
Conventionalizing Deterrence?

U.S. Prompt Strike Programs and Their Limits

Corentin BRUSTLEIN

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Security Studies Center

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Ifri
27 rue de la Procession
75740 Paris Cedex 15 – FRANCE
Tel : 33 (0)1 40 61 60 00
Fax : 33 (0)1 40 61 60 60
Email : ifri@ifri.org

Ifri-Bruxelles
Rue Marie-Thérèse, 21
1000 – Brussels – BELGIUM
Tel : 32 (0)2 238 51 10
Fax : 32 (0)2 238 51 15
Email : info.bruxelles@ifri.org

Website : <http://www.ifri.org/>

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About the Author

Corentin Brustlein is the head of the Deterrence and Proliferation research program at the French Institute of International Relations (Ifri, Paris), and the editor of the *Proliferation Papers*. At Ifri, he is also a researcher in the institute's joint civil-military Defense Research Unit (LRD).

He has most recently co-authored a book on the growing erosion of Western air supremacy (*La suprématie aérienne en péril. Menaces et contre-stratégies à l'horizon 2030*, La Documentation Française, 2014, with Etienne de Durand and Elie Tenenbaum). He has also published articles and monographs on nuclear deterrence postures, force projection and anti-access/area-denial (A2/AD) strategies and capabilities, U.S. Defense policy, conventional warfare and classical strategic theory.

Corentin Brustlein holds a Ph.D. in political science from the Jean Moulin University of Lyon, and has taught international relations theory, strategic studies, and strategic analysis in various institutions such as Sciences Po Paris and the Jean Moulin University of Lyon.

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Abstract

About a decade ago, the U.S. has started to examine options to develop and acquire Conventional Prompt Global Strike capabilities. This move fits in an effort to conventionalize deterrence, an effort initiated decades before and undertaken for profound and diverse motives. Although it has been renewed under the Obama administration, which aims to reduce the U.S. reliance on nuclear weapons, this ambition has resulted in very little concrete progress. Budget cuts to defense spending and technological obstacles have forced the Pentagon to scale back its plans in terms of conventional strategic strike programs. Despite these setbacks, ten years from now the U.S. may well possess a conventional prompt strike capability in its arsenal. As a consequence, this paper also highlights some longer-term, operational and strategic issues that might arise from a context of crisis or war in which prompt strike capabilities could be used, and attempts to shed new light on the potential values these capabilities might have for U.S. national security.

* * *

Depuis près d'une décennie, les Etats-Unis ont identifié le besoin de se doter de capacités de frappe stratégique rapide (*conventional prompt global strike*). S'il ne s'y limite pas, ce développement s'inscrit dans la continuité des efforts américains de conventionnalisation de la dissuasion, efforts de longue date mus par des motivations profondes et variées. Malgré des ambitions renouvelées sous l'administration Obama, désireuse de réduire le rôle de l'arme nucléaire dans sa posture de défense, les programmes américains sont encore loin d'une concrétisation. La conjugaison des coupes budgétaires subies par le Pentagone et des difficultés technologiques rencontrées par les programmes a imposé une révision à la baisse des ambitions américaines dans le domaine de la frappe stratégique rapide. Malgré ces déconvenues, les Etats-Unis pourraient disposer d'ici une dizaine d'années de capacités de frappe stratégique rapide. Néanmoins, la perspective de leur emploi en temps de crise ou de guerre pose de nombreuses questions, tant en termes de crédibilité opérationnelle que d'interaction stratégique. Ces dimensions offrent un éclairage nouveau concernant l'apport de telles capacités pour la sécurité des Etats-Unis, et les limites concrètes de leur rôle.

Introduction

The ambition of the United States is to reduce the role of nuclear weapons in its defense policy in general, and in its deterrence posture in particular. The Nuclear Posture Review Report published in April 2010 considered that progress achieved in areas such as conventional strike and ballistic missile defense were opening up the prospect of significant reductions in the U.S. nuclear arsenal without lowering national ambitions in terms of deterrence and reassurance. To achieve this, the Pentagon planned to reinforce its non-nuclear offensive capabilities by continuing efforts initiated in the mid-2000s in terms of *conventional prompt global strike* (CPGS)¹.

Although the Obama administration has linked these developments to its declared ambition to advance towards a world without nuclear weapons, they are not limited to that goal. Greater reliance on conventional capabilities for deterrence is not a preference that is specific to the individuals currently in place in the White House or the Pentagon, no more than under George W. Bush. The last two administrations are merely continuing along a path traced out by the United States many years ago.

Efforts to conventionalize the U.S. deterrence posture meet a need identified decades ago to reduce the credibility gap inherent in postures of extended deterrence relying on nuclear weapons. Diversifying the U.S. portfolio of offensive and defensive capabilities should make it possible to prevent a wider spectrum of hostile initiatives and, if need be, to better respond to these. This diversification of U.S. response capabilities through a greater reliance on conventional capabilities is considered all the more necessary as the nuclear weapons developed during the Cold War are generally too powerful and insufficiently accurate, and the United States has committed not to develop new nuclear weapons².

¹ *Nuclear Posture Review Report*, Washington, Department of Defense, 2010, pp. 6, 15, 33-34. It should be noted that the U.S. is not the only country developing conventional prompt strike capabilities. Russia and China are both among the countries conducting studies or experiments on the kinds of hypersonic strike capabilities considered by the U.S. military. In fact, since it is not a signatory of the INF treaty, China already possesses several types of short- and medium-range ballistic missiles possibly tipped with conventional warheads and traveling at hypersonic speeds (mostly CSS-5/DF-21 and CSS-6/DF-15).

² *Ibid.*, p. 40; Elaine M. Grossman, "A Former Nuclear Commander Not Wild About Nukes", *Global Security Newswire*, 28 May 2008, available at: <http://www.nti.org/gsn/article/a-former-nuclear-commander-not-wild-about-nukes/>;

The post-Cold War period contributed to the acceleration of U.S. conventionalization efforts in two complementary ways. First, air operations during the Gulf War revealed the extent of progress achieved since Vietnam in terms of precision targeting and strike and triggered an outbreak of enthusiasm over a possible “revolution in military affairs” that could reinforce deterrence postures. Second, Iraq’s invasion of Kuwait and the unexpected scope of the former’s weapons of mass destruction (WMD) programs focused attention on the strategic problems bold regional adversaries might pose to a U.S. deterrence posture that was still tailored to Cold War requirements³.

In many ways, the conventionalization issue reflects the profound difference between U.S. and French approaches to deterrence, which has its roots both in the disparity between the conventional capabilities of the two countries and in their differences in terms of geostrategic ambitions and responsibilities. In view of its key role in regional security architectures, the United States had to design a posture of credible deterrence against attacks both on the U.S. homeland and on its allies and prepositioned forces in Europe, Asia and the Middle East. That the U.S. adopted an *extended* deterrence posture is at the core of the credibility gap that Washington has identified and attempted to fill for decades. The purpose of the French deterrent, on the other hand, is solely to protect the country’s vital interests. Being strictly national, independent and defensive, it has not faced the credibility problems associated with extended deterrence – requiring specific conventional capabilities and significant troop deployments in addition to a very clear political commitment to stand up for allies. Most importantly, French nuclear weapons were developed precisely because of the inherent weaknesses and uncertainties of conventional deterrence postures, as a way for Paris to compensate for the clear asymmetry of military power between France and the Soviet Union, its most formidable potential enemy. While the French policy only seeks to deter through the threat of punishment, the predominant view of deterrence in Washington combines the threat of retaliation and the development of denial capabilities – designed to prevent the adversary from achieving his goals – such as prompt strategic strikes⁴.

The notion of a conventionalization of the U.S. deterrent refers to efforts made by Washington to reduce its reliance on nuclear weapons for deterrence purposes. This first led the U.S., starting during the Cold War, to try to establish favorable balances of conventional military power at the local and regional levels. Although maintaining favorable conventional

Walter Pincus, “Nuclear Weapons Rarely Needed, General Says”, *The Washington Post*, 10 March 2007, available at: <http://www.washingtonpost.com/wp-dyn/content/article/2007/03/09/AR2007030902334.html>.

³ Kenneth Watman and Dean Wilkening, *U.S. Regional Deterrence Strategies*, Santa Monica, RAND, 1995 and Kenneth Watman and Dean Wilkening, *Nuclear Deterrence in a Regional Context*, Santa Monica, RAND, 1995.

⁴ Note that deterrence by denial can rely on nuclear and non-nuclear capabilities. Non-nuclear capabilities are not confined to prompt strategic strikes, but also include missile defense. For an official view of the respective contributions of non-nuclear capabilities to U.S. deterrence, see *Deterrence Operations Joint Operating Concept* (version 2.0), Washington, Department of Defense, 2006, pp. 28-44.

balances still matters today, the dynamic of conventionalization now mostly translates into both the development of ballistic missile defense (BMD) systems and the diversification of non-nuclear strike options. More generally, it is reflected by the growing role attributed to conventional capabilities in escalation management during crises as well as for intrawar deterrence, giving the United States greater flexibility in responding to the spectrum of possible threats and better credibility in preventing hostile initiatives. Washington's willingness to conventionalize deterrence leads it to strengthen both defensive and new non-nuclear offensive capabilities, most recently through the development of prompt strategic strike capabilities. This monograph will focus on the latter, which has received much less analytic attention than ballistic missile defense.⁵

The drivers behind this conventionalization dynamic have evolved with the passage of time. They have not had the same duration nor the same weight on the various U.S. administrations, but they distinctly point in one direction: a diversification of retaliatory and counterforce options meant to reinforce the credibility of U.S. deterrent threats. However, almost 25 years after the end of the Cold War, progress achieved and concrete results in the area of conventional prompt global strike capabilities are meager⁶. Whereas an initial prompt strategic strike capability was to have been deployed at the end of the 2000s, entry into operational service now seems unlikely before the 2020s. Notwithstanding the existence of profound and convergent motivations, this specific dimension of conventionalization has run into multiple obstacles, some short-term, others structural. These constraints have delayed the deployment of these capabilities and forced the U.S. to scale back its ambitions.

This paper begins by reviewing the different drivers behind the conventionalization of the U.S. deterrent, how they emerged and combined, how they affected U.S. defense policy, and how, for the last 10 years, they have led the DoD to study options for the development of prompt strategic strike capabilities (I). It then looks at the budgetary, political and technological obstacles which CPGS programs have recently encountered, and the way in which these constraints have forced the Pentagon to scale back its plans, apparently for the long term (II). Finally, the paper explores the potential operational and strategic limitations that the actual employment of such systems would face in times of crisis or war (III).

⁵ The potential contributions of BMD capabilities to the U.S. deterrence policy are thoroughly examined in Brad Roberts, "On the Strategic Value of Ballistic Missile Defense", *Proliferation Papers*, No. 50, June 2014.

⁶ Brad Roberts, *Extended Deterrence and Strategic Stability in Northeast Asia*, Tokyo, NIDS Visiting Scholar Paper Series, 9 August 2013, p. 21.

A Long-Term Dynamic of Conventionalization

The U.S. objective to rely increasingly on non-nuclear capabilities for deterrence purposes is not recent. It reflects a strong tendency in the evolution of U.S. strategy since the appearance of nuclear weapons. Due to converging operational, strategic and political needs tending towards a rebalancing in favor of conventional capabilities, the Pentagon's efforts in this area have been numerous over the past 50 years. The arguments behind this conventionalization trend have not always been the same, but have become diversified and stronger over time.

The logic behind conventionalization emerged in the aftermath of implementing the first U.S. nuclear doctrine, based on the threat of massive retaliation in response to any attack and on the idea that the nuclear deterrent was a financially advantageous means of ensuring the security of the United States and its allies. Through this initial phase, the U.S. reconsidered the pertinence of an all-nuclear posture and aimed at introducing conventional capabilities into its deterrence posture to reinforce its credibility. These efforts gained momentum in the 1970s, when technological progress appeared to bring within reach a level of lethality unattainable until then, giving conventional capabilities unprecedented credibility for compellence and deterrence purposes. These advances were all the more timely as they presented Washington in the 1980s and 1990s with the prospect of reduced dependence on nuclear weapons. Responding to motivations that are as much cultural and strategic as diplomatic and ideological, this goal has been reaffirmed since the Cold War, as various U.S. administrations have sought to reduce reliance on nuclear weapons in U.S. security strategies.

Massive Retaliation and Extended Deterrence (1950-1970)

The appearance of nuclear weapons created a profound dilemma for U.S. military and political decision-makers. Whereas the conduct of U.S. foreign policy had always sought to combine moral virtue and the use of force, nuclear weapons rendered this task infinitely more complex – even, some would say, impossible⁷. Whereas U.S. strategic culture traditionally emphasizes insularity and the quest for an overwhelming victory over the enemy, the nuclear revolution rendered the U.S. homeland more vulnerable than ever and seemed to impose a conception of the use of force that was

⁷ See Robert E. Osgood, *The Nuclear Dilemma in American Strategic Thought*, Boulder, Westview, 1988.

totally out of step with national preferences, since it implied quite simply abandoning victory as a relevant goal in certain conflicts⁸.

Thus, since 1945, Washington has been the scene of political and strategic debates seeking a way out of this dilemma, matching morals against strategic effectiveness, with some seeking to ignore the issue and others believing that only the abolition of nuclear weapons could solve the problem. In practice, due to the specificity of nuclear weapons and U.S. dependence on them to deter the Soviet Union, U.S. strategic orientations have essentially sought to reconcile moral preoccupations and the necessity to deter a Soviet attack, either by giving preference to the quest for strategic superiority over the enemy, acceptance of reciprocal vulnerability, or by trying to expand the range of possible options, including non-nuclear capabilities, to protect Western interests. Thus, following a period of reliance on an all-nuclear strategy, the U.S. has naturally come to affirm, then reinforce, the role of conventional weapons in its deterrence posture.

Though the U.S. deterrence posture has long relied on conventional systems, it should be noted that their nature and their missions have evolved considerably over the previous half century. Initially, the role of U.S. air and ground general purpose forces in Western Europe and East Asia was more political than military: they embodied the bond of solidarity between members of existing alliances. This primarily political role was progressively complemented by a military function, as doubts emerged about the credibility of the deterrence posture based on massive nuclear retaliation, while in the meantime U.S. conventional capabilities were slowly restored.

