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**The Challenges of Maintaining  
Nuclear Cultures  
US and UK Perspectives**

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**Linton Brooks  
Tom McKane**

*January 2016*

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Though it has long been a concern for security experts, proliferation has truly become an important political issue with the last decade, marked simultaneously by the nuclearization of South Asia, the weakening of international regimes and the discovery of frauds and traffics, the number and gravity of which have surprised observers and analysts alike (Iraq in 1991, Libya until 2004, North Korean and Iranian programs or the A. Q. Khan networks today).

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# Contents

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<b>Introduction</b>	<b>9</b>
<b>U.S. Nuclear Culture in the 21<sup>st</sup> Century</b>	<b>11</b>
<b>American Nuclear Culture:     Shared Values and Persistent Disagreements</b>	<b>12</b>
<b>Can the Lack of Consensus Be Remedied     and Does It Matter?</b>	<b>15</b>
<b>Components of the American Nuclear Establishment and     Their Unique Cultures</b>	<b>17</b>
<b>International Challenges to Nuclear Culture</b>	<b>22</b>
<b>Special Cultural Problems Beyond Nuclear Culture</b>	<b>23</b>
<b>Nuclear Modernization:     A Case Study of Culture, Politics and Economics</b>	<b>25</b>
<b>Conclusions</b>	<b>27</b>
<b>Nuclear Culture in the United Kingdom</b>	<b>29</b>
<b>Maintaining the British Nuclear Deterrent</b>	<b>29</b>
<b>The British Public's Attitude towards Nuclear Deterrence</b>	<b>31</b>
<b>Political Parties' Views of the Nuclear Deterrent</b>	<b>32</b>
<b>Understanding of Nuclear Deterrence by Politicians</b>	<b>33</b>
<b>The Military</b>	<b>34</b>
<b>The Civil Service</b>	<b>36</b>
<b>Industrial Base</b>	<b>36</b>
<b>Safety and Security</b>	<b>39</b>
<b>Academia and Think Tanks</b>	<b>40</b>
<b>Looking Ahead</b>	<b>41</b>





# Abstract

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After the world entered the nuclear age, civilian and military organizations have witnessed the slow emergence of nuclear cultures, defined as the set of values and knowledge, shared among the national security community, about the relative importance of nuclear weapons in the country's defense posture, the distinctive features of nuclear weapons in terms of security, safety and operational requirements, and the workings of deterrence. Nuclear cultures have helped to ensure some level of coherence in policymaking and, most importantly, to maintain safe and effective deterrents. At a national level, however, each nuclear culture is confronted with significant challenges, such as generational change, decreasing levels of understanding or attention among the political and military leadership, insufficient funding or a growing inability to meet manpower requirements in both the nuclear weapons complexes and the armed forces. This paper looks at the United States and United Kingdom's recent efforts to maintain their nuclear culture, and at the key challenges these two countries face while pursuing this aim.

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L'âge nucléaire a vu l'émergence de cultures nucléaires au sein d'organisations civiles et militaires. Une culture nucléaire peut être entendue comme l'ensemble des valeurs et des connaissances, partagées par la communauté de défense, concernant l'importance relative de l'arme nucléaire dans la posture stratégique, les spécificités de l'arme nucléaire en termes de sécurité, de sûreté, et de dispositions opérationnelles, et le fonctionnement de la dissuasion. La culture nucléaire de certaines puissances nucléaires a ainsi contribué à assurer un certain degré de cohérence dans les politiques suivies et, plus important encore, à maintenir des forces de dissuasion sûres et efficaces. Au niveau national, toutefois, chaque culture nucléaire se voit confrontée à des défis significatifs, qu'il s'agisse de changement générationnel, d'un déficit de compréhension ou d'attention au sein des élites politiques et militaires, de niveaux de financement insuffisants ou d'une incapacité croissante à garantir au complexe nucléaire et aux forces armées l'accès à une main d'œuvre adaptée et suffisamment qualifiée. Cette note s'intéresse aux efforts récents des Etats-Unis et du Royaume-Uni pour maintenir leur culture nucléaire et aux principaux défis auxquels ces deux pays font face en vue d'y parvenir.



# Introduction

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*Corentin Brustlein*

The transformative effects of the advent of the nuclear age on warfare and international politics have been amply documented during the previous decades. While changes in states' behavior – whether they possessed nuclear weapons or not – were soon very tangible as countries adjusted their strategic policies and exercised restraint during conflicts or in their foreign policies, the impact of the nuclear age on individuals and organizations occurred at a deeper and perhaps less visible level. Organizational, psychological and cultural changes nonetheless played a crucial role to ensure that at least the core physical principles of the nuclear age and their implications for day-to-day operations were shared and understood. Indeed it took years, sometimes decades, for national security establishments and communities to adapt to nuclear weapons, by establishing new structures, procedures and norms, rebalancing funding priorities, devising new military doctrines or grasping the technical, scientific, and industrial aspects of these weapons of unprecedented destructive power.

The result was the progressive emergence of a “nuclear culture” among key political, military, technical and scientific actors involved in nuclear matters. For the purpose of this publication, the concept of nuclear culture has been defined as the set of values and knowledge, shared between individuals across the national security community, about (1) the relative importance of nuclear weapons in the country's defense posture; (2) the distinctive features of nuclear weapons in terms of security, safety and operational requirements; and (3) the workings of deterrence.

Nuclear culture is not supposed to be a perfectly consensual set of ideas about the value of nuclear weapons and the most appropriate policies, nor should it be considered fully homogenous among the different nuclear weapon states. Its strength can vary, depending on leadership attention, education and training, funding, ideological change, or other factors. A strong nuclear culture among the national security community nonetheless constitutes a valuable common basis and a key element to help maintaining some level of coherence in policymaking and, most importantly, safe and effective deterrents.

