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Modernizing NATO's Nuclear Forces:

Implications for the Alliance's defense posture and arms control

NATO's nuclear posture is scheduled to undergo a significant modernization over the next decade that involves upgrading both the nuclear weapons and delivery vehicles. The modernization will significantly increase the military capabilities of NATO's nuclear posture in Europe. The modernization plan contradicts key elements of the Deterrence and Defense Posture Review (DDPR).

First, the plan to increase the nuclear capabilities contradicts the main conclusion of the DDPR, that "the Alliance's nuclear force posture *currently meets the criteria* for an effective deterrence and defense posture" (emphasis added).[1] If the current posture meets the requirements of NATO, why then is it necessary to improve the capabilities? A modernized posture with increased capabilities would appear to exceed the deterrence and defense criteria determined by the DDPR.

Second, increasing the capabilities of NATO's nuclear posture in Europe is unlikely to help persuade Russia reduce its non-strategic nuclear forces or "create the *conditions for a world without nuclear weapons*," two of the main arms control goals in the DDPR.[2] Instead, since NATO's strategy is to seek "reciprocal steps" from Russia, *modernizing* NATO's nuclear posture would seem to endorse reciprocal Russian modernization of its non-strategic nuclear forces. It is hard to see why that would be in NATO's interest.

Nuclear Modernization

The first part of the modernization involves the B61 bomb, of which nearly 200 are deployed at six bases in five European countries. Over the next decade, the B61-3 and B61-4 bombs currently deployed in Europe will be shipped back to the United

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States as part of a life-extension program for the B61-4 bomb. The program uses the 50-kiloton warhead from the B61-4,[3] incorporates selected components from the B61-3, B61-7 and B61-10, and adds a new guided tail kit assembly. Disassembly of existing B61s will begin in 2016 and the first new weapon – known as the B61-12 – is scheduled for delivery in 2019.

The addition of the guided tail kit will increase the accuracy of the B61-12 compared with the current versions and result in a greater target kill capability than the B61 versions currently deployed in Europe. This means that the B61-12 will be able to hold at risk targets that cannot be held at risk with the B61s currently deployed in Europe. For example, a guided B61-12 will be able to hold at risk hardened and underground targets that today require use of a 360-kiloton strategic B61-7. The B61-7 is not currently deployed in Europe.

A secondary effect from the increased accuracy is that the B61-12 will allow war planners to select lower yield options for current target sets, thereby reducing the radioactive fallout from a strike. For the planners, this creates a much more "useable" weapon because they will be able to destroy targets with much less radioactive fallout than would be generated by the higher yields needed for today's less accurate weapons.[4] Back in 1992, the U.S. Congress rejected a similar guided bomb proposal partly because of concern that it would make nuclear weapons appear more useable.

The political side of NATO may not be aware of this, but NATO approved the key military characteristics of the B61-12 in April 2010[5] – the very same month U.S. Nuclear Posture Review promised that "Life Extension Programs … will not … support new military missions or provide for new military capabilities."[6] U.S. officials said getting approval from NATO was a significant achievement because the B61-12 program might not have been possible if the Europeans had opposed improving the accuracy with the guided tail kit.[7]

The second part of the modernization involves the aircraft used to deliver the bombs. Starting in the early 2020s, the F-35A Lightning II, also known as the Joint Strike Fighter (JSF), will begin to replace the F-16 (Holland, Turkey, United States) and PA-200 Tornado (Italy) as carrier of the B61 nuclear bomb. Germany will not acquire the JSF and has not announced plans to equip the Eurofighter with nuclear capability. The F-35A has a significantly better penetration capability than the F-16 and Tornado due to its stealth features, and also has a longer range. Each F-35A will be able to carry two B61-12s internally (the F-16 and Tornado can only carry the weapons externally). The U.S. Air Force "intends to deliver nuclear capability to all JSFs in Europe in the 2020 time frame via the Block IV upgrade."[8]

The introduction of the B61-12 and F-35A in Europe has several implications. At the political level, the modernization seems to contradict the pledge made by the U.S. Nuclear Posture Review that life-extension programs "will not provide for new military capabilities."[9] Yet the B61-12 clearly will

have new military capabilities in form of the guided tail kit and the increased accuracy and target kill capability this provides.

Government officials are aware of the dilemma and try to explain it by saying one of two things: either that the NPR reference to new military capabilities only refers to the warhead itself (it is acceptable to improve other components); or that the pledge must be measured across the stockpile (the maximum B61-12 kill capability already exists in the form of the B61-7).