After 1945, the United States reverted to their traditional strategic preferences and organized a massive drawdown of their standing conventional forces, the implications of which became clear during the Korean War. True, the war on the Korean peninsula reversed this move to reduce conventional capabilities, but the policy of the Eisenhower administration from 1953 onwards was marked by efforts to reduce public spending and, consequently, attached priority to nuclear weapons. Thus, the doctrine of "massive retaliation", articulated between 1953 and 1954, constituted the administration's response to the threat posed by the Soviet Union. The objective was to neutralize the power of the Red Army's land

⁸ On the impossibility to secure victory in the nuclear era, see Bernard Brodie, "Implications for Military Policy", in Bernard Brodie (ed.), *The Absolute Weapon. Atomic Power and World Order*, New York, Harcourt, Brace and Co., 1946, pp. 70-107; Robert Jervis, *The Meaning of the Nuclear Revolution. Statecraft and the Prospect or Armageddon*, Ithaca, Cornell University Press, 1989, pp. 4-8. On victory in the U.S. strategic culture, see Benjamin Buley, *The New American Way of War. Military Culture and the Political Use of Force*, Abingdon, Routledge, 2008, pp. 16-62. Some authors have been extremely critical about the reluctance to consider military victory as an objective among those in charge of planning potential conflicts between the U.S. and nuclear adversaries. Colin S. Gray, "Nuclear Strategy: The Case for a Theory of Victory", *International Security*, Vol. 4, No. 1 (Summer 1979), pp. 54-87.

forces without risking the financial depletion that would follow a strategy based on a symmetrical response to the Soviet threat and, therefore, the development of massive U.S. conventional capabilities⁹. Thus, the nuclear weapons complex benefited from heavy investments during the 1950s, resulting in a rapid growth of the U.S. atomic arsenal. Within one decade, the number of nuclear weapons in the arsenal jumped from 450 to 18,500¹⁰. U.S. conventional forces deployed in Europe and Asia at that time remained sparse, contributing essentially to the political dimension of deterrence – their sheer presence was intended to embody the shared fate bringing together the United States and its allies, and the risks taken by the former to defend the latter.

It was not until later that, beyond their political role, conventional capabilities also contributed to the military dimension of deterrence. As the conditions for bilateral nuclear stability at a global level were theorized, doubts emerged on both sides of the Atlantic as to the credibility of the U.S. posture against Soviet attempts to attack and destabilize the West. Questions were raised regarding what should be considered to be an excessive dependence on nuclear weapons. On the one hand, the persistent conventional imbalance between East and West combined with the immediate proximity of belligerents weakened the stability of bilateral deterrence¹¹. On the other, the increased vulnerability of the U.S. homeland following deployment of the first Soviet ICBMs (SS-6) in 1960 cast a shadow over the credibility of the U.S. commitment to defend its allies in Western Europe.

Accordingly, in order to credibly support a deterrence posture against a wider range of threats, the United States chose early in the 1960s to massively redevelop its conventional capabilities while multiplying its tactical nuclear weapons. The conventional forces needed in Europe were heavy units – armored, mechanized divisions – with a blocking role; they had to absorb the shock caused by the first echelon of Soviet forces and offer a resistance which, although it was ultimately doomed to fail, enabled the defender to raise its nuclear threshold and offered him time to adapt and react to the surprise attack by the Warsaw Pact. These developments were undertaken in the framework of the doctrine of “flexible” response,

⁹ John Foster Dulles, “The Evolution of Foreign Policy”, in Philipp Bobbitt, Lawrence Freedman and Gregory F. Treverton (eds.), *US Nuclear Strategy. A Reader*, Londres, MacMillan, 1989, pp. 122-130. On Eisenhower’s military policy, see Allan R. Millett and Peter Maslowski, *For the Common Defense. A Military History of the United States of America*, New York, The Free Press, 1994, pp. 531-552.

¹⁰ Thomas B. Cochran, William B. Arkin and Milton M. Hoenig, *Nuclear Weapons Databook. Volume I: U.S. Nuclear Forces and Capabilities*, Cambridge, Ballinger Publishing Co., 1984, p. 15.

¹¹ One is reminded of the stability-instability paradox, posed as a hypothesis – not as a theorem – by Glenn Snyder and formulating the possibility that the stability of nuclear deterrence backed by invulnerable forces of retaliation could have the paradoxical effect of partially freeing the hands of rivals in conflict, who would consider nuclear escalation improbable. Glenn Snyder, “The Balance of Power and the Balance of Terror”, in Paul Seabury (ed.), *The Balance of Power*, San Francisco, Chandler, 1965, pp. 184-201.

designed to offer the Alliance the means to respond in a symmetrical manner to any kind of attack¹².

The reality of the reinforcement of NATO's conventional forces in Europe, however, did not live up to the administration's expectations¹³. The European defense effort remained very limited, among other things because Europe saw a risk of transatlantic decoupling behind the new U.S. orientations. In parallel, the Vietnam War from the mid-1960s onwards prevented a significant reinforcement of U.S. conventional capabilities in Western Europe¹⁴.

Conventional Deterrence Comes to the Fore (1970-2000)

Starting in the mid-1970s, Europe's conventional imbalance, which had been imperfectly restored through tactical nuclear weapons, began to turn in favor of the Western side. Thanks to technological progress, and in particular the arrival of precision-guided munitions, during the last two decades of the Cold War, conventional forces became a more credible means of reinforcing Western capabilities of deterrence by denial – although relying on strategic nuclear weapons for the retaliatory mission. This increased emphasis on conventional forces was aimed at strengthening the credibility of the Alliance's deterrent by increasing its defensive capabilities, with the added ambition of diversifying the available options in the event of war. Conventionalization of deterrence as a way to reduce the U.S. reliance on nuclear weapons came increasingly to the fore in the 1980s and continued beyond the end of the Cold War, first and foremost as a result of the ethical and strategic considerations already mentioned, supplemented after the Cold War by secondary political objectives¹⁵.

The search for more flexible retaliatory and denial options was a constant theme of U.S. military policy from the 1960s onwards. On a nuclear level, this need for flexibility had already become apparent to the Kennedy administration in 1961 during the Berlin crisis, when the president discovered the massive nature of all the strike options available under the operational plan in force at the time, SIOP-62. However, the ensuing development of limited counterforce options in the name of escalation control and damage limitation encountered the massive buildup of the

¹² Robert S. McNamara, "Speech to NATO Council, Athens, 5 May 1962", in Bobbitt, Freedman and Treverton (eds.), *US Nuclear Strategy. A Reader, op. cit.*, pp. 205-222.

¹³ The line of reasoning that shaped the vision of the Pentagon under McNamara on this question is explained in Alain C. Enthoven and K. Wayne Smith, *How Much Is Enough? Shaping the Defense Program, 1961-1969*, Santa Monica, RAND, 2005 (1971), pp. 117-164.

¹⁴ Lawrence Freedman, *The Evolution of Nuclear Strategy*, London, St. Martin's Press – IISS, 1989 (1981), pp. 285-302.

¹⁵ The launch of the Strategic Defense Initiative in 1983 established the basis for a second dimension of conventionalization of the U.S. deterrent – the development of active ballistic missile defense systems. Within two decades, these became a key part of the U.S. strategic posture.

Soviet nuclear arsenal and their progress in terms of survivability¹⁶. Due to the challenges posed by counterforce requirements in terms of targeting or C2, it was not until the Schlesinger doctrine in 1974 that U.S. strategy again embraced such ambitions to achieve flexibility.

On the conventional level, too, from the late 1970s onwards, technological progress – revealed, for example, during the Vietnam and Yom Kippur wars – made it possible to consider in a credible manner a much more substantial contribution of conventional capabilities to the U.S. deterrence posture, laying the groundwork for capabilities that would later be at the core of the “revolution in military affairs” in the 1990s¹⁷. During the wars of the early 1970s, precision-guided munitions (PGMs), whether air-to-surface or surface-to-surface, repeatedly demonstrated their tactical effectiveness. The use of laser-guided air-to-surface weapons in Vietnam resulted in spectacular gains in precision and was merely the first step in a series of advances made possible by miniaturization of electronics (inertial measurement units, GPS, TERCOM, etc.). Similarly, the effectiveness of Soviet-made anti-tank guided missiles caught Israeli armored units in the Sinai and the Golan Heights by surprise and overturned prevalent thinking about land warfare by considerably reinforcing infantry’s capacity to destroy modern armor. The confluence of these advances in precision guidance, surveillance and reconnaissance opened up the prospect of a decisive increase in battlefield lethality, substantially increasing the exposure to enemy firepower, and hence the potential cost of any offensive maneuver¹⁸.

This strengthening of NATO’s conventional firepower led the United States to take a fresh look at the relevance and feasibility of a deterrence posture with increased reliance on conventional forces and on “non-nuclear strategic weapons” capable of raising the nuclear threshold¹⁹. It was in this context that the *Commission on Integrated Long Term Strategy*, chaired by Fred Iklé and Albert Wohlstetter, published *Discriminate Deterrence*, in which the authors raised the possibility of using conventional weapon systems to perform certain missions hitherto earmarked solely for nuclear capabilities and underlined the fear that such developments created on the Soviet side, as well as the precarious nature of the U.S. advantage²⁰. The post-Cold War period seemed to confirm the hopes of Iklé and Wohlstetter, beginning as it did with the stunning demonstration of the tactical effectiveness of new conventional capabilities during operation *Desert Storm*. This seemed to announce a new age in which the conventional superiority enjoyed by the United States would give it unprecedented

¹⁶ Scott D. Sagan, *Moving Targets. Nuclear Strategy and National Security*, Princeton, Princeton University Press, 1989, pp. 26ff.

¹⁷ Robert R. Tomes, *US Defense Strategy from Vietnam to Operation Iraqi Freedom. Military Innovation and the New American Way of War, 1973-2003*, Abingdon, Routledge, 2007, pp. 58-95.

¹⁸ *Ibid.*, pp. 62-64.

¹⁹ A declassified document produced by the Strategic Air Command reflects this argument: *Stepping Back from the Nuclear Threshold*, Offutt Air Force Base, Headquarters Strategic Air Command, 21 March 1984.

²⁰ Fred C. Iklé and Albert Wohlstetter, *Discriminate Deterrence. Report from the Commission on Integrated Long-Term Strategy*, Washington, January 1988, pp. 8-9, 36, 47-55.

potential in terms of deterrence and compellence²¹. The Iraqi invasion of Kuwait and the UN inspections following operation *Desert Storm* revealed how regional powers with revisionist ambitions could take advantage of the limits of the WMD nonproliferation regime and pose a significant problem to the U.S. ability to protect its interest in regional crises. As a consequence, the DoD launched in the early 1990s a Counter-Proliferation Initiative meant to develop new offensive and defensive capabilities and thereby to strengthen Washington's freedom of action vis-à-vis regional powers that might attempt to deter U.S. military intervention.

The appeal of conventionalization was all the stronger as the emerging opportunities offered by conventional capabilities coincided with a growing desire within the U.S. system to reduce reliance on nuclear weapons. In the first place, the American unease about such weapons, already pronounced, was even more strongly affirmed following the end of the Cold War. Efforts to conventionalize the U.S. posture were not solely the result of a desire to move beyond the historical unease about nuclear weapons: they also had an ethical origin, rooted in the indiscriminate nature of nuclear retaliation as a means to ensure national security. Critics based on an ethical argument were not enough to undercut the legitimacy of a deterrence strategy based on the threat of nuclear weapons as a last resort for the sole defense of vital interests, but they became increasingly convincing when they targeted a U.S. doctrine relying on overkill and tactical nuclear options.

The ethical argument was gradually reinforced by a strategic argument: while the United States had started the Cold War in a situation of strong dependency on nuclear weapons to compensate for its inferiority in conventional capabilities, the rebalancing of the conventional power between East and West, followed by the perception that the United States was developing a growing advantage in this domain, considerably reduced the attraction of a posture centered on nuclear weapons, the employment of which was considered less and less credible. It finally seemed that U.S. frustration and unease due to its inability, in the nuclear age, to derive political benefit from a military advantage could finally be put to rest. While nuclear weapons tend to put adversaries on an equal footing, the quest for superiority in conventional military technologies – including BMD – seemed to be a better orientation to gain a comparative advantage over the Soviet Union or any other potential adversary²². The move towards reduced dependence on nuclear weapons translated into concrete political decisions as early as the 1980s, and was one of the factors that encouraged the Strategic Defense Initiative in March 1983 and arms control initiatives in the middle of the decade.

A final argument in favor of a reduced reliance on nuclear weapons emerged in the post-Cold War period as risks of nuclear proliferation came

²¹ William J. Perry, "Desert Storm and Deterrence", *Foreign Affairs*, Vol. 70, No. 4, Fall 1991, pp. 66-82.

²² Gordon S. Barrass, "U.S. Competitive Strategy During the Cold War", in Thomas G. Mahnken (ed.), *Competitive Strategies for the 21st Century. Theory, History, and Practice*, Stanford, Stanford University Press, 2012, pp. 71-89.

back to the fore. Reduced reliance on nuclear weapons in their defense policy is one of the commitments made by the P5 to non-nuclear weapon states members of the NPT. As a consequence, the latter, whose cooperation is needed to enforce and strengthen the non-proliferation regime, expect to witness progress in this regard during NPT review conferences²³.

Growing Ambitions for Conventional Strategic Strike (2000-2010)

Major new developments occurred during the George W. Bush administration. Although some of the current orientations – conventional strikes in support of counter-proliferation, or BMD as a central element of the U.S. defense policy – began to be sketched out earlier, the 2002 *Nuclear Posture Review* gave them a key role for the first time. Thus, from 2000 onwards, the U.S. pursued both a diversification and a development of its conventional capabilities contributing to reassurance, deterrence by denial, or retaliatory missions.

The U.S. National Security strategy under G. W. Bush was characterized by three concurrent trends: not only did the relative importance of *deterrence* diminish versus other strategic missions (“*assure, dissuade, defeat*”), but the *logic of deterrence itself* was deemed inadequate to respond effectively to threats such as terrorism or rogue states. Thus was emphasized the need for the United States to acquire the means to *preempt* the adversary – meaning, in fact, to adopt a posture of *preventive* military action. Furthermore, the very understanding of deterrence changed and became more ambitious, blurring the line between deterrence and compellence: the identified goal was no longer solely to prevent an enemy aggression but also to *dissuade* various other types of behaviors running counter to U.S. interests, in particular acquiring weapons of mass destruction or transferring them to state or non-state actors²⁴. Finally, the *capabilities* involved in the strategy considered by the administration were no longer limited solely to nuclear weapons but included a “new strategic triad”. The originality of the latter resided both in its two new major legs – defensive capabilities (including BMD) and more responsive infrastructure – and in the transformation of offensive capabilities which, by adding conventional and non-kinetic capabilities to the U.S. portfolio, were no longer limited to nuclear options²⁵.

²³ Paul Schulte, “The Strategic Risks of Devaluing Nuclear Weapons”, *Contemporary Security Policy*, Vol. 34, No. 1, April 2013, pp. 199-200.