Each national nuclear culture is confronted with significant challenges, both in the short and longer term: generational change among administrations, political parties, armed forces, laboratories or industries;

decreasing levels of understanding, or neglect, by the political and military leadership; lack of funding; inability to attract and retain the types and numbers of skilled people required in both the nuclear weapons complexes and the armed forces, etc. Whether one supports nuclear disarmament or believes in the enduring relevance of nuclear deterrence policies, as long as nuclear weapons exist, they must be safe, secure and under proper civilian control. Thus, the possibility that any national nuclear culture might be eroding should be a concern to all decision makers and members of the national security community.

This *Proliferation Paper* turns to this crucial, although seldom analyzed, issue, by focusing on two distinct national cases: the United States and the United Kingdom. While the two cases differ significantly, both authors share at least two important insights: (1) even though the current situation should not be considered alarming, significant long-term challenges lie ahead; (2) the attitude of senior political and military leadership will be key in handling those challenges.

# U.S. Nuclear Culture in the 21<sup>st</sup> Century

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*Linton Brooks*

Anyone with experience in a large organization instinctively understands the central role that culture plays. A strong, coherent culture permeates institutions as diverse as the Jesuits, disaster relief organizations, large hotel chains and the United States Marine Corps. Leaders often seek to foster a strong culture because it makes the organization more effective. But cultures exist whether or not they are consciously supported or planned. Understanding the functioning of any organization, therefore, requires examining its culture. This is all the more important because such cultures typically change slowly.

Culture also applies to the collection of institutions and organizations that collectively constitute the U.S. nuclear weapons establishment. Overall nuclear culture is an amalgam of a set of individual cultures. In this paper, we will define this overall nuclear culture as follows:

Nuclear culture is the set of values and knowledge, shared between individuals across the national security community, about (1) the relative importance of nuclear weapons in the country's defense posture; (2) the distinctive features of nuclear weapons in terms of security, safety and operational requirements; and (3) the workings of deterrence.<sup>1</sup>

The analysis will begin by discussing overall U.S. nuclear culture and noting that, while there are many shared values, there is also a long-standing tension between those who would reduce the threats to the United States by emphasizing effective deterrence and those who would give greater emphasis to arms control, non-proliferation and the long-term hope of disarmament. We will then consider recent unsuccessful efforts to bridge this gap and analyze whether complete consensus actually matters.

Because of the size and complexity of the U.S. government, we will next look at the separate and unique cultures of the various components of the nuclear weapons establishment as well as at some of the external challenges to establishing and maintaining a strong unified U.S. nuclear culture. We will then describe three cultural problems that do not fit neatly

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<sup>1</sup> This definition was suggested by Dr. Corentin Brustlein of IFRI in commissioning this paper.

into the definition of nuclear culture given above before concluding with a brief case study on how the various factors we have described interact.

As this examination will reveal, American nuclear culture, while not totally coherent, is sufficiently robust to maintain an effective nuclear deterrent. Because some cultural challenges cannot be overcome and must therefore be managed, maintaining a nuclear culture that can ensure both strong national defense and meeting America's international obligations requires continuing strong leadership, above all by the President.

### ***American Nuclear Culture: Shared Values and Persistent Disagreements***

If an extensive set of shared knowledge and values is crucial to a successful culture, the situation in the United States should raise concerns. Across the broad and diverse national security community, there is consensus about security, safety and operational requirements. There is no support for unilateral disarmament. While U.S. military requirements can be met even if the number of warheads is reduced one-third below the levels allowed by New START<sup>2</sup>, the Administration insists it will not make those reductions unilaterally. This position is widely (but not universally) supported both inside and outside government. There is near universal recognition that decisions about nuclear weapons must be based on global considerations, rather than those of any single region.

Consensus on these elements is not surprising. Historically, there has been a rough agreement on a set of overarching principles within the United States. In a 2008 study, the Washington-based National Institute for Public Policy identified ten policy continuities that have endured across administrations, including those of different political parties:

1. Nuclear arms are special weapons and not just more powerful versions of high explosive munitions.
2. The safety, security, and authorized control of nuclear weapons are essential.
3. Alternatives to nuclear weapons, where possible, are preferred.
4. The roles for nuclear forces go beyond the deterrence of nuclear use.
5. The threat of nuclear retaliation, not defenses, provides the primary protection against nuclear attack.
6. Nuclear forces must not be inferior to those of another power.
7. Nuclear forces support security commitments to defend key allies.
8. The option to use nuclear weapons first should be retained.
9. A minimum deterrence force is inadequate to meet defense requirements.

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<sup>2</sup> United States Department of Defense, *Report on the Nuclear Employment Strategy of the United States*, Washington, DC, June 2013. New START provides for a level of 1550 deployed warheads.

10. A triad of strategic nuclear forces is valuable for its resilience, survivability, and flexibility.<sup>3</sup>

The Obama administration has largely embraced these policies. In an important modification, the administration explicitly included preventing nuclear proliferation and countering nuclear terrorism as an element of U.S. nuclear policy.<sup>4</sup> This was a significant structural innovation, but not a substantive one. The policies the administration pursued were widely supported but were not new; what was new was the explicit link to overall nuclear policy and the strong personal involvement of the President, especially in raising global awareness of physical security through a series of Nuclear Security Summits.