Spin aside, the improvements will enhance the military capability of NATO's nuclear posture, and this raises important questions for NATO. One is how this will help persuade Russia to reduce its non-strategic nuclear weapons or become convenient ammunition for Russian hardliners to justify modernizations of Russia's non-strategic nuclear forces. Another question is to what extent improving nuclear capabilities is compatible with NATO's policy to reduce the number and reliance on nuclear weapons and create the conditions for a world free from them.

Safety and Security

Safety and security (combined known as surety) of nuclear weapons are determined by two primary factors: the design of the weapons and the storage location. Both can be undermined by the acts of unauthorized personnel, authorized personnel, and natural courses.

As forward deployed weapons, the B61 bombs in Europe have been equipped with some of the most safe and secure features in the U.S. inventory.[10] The new B61-12 will have some improved use control features compared with the B61s in Europe, but the details are secret. What is known, however, is that the B61-12 will *not* be equipped with new safety features such as Fire Resistant Pit and Multi-Point Safety (see table).

Yet no safety or security system is fail-safe: accidents and incidents always happen in ways not foreseen despite the best of intensions. In 2005, I disclosed that a U.S. Air Force safety review had discovered that procedures used during maintenance of weapons created a risk that a lightning strike could trigger a nuclear detonation.[11] In 2008, I disclosed that another U.S. Air Force review had concluded that "most" nuclear weapons storage locations in Europe did not meet U.S. security requirements and would "require significant additional resources" to bring up to standard.[12]

B61 Nuclear Surety Features Comparison

Surety Feature	B61-3/4	B61-12
Insensitive High Explosive	yes	yes
Fire Resistant Pit	no	no
One-Point Safety	yes	yes
Enhanced Nuclear Detonation Safety (ENDS) / Enhanced Electrical Isolation (EEI)	yes	yes
PAL (Category F)	yes	yes
Command Disable	yes	yes
Code Management System	yes	(yes)
Disablement technology*	no	(yes)
Improved use control*	no	(yes)

* Disablement and improved use-control features are rumored but details have not been disclosed.

Before these disclosures, NATO insisted that the nuclear weapons in Europe were safe and secure. After the disclosures, corrections were made and NATO once again insisted that the weapons were safe and secure. And now NATO has approved the expensive B61-12 program to incorporate *additional* security features into the forward deployed weapons. Are the weapons safe or not? Improved safety and security is always better, in principle, but given the considerable costs involved upgrades must be based on specific threats. Yet the current B61-12 upgrade appears to be based on a White House directive from 2003 that determined that warhead life extension programs must include the "incorporation of enhanced surety features *independent of any threat scenario*" (emphasis added).[13] If the weapons are not safe, they should be withdrawn. This is not a technical issue: patching them up with additional features will only suffice until the next review.

Security and safety are not only determined by what potential adversaries might do but also by how NATO itself deploys the weapons. Indeed, the current form of deployment in Europe might be the least secure. Instead of concentrating the weapons in one or a couple of storage facilities to maximize security, the weapons are scattered across Europe inside nearly 100 aircraft shelters at six bases in five countries. This form of deployment significantly complicates security and multiplies the points of vulnerability where accidents or incidents can happen. The widely scattered deployment is based on warfighting considerations from the Cold War to decrease the vulnerability of the weapons to a Soviet attack. This deployment is incompatible with today's security challenges where the primary focus must be on decreasing the weapons' vulnerability to accidents and theft.

B61-12 Compatibility with Current Dual-Capable Aircraft

The B61-12 is scheduled for integration with five delivery platforms: B-2, F-15E, F-16, F-35 (Joint Strike Fighter; JSF) and PA-200 (Tornado). Each aircraft has its own specific requirements for system integration, qualification and certification activities, technical and management challenges that drive up costs.

Details of the upgrades are secret but according to several official sources will require upgrades to all existing aircraft. Unlike the current analog B61s, the B61-12 will be digital and require upgrades of aircraft computers and software as well as mechanical interfaces. Manuals and certification procedures will have to be updated, and the new guided tail kit will presumably require some upgrade of field maintenance facilities and procedures.

The initial plan envisioned B61-12 first production unit (FPU) delivered in 2017. This was then delayed to 2019, and it will most likely be delayed further. Likewise, delivery of the F-35 JSF was initially scheduled for 2017, but "the Air Force now intends to deliver nuclear capability *to all JSFs in Europe* in the 2020 time frame via the Block IV upgrade," according to DOD (emphasis added).[14]

For Germany and Italy, backfitting the B61-12 to the aging Tornado will require upgrades of technical capabilities and operational procedures. A German decision to add B61-12 capability to the Eurofighter would require much more extensive integration, qualification and certification and be more expensive and time consuming. In the case of Turkey, a stopgap upgrade of the F-16 is planned to enable the aircraft to deliver the B61-12 until sufficient F-35s are operational to take over the nuclear strike mission. A stopgap upgrade is presumably also required for Dutch F-16s, and Belgian B-16s would need to be upgraded as well.