²⁴ M. Elaine Bunn, “Can Deterrence Be Tailored?”, *Strategic Forum*, No. 225, January 2007, and Jeffrey W. Knopf, “Wrestling with Deterrence: Bush Administration Strategy After 9/11”, *Contemporary Security Policy*, Vol. 29, No. 2, August 2008, pp. 229-265.

²⁵ For an overview of the “New Triad” and of its elements, see Michael J. Frankel, James Scouras and George W. Ullrich, *The New Triad. Diffusion, Illusion, and Confusion in the Nuclear Mission*, Washington, Johns Hopkins University Applied Physics Laboratory, July 2009; David S. McDonough, *Nuclear Superiority. The ‘New Triad’ and the Evolution of Nuclear Strategy*, London, IISS – Routledge, Adelphi Paper No. 383, 2006, pp. 43-61; James J. Wirtz and Jeffrey A. Larsen

Thus, conventionalization was only one of the trends affecting the role and the form of the U.S. deterrence posture during the Bush administrations, which tended to refocus on the challenges posed by rogue states to regional and global security. Among the factors encouraging conventionalization efforts, non-strategic arguments such as the U.S. commitment under article VI of the NPT did not get much traction, however the quest for an ever more extensive range of options continued. Thus, the development of Conventional Prompt Global Strike (CPGS) and active defense capabilities were seen as (1) contributing to the credibility of the U.S. deterrent against a wider variety of threats, (2) offering new opportunities as part of strategies of preventive action and (3) reinforcing U.S. damage limitation capabilities in case of a deterrence failure or preventive attack.

Consequently, on completion of the 2002 NPR, Washington started to integrate non-nuclear capabilities to the offensive leg of its “new triad”. Increasingly sophisticated conventional strike systems in terms of range, speed and precision, integrated with more comprehensive, diverse and responsive C4ISR architectures seemed to offer new medium term opportunities to deal with two types of high-value targets: those that hitherto only a nuclear strike could have destroyed (hardened and deeply buried targets such as command posts, WMD facilities, etc.) or mobile targets (fleeting opportunities in distant, non-permissive environments, e.g. mobile ASAT launchers)²⁶.

The CPGS capabilities the United States sought to acquire from the early 2000s onwards were supposed to combine several characteristics that could increase the effectiveness of U.S. forces against those high-value targets: intercontinental or global range, precision (possibly including in-flight trajectory correction), very high speed, element of surprise, penetration capability²⁷. Some capabilities in the U.S. arsenal do already possess one of these characteristics or combine several of them: the *Tomahawk Land Attack Missile* (TLAM) is accurate and able to achieve surprise, but it is slow, and has a range limited to 2,000 km; the B-2 can carry high-precision munitions, has global reach and a very high ability to achieve a surprise effect due to its very low radar cross section (RCS), but it is also relatively slow, and available in limited numbers (19 operational aircraft). As no operational weapon system was able to meet all the requirements associated with CPGS missions, funding was needed for R&D programs²⁸.

(eds.), *Nuclear Transformation. The New US Nuclear Doctrine*, New York, Palgrave, 2005.

²⁶ U.S. *Conventional Prompt Global Strike: Issues for 2008 and Beyond*, Washington, National Research Council, National Academy Press, 2008, pp. 148-150.

²⁷ James Acton, *Silver Bullet? Asking the Right Questions about Conventional Prompt Global Strike*, Washington, Carnegie Endowment for International Peace, 2013, pp. 21-25.

²⁸ Mark A. Gunzinger, *Sustaining America's Strategic Advantage in Long-Range Strike*, Washington, Center for Strategic and Budgetary Assessments, 2010,

Financing of R&D work for a rapid strategic strike capability (designated *Prompt Global Strike* at the time) began in 2003 in support of Air Force and Navy programs using existing types of ballistic missiles combined with new types of reentry vehicle²⁹. However, the use of ballistic missiles identical to the types equipping the strategic nuclear forces was rapidly identified as a potential source of danger: the ambiguity as to the nature of the payload meant that a conventional strike could be mistaken for a nuclear attack by the defender or by a third party. Thus, although the 2006 QDR called for an initial operational capability using a modified *Trident II D-5* missile (*Conventional Trident Modification* – CTM) by 2008, Congress cut off the funding for this project in 2007 and sent DoD back to the drawing board to further examine technical options not based on the *Trident SLBM*³⁰, such as the recent *Advanced Hypersonic Weapon* (AHW) and the *Hypersonic Technology Vehicle-2* (HTV-2) programs (see below).

The two terms of office of the Bush administration were also those in which homeland BMD became a reality in the United States³¹. As with offensive options, development of multi-layer active defense systems was intended to reinforce the credibility of the U.S. deterrent against adversaries with a small number of ICBMs and to constitute a rudimentary damage limitation capability against the same kind of threats. It was also part of the effort called for by the 2002 NPR to influence the adversary's programmatic choices, by trying to *dissuade* the development and deployment of ballistic missiles threatening the United States, as well as part of the security guarantees offered to U.S. allies for *assurance* purposes³². In this framework, the Bush administration, encouraged by development of ballistic threats from North Korea and Iran, intensified existing cooperations (Japan, Israel) and created new partnerships with some allies (planned 3rd GBI site in Eastern Europe). By placing BMD at the core of its security relationship with several allies in Europe, the Middle East and Asia, the United States was able to add a new dimension to an extended deterrence

pp. 54-58; *U.S. Conventional Prompt Global Strike: Issues for 2008 and Beyond*, *op. cit.*, pp. 21-22.

²⁹ Amy F. Woolf, *Conventional Prompt Global Strike and Long-Range Ballistic Missiles: Background and Issues*, Washington, Congressional Research Service, 26 April 2013, p. 8.

³⁰ *Ibid.*, pp. 10-11, 21-24 ; *Quadrennial Defense Review Report*, Washington, Department of Defense, March 2006, p. 50.

³¹ A few months after the arrival of the new team, the Bush administration invoked article XV of the ABM Treaty and informed the Russian government of its intention to withdraw from the treaty within six months. This decision released the United States from earlier constraints weighing on R&D, testing and deployment of BMD systems protecting the U.S. homeland. Deployment of this capability, based on exoatmospheric *Ground Based Interceptors* (GBI), began in 2004, with facilities at two sites, in Alaska, then in California. Although this occurred under the G. W. Bush administration, it resulted from a long-term effort and from investments that started more than a decade before.

³² Kerry Kartchner, "Implementing Missile Defense", in James J. Wirtz and Jeffrey A. Larsen (eds.), *Nuclear Transformation. The New US Nuclear Doctrine*, New York, Palgrave, 2005, pp. 70-71.

posture that used to rely only on forward basing of general purpose forces and on nuclear guarantees³³.

Indeed, the form taken by U.S. extended deterrence policy seems destined to evolve, under the influence of changes in regional balances of power. While the 1990s and 2000s were marked by the increasing military credibility of U.S. conventional forces (deep strike, multispectral ISR, BMD...), it also witnessed a parallel evolution leading to a relative weakening of the United States *strategic* credibility and of its ability to politically sustain a permanent forward presence. Over the past 20 years, the disappearance of the existential Soviet threat; the political and financial costs of permanent forward basing on allied territory; the growing vulnerability of regional bases due to cruise and ballistic missile proliferation; and the U.S. command of the commons³⁴, encouraged Washington to increasingly base its conventional deterrence on expeditionary, long-range strike and BMD capabilities, relying less on forward deployments. In the current context, ground troops, which had hitherto symbolized the solidity of political links between the Allies, only rarely play a central role, as is still the case on the Korean peninsula.

To maintain a presence in crisis areas and demonstrate its political commitment to local partners, the United States now seems to rely mostly on force rotations (Army, Navy and Air Force units, including BMD) and on strategic signaling in the form of multinational exercises, temporary deployments and maneuvers involving carrier strike groups or strategic bombers based in Guam, Diego Garcia or the continental United States³⁵. Through the rebalance to Asia, the U.S. attempts among other things to reinforce an important element of its conventional deterrence posture that should rely on both permanent and temporary forms of forward presence, backed by conventional prompt strike and missile defense capabilities.

When the Obama administration entered office in 2008, its ambitions in terms of nuclear arms control and non-proliferation, with the 2010 NPT Review Conference approaching, came on top of the persistent and reasserted need to pursue conventionalization to develop tailored deterrence and damage-limitation capabilities. By establishing a link between planned investments in CPGS and the objective of reducing the role of nuclear weapons in U.S. defense policy, the new administration demonstrated how broad the rationale for conventionalization is in Washington. While major orientations remained globally aligned in the same direction, the preferred prompt strategic strike options were slightly

³³ Roberts, *Extended Deterrence and Strategic Stability in Northeast Asia*, *op. cit.* On the role of BMD in this architecture, see Emmanuel Delorme, Bruno Gruselle and Guillaume Schlumberger, *La nouvelle guerre des étoiles. Idées reçues sur la défense antimissile*, Paris, Le Cavalier Bleu, 2013, pp. 132-136.

³⁴ Barry R. Posen, "Command of the Commons. The Military Foundation of US Hegemony", *International Security*, Vol. 28, No. 1, Summer 2003, pp. 5-46.

³⁵ Corentin Brustlein, "La nouvelle posture militaire américaine en Asie", *Politique étrangère*, Summer 2013, pp. 53-65.

adjusted during the most recent years³⁶. Although the Pentagon had declared since 2008 that it viewed CPGS capabilities as a means to retain a credible deterrent while reducing its reliance on nuclear weapons³⁷, its initial plans were disrupted by U.S. political and budgetary tribulations: the consequences of the debt crisis on federal spending, combined with the strained relations between the executive and Congress, adversely affected program progress.

As a consequence, while the Obama administration has identified the pursuit of conventionalization of the U.S. deterrent as a necessity, its efforts in this respect have been irregular and limited. Even though drivers behind it remain deep and varied, the conventionalization dynamic has run into a series of short- and longer-term constraints and challenges related both to the political and financial environment and to more structural operational and strategic factors.

³⁶ Regarding BMD, it was decided to rationalize developments and acquisitions and put an emphasis on what was seen as the most immediate threat, that of short-, medium- and intermediate-range ballistic missiles, i.e. primarily threatening Allies and forward-based or projected U.S. forces. BMD thus illustrated the type of strategic capabilities simultaneously fulfilling several functions: protection, reassurance, damage limitation and deterrence by denial, by rendering ballistic blackmail less attractive to a potential adversary. In this perspective, and although it did not abandon nor downgrade homeland defense, the administration abandoned the option of a third GBI site in Europe, replacing it with a defensive architecture based on a larger number of SM-3 exoatmospheric interceptors, based initially on U.S. cruisers and destroyers equipped with the *Aegis* system and subsequently to be also installed in ground launchers in Eastern Europe in the 2015-2018 timeframe. SM-3 interceptors were thus to constitute the main pillar of the U.S. upper tier, forward-based BMD, complemented at lower tiers by the THAAD and PAC-3 systems. Following the December 2012 North Korean ballistic missile test, U.S. legislators called for stronger capabilities for the defense of the U.S. homeland. It is unclear for now which options will be pursued to this aim, due to cancellation of the Block IIB variant of SM-3 and lingering doubts as to the effectiveness of GBI interceptors. *Ballistic Missile Defense Review Report*, Washington, Department of Defense, 2010, p. 24; Chuck Hagel, "Missile Defense Announcement", *Defense.gov*, 15 March 2013, available at: <http://www.defense.gov/Speeches/Speech.aspx?SpeechID=1759>.

³⁷ *Nuclear Posture Review Report*, *op. cit.* ; *Report on Nuclear Employment Strategy of the United States Specified in Section 491 of 10 U.S.C.*, Washington, Department of Defense, June 2013, p. 9.

Obstacles in the Way: Budget, Technology, Politics

Despite early Pentagon statements reflecting ambitious projects and schedule, as of today the concrete results of U.S. efforts are far below initial expectations. While diplomatic factors seem to have only an indirect effect on the development of these capabilities, the logic of conventionalization of the U.S. deterrent has run into a series of inherent constraints. Constraints of a political or technical nature, added to the financial pressure, have resulted in U.S. ambitions being scaled back.

Conventional Prompt Strike: Status Report

Initially, the capabilities developed under CPGS were intended to meet several requirements:

- 1) reach any point on the globe;
- 2) reach the target in one hour³⁸;
- 3) destroy hardened or deeply buried targets;
- 4) destroy mobile targets.

Each of these criteria involves facing technical, operational, budgetary or strategic constraints, and the U.S. choice to search for a system that would meet all of these extremely demanding requirements explains to a large extent a number of difficulties that the programs have encountered over the past 10 years. The main technical options being studied to meet these objectives fall into two groups:

- **Ballistic missile with conventional warhead:** an ICBM or SLBM propels one or more reentry vehicles (MaRV), each carrying a conventional warhead. The vehicles follow a ballistic trajectory and are capable of maneuvering on reentering the atmosphere in order to strike the target with precision.

Example: *Conventional Trident Modification (CTM)*

³⁸ Interval of time between the decision to attack and the end of flight of the payload.

- **Ballistic missile with a hypersonic glide vehicle:** a ballistic missile (ICBM, SLBM, IRBM or MRBM) propels a hypersonic glide vehicle (HGV) during the powered phase of flight, after which the vehicle separates. It then completes the major part of its flight gliding in the atmosphere at extreme hypersonic speeds (from Mach 10 to beyond Mach 20, *i.e.* almost 7 km/s).

Examples: *Conventional Strike Missile* (CSM), *Advanced Hypersonic Weapon* (AHW)

A final option is being pursued in parallel, outside the official scope of CPGS. Although its characteristics are very different from those of the two other types of programs – in terms of maximum range, for example – it will contribute to U.S. prompt strategic strike efforts:

- **Hypersonic cruise missile:** air-breathing, scramjet-powered missile launched from an airborne or naval platform.

Example: *High Speed Strike Weapon* (HSSW)

Although none of these programs today seems capable of meeting all the aforementioned requirements (global range, flight time less than one hour, metric precision, delivery vehicles different from those carrying nuclear payloads), the Pentagon seems for now to favor continued slow-rate development of a prototype hypersonic glide vehicle, retaining the possibility of placing it on a surface-to-surface or submarine-launched ballistic missile. While most of the current funding for CPGS seems devoted to R&D work on HGVs, the Navy also envisages a shorter range, less technologically demanding option relying on a submarine-launched IRBM (SLIRBM) tipped with one or several MaRVs. In parallel, though outside of the budget line earmarked for CPGS programs, DARPA and the U.S. Air Force are funding the *High Speed Strike Weapon* program to support a scramjet-powered hypersonic cruise missile capable of carrying out strikes at standoff distance, with no ambition to achieve intermediate or intercontinental range.