The considerable consensus on broad nuclear principles is, however, paired with equally significant disagreements. As Leon Sloss, a long-time, widely regarded nuclear policy expert noted in 1999, “there is no consensus among U.S. nuclear experts about the future role of nuclear weapons. As a result, clear policy to guide the future direction of the nuclear program is lacking.”<sup>5</sup> Sloss pointed out a sharp divide – which still exists today – between those who see nuclear weapons as a solution to problems of international peace and stability (through the prevention of war) and those who see nuclear weapons as themselves the problem (through increased risk of proliferation, nuclear terrorism and global destruction).

Sloss speaks of two sharply differing views among experts. View Alpha sees “the continuing existence of large inventories of nuclear weapons primarily as a threat to U.S. security.” It favors deep cuts in the U.S. stockpile, ratification of the Comprehensive Nuclear Test-Ban Treaty (CTBT), arms control with Russia and limiting modernization. View Beta sees a robust nuclear capability as important to national security, tends to oppose reductions, sees the CTBT as dangerous, is skeptical of arms control and believes modernization is essential “if the role of nuclear weapons has an indefinite future.”

President Obama did not create this divide within the nuclear establishment, but he brought it into sharp focus early in his presidency with his 2009 Prague commitment to “seek the peace and security of a world without nuclear weapons.”<sup>6</sup> The Administration sought to make concrete progress toward this goal by negotiating the New START Treaty and by strengthening the traditional United States negative security

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<sup>3</sup> Kurt Guthe, *Ten Continuities in U.S. Nuclear Weapons Policy, Strategy, Plans, and Forces*, Fairfax, VA, National Institute for Public Policy, September 2008, available at: [www.nipp.org/wp-content/uploads/2014/11/N-Continuities-Draft\\_Rev-2.11.pdf](http://www.nipp.org/wp-content/uploads/2014/11/N-Continuities-Draft_Rev-2.11.pdf)

<sup>4</sup> United States Department of Defense, *Nuclear Posture Review Report*, Washington, DC, April 2010.

<sup>5</sup> Leon Sloss, “The Current Nuclear Dialogue,” *Strategic Forum*, No. 156, January 1999.

<sup>6</sup> White House Press Release, *Remarks by President Barack Obama, Hradcany Square, Prague, Czech Republic*, Washington, DC, April 5, 2009.

assurance.<sup>7</sup> While the Administration said that current conditions made it impossible to declare that the *sole* purpose of nuclear weapons was to deter nuclear attack (as opposed to large scale conventional attack or attacks involving chemical or biological weapons), it adopted the long term goal of moving to a position where it could prudently make such a statement.<sup>8</sup> The Administration hoped to ratify the CTBT, but the longer-than-expected process of negotiating and ratifying New START made that impossible.<sup>9</sup> Finally, it formally foreswore the development of new nuclear weapons, new military missions for nuclear weapons, and new military capabilities for such weapons.<sup>10</sup>

Eventual elimination of nuclear weapons has been endorsed by almost all U.S. Presidents over the past half century. Complying with the requirements of Article VI of the Nuclear Nonproliferation Treaty has been the formal position of the United States for decades. But most past administrations have treated elimination as a long-term aspirational goal with no near-term impact. Not since Ronald Reagan has there been a president as deeply and personally committed to actually making progress toward abolishing nuclear weapons as President Obama in the early days of his Presidency. The Administration's actions in the nuclear area have been incremental, prudent and pragmatic, but this has been overshadowed in the minds of many by the way President Obama initially made abolition a major part of his international profile.<sup>11</sup> Obviously, those who believe we should be taking concrete steps now to bring about abolition within a few decades and those who believe abolition is a near-utopian goal that is so far in the future that it should play no role in current policy will have trouble agreeing on many specific issues.

In addition to the long term future of nuclear weapons there is another aspect of a coherent nuclear culture that is in dispute: the relative importance of nuclear weapons and nuclear deterrence in today's world. All post-Cold War administrations have sought to reduce the salience of nuclear weapons in dealing with the national security challenges America

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<sup>7</sup> Negative security assurances are promises not to use nuclear weapons against non-nuclear states even in response to a non-nuclear attack. In the post-Cold War period, the United States maintained ambiguity about nuclear use in response to an attack with chemical or biological weapons. The Nuclear Posture Review narrowed this possibility to apply only to nuclear-weapons states or states not in compliance with their nuclear non-proliferation obligations. For such states the United States concluded there were still circumstances in which U.S. nuclear weapons could help deter a conventional, chemical or biological attack.

<sup>8</sup> The practical impact of this formal goal has been limited.

<sup>9</sup> By the time New START was approved by the Senate, the Congressional election of 2010 changed the composition of the Senate. Correctly concluding that ratification was now impossible, the Administration never made a formal attempt but has focused on a quiet "educational" campaign with individual Senators.

<sup>10</sup> *Nuclear Posture Review Report, op. cit.*, p. 39.

<sup>11</sup> After about 2010, the President's international speeches have largely focused on deterrence and on assurance of allies and the Administration has done little to further the abolition agenda. Despite this, the perception that abolition is central to the President's thinking remains strong.



faces. Yet each has recognized that there are enduring threats to our vital interests that can only be countered by nuclear weapons.

Intellectually, these two positions are perfectly coherent, but they are not understood in the same way across the national security community. This leads to disagreements over the degree and the situations for which nuclear deterrence is relevant. One school asserts that nuclear weapons play no role in Afghanistan or in the battle against the Islamic State in the Middle East, that they didn't prevent aggression against Ukraine or thwart China's aggressiveness in the South China Sea, and that they thus have almost no relevance to any real national security problems in the post-Cold War world. A corollary is that extended deterrence is either irrelevant or can be accomplished by conventional means. These attitudes are found mostly – but not entirely – outside government. They are countered by those who think nuclear weapons are responsible for the lack of major interstate war in Europe for 70 years, that they undergird the strategic competition with Russia and China, help discourage nuclear proliferation, and underpin both extended deterrence and the reassurance of America's allies

Because of the perceived nuclear aggressiveness of the Russian Federation, currently those favoring a strong deterrent, even at the expense of emphasis on arms control, appear to have the upper hand. The long-term prognosis is less clear. During the Cold War, support for making abolition a major component of American policy was limited to those outside government with little political influence. The most striking development in nuclear policy in the last twenty years has been the growing support for abolition among former (and current) senior military and civilian officials.