Adding B61-12 capability to five different types of aircraft in six Air Forces is excessive, complex and expensive for the type of security challenges that face NATO today. More importantly, it demonstrates that the nuclear posture is patched together by leftover pieces from an outdated posture rather than reduced, streamlined and adapted to the military and fiscal realities of today.

NATO Nuclear Decision-Making and Arms Control Policy

During the Cold War, the immediacy of the threat and the enormous issues at stake almost dictated that the role of nuclear weapons in NATO was overwhelmingly a military-technical issue. Of course, political arms control considerations were important too but they took on a secondary and follow-up function.

Today, the immediate threat is gone and the stakes are not about survival but about shaping future directions. As a result, many things have changed fundamentally. But the nuclear decision making process in NATO is still the prerogative of a small, insulated group of career officials in the ministries of defense and the military planning communities. These communities use their privileged access and knowledge to prepare and "work" the nuclear issue before it rises through the layers of bureaucracy to the formal decision makers. As a result, new thinking has a hard time to affect the posture resulting in NATO's nuclear policy being perpetually out of sync with the geopolitical realities.

The Strategic Review and Deterrence and Defense Posture Review were not bottom-up reviews but attempts to bridge widely different nuclear perspectives of different member countries and internal constituencies within NATO. This constraint was deepened by the Obama administration taking a back-seat position, asking the NATO countries what they wanted rather than taking on the leadership role that has traditionally been the U.S. role in NATO on nuclear issues. As a result, the reviews decided on nuclear status quo rather than outlining a road forward toward reductions and less reliance on nuclear weapons.

But since the documents contain both status quo and arms control goals, NATO has a self-contradictory policy where supporters of status quo and arms control both will argue that their favorite path is the priority. The stage has been set for perpetual discord. Which path is the priority: status quo or reductions?

After two decades of unilaterally reducing U.S. nuclear weapons in Europe, NATO now has reinstated a bi-polar arms control policy where "any further steps must take into account the disparity with the greater Russian stockpiles of short-range nuclear weapons,"[15] and be considered "in the context of reciprocal steps by Russia."[16] Given that Russia's non-strategic nuclear posture is *not* determined by NATO's nuclear posture in Europe but by inferior conventional forces, making further NATO reductions conditioned upon Russian reciprocity and disparity would appear to effectively surrender the arms control initiative to the hardliners in the Kremlin.

In fact, why have NATO's policy makers decided that disparity with Russian non-strategic nuclear weapons matters now? It did not matter in 1994 when the United States unilaterally de-nuclearized its aircraft carriers, cruisers and destroyers – a decision that was matched by Britain's unilateral destruction of all its non-strategic nuclear weapons. Disparity also did not matter in 1995 when the U.S. Air Force closed several nuclear sites in Turkey or in 2001 when it unilaterally withdrew all nuclear weapons from Greece. Nor did disparity matter in 2005, when the Bush administration unilaterally cut the nuclear deployment in Europe by more than 50 percent and withdrew all U.S. nuclear weapons from Britain. So why does disparity matter now?

To that end, what does NATO mean by disparity? Is the intension to create nuclear parity in NATO and Russian non-strategic nuclear weapons? Hardly. If not, how much disparity is acceptable? NATO and Russian non-strategic nuclear postures are very asymmetrical, a characteristic that is growing with the U.S. decision to retire its last naval non-strategic nuclear weapon (Tomahawk Land-Attack Cruise Missile, TLAM/N) and the plan to convert its remaining non-strategic nuclear bombs into strategic weapons.[17]

Granted, reducing Russian non-strategic nuclear weapons would be good for many reasons. But re-linking that objective to the future of NATO's nuclear posture in Europe seems poorly thought through. Regardless of Russia's posture, why does the deployment of nearly 200 U.S. nuclear bombs in Europe meet NATO deterrence and defense posture? Why not 100 weapons, or 50?

Offering a left-over non-strategic posture from the Cold War as reassurance to nervous Eastern European countries seems to be fake reassurance for the simple reason that those non-strategic nuclear weapons are the least likely of all military means to be employed in response to the kind of security challenges those countries face today. Instead, they should be offered non-nuclear and non-military assurances that are credible. To the limited and hypothetical extent that nuclear weapons are needed to provide the ultimate security guarantee, that mission can be covered by long-range strategic nuclear forces – as the Strategic Concept and DDPR both clearly state.[18] Neither document assigns that mission to the non-strategic nuclear weapons, which should be withdrawn from Europe.