The United States currently has several programs either in development, under consideration or not yet formally abandoned. Different services are exploring different kinds of technological options (in terms of range, payload, launchers, etc.), thus opening the way to various concepts of operations to meet the requirements laid out in terms of conventional prompt strike capabilities. Table 1 (next page) summarizes the most promising technological options currently or until recently considered for U.S. future conventional strategic strike programs.

	<i>Hypersonic Test Vehicle (HTV-2) and Conventional Strike Missile (CSM)</i>	<i>Advanced Hypersonic Weapon (AHW)</i>	<i>Submarine-Launched Intermediate Range Ballistic Missile (SLIRBM)</i>	<i>High Speed Strike Weapon (HSSW) (X-51A or other)</i>
Type of vehicle	ICBM combined with hypersonic glide vehicle (HGV)	Ballistic missile (in theory SLBM or IRBM) combined with HGV	SLBM combined with MaRV or HGV	Hypersonic cruise missile
Status	Slow and uncertain development	Under development, has apparently received most of the funding since FY2012	Studies, apparently no significant funding at this stage	Slow-rate development of a demonstrator, outside the scope of CPGS
Projected range	17,000 km	8,000 km	2,400-3,700 km for MaRV version; greater if equipped with HGV	1,000-2,000 km
Type of launcher/platform and projected location	Land-based, continental U.S.	Submarine, surface ship, or land-based launchers at locations such as Guam or Diego Garcia	Modified <i>Virginia</i> class nuclear attack submarine (VPM)	Strategic bomber, possibly unmanned air vehicle or naval platforms
Estimated initial operational capability	2018-2024, but seems to have been abandoned for now	2020s	2019-2020 for MaRV version, later for HGV	Mid-2020s

Table 1. U.S. prompt strategic strike alternatives (currently or recently considered)³⁹

³⁹ Acton, *Silver Bullet? Asking the Right Questions about Conventional Prompt Global Strike*, *op. cit.*, pp. 37-56; Bruno Gruselle, *Frappes stratégiques rapides*, Paris, Fondation pour la recherche stratégique, December 2012, pp. 36-44.

Budgetary and Technological Barriers

Development of CPGS capabilities has run into a series of budgetary, political and technological barriers which have mutually reinforced each other. Taken together, they help understand why progress has until now been extremely limited. These factors combined have pushed back the perspective of deploying an operational capability to the end of the decade at least⁴⁰.

In the first place, most U.S. projects suffer from their reliance on technologies that are not yet mature, particularly when relying on HGVs (scramjet propulsion is another example). The requirements laid down by the Pentagon for the planned systems – strike any target on the earth with metric precision in less than one hour – are extremely ambitious. Because Congress had ruled out the only option based on relatively proven technologies (CTM program), any CPGS system development first required key advances in mastering hypersonic flight.

In theory, only a hypersonic glide vehicle could combine global range, short flight time and sufficient precision, while reducing the nuclear ambiguity problem thanks to its maneuverability during the intermediate phase of flight. However, in concrete terms, achieving a mature design for a HGV with global range poses numerous difficulties, either revealed during HTV-2 testing or anticipated in the longer term:

- the conditions for stable gliding flight at hypersonic speeds are still poorly understood;
- test costs are prohibitive, and reproducing hypersonic flight conditions in an experimental environment is both difficult and expensive;
- shielding the payload from the extreme heat generated by high-speed endoatmospheric flight constitutes a tremendous challenge;
- current precision guidance systems seem inadequate for use with a HGV: the GPS signal could be disrupted by the plasma generated by atmospheric heating, while inertial measurement units would lack precision considering the extreme speed of both the vehicle and payload⁴¹.

⁴⁰ Acton, *Silver Bullet? Asking the Right Questions about Conventional Prompt Global Strike*, *op. cit.*, pp. 49, 55.

⁴¹ Acton, *Silver Bullet? Asking the Right Questions about Conventional Prompt Global Strike*, *op. cit.*, pp. 59-60; Elaine M. Grossman, "Cost to Test US Global-Strike Missile Could Reach \$500 Million", *Global Security Newswire*, 15 March 2010, available at: <http://www.nti.org/gsn/article/cost-to-test-us-global-strike-missile-could-reach-500-million/>. DARPA lists some of these HTV-2 challenges on its website: "Falcon HTV-2 Three Key Technical Challenges", undated (accessed on 22 February 2014), available at: http://www.darpa.mil/Our_Work/TTO/Falcon_HTV-2_Three_Key_Technical_Challenges.aspx

To know whether these obstacles could be overcome and explore the different potential technical options, large R&D investments sustained in the long term would be needed⁴². However, this kind of investments has not taken place. The first phase of significant investments was planned in 2007 and was to fund the CTM program on which the administration had pinned its hopes. After Congress abruptly blocked credits due to the payload ambiguity problem, investment slightly increased in the following year, but remained at a limited level since then. As of today, the conventional prompt strike budget has never reached 200 million dollars – which, though non-negligible, is still extremely modest in comparison with the U.S. R&D budget (see Figure 1.).

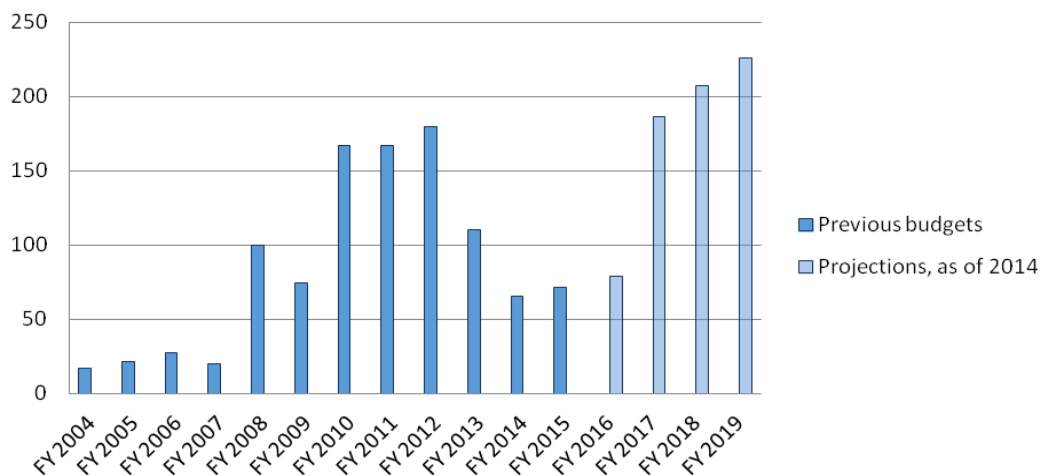


Figure 1. Conventional prompt global strike budgets (2004-2019), in millions of dollars⁴³

Not only has the budget allocated for CPGS programs remained modest (116 million dollars per year on average since 2008), but the projects receiving funding have frequently changed, moving within a few years from CTM to HTV-2 to AHW. This instability, which can be explained both by political motives (nuclear ambiguity of the CTM) and by the

⁴² In a 2006 report, the Congressional Budget Office evaluated the cost of various conventional long-range strike alternatives for the U.S. military. In the specific case of ballistic missiles equipped with hypersonic glide vehicles, as contemplated under the recent HTV-2 or AHW projects, the CBO estimated that the research, development, test and evaluation (RTD&E) costs alone would be around \$2.5 billion. *Alternatives for Long-Range Ground-Attack Systems*, Washington, Congressional Budget Office, March 2006, pp. 28, 33-34.

⁴³ Sources: *Department of Defense Fiscal Year (FY) 2014 President's Budget Submission, Justification Book Volume 3 of 3, Research, Development, Test & Evaluation, Defense-Wide*, Washington, Office of the Secretary of Defense, April 2013, p. 581; *National Defense Authorization Act for Fiscal Year 2013*, H.R. 4310, 112th Congress of the United States of America, (2011-2012); Woolf, *Conventional Prompt Global Strike and Long-Range Ballistic Missiles*, op. cit.; Carl Levin and Howard P. 'Buck' McKeon *National Defense Authorization Act for Fiscal Year 2015*, 2 December 2014, p. 1617.

disappointing results of HTV-2 tests⁴⁴, has reduced the ability of the project teams to consolidate know-how and overcome technical obstacles they face.

In addition, the constraints weighing on the U.S. defense budget since 2011 have constituted a severe test for a nascent program relying on immature technologies. The absolute necessity for the administration to reduce federal spending on a long-term basis meant that budgetary priorities had to be established in the defense sector. Although it has not been publicly acknowledged, the choices were detrimental to CPGS programs. Due to the modest investments and sunk costs to date, the local economic impact of these programs was practically zero. In fact, conventional strategic strike programs seem not to have enjoyed sufficient support from either Congress, the armed forces or the OSD. At the very least, these capabilities have not been considered important enough to be exempted from budgetary cuts. The administration, which had planned in spring 2011 to allocate almost 1.8 billion dollars to CPGS programs over the next five years, found itself forced to drastically scale back its ambitions: in early 2014, the projected credit envelope for CPGS programs through 2018 was divided by almost three, to 673 million dollars (see Figures 2 and 3), which approximately equals the actual spending levels from FY2010 to FY2014. Figure 2 shows the extent to which credits projected on an annual basis dropped sharply after the Budget Control Act was voted in summer 2011, forcing the administration to find more than 1,000 billion dollars in savings over a decade, heavily impacting the Pentagon's budget⁴⁵.

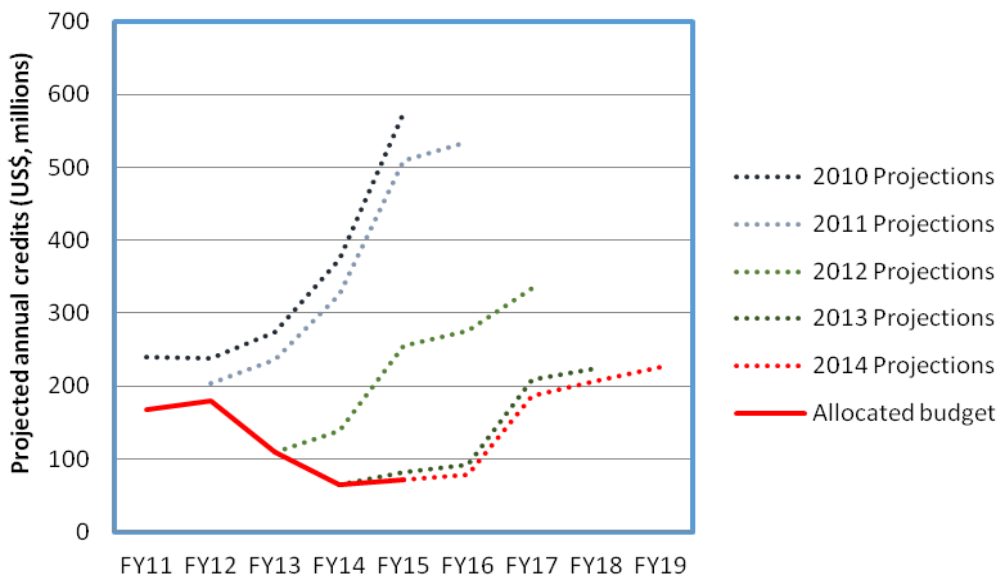


Figure 2. Projections of credits for CPGS programs⁴⁶

⁴⁴ The two HTV-2 tests, in April 2010 and August 2011, ended prematurely.

⁴⁵ On this point, see Aude-Emmanuelle Fleurant, “Le Pentagone face à la séquestration and aux sorties de guerres : l’art du brouillard budgétaire ?”, *Policy Brief GMF-Ifri*, August 2013.

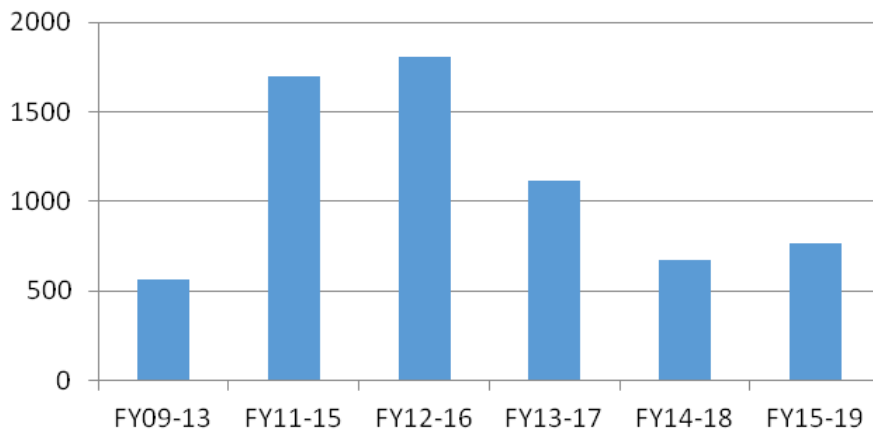


Figure 3. Volume of projected credits for CPGS programs (FYDP)⁴⁷

Thus the Pentagon's ambitions in terms of conventional strategic strike fell hostage to a dynamic that combined budgetary uncertainties, technical difficulties and lack of sufficient support from any constituency (see Figure 3). The interaction between these three types of constraints, already unfavorable to the development of new capabilities when budgets were not yet under heavy pressure, became a key handicap once the Pentagon entered a period of budget austerity, and appears to have sealed the fate of the most ambitious goals for U.S. strategic strike programs.

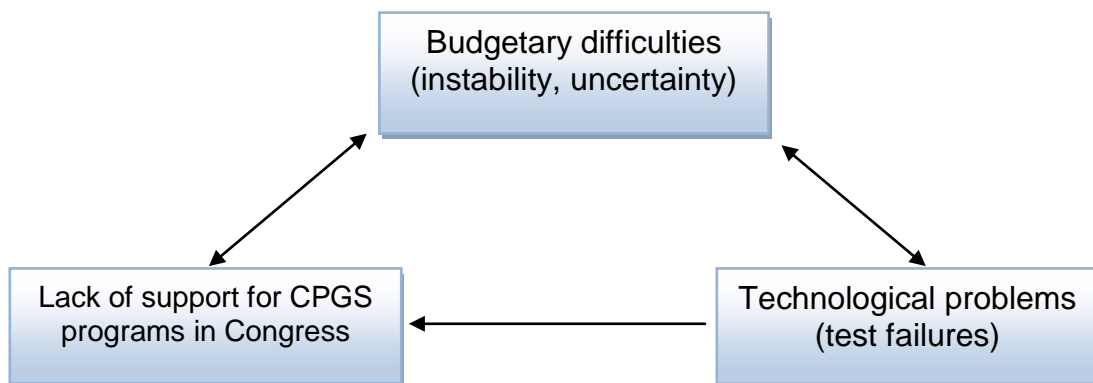


Figure 4. Interaction between budgetary, technological and political difficulties

⁴⁶ Sources: descriptive summaries on R&D programs provided by the Office of the Secretary of Defense as a complement to the White House budget requests for the DoD for fiscal years 2009 to 2013, available at: <http://www.dtic.mil/descriptivesum/>; Carl Levin and Howard P. 'Buck' McKeon *National Defense Authorization Act for Fiscal Year 2015*, *op. cit.*, p. 1617.