### ***Can the Lack of Consensus Be Remedied and Does It Matter?***

If we accept the definition of nuclear culture given at the start of this essay, it is difficult to argue that a coherent U.S. nuclear culture exists. While some values are widely shared across the national security community, there are significant disagreements on the purpose and future both of nuclear weapons and of nuclear deterrence.

To the extent that there is not a consensus on fundamental issues, what can be done about it? During the George W. Bush Administration, many in the U.S. national security community, including most of the Department of Defense, were consumed with the war on terror and ignored nuclear issues. Many nuclear analysts sought a public debate about the role of nuclear weapons, in the belief that discussion and debate would lead to consensus. No such debate took place. The Obama administration did witness such a debate, which was widespread and vigorous both inside and outside government. Consensus on long-term goals and emphasis did not emerge.

In 2008, concerned with the apparent lack of agreement on the fundamental role of nuclear weapons, Congress established a bi-partisan

Strategic Posture Commission to “examine and make recommendations with respect to the long-term strategic posture of the United States.” The Commission and its supporting experts groups included some of the most knowledgeable nuclear policy experts in the United States, many of whom would later hold senior positions in the Obama administration. The Commission’s final report, issued in 2009,<sup>12</sup> was substantive and unanimous. It served as a major input to the 2010 Nuclear Posture Review and was hailed by many as re-establishing the consensus that they believed (incorrectly) had existed in the past. In hindsight, however, the Commission reached unanimity by declining to choose between the two competing views of the long-term role of nuclear weapons described earlier, calling instead for a balanced approach it defined as follows:

Despite our many differences of opinion, we have come together around a strategy that offers pragmatic steps for bringing this vision closer to reality. It is firmly grounded in the strategic tradition of the United States and the twin imperatives to meet nuclear dangers with effective deterrence and to reduce them where possible with additional political means, including principally arms control and nonproliferation. *Many of us see one component of strategy as more important than the other.* But none of us would endorse a strategy that emphasizes one approach to the near exclusion of the other. [Emphasis added]

Continued attempts to define a “middle ground” that would attract broad support and lead to consensus have not been effective. For now, the U.S. expert community (and the world more generally) must live with an American nuclear culture that includes significant disagreement on fundamental goals. This may not be as significant a problem as it appears. The 2009 Strategic Posture Commission and the 2011 ratification of New START demonstrate that Americans can often agree on what to do, even if they disagree on why they are doing it.

Historically, there has never been complete consensus on nuclear issues. Indeed, total consensus would be a mixed blessing. From the clash of ideas and viewpoints, better ideas invariably emerge. If a President is engaged, his or her policies will emerge following an initial period of debate at the start of an administration. Thereafter, the American political system and nuclear culture will normally ensure an effective consensus during the President’s term. Serious problems only arise when the White House fails to pay sufficient attention.

The long term situation is somewhat different. Modernizing nuclear weapons and their delivery systems and constructing new nuclear facilities take decades and the systems involved will be operational for decades after that. For example, the replacement for the Ohio class ballistic missile submarine has been in development for several years and is being actively

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<sup>12</sup> William J. Perry, James R. Schlesinger (eds.), *America’s Strategic Posture: The Final Report of the Congressional Commission on the Strategic Posture of the United States*, Washington, DC, United States Institute of Peace Press, 2009.

debated today. Yet the first ship of the new class will go on patrol after 2030 and the final ship will still be operational in the 2070s. Warhead modernization typically takes 20 years from concept to completion, with the modified warheads in the stockpile for at least three decades. To avoid expensive and disruptive changes to programs, there must be enough consensus to allow continuity between administrations. Thus far there has been.

### ***Components of the American Nuclear Establishment and Their Unique Cultures***

The persistent fragmentation of American nuclear security thinking into the two broad view points outlined above is not the only difficulty facing those who seek to ensure a unified nuclear culture. The size and complexity of the American government and thus of the American nuclear establishment is also important. The various components of that establishment are shaped by the overall nuclear culture, but have their own internal cultures as well.

The most important single figure in American nuclear culture is the President of the United States. Nuclear weapons are inherently Presidential. If the President is not seen to be personally engaged, other leaders throughout government will lose focus, making sustaining a strong and coherent nuclear culture exceptionally difficult.<sup>13</sup> Thus, even though nuclear policy issues typically play little role in Presidential campaigns, the long-term health of American nuclear culture depends crucially on who is elected President and the senior officials he or she appoints. The American President cannot impose policy to the same degree that the leaders of Britain and France can; thus his or her leadership is necessary to the maintenance of a strong nuclear culture, but is not always sufficient.

Beyond the President personally, the U.S. national security community that is relevant to nuclear weapons and nuclear weapons policy includes the following:

**White House officials**, including those with political, rather than national security responsibilities. White House culture is totally oriented toward supporting the President, providing options for Presidential consideration and ensuring Presidential decisions are implemented. With rare exceptions the workload and culture preclude individual initiatives not part of the President's program. Indeed the White House staff is best thought of not as an organization with a separate culture but as an extension of the President.