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[1] North Atlantic Treaty Organization, *Deterrence and Defense Posture Review*, May 20, 2012, section 8.
[2] Ibid, sections 24-28.
[3] Note that the different B61 versions also have several lower yields options that can be selected depending on mission.
[4] For an analysis of the B61-12 capabilities, see: Hans M. Kristensen, *B61 LEP: Increasing NATO Nuclear Capability and Precision Low-Yield Strikes*, FAS Strategic Security Blog, June 15, 2011, http://www.fas.org/blog/ssp/2011/06/b61-12.php
[5] U.S. Government Accountability Office, Nuclear Weapons: *DOD and NNSA Need to Better Manage Scope and Future of Refurbishments and Risks to Maintaining U.S. Commitments to NATO*, GAO-11-387, May 2011, p. 5, http://www.gao.gov/assets/320/317883.pdf
[6] U.S. Department of Defense, Office of the Secretary of Defense, *Nuclear Posture Review Report*, May 2010, pp. xiv, 39.
[7] U.S. Government Accountability Office, Nuclear Weapons: *DOD and NNSA Need to Better Manage Scope and Future of Refurbishments and Risks to Maintaining U.S. Commitments to NATO*, GAO-11-387, May 2011, p. 5, http://www.gao.gov/assets/320/317883.pdf. Note that although the B61 life-extension program is officially said to be a consolidation of four existing versions, it is in fact only one of the four versions – the B61-4 – that is being life extended. Instead, it will borrow selected components from the other three types, which will be retired.
[8] Joint Statement for the Record, The Honorable Madelyn Creedon, Assistant Secretary of Defense for Global Strategic Affairs, and The Honorable Andrew Weber, Assistant Secretary of Defense for Nuclear, Chemical, and Biological Defense Programs, *On Fiscal Year 2013 National Defense Authorization Budget Request for Department of Defense Nuclear Forces Programs, Before the Strategic Forces Subcommittee Committee on Armed Services*, U.S. Senate, March 28, 2012, p. 13, http://www.senate.gov/~armed_services/statemnt/2012/03%20March/Creedon-Weber%2003-28-12.pfd.
[9] U.S. Department of Defense, Office of the Secretary of Defense, *Nuclear Posture Review Report*, May 2010, pp. xiv, 39.
[10] For an overview of safety and security features used in U.S. nuclear weapons, see: Hans M. Kristensen and Ivan Oelrich, *JASON and Replacement Warheads*, FAS Strategic Security Blog, November 20, 2009, http://www.fas.org/blog/ssp/2009/11/jason.php
[11] Hans M. Kristensen, *U.S. Nuclear Weapons in Europe*, Natural Resources Defense Council, February 2005, pp. 51-52, http://www.nukestrat.com/pubs/EuroBombs.pdf
[12] Hans M. Kristensen, *USAF Report: 'Most' Nuclear Weapon Sites in Europe Do Not Meet US Security Requirements*, FAS Strategic Security Blog, June 19, 2008, http://tinyurl.com/5vhj22
[13] U.S. Department of Energy, National Nuclear Security Administration, FY2010 Budget Request, Volume 1, May 7, 2009, p. 99.
[14] Madelyn Creedon, Assistant Secretary of Defense for Global Strategic Affairs, and Andrew Weber, Assistant Secretary of Defense for Nuclear, Chemical, and Biological Defense Programs, *Joint Statement On Fiscal Year 2013 National Defense Authorization Budget Request for Department of Defense Nuclear Forces Programs Before the U.S. Senate Armed Services Strategic Forces Subcommittee*, March 28, 2012, 13.
[15] North Atlantic Treaty Organization, *Active Engagement, Modern Defense, Strategic Concept for the defense and security of the members of the North Atlantic Treaty Organization*, November 2010, section 26.
[16] North Atlantic Treaty Organization, *Deterrence and Defense Posture Review*, May 20, 2012, section 26.
[17] The reason for increasing the accuracy of the 50-kiloton B61-4 non-strategic bomb is so it can perform the mission of the 360-kiloton B61-7 strategic bomb. After the conversion is complete, the remaining non-strategic nuclear bombs (B61-3, B61-10) will be retired.
[18] North Atlantic Treaty Organization, *Deterrence and Defense Posture Review*, May 20, 2012, section 9; North Atlantic Treaty Organization, *Active Engagement, Modern Defense, Strategic Concept for the defense and security of the members of the North Atlantic Treaty Organization*, November 2010, section 18.