⁴⁷ *Ibid.*

Reorienting Prompt Strike Capabilities

While the budget crisis dampened the ambitions of the advocates of a prompt global strike capability, it had the merit of bringing the Pentagon to acknowledge that any type of system meeting all the aforementioned operational requirements would inevitably have a prohibitive cost. Accordingly, since 2012, the Pentagon appears to have begun to scale back its expectations, or at least to refocus on what might be possible in the near term with available technologies and limited resources, while continuing to explore other options for a later time⁴⁸. Prompt strategic strike is now considered as a niche capability, designed to be employed parsimoniously to neutralize high-value, fleeting targets in non-permissive environments, as well as in the initial phase of a military campaign, though in conjunction with other, more numerous and less costly deep strike assets.

To make the needed capability choices, the Pentagon had to take into account such criteria as the different scenarios for which prompt strike capabilities would be required; the various kinds of desired effects on the ground; the operational characteristics of the systems that are either currently available or planned; and the budget constraint likely to impact these efforts in the long term. Decision-makers were rapidly confronted with the ambiguities inherent in the missions initially planned for CPGS capabilities, which ranged from neutralizing a single terrorist leader to destroying or suppressing Chinese critical anti-access capabilities. Thus, in terms of required volume of offensive strike assets, these different missions implied a wide range of operational needs: a single vehicle would be enough to neutralize an individual. On the other hand, during U.S. post-Cold War operations against regional adversaries, 500 to 1,000 Desired Mean Points of Impact (DMPIs) were hit by air strikes every day. A confrontation between the United States and China could require 10 times that volume of firepower⁴⁹. It is clear that no CPGS capability would be acquired in sufficient numbers to meet the needs identified by the Pentagon in terms of volume of fire, responsiveness, ability to destroy HDBTs and to evade or penetrate active defenses for such a campaign. Even if one focuses on the specific kinds of targets associated with CPGS missions, the number of potentially critical targets in China (Second Artillery Corps and air defense command and control centers, long-range ISR assets and communications nodes, ballistic missile TELs, long-range air defense missiles such as HQ-9s/S-300s, etc.), is impressive and growing.

In order to develop a U.S. conventional prompt strike capability in non-permissive environments, DoD seems to have broken down the desired operational effects (penetration, speed, surprise, volume of fire, etc.) and distributed the tasks more evenly among the different available strike systems, each offering varying levels of performance and cost. While

⁴⁸ See for example Elaine M. Grossman, "U.S. Military Could Redefine Global Strike Weapon", *Global Security Newswire*, 24 January 2013, available at: <http://www.nti.org/gsn/article/us-military-could-redefine-global-strike-weapons/?mqs1=5e09ajGI9a>

⁴⁹ Mark A. Gunzinger, *Sustaining America's Strategic Advantage in Long-Range Strike*, Washington, Center for Strategic and Budgetary Assessments, 2010, p. 25.

these systems, taken individually, cannot satisfy all the identified operational needs to conduct a major operation, they could do so when taken together.

The first step was to reduce range requirements. In both recent testimony by the new STRATCOM commander and a recent call for bids from the U.S. Navy, the term *Conventional Prompt Strike* (CPS) was used, with no mention of a “global” range⁵⁰. Missiles capable of striking any point on the globe (i.e. a range of 15 to 20,000 km) would only be indispensable if the United States was confined to its own territory. True, its numerous bases in allied countries will *de facto* be increasingly exposed to ballistic and cruise missile strikes, particularly effective against fixed targets, all the more since hardening forward bases is extremely expensive. However, for now, these facilities are liable to remain in place as a symbol of U.S. commitment to defense allies, and active and passive defense measures (selective hardening of aircraft shelters and critical elements) are either considered or being implemented in key bases⁵¹. Above all, the United States also enjoys control of the high seas, which already today allows it to conduct covert patrols using SSGNs or SSNs. The latter could in the longer term carry not only TLAM cruise missiles or their replacements, but also ballistic missiles such as a SLIRBM, making it possible for them to strike targets in the heart of Asia. Consequently, the United States has slightly modified its language, dropping the references to “global” range and envisioning a portfolio of conventional prompt strike systems with international, regional and local ranges, based on programs like AHW (with a planned range of 8,000 km) or a possible SLIRBM (potential range of 2,500 to 4,000 km, more if it carries a HGV)⁵².

The Pentagon has also scaled back its expectations in terms of speed, now alluding to a mission execution requirement of two hours instead of one⁵³. The one-hour timeline was indicative of capability aspirations, particularly the desire to strike fleeting targets. However, by focusing only on the time required to implement the decision to strike, it neglected other enduring constraints. The ability to strike fleeting targets also depends on the time required to collect, cross-check and analyze intelligence and to make the political decision to strike – a lengthy process that will remain difficult to compress. This relaxation of the promptness criteria was combined with two other changes that ultimately make U.S. ambitions more attainable: first, an acknowledgement that the actual number of targets requiring *urgent* action should remain limited; secondly,

⁵⁰ “Statement of Admiral C. D. Haney, Commander, United States Strategic Command”, Senate Committee on Armed Services, 27 February 2014; see also “FY 2014 Conventional Prompt Strike (CPS) Trade Studies and Demonstrations”, Department of the Navy, Strategic Systems Programs, 9 May 2013, available at: <https://www.fbo.gov/spg/DON/SSP/SSP/N00030-13-R-0202/listing.html>

⁵¹ See for example “Hearing to Receive Testimony on U.S. Pacific Command in Review of the Defense Authorization Request for Fiscal Year 2014 and the Future Years Defense Program”, Senate Committee on Armed Services, 9 April 2013.

⁵² Grossman, “U.S. Military Could Redefine Global Strike Weapon”, *op. cit.*; Acton, *Silver Bullet? Asking the Right Questions About Conventional Prompt Global Strike*, *op. cit.*, p. 44.

⁵³ Grossman, “U.S. Military Could Redefine Global Strike Weapon”, *op. cit.*

having no longer to think in terms of *global* range immediately extended the number of available prompt strike options: the closer the target, the more a rapid response becomes physically possible (hypersonic cruise missiles for ranges up to 2 or 3,000 km, reentry vehicles or HGVs launched by medium- and intermediate-range ballistic missiles, etc.).

In many respects, the need for speed initially identified in the CPGS program seems to have stemmed from the kind of protracted air campaigns conducted as part of the “war on terror” and counter-insurgency operations in the Middle East and Central Asia, during which the need to destroy fleeting targets emerged, and was progressively met. Being responsive, however, is particularly problematic if units have not received an early warning, or have to penetrate a defended airspace. Once the military campaign against a regional power is under way, airspace above the theater of operations should progressively become less dangerous as the adversary’s air defense capabilities are suppressed or destroyed. In these circumstances, long-range platforms would be able to permanently patrol over the theater of operations, offering very short response time⁵⁴.

Thus, by the mid-2020s, U.S. conventional strategic strike capabilities should be centered around a prompt strike asset of regional or international range (a “spearhead”), a role that only HGVs seem capable of filling, if the technology lives up to its promise and gets enough funding⁵⁵. Apart from the Congressional Budget Office, which already argued in 2006 that hypersonic glide vehicles could only play a very limited role, U.S. ambitions regarding the volume of this “spearhead” have continuously been revised downwards over the past 10 years⁵⁶. In 2004, the *Defense Science Board* evaluated capability options to promptly neutralize 300 to 400 targets⁵⁷. By 2008, the same organization had downscaled its ambitions, and the *National Research Council* already estimated CPGS requirements in terms of numbers at less than 10 systems for small-scale scenarios, and less than 100 for military campaigns⁵⁸. In view of the theoretically prohibitive cost of HGVs, the trend to cut back on this “spearhead” seems

⁵⁴ Acton, *Silver Bullet? Asking the Right Questions About Conventional Prompt Global Strike*, *op. cit.*, p. 67.

⁵⁵ It is unclear whether the failure of the second flight test of the AHW, in August 2014, will have an impact on its funding, and more generally on the funding for technologies using HGVs. Aaron Mehta, “U.S. Army’s Hypersonic Missile Fails During Test”, *Defense News*, 25 August 2014, available at : <http://www.defensenews.com/article/20140825/DEFREG02/308250004/US-Armys-Hypersonic-Missile-Fails-During-Test>.

⁵⁶ *Alternatives for Long-Range Ground-Attack Systems*, *op. cit.*, pp. 33-34

⁵⁷ *Future Strategic Strike Forces*, Washington, Defense Science Board, Department of Defense, February 2004, pp. 2-16.

⁵⁸ *Time-Critical Conventional Strike from Strategic Standoff*, Washington, Defense Science Board, Department of Defense, 2009, p. 10; *U.S. Conventional Prompt Global Strike: Issues for 2008 and Beyond*, Washington, National Academies Press, 2008, p. 43; Gunzinger, *Sustaining America’s Strategic Advantage in Long-Range Strike*, *op. cit.*, pp. 71-73.

to be continuing in the Pentagon's current plans, which, according to some reports, provide for less than 10 systems in all, or even less than five⁵⁹.

Due to its very low numbers, operational use of this "spearhead" would probably be limited to neutralizing a critical target in preparation for combat or preempting the adversary before he could use its strategic strike assets. It could also be held in reserve for conventional deterrence purposes, threatening to counter attempted escalation by a regional adversary. When considering potential critical targets that could be earmarked for conventional prompt strategic strikes, it is possible to identify several types of targets, some of which belong to more than one category:

- fixed targets requiring prompt neutralization (political leadership, C3 for long-range strike capabilities and strategic nuclear forces; entrance tunnels to HDBTs such as a mobile ICBM base);
- critical targets protected by robust BMD capabilities;
- targets that are the most critical for the adversary's warfighting capabilities (long-range, over-the-horizon radars, early warning or air defense radars; C3 for integrated air defense system, etc.);
- fleeting critical targets (political leadership; mobile conventional ballistic missiles, ASAT or WMD launchers, etc.).

Against almost any regional adversary under consideration, these types of targets alone could already generate a need for long-range strike assets well beyond the small volume of HGVs that may ultimately be deployed. Hence the need to combine the "spearhead" with other capabilities (see Figure 5). The second echelon could be composed of platforms capable of firing several hundred prompt strike systems with a local or regional range: *Virginia*-class submarines firing SLIRBMs with maneuvering reentry vehicles⁶⁰, B-2 stealthy strategic bombers and/or future *Long-Range Strike Bombers* (LRSB) carrying hypersonic cruise missiles (HSSW or equivalent) with a range of 1,000-2,000 km or PGMs specifically designed for hardened targets. Finally, a third echelon could rely on *Virginia*-class SSNs armed with cruise missiles and on B-2s, or,

⁵⁹ Interviews; Grossman, "Cost to Test US Global-Strike Missile Could Reach \$500 Million", *op. cit.*

⁶⁰ According to current plans, starting with the fifth batch of delivered submarines, *Virginia*-class SSNs will be equipped with the *Virginia Payload Module*, bringing each Block V ship four additional payload tubes similar to those designed for SSGNs. Each payload tube could either launch 2 to 3 SLIRBM or 7 TLAMs. Acton, *Silver Bullet? Asking the Right Questions About Conventional Prompt Global Strike*, *op. cit.*, pp.155-156; "Navy Selects Virginia Payload Module Design Concept", *USNI News*, 4 November 2013, available at: <http://news.usni.org/2013/11/04/navy-selects-virginia-payload-module-design-concept> ; Ronald O'Rourke, *Navy Virginia (SSN-774) Class Attack Submarine Procurement: Background and Issues for Congress*, Washington, Congressional Research Service, 3 February 2014.

once the enemy air defense has been neutralized, on B-1s or B-52s. In a report published in the fall of 2013, the *Defense Science Board* already underlined the emerging need to complement possible conventional prompt strike capabilities with very long-range precision strike systems, not necessarily fast (5,500 km in 10 hours) but of sufficiently low cost to enable procurement of more than 1,000 missiles (no more than 2 million dollars unit price)⁶¹.

This diversification of the U.S. portfolio of strategic strike capabilities calls for close coordination in terms of R&D, training and military planning. Since the 2001 NPR, the Pentagon seems to have already integrated conventional offensive systems into its strategic strike plans⁶². It now appears to be seeking reinforced cooperation between STRATCOM and the regional commands (starting with PACOM and CENTCOM), in order to ensure good integration, in contingency planning, of CONUS-based capabilities with those located in-theater, as well as, at both levels, a better understanding of the available capabilities.

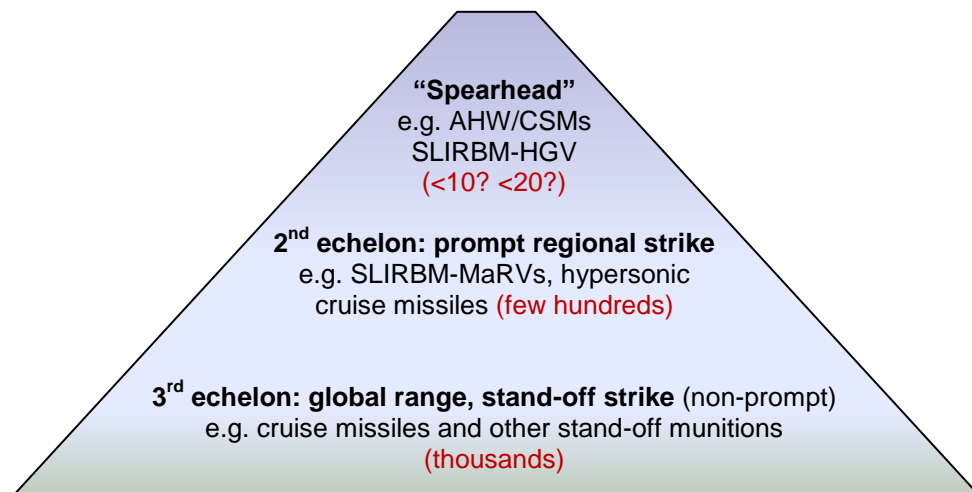


Figure 5. Pyramid of U.S. conventional strategic strike capabilities around 2025-2030

Implementation of these new U.S. ambitions in conventional strategic strike, particularly the capabilities behind the “spearhead”, will depend first and foremost on the possibility for the Pentagon to obtain some budgetary leeway that would allow for long-term investment in critical capabilities, particularly in terms of endoatmospheric hypersonic flight – whether HGVs or scramjet-powered cruise missiles.