**The professional military**, including both those actively performing the nuclear mission and those providing leadership and support. One of the ways in which nuclear weapons differ from other military weapons is that

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<sup>13</sup> To some degree the President's National Security Advisor or the Secretary of Defense can provide a focal point for leadership on nuclear issues, but only if they are perceived as having the President's confidence.

virtually the entire body of American thought about their use has been developed, not by military officers, but by civilians, many outside of government.<sup>14</sup> The military, therefore, tends to focus on operational aspects of nuclear weapons and, except at the highest level, not to be as involved in nuclear weapons policy issues. A complicating factor is that the nuclear cultures of different parts of the military – the Air Force, the Navy<sup>15</sup> and joint commands – differ from one another in subtle but significant ways:<sup>16</sup>

- **Navy.** The Navy has subsumed the nuclear weapons mission into the culture of the submarine force. Officers rotate through shipboard weapons billets as they would through engineering or operations billets and routinely move between ballistic missile submarines (which carry nuclear weapons) and attack submarines (which do not). As a result, they have the culture of the submarine force, valuing independence of action, technical excellence, hard work and attention to detail. Significantly, this culture has been essentially unchanged for decades.
- **Air Force.** In contrast, following the end of the Cold War the Air Force made a series of decisions which fragmented its nuclear community. Intercontinental Ballistic Missiles (ICBMs) were merged with space forces, causing junior officers to question the viability of a career focused on nuclear weapons.<sup>17</sup> At the same time, the increased involvement of bombers in conventional conflict and the end of the practice of maintaining nuclear bombers on ground alert resulted in the bomber force emphasizing its non-nuclear operations to the detriment of the nuclear mission. One result was a 2007 incident in which six nuclear-armed cruise missiles were inadvertently transferred between air bases. In response, the Secretary of Defense requested the resignation of both the civilian Secretary of the Air Force and the military Air Force Chief of Staff because of their lack of effective oversight of the nuclear mission. He also convened a Task Force headed by a former Secretary of Defense to review the incident. The Task Force concluded there had been “an unambiguous, dramatic, and unacceptable decline

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<sup>14</sup> Fred Kaplan, *The Wizards of Armageddon*, Stanford, CA, Stanford University Press, 1991.

<sup>15</sup> Since the end of the Cold War and the elimination of battlefield nuclear weapons, neither the Army nor the Marine Corps have weapons systems capable of delivering nuclear weapons. Both maintain some nuclear expertise in order to support joint commands.

<sup>16</sup> For an overall discussion of service cultural differences see Carl Builder, *The Masks of War*, Santa Monica, CA, RAND Corporation, 1989. The discussion in this paper is limited to nuclear issues.

<sup>17</sup> One rationale was that ICBMs needed many junior officers but relatively few mid-grade officers while space organizations had the exact opposite profile. While logical, this had the unintended effect of causing some junior officers in the ICBM force to doubt that they had a viable career as nuclear operators.

in the Air Force's commitment to perform the nuclear mission."<sup>18</sup> In response, the Air Force established a Global Strike Command consolidating nuclear assets and providing a single commander responsible for them. The result has been an improvement in the stability of Air Force nuclear culture. New incidents in 2014 indicate more effort is required.<sup>19</sup>

- **Joint Commands.** Planning for nuclear weapons use and formal operational command of nuclear forces is vested in the U.S. Strategic Command in Omaha, Nebraska. While the command has important non-nuclear responsibilities, its nuclear culture is focused on implementing Presidential guidance for nuclear use in close coordination with the Office of the Secretary of Defense as well as on being an advocate for nuclear force requirements.<sup>20</sup> Although some worried that the many new tasks (space, cyber, and coordination of global military efforts against weapons of mass destruction) would lessen the command's nuclear focus, this does not appear to have occurred under recent commanders.
- **Joint Chiefs of Staff.** The Chairman of the Joint Chiefs of Staff is the senior military officer in the United States and, by law, the principal military advisor to the President. The senior officer culture governing the Chairman and the other Chiefs is that they always provide their best military advice to the President regardless of political implications. In testifying before Congress they are expected to provide their personal view rather than automatically defending the Administration position.

**Officials at the Cabinet and sub-cabinet level**, including both career civil servants and Presidential appointees. The relevant departments are the Defense Department, which tends to dominate on nuclear policy issues, the Department of State (especially relevant on arms control issues) and the Department of Energy's National Nuclear Security Administration on technical issues.<sup>21</sup> Although in the past there have been periods where there was significant tension between the pro-arms control State Department and the more skeptical Defense Department, this tension appears to have abated in recent years.

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<sup>18</sup> For details see Report of the Secretary of Defense's Task Force on DOD Nuclear Management, *Phase I: The Air Force's Nuclear Mission*, Washington, DC, September 2008.

<sup>19</sup> See footnote 32 below and the accompanying text.

<sup>20</sup> This seems obvious, but it is a significant change from the most of the Cold War when the military attitude was that no civilians other than the Secretary of Defense personally should have access to any aspects of nuclear planning. For how this largely unknown change came about, see Janne Nolan, *Guardians of the Arsenal*, New York, NY, Basic Books, 1989.

<sup>21</sup> Nuclear weapons (as opposed to delivery systems) are not a responsibility of the Department of Defense. This policy dates from the 1940s (a time when there was far less civilian control over the military than there is today) and was designed to ensure nuclear weapons were under civilian rather than military control. It is retained in part because there is no good reason to change it.

In the nuclear area, Presidential (or political) appointees in all three relevant Cabinet departments almost always have strong professional credentials with experience in weapons laboratories, defense oriented think tanks, universities or defense industries. The culture, typical of large hierarchical organizations with relatively low turnover at the working level, has a bias toward incremental, rather than radical change. Coordination is time-consuming and, except on a few issues of direct interest to the President or a Cabinet Secretary, the culture favors consensus over speed.

