enterprise just starting to address these issues.

DOE/NNSA. The Nuclear Posture Review expressed concern about the ability of the DOE/NNSA infrastructure to support the strategic strike mission in both maintaining the stockpile and creating the capabilities needed for an uncertain future. The United States is unique among nations with nuclear weapons in that it cannot produce new weapons, even those of old design, because of the lack of key production capabilities. In addition most parts of the NNSA nuclear weapon production complex that can still produce are old, costly to maintain, and in some cases, in a state of increasing deterioration. The NPR called for a reversal of this situation and the creation of a

responsive DOE/NNSA infrastructure. A recent DSB study called attention to the serious atrophy that had taken place, even more so since the NPR.³

DOE/NNSA is starting to respond to the challenge. In October 2006 the “Complex 2030” plan was produced; the objective is “An infrastructure able to meet the threats of the 21st Century.” The explicit objectives stated are:

- (1) In partnership with the Department of Defense, transform the nuclear stockpile through development of Reliable Replacement Warheads, refurbishment of limited numbers of legacy designs, and accelerated dismantlement of the Cold War stockpile;
- (2) Transform to a modernized, cost-effective nuclear weapons complex;
- (3) Create a fully integrated and interdependent nuclear weapons complex; and
- (4) Drive the science and technology base essential for long-term national security.

The necessary EIS process is underway. Important interim steps for renewed or updated manufacturing capabilities associated with special nuclear materials are being taken. However, a necessary, but missing, element for Complex 2030 is sizing. Its capacity and agility can be traded against weapons in being, both deployed and reserve. But DoD and the policy community, as the drivers for this aspect, have yet to provide that guidance.

In the near term, NNSA, in partnership with DoD, has initiated the RRW1, the initial attempt to design, develop, and produce a weapon that will be more reliable, safer, and more secure than the existing weapons in the stockpile. If successful, RRW1 could be the first step in transforming the stockpile by shifting from life extension of legacy warheads to replacement with a succession of RRW designs.⁴ RRW1 will also, for the first time in fifteen years, exercise the design, development and production skills of the nuclear weapon complex, revitalizing this expertise and laying the foundation for the restoration of skills imperative for a responsive infrastructure.

As healthy a step as RRW1 is, it is limited by the Congressional stricture against new military capability. The world faces an uncertain future and it is far from clear that the cold war military capabilities of the current stockpile, which will be perpetuated by an RRW Program, can assure, dissuade, deter, and defeat in the face of a dynamic and increasingly proliferated threat environment the nation appears to be facing.

DoD. The difference in status between non-nuclear strike forces and nuclear forces is stark. Whereas non-nuclear forces are relatively modern, numerous, tested in operations, and in many cases adaptable to multiple delivery systems, the few existing

³ DSB report *Nuclear Capabilities*, December 2006.

⁴ Life extension past a generation or so raises the possibility of introducing production errors with each remanufacture and/or uncertainty due to replacing new components for old – none of which can be tested underground. Even this first cycle of LEPs have experienced difficulties and costs reinstating processes long abandoned, using materials that require added security and/or special handling on account of environment, safety, and health risks. Expertise at the labs and plants to do the job with such materials is fragile, at best, so that recreating the processes has proved to be problematic. In the long run, we will simply run out of the ability in the LEP domain to reproduce what was. Reliability will come into question, while weapon safety and security will be limited to 1980-1990 technology and requirements.

nuclear strike forces are remnants of the Cold War deterrent, reflecting the technology of that period.

We note first that the readiness of current nuclear strike forces is not yet an issue despite the advanced age of strategic strike platforms. Alert levels of operationally deployed systems can be adjusted as necessary in response to changing world conditions. Escalating threats can be met (up to a point) with increased nuclear weapon deployments on bombers, intercontinental ballistic missiles, and even sea-launched ballistic missiles. The time scales vary, ranging from weeks to months, but likely to be more rapid than the threat can escalate provided warning is acted upon promptly. However, the response to threats whose sophistication or numbers cannot be countered with changes in alert status or simply increasing the numbers of operationally deployed weapons from the existing reserve weapon stockpile is not assured.