⁶¹ *Technology and Innovation Enablers for Superiority in 2030*, Washington, Department of Defense, Defense Science Board, October 2013, pp. 32-37.

⁶² Hans M. Kristensen, “Obama and the Nuclear War Plan”, *Federation of American Scientists Issue Brief*, February 2010, available at: <http://www.fas.org/programs/ssp/nukes/publications1/WarPlanIssueBrief2010.pdf> ; Hans M. Kristensen, “U.S. Strategic War Planning After 9/11”, *The Nonproliferation Review*, Vol. 14, No. 2, July 2007, pp. 373-390.

While following this path, U.S. ambitions might also be constrained by external considerations, although these constraints should stem less from current or future treaties than from congressional concerns about the ambiguity problem associated with CPGS capabilities.

Limited External Constraints

U.S. reluctance to accept formal external constraints on its foreign policy is well-documented, long-standing and deep-rooted. It is particularly evident when it involves the orientation of the U.S. strategic posture and arms control agreements likely to restrict Washington's future freedom of action. The negative vote by the Senate on the attempt to ratify the CTBT in 1999 and the withdrawal from the ABM treaty in 2001 illustrate this. This was visible again in the difficulties the Obama administration recently encountered in the debate leading up to the New START treaty ratification, particularly in the political capital that had to be spent to secure that vote, despite the fact that the treaty only has a minor impact on the U.S. nuclear arsenal. Already clear in the case of nuclear weapons and even more so vis-à-vis ballistic missile defense, the U.S. unwillingness to accept external constraints on R&D and new military developments also extends to other types of strategic capabilities, whether it is space, cyber warfare or long-range conventional strike.

U.S. ambitions in terms of conventional strategic strike have always been a source of concern for Moscow. In the 1970s, the Soviets already foresaw a "military-technical revolution" as precision-guided conventional weapon systems offered the promise of achieving the same lethality as tactical nuclear weapons⁶³. As U.S. ambitions and capabilities grew while the volume of the Russian nuclear arsenal decreased, albeit slowly, Russian concerns and protests increased, emphasizing above all the threat U.S. long-range guided weapons represented for the ground component of the Russian strategic triad – ICBM in silos and on mobile launchers⁶⁴. During the 2000s, U.S. ambiguity as to the missions of prompt long-range strike assets and the ultimate numbers of systems it wished to acquire and field did nothing to alleviate Russian concerns.

While, under Obama, Congress has remained impervious to new formal agreements that would appear to constrain U.S. freedom of action, the administration has tried to alleviate Russian and Chinese fears following the 2009-2010 BMD and Nuclear posture reviews. For instance, 2010 NPR report states that U.S. efforts in terms of CP(G)S capabilities are only meant to counter emerging regional threats, thereby hinting that DoD would only be developing a small scale capability⁶⁵. Beyond this, Russia's impact on U.S. conventional strike projects has been slight until now. It has

⁶³ Dima Adamsky, *The Culture of Military Innovation. The Impact of Cultural Factors on the Revolution in Military Affairs in Russia, the US, and Israel*, Stanford, Stanford University Press, 2010, pp. 26-31.

⁶⁴ See Dennis M. Gormley, "The Path to Deep Nuclear Reductions. Dealing With American Conventional Superiority", *Proliferation Papers*, No. 29, Fall 2009, pp. 27-31.

⁶⁵ *Nuclear Posture Review Report, op. cit.*, pp. 28-29, 34.

appeared through the problem posed by payload ambiguity, as well as through some provisions of the New START treaty.

The use of conventional strategic strike capabilities may be ambiguous – and thus potentially destabilizing – on two levels: the target of the strike and the nature of the delivered payload. In the first case, the risk would be that a nuclear state could detect a CPGS launch against a third state and consider itself as the target of a (conventional or nuclear) U.S. attack. In the second case, a nuclear state targeted by a limited CPGS strike could interpret it as a nuclear first strike. In each of these two cases, a CPGS strike would therefore carry a non-zero risk of triggering nuclear retaliation.

This ambiguity can be limited by a number of options. Before anything else, for ambiguity to exist, there must first be detection capabilities. Thus, ambiguity issues only exist in relation to states equipped with early warning and tracking radars to follow enemy warheads – systems that only Russia possesses today. These surveillance systems and half a century of observation and analysis of U.S. ballistic missile launches thus give Russia the ability to recognize the type of missile fired (origin of the launch, number of stages, duration of the boost phase, missile plume signature, etc.) and, therefore, whether or not it usually delivers nuclear payloads, or potentially could do so⁶⁶. Provided the observed delivery vehicle is not a HGV, the tracking systems also make it possible to rapidly determine the trajectory and, therefore, the final target of the payload⁶⁷. In addition, the very small number of conventional prompt strike assets that would be used at the same time in some small scale scenarios – a few units, or even just a single launch – could help to avoid doubts as to the nature of a U.S. strike in progress.

Despite these factors limiting the risk that a CPGS strike could trigger nuclear retaliation, the potentially disastrous consequences of a misinterpretation have already impacted CPGS system development. In 2006, and again in 2007, Congress rejected Pentagon requests for financing for the *Conventional Trident Modification* program due to ambiguity problems – the risks were even greater in this case, since the plans were to carry on the same *Ohio*-class SSBNs both nuclear-tipped *Trident* SLBMs and other *Trident* SLBMs adapted for conventional strike following the CTM program⁶⁸.

⁶⁶ U.S. *Conventional Prompt Global Strike: Issues for 2008 and Beyond*, op. cit., pp. 71-77.

⁶⁷ The case of HGVs initially boosted by a ballistic missile are more complex, since a hypersonic glider would be extremely fast and maneuvering, making it impossible for the defenders to anticipate its final destination, thus increasing the ambiguity as to the potential strike target. M. Elaine Bunn and Vincent A. Manzo, "Conventional Prompt Global Strike: Strategic Asset or Unusable Liability?", *Strategic Forum*, No. 263, February 2011, pp. 14-18.

⁶⁸ Woolf, *Conventional Prompt Global Strike and Long-Range Ballistic Missiles: Background and Issues*, pp. 21-24.

During the new START treaty talks, Russian negotiators attempted to introduce restrictive provisions about BMD and conventional strike systems. While the treaty preamble merely underlines the growing impact that defensive systems and conventional offensive capabilities will have on strategic stability as nuclear arsenals are reduced, the treaty itself places only very few constraints on the two countries' ambitions in terms of conventional strategic strike, through limits set on the number of deployed ballistic missiles of strategic range and on the numbers of deployed warheads. Any conventional ICBM or any SLBM with a range of more than 600 km, if it carries a conventional warhead in a reentry vehicle that follows a purely ballistic trajectory for most of its flight, will be counted as an offensive strategic ballistic missile deployed by the United States, whose number must not exceed 700. In the same way, conventional warheads carried by these missiles would be counted as part of the total number of U.S. offensive strategic warheads, whose limit is set by New START at 1,550⁶⁹.

As long as it remains in force, the Intermediate-range Nuclear Forces (INF) treaty, which prohibits surface-to-surface ballistic and cruise missiles with a range between 500 and 5,500 km, will continue to constrain U.S. options in terms of conventional regional strike capabilities. When looking for potential CP(G)S options, the U.S. has only considered sea-based or air-delivered systems, as well as longer-range, surface-to-surface missiles tipped with an HGV (e.g. AHW). If the INF treaty ceases to be in effect, the range of U.S. – and Russian – options for CPGS capabilities will be much wider. Since forward-based medium- or intermediate-range ground-based systems and more mature technologies could be relied upon, developing and fielding a CPGS capability might become more affordable⁷⁰.

In the future, ambiguity issues should continue to influence CPGS developments, at least as long as Washington still deems important to accommodate for Russian and Chinese fears or remains preoccupied by escalation risks. The ambiguity problem appears to be technically and politically insoluble. Confidence-building measures with respect to Russia are conceivable which, combined with past experience and the very limited number of prompt strike assets that might be deployed by the United States, should limit the risk of misinterpretation, without, however, eliminating it. Furthermore, at least four reasons lead us to anticipate that the risk of nuclear escalation caused by ambiguity will be considerably more complex to manage with respect to China. First, at the time when CP(G)S capabilities might be deployed, Beijing will probably only have nascent and incomplete early warning, detection and tracking capabilities

⁶⁹ *Ibid.*, pp. 37-39. These limits apply to maneuvering reentry vehicles (MaRV) with terminal guidance, as planned for CP(G)S systems like the SLIRBM or an equivalent of the CTM, but would not affect systems using a hypersonic glide vehicle as payload (AHW, CSM/HTV-2, or a hypersonic glide vehicle boosted by a SLIRBM).

⁷⁰ *Report on Conventional Prompt Global Strike Options if Exempt from the Restrictions of the Intermediate-Range Nuclear Forces Treaty Between the United States of America and the Union of Soviet Socialist Republics*, Washington, U.S. Department of Defense/Joint Chiefs of Staff, September 2013.

for extra-atmospheric objects, which could increase the risk of misinterpretation and over-reaction. Secondly, unlike Russia, China will not have accumulated the decades of data that would give it confidence in its ability to distinguish with certainty between the different types of U.S. missiles. Next, as long as its arsenal remains of limited size, it will *de facto* be more vulnerable to a first strike, with genuine concerns about survivability. Finally, and perhaps most importantly, unlike Russia, China is not explicitly excluded in the U.S. rationale for the development and acquisition of CP(G)S capabilities, thereby increasing the risk that China will consider itself the target of an ongoing attack⁷¹. The risk of misunderstanding or miscalculation, thus, cannot be wholly eliminated. This does not necessarily mean, however, that U.S. administrations and lawmakers will indefinitely consider more important to work around the issue of ambiguity rather than to find a solution to a credibility gap perceived to be growing.

In view of the downscaling of U.S. ambitions in terms of CP(G)S capabilities, the New START limits should not constitute a significant constraint for the United States: in the unlikely event that U.S. CPGS capabilities would be operational and deployed by the time the New START force limits must be met (2018), Washington would still be able to adapt its nuclear force posture to accommodate for the very limited number of conventional strategic strike assets involved. Beyond New START, it seems impossible for now that any president would consider signing a treaty placing significant constraints on U.S. long-term possibilities in terms of conventional strategic strike – even more so that the Senate would ratify it. It seems equally implausible that the U.S. willingness to obtain from Moscow a new bilateral nuclear arms reductions agreement would lead Washington to concede limits on its conventional strategic strike systems, unless the administration reaches the conclusion that CP(G)S capabilities are financially and technically out of reach⁷². Moreover, considering the current state of U.S.-Russia relations, such a push in favor of nuclear arms control appears exceedingly unlikely.

⁷¹ Destroying Chinese ASAT or Over-The-Horizon radar systems is among the tasks envisioned for U.S. CPGS capabilities. Acton, *Silver Bullet? Asking the Right Questions About Conventional Prompt Global Strike*, *op. cit.*, pp. 17-21; *Time-Critical Conventional Strike from Strategic Standoff*, *op. cit.*, pp. 65-68.

⁷² Even in this hypothesis, it appears highly improbable that the Senate would ratify such a treaty.

Uncertain Implications: CPGS in the Fog of War

While numerous obstacles remain in the path of U.S. development of conventional prompt strike capabilities, thinking about deployment and possible use scenarios also generates its share of uncertainties and questions. To begin with, on the operational level, several major constraints will, if not properly addressed, considerably reduce the effectiveness of these deep strike capabilities. Next, at the strategic level, how these capabilities would fit the pillars of the U.S. posture raises issues: to what extent will they help to overcome the traditional limits of conventional deterrence? How will they affect the allies' perception of Washington's commitment to regional crisis management? Will the deployment of these capabilities really bring a substantial gain in strategic flexibility? Finally, considering the essence of strategy is the opposition between the plans of two adversaries, one should anticipate that the deployment of these capabilities would inevitably trigger reactions to readjust to, or circumvent them, exploiting the proven shortcomings or anticipated weaknesses of the U.S. programs.

Operational Limits

The ambitions initially set forth for GP(G)S programs reflect how, in the mid- to late 2000s, the U.S. imagined its strategic conventional strike capabilities in the medium term. Thus, the United States would possess the means to neutralize a critical target anywhere in the world within a very limited timeframe in the hope that such an action would destabilize the adversary's plans (decapitation, destruction of C2 nodes, incapacitation of critical ISR systems, etc.) or eliminate its primary means of gaining leverage on the U.S. or of putting pressure on the U.S. operational plan (WMD, ASAT capabilities, etc.). This extremely ambitious objective appears to have been partly shaped by U.S. operational assumptions inspired by recent U.S. experience and progress achieved in terms of air strikes, particularly in Afghanistan⁷³. However, it appears very unlikely that CP(G)S capabilities would be used in conditions similar to those in which U.S. strikes were able to achieve such a high degree of precision or responsiveness – with aircraft operating from local air bases, a total absence of surface-to-air threats enabling continuous surveillance of the battlefield. More generally, it would appear that U.S. strategic strike

⁷³ The influence of the Afghan experience also appears through Washington's desire to possess capabilities to promptly neutralize the leadership of a terrorist organization.

ambitions underestimate several operational constraints that need to be taken into account.

One of the most restrictive operational parameters for the conduct of conventional deep strike missions will be the growing challenges to Western air dominance. For over 20 years, the United States has conducted military operations against adversaries that only possessed very limited air defense capabilities. Nevertheless, a number of current trends point to a future with reduced U.S. freedom of action in the air: development of 5th generation fighters by potential adversaries (Russian PAK-FA, Chinese J-20 and J-31); increasing numbers of 4th generation aircraft carrying *Beyond Visual Range* (BVR) air-to-air missiles supported by airborne early-warning / C2 aircraft; diffusion of long-range, mobile surface-to-air defense systems resistant to jamming and firing missiles with greater velocity; and development of passive or VHF radars that offer improved detection capabilities against low or very low radar-cross-section platforms⁷⁴... The consequences of these changes for long-range strike capabilities are considerable; in 2006, the CBO estimated that, when air-to-air refueling is not possible over a targeted territory, the volume of munitions available for deep strikes is divided by four⁷⁵.