There is a significant exception to this characterization. When a new administration takes office (even one of the same political party) there is a large turnover in Cabinet and sub-Cabinet officials. This turnover results in an injection of fresh ideas and perspectives into government every four or, usually, eight years. It is part of the process whereby Presidents impose their vision on the bureaucracy. It is in the first year of an administration that significant policy changes are most likely to occur.

Following the inadvertent transfer of six nuclear-armed cruise missiles between two Air Force bases discussed above, the Secretary of Defense's Task Force concluded that nuclear responsibilities within the Defense Department headquarters were fragmented, leading to a dilution of management attention.<sup>22</sup> Recommendations to consolidate responsibilities were not implemented. It remains to be seen whether the systemic issues the Task Force identified will lead to future problems.

**The intelligence community.** Focused on providing policy makers with accurate information on the capabilities and intentions of other countries (especially potential adversaries), the multiple agencies that make up the intelligence community aspire (and usually succeed) to having a culture of analytic objectivity. As part of this culture, intelligence analysts, even at senior levels avoid taking positions on policy questions.

**Scientists, engineers and technicians** at U.S. national laboratories, especially those in leadership positions. The culture is essentially scientific, valuing intellectual independence, scientific objectivity and peer review. There tends to be a bias toward multi-disciplinary science (made necessary by the complexity of nuclear weapons), toward maintaining a world-class scientific staff and toward continuously expanding nuclear scientific knowledge. While laboratory leaders have strong technical views on the requirements for maintaining the stockpile, they typically avoid taking sides in major policy debates.<sup>23</sup>

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<sup>22</sup> The Secretary of Defense's Task Force on DOD Nuclear Management, *Phase I : The Air Force Nuclear Mission, and Phase II : DOD Nuclear Mission*, September 2008 and December 2008.

<sup>23</sup> The national laboratories are private institutions and the scientists in them are not government employees. This has been true since the Manhattan Project, both to provide flexibility in human resource management and to foster the scientific culture.



**The Defense, Appropriations and (sometimes) Foreign Relations committees of Congress.** Because most of Congress' work is done by committee, individual members not on those committees typically have much less relevance, even if they have strong beliefs. The overall culture of the U.S. Congress has changed significantly over the past twenty years. Prior to that time the two political parties were each somewhat ideologically diverse, including both liberal Republicans and conservative Democrats. There was thus space for compromise and deal making. Today the most conservative Democrat is more liberal than the most liberal Republican. Further, most House of Representatives districts are in the firm control of one of the two political parties, reducing the incentives to compromise. This is less true of the Senators, who are elected on a state wide basis, but the rules of the Senate allow the minority party to obstruct legislation.<sup>24</sup> As a result Congress often has difficulty in handling contentious issues.

The consequences of these developments are primarily felt on major issues like New START. Most contentious issues concern long-term goals, while the day-to-day work of Congress is focused on policy and financing of the coming year where some agreement is possible. But the hyper-partisanship and dwindling knowledge make it more difficult for Congress to have a thoughtful role in fostering and strengthening an overall national nuclear culture.

A disquieting feature of the last decade has been the steady reduction in the number of members and their staff with more than a rudimentary knowledge of nuclear issues. Structural changes have made this problem worse. At the time of the first Strategic Arms Reduction Treaty a bipartisan Senate Arms Control Observer Group routinely observed negotiations. This was designed to foster a bipartisan approach and was largely successful in doing so. In 1999 the group was abolished and replaced by a broader National Security Working Group which has proven to be a vehicle for conducting partisan debates rather than forging bipartisan consensus.<sup>25</sup> In another example, for decades Congress had an Office of Technology Assessment to provide objective advice on technical issues, including those associated with nuclear weapons. With its elimination in the 1990s as a cost-cutting device, Congress can only draw of the handful of excellent analysts at the Congressional Research Service of the Library of Congress and on outside think tanks, often those with a strong partisan agenda.

**Outside organizations** (and a few individuals<sup>26</sup>) with a particular policy or political focus. These groups vary widely in the degree to which

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<sup>24</sup> For additional information on the causes and consequences of this phenomenon, see Thomas E. Mann and Norman J. Ornstein, *It's Even Worse Than It Looks: How the American Constitutional System Collided With the New Politics of Extremism*, New York, NY, Basic Books, 2012.

<sup>25</sup> For more details, see Nicolas Roth, "The Evolution of the Senate Arms Control Observer Group," *Public Interest reports*, Vol. 67, No. 2, Spring 2014.

<sup>26</sup> The most prominent are former Secretaries of State George Shultz and Henry Kissinger, former Secretary of Defense William J. Perry, and former Senator Sam

they have short term influence, which they typically exert through personal contacts both with individual Executive Branch officials and with Congressional staff (and sometimes members). They tend to be more influential when they reinforce, rather than challenge, views of government policy makers. In the long term, however, outside groups can have significant indirect influence since they are often a source for sub-cabinet appointments, especially when administrations change. In terms of the two broad viewpoints set forth above – whether nuclear weapons are essential to American security or detract from it – some organizations seek to bridge the two positions, while the culture of other organizations leads them toward embracing one or the other of these viewpoints.<sup>27</sup>

### ***International Challenges to Nuclear Culture***

Fundamental disagreement on the future importance of nuclear weapons and the disparate cultures of the many parts of the nuclear security establishment are not the only impediments to maintaining a coherent nuclear culture. At least two external factors complicate attaining nuclear consensus.