While the pipeline of non-nuclear strike systems is full, reflecting a desire to have deployed systems “second to none,” there are no new nuclear strike delivery platforms in development. The Life Extension Programs for Trident and Minute Man III are minimal programs that address only those system components whose deterioration requires that they be replaced in order to perpetuate the life of fundamentally aged systems. Therefore, similar to the DOE nuclear weapons complex until recently, the nuclear strike infrastructure is in a state of decay. Life extension programs are preserving a limited production activity, but the lack of research and development, coupled to no prospects for new systems on the horizon, jeopardizes the continued existence in industry of the production capability unique to strategic strike systems. Of equal concern is the resultant loss of design and system engineering expertise that will be critical to any attempt to respond in the future to unanticipated threats. These concerns are most explicitly evident in the large diameter rocket arena, upon which any future land-based or sea-based ballistic missile system would be dependant.^{5,6}

An area deserving serious attention is the extent to which non-nuclear strike infrastructure could be utilized in assisting nuclear strike to be more responsive to surprises. Historically non-nuclear weapon systems incurred significant costs if they were to be used as nuclear platforms, largely because of the special safety and security requirements for nuclear weapon systems. However, modern technology may offer low cost options for conversion that can meet safety and security needs. This is a possibility, not a certainty. The issue should be thoroughly examined for technical feasibility and policy practicality jointly by DoD and DOE/NNSA for one or more specific non-nuclear delivery systems (e.g., aircraft). If the concept is feasible and acted upon, it could shore up the failing infrastructure in areas important to nuclear strategic strike.

⁵ Defense Science Board Report. *Future Strategic Strike Skills*, 2005.

⁶ Threat Reduction Advisory Report, *An Evaluation to DoD's Responsive Infrastructure for Strategic Strike*, 2006.

Key Issues – or Opportunities. The discussion above introduced to the participants⁷ in the Implementation Workshop of the conference a number of issues, or alternatively, opportunities for action.

The first of these derives from our observation that while many of the elements of the New Triad are reasonably healthy, nuclear strike is fragile, at best. The root cause, we believe, is the lack of a clear and accepted articulation by national leadership of the role of nuclear weapons in the current and future strategic environment. Lacking that, it will be difficult, if not impossible, to sustain even a sensible program like RRW. Addressing this gap is unlikely in the current political environment, but the strategic policy community should develop a story that resonates with new leadership in both the Administration and Congress, and we all need to tell it. That story should:

- Address the assure-dissuade-deter-defeat (ADDD) spectrum, just as the NPR did;
- Define the unique and complementary roles for the major strategic capabilities, to include the elements of the newly defined triad of this paper;
- Link offenses, defenses, and non-proliferation for a more robust approach to assurance and dissuasion (e.g., how should we expand extended deterrence to embrace defenses as well as offenses; non-nuclear as well as nuclear forces?);
- Expand the Responsive Infrastructure element of the 2001 NPR to a readiness-responsiveness continuum relevant for each of the strategic capabilities; and
- Acknowledge that we cannot “go it alone;” the complex world portrayed by the International and Domestic Dynamics workshop of this conference emphasizes that our allies and partners can contribute strongly to enable assurance, dissuasion, and deterrence.

More immediately, there are several actions that can and should be taken to keep the new starts within the nuclear weapons enterprise going.

- Nuclear Weapons Council members and DOE leadership need to communicate the importance of, and rationale for, RRW; the first steps have been done well with the coordinated announcements for the RRW-1 decision, but continuity of message and delivery will be needed to address the continued concerns by Congress;
- Nuclear weapons laboratory directors should formally state that RRW can be certified without underground testing; and
- NNSA and ATSD/NCB/NM should do their homework for next year’s hearings that would include: (1) a “balanced scorecard” assessing the risks and mitigations for the LEP, RRW, or mixed strategy paths forward; (2) linkage to complex transformation and synchronization required with DoD; and (3) analysis and facts that back up program and budget proposals.

DoD has taken a major step forward with identification of “Tailored Deterrence” as one of the eleven Joint Capability Portfolios in the latest QDR, but it is an “orphan” in the Capabilities Based Planning and acquisition processes because of its focus on avoiding, rather than directly contributing to, warfighting. We acknowledge that important decisions regarding upgrading command and control and ISR assets have been made, but looming

⁷ See Appendix for a list of participants.

issues regarding strategic delivery platform replacements are yet to be addressed – and probably won't be so long as the planning and acquisition processes remain focused on “defeat” and are not adapted to address the “assure, dissuade, deter” policy objectives relevant to strategic forces. We recommend that the Deputies Advisors Working Group (DAWG) name a high level portfolio manager responsible for Tailored Deterrence, with oversight authorities across the Services. The manager will need to be supported by a strong analytical team so that options can be assessed and trades can be made to inform what will be costly decisions.

As a closing comment, we are starting to understand that the lack of clarity of vision and the communications that should accompany it have not only led to a lack of consensus among national leadership, but have also confused our allies, partners, and potential adversaries. Only through a re-engagement of dialogue, on all fronts, can we hope to turn this situation around.

Appendix Implementation Workshop Participants

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