These defensive developments, combined with the proliferation of surface-to-surface strike capabilities with regional reach, participate to the emergence of anti-access / area-denial (A2/AD) capabilities and strategies⁷⁶ which constitute one of the arguments in favor of developing strategic strike capabilities with longer-range – whether regional, intercontinental or global⁷⁷. However, conventional prompt strike capabilities appear unable to solve the problem posed by A2/AD capabilities. Although it would reduce the risks taken by U.S. forces, extending the ability to strike from stand-off distances does not eliminate the need for accurate intelligence regarding target location; on the contrary, it tends to *increase* this need. The ability to gather, process and distribute precise and up-to-date intelligence in near real time is less necessary to destroy fixed targets than to strike mobile targets or targets of opportunity. Yet the ISR systems which enabled the progress in precision strike witnessed during the past decade were designed to operate in permissive airspace. Their low speed, rather big radar cross section and electromagnetic signature would make them easy prey for an integrated air defense system, even unsophisticated. Even though the need for precision – and, therefore, for high-quality ISR – to enable conventional prompt strike will be extremely high, doubts surface as to the long-term ability to gather intelligence but also – perhaps especially – to maintain contact between

⁷⁴ On this point, see Corentin Brustlein, Etienne de Durand and Elie Tenenbaum, *La suprématie aérienne en péril. Menaces et contre-stratégies à l'horizon 2030*, Paris, La Documentation française, 2014, pp. 75-78.

⁷⁵ *Alternatives for Long-Range Ground-Attack Systems*, *op. cit.*, pp. 5-6.

⁷⁶ Corentin Brustlein, "Toward the End of Force Projection? I. The Anti-Access Threat", *Focus stratégique*, No.20 bis, July 2011, available at: <http://www.ifri.org/sites/default/files/atoms/files/fs20bisbrustlein.pdf>.

⁷⁷ Gunzinger, *Sustaining America's Strategic Advantage in Long-Range Strike*, *op. cit.*, p. 51.

ISR, C2 and strike platforms due to an increasingly contested electromagnetic spectrum, particularly over enemy territory. Propagation of electronic attack, jamming and spoofing capabilities renders U.S. capacity to maintain constant C4ISR coverage over the theater of operations increasingly uncertain. It is, thus, indicative that the *Air-Sea Battle* concept no longer postulates U.S. C4ISR superiority, unlike *Joint Vision 2010* and *Joint Vision 2020* in the 1990s, but underlines the need for U.S. armed forces to develop and retain their capacity to operate in an environment with degraded or discontinuous access to information networks⁷⁸.

The problem of specific ISR needs in support of conventional prompt strike capabilities has been repeatedly underlined. In 2004, and again in 2008, the *Defense Science Board* emphasized the imbalance between U.S. investments in delivery vehicles and payloads and the lack of attention being paid to ISR⁷⁹. Some programs have apparently been initiated since then, but the root of the problem remains that neither satellites nor airborne platforms seem capable of providing the type of intelligence required⁸⁰. While they are less vulnerable to adversary initiatives, satellites cannot offer continuous and sufficiently detailed coverage of the battlefield. Long-endurance, low-RCS UAVs like the RQ-180 could in theory close at least part of the current capability gap, thanks to their apparent ability to penetrate contested airspaces⁸¹. However, for the intelligence gathered to translate into prompt strikes, it must be (1) processed in a fully autonomous manner inside the UAV (automated analysis and decision to strike) or (2) transmitted to a command and control network to enable a strike decision, a task of uncertain feasibility in a contested electromagnetic environment. In the end, the increasing difficulty of ensuring a resilient and impenetrable C4ISR network over the theater of operations could lead the United States to rely less on CPGS-type strikes and more on stealthy platforms like the F-22 and B-2 or, later, the RQ-180 and LRSB – provided that stealth has not been jeopardized in the long term by new types of radar⁸².

The use of prompt strike capabilities could run into another type of operational problem: reinforced enemy missile defense capabilities, partly based on the same type of capabilities that threaten U.S. air superiority, *i.e.* integrated air defense systems equipped with AESA radars operating across wide bands of the electromagnetic spectrum, and high-velocity interceptors (S-300s/HQ-9s, S-400s and the future S-500s). In most cases,

⁷⁸ *Air-Sea Battle. Service Collaboration to Address Anti-Access & Area Denial Challenges*, Washington, Department of Defense, Air-Sea Battle Office, May 2013, available at: <http://www.defense.gov/pubs/ASB-ConceptImplementation-Summary-May-2013.pdf>; Corentin Brustlein, "Air-Sea Battle, de quoi s'agit-il ?", *Ultima Ratio*, 9 July 2013, available at: <http://ultimaratio-blog.org/fr/archives/5930>.

⁷⁹ *Future Strategic Strike Forces*, *op. cit.*; *Time-Critical Conventional Strike from Strategic Standoff*, *op. cit.*

⁸⁰ Acton, *Silver Bullet? Asking the Right Questions About Conventional Prompt Global Strike*, *op. cit.*, pp. 83-84.

⁸¹ Amy Butler and Bill Sweetman, "The Return of the Penetrator", *Aviation Week and Space Technology*, 9 December 2013, pp. 20-23.

⁸² Arend G. Westra, "Radar versus Stealth: Passive Radar and the Future of U.S. Military Power", *Joint Force Quarterly*, No. 55, 2009, pp. 136-143.

this type of capability would not pose a significant threat to U.S. strike assets, since the hypersonic velocity the payload should protect them from intercept attempts. However, in at least two cases, the payload must be slowed down before reaching its target: penetrating warheads and submunition dispenser systems. Current penetrating warheads, required to destroy Hard and Deeply Buried Targets (HDBTs), must not reach their target at a speed greater than Mach 3.5, or their penetration effectiveness will decrease. Similarly, warheads equipped with submunition dispensers, designed to destroy soft large targets like the antenna array of a long-range, over-the-horizon radar, must reach the target at a speed between Mach 1 and Mach 5. In these conditions, advanced air defense systems could be able to intercept U.S. delivery systems once the required deceleration in the terminal phase of their flight is completed⁸³. Furthermore, HGVs, whose terminal speed would be close to that of an IRBM/MRBM, could also be vulnerable to modern theater BMD capabilities designed to perform endoatmospheric intercepts: as they fly within the atmosphere, HGVs generate extreme heat, making them highly visible to infrared sensors, while they cannot carry radar or thermal countermeasures⁸⁴.

Finally, strong doubts remain about the ability of a conventional warhead to destroy all types of hardened targets earmarked for CP(G)S capabilities. The problem here partly stems from the difficulty to ensure extreme terminal precision of the delivery system⁸⁵. Precision is all the more necessary as the weight and volume of the payload will remain limited so that it can be carried over very long distances. Even in conditions where intelligence is available and reliable, and where the required degree of precision is possible, it is not certain that a penetrator combined with a conventional explosive would succeed in generating sufficiently powerful physical effects to neutralize the hardest or most deeply buried targets⁸⁶. Beyond a certain depth, precision is no longer a substitute for the raw energy needed to neutralize the target. Over 40 years after the first studies presenting precision-guided conventional weapons as an alternative to tactical nuclear weapons, only the latter seem able to guarantee destruction

⁸³ Acton, *Silver Bullet? Asking the Right Questions About Conventional Prompt Global Strike*, *op. cit.*, pp. 73-74; *Review and Evaluation of the Air Force Hypersonic Technology Program*, Washington, National Research Council, National Academy Press, 1998, pp. 54-58.

⁸⁴ Acton, *Silver Bullet? Asking the Right Questions About Conventional Prompt Global Strike*, *op. cit.*, pp. 75-77.

⁸⁵ As indicated page 27, both GPS and inertial guidance would probably face problems.

⁸⁶ Gormley, "The Path to Deep Nuclear Reductions. Dealing with American Conventional Superiority", *op. cit.*, pp. 31-38; Soon Ho Lee, "Contemporary American Military Technology and North Korea's Hard and Deeply Buried Targets (HDBTs)", *Comparative Strategy*, Vol. 32 (2013), pp. 387-401; *U.S. Conventional Prompt Global Strike: Issues for 2008 and Beyond*, *op. cit.*, p. 42; Jeffrey Lewis, "Can CTM Bust Russian Silos?", *ArmsControlWonk*, 5 October 2009, available at: <http://lewis.armscontrolwonk.com/archive/2486/can-conventional-trident-bust-russian-silos>; Tong Zhao, "Conventional Counterforce Strike: An Option for Damage Limitation in Conflicts with Nuclear-Armed Adversaries?", *Science and Global Security*, Vol. 19 (2011), pp. 195-222.

against adversaries possessing hardened, extensive tunnel complexes hiding WMD capabilities.

Taken together, these operational constraints could impose significant limits on the role of conventional prompt strike systems. Unless solutions are found to problems such as mobile target tracking at long range, continuous C4ISR connectivity in a contested environment and the ability to penetrate hard or buried targets, the specific contribution of CP(G)S systems to U.S. strike capabilities and operational credibility would appear to be very limited. If effectiveness is guaranteed only for a very limited set of targets (fixed and non-buried or shallow-buried targets), the added value of CP(G)S capability would essentially lie in their short flight time.

Strategic Constraints

While the rationale behind the U.S. willingness to increasingly rely on its conventional capabilities for deterrence purpose is clear, the long term effects of such an orientation on U.S. ability to achieve its strategic objectives appear uncertain. In the long term, the added value of conventional prompt strike capabilities to U.S. strategies of deterrence, reassurance or compellence, could remain marginal.

On paper, possessing conventional strike options more effective than current capabilities would represent a considerable asset; raising the threshold of nuclear weapons use would reduce the risk that the United States might be self-deterred from the outset of a crisis, and reinforce its credibility while managing escalation. Thus, an even greater U.S. conventional superiority could theoretically allow the “burden of escalation” to be shifted to the adversary, who would rapidly run out of options other than a nuclear weapons use that would expose him to intolerable retaliations. The ability of the United States to exploit this advantage is, however, far from guaranteed.

There is nothing new about deterring an adversary by relying on conventional capabilities; deterrence is a form of strategy that pre-existed nuclear weapons⁸⁷. What is renewed, however, is the hope that recent technological progress could overcome the inherent weaknesses of this type of deterrence. Traditionally, conventional deterrence is considered more politically credible than nuclear deterrence, although it is physically less credible. This alleged superior political credibility stems from both the fear of nuclear escalation and the deep reluctance to be the first to break the nuclear taboo. Considering the destructive capability of nuclear weapons and the risks entailed, nuclear deterrence hardly appears credible beyond the protection of a state’s vital interests, while conventional threats are intrinsically more credible.

⁸⁷ See for example John J. Mearsheimer, *Conventional Deterrence*, Ithaca, Cornell University Press, 1983; George H. Quester, *Deterrence Before Hiroshima. The Airpower Background of Modern Strategy*, New Brunswick, Transaction, 1986.

However, the reasons why conventional deterrence has never matured as a strategically sound posture are at the very least just as deep as the political credibility problems posed by nuclear deterrence. These reasons have their roots in both the specificities of the nuclear revolution and the nature of conventional warfare. The destructive capacities of nuclear weapons, the instantaneous nature of their destructive effects and the impossibility of any effective defense, make them an “absolute” weapon, in the words of Bernard Brodie. The latter expression is intended to indicate not that nuclear weapons are sufficient on their own to ensure victory, but that a relative advantage in terms of nuclear weapons usually gives no strategic advantage. The certainty and brutality with which nuclear reaction releases its destructive energy drastically simplify the adversary’s calculations as to the risk he faces and his chances to recover from retaliation⁸⁸.

On the other hand, everything in conventional warfare should be considered “relative”. Technological progress may appear on one side, but its effects can be offset by adaptation – whether it is tactical, organizational, or technological. The advantage conferred by innovation may, indeed, be very significant, but it will generally be short-lived⁸⁹. This sensitivity to innovations and countermeasures on both sides means that the physical credibility of conventional threats must be frequently demonstrated in practice to dispel any doubts. Beyond the sole impact of innovations, the “grammar” of conventional warfare dictates that even a brilliant demonstration of force can see its effects more than offset in the medium to long term. Nothing indicates that prompt strike capabilities would be able to escape this logic. On the contrary, the previously discussed operational difficulties that their implementation would imply seem to indicate that such systems would face the same recurrent problem of physical credibility⁹⁰. Nuclear weapons have been the preferred instrument of deterrence precisely because they seem to contradict Clausewitz when he writes that “in war the result is never final⁹¹”. No conventional capability seems able to surpass this dictum⁹².

Even on a strictly political level, the credibility of conventional U.S. threats is not as strong as might be wished. True, when the stakes are marginal, the threat of a large cruise missile salvo will always be more credible than that of a nuclear strike. However, a credible conventional deterrent presupposes a strong political will, capable of drawing lines in the sand and displaying its willingness to use force. Since the 2000s, U.S.

⁸⁸ See for example Bernard Brodie, “War in the Atomic Age”, in Brodie (ed.), *The Absolute Weapon. Atomic Power and World Order*, *op. cit.*, pp. 24-34, 46-49; Lucien Poirier, *Des stratégies nucléaires*, Paris, Complexe, 1988, pp. 171ff.

⁸⁹ On this point, see Edward N. Luttwak, *Strategy. The Logic of War and Peace*, Cambridge, Belknap/Harvard University Press, 1987, chapters 1 to 4.

⁹⁰ On the physical credibility problems of conventional capabilities, see Dennis M. Gormley and Thomas G. Mahnken, “Facing Nuclear and Conventional Reality”, *Orbis*, Vol. 44, No. 1, Winter 2000, pp. 109-125.

⁹¹ Carl von Clausewitz, *On War*, Princeton, Princeton University Press, 1976, p. 80.

⁹² For a similar analysis, see John Stone, “Conventional Deterrence and the Challenge of Credibility”, *Contemporary Security Policy*, Vol. 33, No. 1, April 2012, pp. 108-123.

military power seems to have undergone a process of erosion whose effects have combined with those of the financial crisis and a clear weariness with regard to external interventions. Signals sent by the United States in recent years in Libya or Syria are not alarming for the credibility of U.S. deterrence policy, since the U.S. interests at stake in those conflicts were extremely limited. Still, these signals add to the perception that the U.S. leadership might durably refrain from any meaningful involvement in regional crises. Conventional credibility rests primarily on the willingness to take risks, rather than on the capacity to brandish a few very-long-range, exorbitantly expensive systems⁹³.