**Complexity and fluidity of the international situation.**<sup>28</sup> Nuclear weapons policy does not exist in a vacuum. Gaining consensus on a coherent and consistent nuclear policy is made more difficult by the changed and changing security environment that increasingly characterizes the 21st century. This is not a more dangerous world than the world of the Cold War (after all, a nuclear confrontation with the Soviet Union, if mismanaged by either side, could have ended both countries as functioning societies). It is, however, a more complex and confusing one, with no clear answers to important questions. Part of our uncertainty about the role of nuclear deterrence today is our uncertainty about the security environment. Is world order unraveling, as Henry Kissinger has argued?<sup>29</sup> Or are we simply living through another of the periodic historical perturbations in international relations? Is the United States a declining power that will need – like today's Russia – to emphasize nuclear weapons to compensate for weakness in other areas or will the inherent strengths of the United States allow it to retain a preeminent role without over-emphasis on nuclear weapons? Will Russia, China and other emergent powers not committed to the existing order succeed in replacing the international system created by the United States in 1945 with something that gives them a greater role

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Nunn whose series of statements beginning with *Wall Street Journal* article on 4 January 2007 provided the first senior-level endorsement of seeking a world free of nuclear weapons.

<sup>27</sup> In Washington, illustrative organizations for analyzing nuclear policy in the centrist or bridging camp are RAND, the Institute for Defense Analyses, the Center for Strategic and International Studies and the Center for a New American Security. The Stimson Center, Brookings Institution and Arms Control Association are typical of institutions often seeing the dangers of nuclear weapons, while the National Institute for Public Policy, American Enterprise Institute and Heritage Foundation exemplify those seeing greater need for nuclear weapons in preserving American security.

<sup>28</sup> I am indebted to Brad Roberts for pointing out the importance of this factor.

<sup>29</sup> Henry Kissinger, *World Order*, London, Penguin Press, 2014.



and, if so, will the change(s) have any military impact? Will China's rise remain peaceful or will it lead not just to confrontation with the United States but to actual war? Most of these questions are unanswerable, yet crafting a meaningful long-term national security strategy without at least rudimentary answers may be impossible. And if there is no agreement on an overall security strategy, it is not surprising that there is a continued lack of agreement on long-term nuclear strategy.

**Enduring American commitments.** Unlike other nuclear powers, the United States regards its military forces, including its nuclear forces, as being maintained for the defense of its allies as well as of itself. These allies include all NATO states, Japan, the Republic of Korea, Australia, and, to a lesser degree, others. While it is common to use the term "nuclear umbrella," to describe these U.S. commitments, that is technically incorrect. The U.S. obligation is typically to regard an attack on an ally as though it were an attack on itself. Although this does not require nuclear weapons use, allies often want to be assured that it does not exclude such use.

What does this have to do with nuclear culture? As former British Secretary of State for Defence Denis Healy famously observed, "I always used to define the NATO dilemma in terms of what I call the Healy theorem: it... only takes a 5 percent credibility of American retaliation to deter an attack, but it takes a 95 percent credibility to reassure the allies..."<sup>30</sup> Reassuring allies of U.S. resolve even though both Russia and China can inflict significant damage on the U.S. homeland requires constant attention. The need for reassurance also directly affects force structure, causing the United States to maintain a standard of nuclear forces "second to none" even if not required by narrow military considerations.<sup>31</sup> Extended deterrence and reassurance complicate seeking compromise within the nuclear establishment between advocates of unilateral reductions, of establishing deterring nuclear attack as the sole purpose of nuclear weapons or of withdrawing U.S. nuclear weapons from Europe and those who believe that nuclear reassurance is vital. Without U.S. obligations to its allies, these disagreements would vanish. Further, the United States places a high value on cooperation with its British and French allies on nuclear issues and on fostering the ongoing efforts of NATO to strengthen deterrence, adding further complexity to internal U.S. policy formulation.

### ***Special Cultural Problems Beyond Nuclear Culture***

Not all cultural problems affecting nuclear weapons are problems with nuclear culture. There are significant cultural problems in the American nuclear establishment today that don't fit neatly into the definition used in this essay. These problems manifest themselves in leadership,

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<sup>30</sup> Interview with Denis Healy, Boston, MA, WGBH Media Library & Archives, 1987, available at <http://openvault.wgbh.org/catalog/wpna-e3fddb-interview-with-denis-healy-1987>

<sup>31</sup> For a broader discussion of the implications of extended deterrence see Brad Roberts, *The Case for Nuclear Weapons in the 21<sup>st</sup> Century*, Stanford, CA, Stanford University Press, 2015.

management and oversight of those actually accomplishing the nuclear mission.

Three are particularly worrying. The first concerns the military operators of the strategic nuclear forces, especially in the Air Force. The men and women on the flight lines and in the missile launch control centers continue to have a strong, mission-oriented culture. Many of their seniors, however, despite rhetorical claims that the strategic mission is the military's most important one, have diverted resources to other areas. Further, they have substituted a culture of perfection on inspections for one of mission effectiveness. As a result of this, a significant number of officers were found to have cheated on routine proficiency examinations, driven by a belief that such action was necessary to remain competitive for promotion and good assignments. A powerful report by two retired four-star officers documented the problems and the Department of Defense has undertaken strong corrective actions.<sup>32</sup> It remains to be seen whether these will be enough to correct the problem.