The contribution of capabilities like CP(G)S to reassurance missions is also ambivalent. On paper, there are at least two reasons for close allies like Japan and South Korea to be concerned about this U.S. orientation. First, development of prompt strike systems is a response to U.S. perception of increased exposure of prepositioned forces to A2/AD capabilities, particularly due to the proliferation of long-range, surface-to-surface strike systems. However, emphasizing in response the development of stand-off strike systems launched from the United States (as was initially planned for programs like CSM/HTV-2) or from submarines could be interpreted as a reduced acceptance of risk by U.S. leadership, possibly as a preliminary step toward decoupling and, therefore, could weaken U.S. guarantees to allies. Moreover, as the Administration discovered in the 2010 *Nuclear Posture Review*, U.S. allies fear the move endorsed by the White House toward a reduced role for nuclear weapons in the U.S. extended deterrence and reassurance posture, and CP(G)S programs are intended to further this objective. Nonetheless, the concerns of U.S. allies in Asia concerning CP(G)S have remained limited: the reduction in U.S. ambitions in terms of conventional prompt strikes *de facto* excludes any possibility to substitute conventional systems for nuclear capabilities and any substantial reduction of the role of nuclear weapons in the U.S. posture⁹⁴. In fact, this reinforcement of U.S. conventional strategic strike capabilities fits into the redefinition of the regional deterrence architecture in the 2010 NPR, with greater integration of nuclear and non-nuclear offensive systems, defensive systems, allied capabilities, C4ISR systems, etc. The shift from CPGS to CPS could even be seen as reflecting a more profound evolution of U.S. strategy towards greater regionalization of its deterrence architecture. As long as this does not seem to herald a

⁹³ An adversary that would anticipate a belated U.S. involvement in a regional crisis would be encouraged to adopt *fait accompli* tactics, which would be all the more problematic for Washington when combined with reinforced defensive capabilities (e.g. A2/AD), implying a costly fight to regain lost ground.

⁹⁴ Bunn and Manzo, "Conventional Prompt Global Strike: Strategic Asset or Unusable Liability?", *op. cit.*, p. 13. For a more optimistic assessment, see Stephen J. Lukasik, "To What Extent Can Precision Conventional Technologies Substitute for Nuclear Weapons," in Henry D. Sokolski (ed.), *The Next Arms Race*, Carlisle, Strategic Studies Institute, 2012, pp. 387-412.

physical disengagement by the United States, allied reactions will probably remain positive, or at least not overly negative⁹⁵.

Finally, although conventional threats are politically more credible than nuclear ones when managing escalation in times of crisis, their use against a nuclear adversary still carries very significant risks. The latter result both from the possibility of U.S. underestimation of the asymmetry of stakes between the two parties as well as from the ambiguity problems mentioned earlier. Due to their characteristics and their limited numbers, these prompt strikes capabilities would only be employed in exceptional cases, against the most critical targets, which would include the adversary's WMD capabilities and C2 systems. Some countries have deliberately adopted a posture based on ambiguity: China, for instance, seems to be collocating its ballistic missiles launchers equipped with conventional payloads and those meant to carry nuclear warheads. Thus, any military action against this type of unit could be interpreted as an attempted disarming first strike and, thus, might contain the seeds of nuclear escalation. Even if the enemy's physical posture is not deliberately based on ambiguity, it may rely on installations and critical systems contributing both to the conduct of conventional operations and to nuclear operations, such as early warning radars, surveillance systems or command and control networks and centers – all of which belong to categories of targets earmarked for CP(G)S capabilities.

This risk is problematic, both before (planning) and during the operations. Not only could targeting such installations precipitate an enemy decision to use nuclear forces in order to reestablish deterrence vis-à-vis the United States, but the very existence of CP(G)S capabilities could constitute an element of instability in a period of crisis, exacerbating the “use them or lose them” dilemma associated with modest nuclear arsenals. The long-term advantage in raising the U.S. nuclear threshold would, thus, be far from clear if it led the United States to adopt modes of operation that backed a nuclear adversary into a corner, and convinced him that his ability to protect his vital interests is at risk. This risk of “inadvertent escalation”⁹⁶ is all the more worrying if one considers the difficulties encountered by the United States in actually restraining its action when conducting limited wars – restraints in terms of capabilities, targets engaged or political concessions demanded from the adversary⁹⁷.

⁹⁵ On this regional deterrence architecture and what it means for Japan, see Roberts, *Extended Deterrence and Strategic Stability in Northeast Asia*, *op. cit.*, pp. 20-24.

⁹⁶ Barry R. Posen, *Inadvertent Escalation. Conventional War and Nuclear Risks*, Ithaca, Cornell University Press, 1991; Joshua Rovner, “Air-Sea Battle and Escalation Risks”, Institute of Global Conflict and Cooperation, University of California in San Diego, Policy Brief No. 12, January 2012, available at: <http://igcc.ucsd.edu/assets/001/503563.pdf>.

⁹⁷ Russell F. Weigley, *The American Way of War. A History of United States Military Strategy and Policy*, Bloomington, Indiana University Press, 1977.

Countermeasures and Unintended Consequences

The deployment of prompt strike capabilities, if and when it occurs, will probably not live up to initial U.S. ambitions laid out in the 2000s. It will, nonetheless, be perceived as a threat by potential U.S. adversaries, particularly those possessing a nuclear arsenal that, due to its reduced size or its dependence on a small number of critical installations, is vulnerable to counterforce actions. Even Russia, with its vast and survivable nuclear arsenal, considers CP(G)S capabilities to be threatening and destabilizing.⁹⁸ The range of adversary reactions that could be implemented to counter such U.S. developments – from the most sophisticated to the most basic – would be relatively extensive⁹⁹.

Several potential countermeasures can be deduced from operational-level difficulties anticipated for CP(G)S capabilities and identified above.

- 1) Establishing or reinforcing a contested air and electromagnetic environment would probably constitute the first line of defense. Such a response would aim to increase the density, diversity and resilience of the integrated air defense system by deploying sensors supposedly effective against stealthy platforms or resistant to U.S. electronic warfare assets, and by systematically using mobile launchers and radars, less vulnerable to counterforce strikes. A robust air defense system would present at least two challenges to conventional prompt strike capabilities, by heavily reducing the volume of munitions that could be used during the forcible entry operation and, due to the active defenses and to the difficulty to collect and distribute real-time ISR data in such an environment, by increasing the uncertainty regarding the effects and effectiveness of conventional strikes. It could be usefully complemented by a deployment of defensive electronic warfare capabilities echeloned in depth, to scan, jam and spoof certain frequency ranges critical for deep strike missions, whether they are used for tactical or SATCOM links, GPS or radar signals¹⁰⁰.
- 2) Hardening critical facilities, reinforcing and increasing the resilience of underground networks are relatively costly options but quite straightforward and particularly effective against CP(G)S

⁹⁸ See for example Eugene Miasnikov, "Precision-Guided Conventional Weapons", in Alexei Arbatov and Vladimir Dvorkin (eds.), *Nuclear Reset: Arms Reduction and Nonproliferation*, Moscow, Carnegie Moscow Center, 2012, pp. 432-456.

⁹⁹ *U.S. Conventional Prompt Global Strike: Issues for 2008 and Beyond*, op. cit., pp. 84-86.

¹⁰⁰ See, for example, the measures being considered by Russian strategic forces in response to the risk posed by the combination of CPGS capabilities and special forces. Roger McDermott, "US Prompt Global Strike Moves Center Stage in Russian Security Planning", *Eurasia Daily Monitor*, Vol. 11, No. 7, Jamestown Foundation, 15 January 2014, available at: http://www.jamestown.org/programs/ed/m/single/?tx_ttnews%5Btt_news%5D=41817.

capabilities¹⁰¹. Hardening and, in particular, burying of installations will likely remain top-priority areas among an opponent's options to strengthen his defensive capabilities.

- 3) While the trend in favor of relying on mobile ballistic missile launchers and solid-propellant missiles is already clear among current and aspiring regional powers, a visible improvement in U.S. counterforce capabilities would further encourage the systematic fielding of these kinds of systems.
- 4) One of the most obvious options, for regional nuclear powers that can afford it, would also be to increase the volume of their nuclear arsenal and multiply the number of storage facilities and of access points to the latter – with possible negative consequences in terms of security and control¹⁰².
- 5) Offering similar effects but at less cost, a particularly effective asymmetric response could be based on strategies of deception and increasingly sophisticated decoys. By reproducing the appearance and signature of potential CP(G)S targets (mobile launchers, silos, radars, etc.) using relatively inexpensive decoys, it would be possible to present U.S. planners with a considerable number of targets, forcing them to commit many of their rare and exorbitantly expensive capabilities to integrated strike plans, for a wildly uncertain result¹⁰³.

¹⁰¹ Lee, "Contemporary American Military Technology and North Korea's Hard and Deeply Buried Targets (HDBTs)," *op. cit.*; Zhao, "Conventional Counterforce Strike: An Option for Damage Limitation in Conflicts with Nuclear-Armed Adversaries?," *op. cit.*

¹⁰² China seems for now to be storing most of its nuclear warheads on a single base, with only a minority of them distributed among six surface-to-surface missile bases. Mark A. Stokes, *China's Nuclear Warhead Storage and Handling System*, Washington, Project 2049 Institute, 12 March 2010. It is impossible to know whether the nuclear warheads for JL-2 SLBMs are located on the same central storage site. This might be the case for a transitional period, however such an arrangement would be lacking in credibility and effectiveness in support of a robust, submarine-based nuclear component.

¹⁰³ China and Russia have also launched development of conventional long-range strike capabilities. China has deployed the DF-21D, is developing an intermediate-range version of that missile, and apparently tested a dual-capable, Mach 10 hypersonic glide vehicle on 9 January, 7 August and 2 December 2014. Russia, meanwhile, traditionally possesses excellent know-how in very long-range cruise missiles (such as the Kh-55 ALCM) and is thought to be planning development of a conventional variant of its future fixed-base liquid-fuelled *Sarmat* ICBM, deployment of which is planned for 2020, in response to U.S. CPGS projects. Bill Gertz, "China Conducts Third Flight Test of Hypersonic Strike Vehicle", *The Washington Free Beacon*, 4 December 2014, available at: <http://freebeacon.com/national-security/china-conducts-third-flight-test-of-hypersonic-strike-vehicle/>; Sergei Karakayev, "Russia to Develop Precision Conventional ICBM Option", *RiaNovosti*, 14 December 2012, available at: http://en.ria.ru/military_news/20121214/17815444_1.html; *Military and Security Developments Involving the People's Republic of China 2013. Annual Report to Congress*, Washington, Department of Defense, 2013, p. 42; Bradley Perrett, Bill Sweetman and Michael Fabey, "High-Speed Hit.

- 6) Finally, in the case of nuclear opponents who consider their arsenals to be vulnerable, the reinforcement of U.S. prompt strategic strike capabilities could lead to significant adjustments in terms of posture. The first option would be to follow the Chinese example and to deliberately reinforce the ambiguity of their deterrence posture, by systematically collocating nuclear and conventional weapons and using dual conventional-nuclear C4ISR systems, in the hope of provoking caution on the part of U.S. strike planners seeking to minimize the risk of nuclear escalation. The second possibility would be to modify the operational status of nuclear forces by permanently raising their readiness or by adopting a *launch-on-warning* posture – which, of course, would first require an early warning capability. The third option, which could potentially be combined with the previous one, would be to modify the nuclear weapons C2 system and arrangements to increase decentralization and delegation of launch authority in order to counter the risk of paralysis that could result from an initial strike disrupting strategic C4ISR assets. The final logical step in this adaptation of the nuclear posture of foreign countries would be to lower the threshold for nuclear weapons use and to abandon any no-first-use policy.

China Demonstrates a Hypersonic Glider”, *Aviation Week & Space Technology*, 27 January 2014, pp. 18-20.

Conclusion

U.S. initial ambitions in terms of conventional prompt strike have run into a combination of technical, political and financial obstacles obliging the DoD to adopt a more modest approach emphasizing regional reach and a better integration of conventional strategic strikes with general purpose forces. This reorientation, like the very limited investments made in this area over the past decade, stand in strong contrast to the ambitions initially put forward by the Bush and Obama administrations to reduce U.S. dependence on nuclear weapons. While the current Administration seems never to have really considered feasible to substitute a share of the U.S. nuclear capabilities with a combination of conventional offensive and defensive systems, the numerous difficulties encountered by U.S. conventional prompt strike programs make such an orientation impossible in the short term and extremely improbable in the longer term¹⁰⁴. Furthermore, in view of the varied nature of the constraints, even an increased funding for the programs would not be enough to remove all the obstacles confronting Washington. Thus, the kind of capabilities first contemplated by CPGS advocates, and that still generate so much fear among America's potential strategic rivals such as Russia and China, currently appear to be nowhere in sight. The technologies required to enable long-range, non-ballistic hypersonic flight still seem far from maturity.

This does not mean that U.S. efforts to develop conventional prompt strike capabilities will stop. The U.S. desire to reduce dependence on nuclear weapons has deep strategic, political and – particularly under Obama – moral and ideological roots that are here to stay. Non-nuclear capabilities contributing to U.S. deterrence policy, of which conventional prompt strike capabilities are just one aspect alongside BMD and modernized general purpose forces that offer reach, agility and persistence, will continue to be seen in Washington as a key element of U.S. future freedom of action vis-à-vis regional adversaries equipped with WMDs.

While the strategic value of conventionalizing deterrence appears clear from a U.S. perspective, the specific added value of conventional prompt strike should remain limited to the most demanding missions (decapitation strikes, preemptive or preventive strikes on a very small set of targets in A2/AD environments, etc.) that the U.S. could have to conduct

¹⁰⁴ M. Elaine Bunn explicitly excluded the objective of any substitution in a U.S. Senate hearing. "Statement of M. Elaine Bunn, Deputy Assistant Secretary of Defense, Nuclear and Missile Defense Policy", Senate Committee on Armed Services, Subcommittee on Strategic Forces, 5 March 2014.

against regional powers such as North Korea or Iran. From a warfighting perspective, a conventional prompt strike capability would certainly constitute a useful complement to the existing U.S. long-range strike portfolio. However, due to its insufficient volume, to the complexity and size of the potential target sets, and to the challenges it would pose in terms of crisis stability, the added value of such a capability to U.S. deterrence credibility against major nuclear adversaries such as Russia and China appears at best extremely marginal.

Although it seems likely to advance between now and the 2020s through further integration and diversification of forward-deployed conventional capabilities, the conventionalization of the U.S. deterrence posture does not seem capable of offering Washington the possibility of significantly reducing the volume of its nuclear arsenal below the numbers already identified in President Obama's Berlin speech of June 2013¹⁰⁵. However, if it is supported by sufficient accompanying advances in terms of responsiveness, penetration and precision targeting in a contested air and electromagnetic environment, this endeavor could reinforce Washington's conventional credibility against regional powers and allow for a U.S. shift towards a no-first-use declaratory policy.

¹⁰⁵ "I've determined that we can ensure the security of America and our allies, and maintain a strong and credible strategic deterrent, while reducing our deployed strategic nuclear weapons by up to one-third." "Remarks by President Obama at the Brandenburg Gate", Berlin, 19 June 2013, available at : <http://www.whitehouse.gov/the-press-office/2013/06/19/remarks-president-obama-brandenburg-gate-berlin-germany>.

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