The remaining two issues involve the National Nuclear Security Administration, the semi-autonomous part of the Department of Energy that operates the nuclear weapons complex. A major element of that complex is the Y-12 uranium storage and fabrication plant in Oak Ridge, Tennessee. Like all NNSA facilities, Y-12 is operated by a private company and all of the work done there (including maintaining a guard force) is done by non-government employees. In a significant security incident in July 2012, three protestors, including an 82-year-old nun, were able to cut through security fences and reach the Highly-Enriched Uranium Materials Facility (which stores most U.S. highly enriched uranium not actually in weapons) without being detected. Although no nuclear material was at risk, the incident revealed major problems involving organization, division of responsibility and security culture.<sup>33</sup>

While the first two issues resulted from specific cultural lapses that are being corrected, the final and most disturbing issue may represent a systemic problem. It involves the national laboratories. There are many challenges to attracting and retaining the very best scientists and engineers. Some of those challenges were the result of a prolonged holiday

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<sup>32</sup> Department of Defense of the United States, *Independent Review of the Department of Defense Nuclear Enterprise*, Washington, DC, June 2014. An internal review came to similar conclusions. See Department of Defense of the United States, *Summary of DoD Internal Nuclear Enterprise Review*, Washington, DC, November 2014. For the Department of Defense response, see Principal Deputy Under Secretary of Defense for Policy Brian P. McKeon and Principal Director for Nuclear and Missile Defense Policy Greg Weaver press conference "Department of Defense Reforms to the Nuclear Enterprise," Washington, DC, November 14, 2014. Both reports also deal with a cheating scandal within the Navy unrelated to nuclear weapons.

<sup>33</sup> For details see U.S. Department of Energy Inspector General Special Report, *Inquiry into the Security Breach at the National Nuclear Security Administration's Y-12 National Security Complex* (DOE/IG-0868), Washington, DC, August 2012. The intruders were subsequently convicted in Federal court and sentenced to lengthy prison terms.

in modernization and life extension, now ended. Others are the result of funding instability, leading to a “boom and bust” workload. But laboratory directors also point both to a loss of flexibility caused by federal (primarily NNSA) micromanagement and to a vast increase in the number of budget categories individually managed from Washington, a situation caused by both NNSA headquarters and the Congressional appropriation process. Eliminating NNSA micromanagement has been a goal for the last 15 years, with little success. Changing culture is difficult, takes a long time and requires determined, consistent leadership. In November 2014, a Congressionally-chartered commission concluded that NNSA is a failed experiment and should be re-integrated into the broader Department of Energy (which has its own share of micro-managers).<sup>34</sup> This would require Congressional approval, which is unlikely. The report also made recommendations that do not require legislation. Most are being implemented, although it is unclear whether they will reduce micromanagement.<sup>35</sup> For now, the problem is manageable with strong leadership; in the long term it could undermine the strong scientific contributions of the weapons laboratories. A final solution remains elusive

***Nuclear Modernization:  
A Case Study of Culture, Politics and Economics***

The United States maintains a “Triad” of strategic forces, including ballistic missile submarines, silo-based ICBMs and two types of strategic bombers, the B2, designed to penetrate air defenses and drop gravity bombs, and the B52, equipped with air-launched cruise missiles (ALCM). There are current plans to replace all three legs over the next twenty to twenty-five years

For a variety of technical reasons, major expenditures for all of these replacement programs will come in the decade of the 2020s. This has led many to claim that the total program is unaffordable. One widely quoted study estimates the total cost will be about a trillion dollars over thirty years, or about 35 billion dollars annually.<sup>36</sup> This isn’t an affordability issue as much as a priority issue. Seven percent of a \$500 billion dollar defense budget isn’t actually “unaffordable;” what critics mean is that they believe the money should be spent elsewhere (Navy surface warships rather than ballistic missile submarines, for example).<sup>37</sup>

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<sup>34</sup> Nuclear Security Working Group, *A New Foundation for the Nuclear Enterprise: Report of the Congressional Advisory Panel on the Governance of the Nuclear Security Enterprise*, Washington, DC, November 2014.

<sup>35</sup> National Nuclear Security Administration, *Comments on the Report of the Congressional Advisory Panel on the Governance of the Nuclear Security Enterprise*, Washington, DC, 15 May, 2015.

<sup>36</sup> Jon B. Wolfstahl, Jeffrey Lewis and Mark Quint, *The Trillion Dollar Nuclear Triad: U.S. Strategic Modernization over the Next Thirty Years*, Monterey, CA, James Martin Center for Nonproliferation Studies, January 2014. Other studies suggest similar results.

<sup>37</sup> Todd Harrison and Evan Montgomery (eds.), *The Cost of U.S. Nuclear Forces: From BCA to Bow Wave and Beyond*, Washington, DC, Center for Strategic and Budgetary Assessments, 2015.

What seems to be an economic issue actually is more than that. Those who view large inventories of nuclear weapons as a threat to U.S. security (for example, the Arms Control Association or the Ploughshares Fund) can be expected to use the affordability issue to argue against modernization and for eliminating one leg of the Triad (typically ICBMs).

Examining one element of the modernization program illustrates how the different U.S. sub-cultures interact and, in some cases, compete. To modernize the Triad's bomber leg, the United States will develop a new strategic bomber which will have both nuclear and non-nuclear missions. The bomber will penetrate air defenses through stealth but will also carry a new cruise missile called the Long-Range Stand-Off weapon (LRSO).

Consider the different institutional perspectives, each driven in part by their institutional culture. The Secretary of Defense, the Chairman of the Joint Chiefs of Staff and appropriate White House officials, have all approved developing the Long-Range Stand-off weapon. This would appear to settle the issue, but it does not. The budget for LRSO development comes from the Air Force. The Air Force is anxious to have a new bomber for non-nuclear use. At least some senior Air Force officers would be willing to forego nuclear capability for the bomber if doing so ensured adequate funding for the bomber itself. Still more would abandon a new nuclear cruise missile.

On the other hand the nuclear weapons laboratory that will develop the warhead for the new cruise missile will otherwise have no significant new development work for several years,<sup>38</sup> running contrary to the cultural imperative of maintaining a cutting edge scientific work force.

Members of Congress with production facilities or bases in their districts may or may not subscribe to a specific understanding of nuclear culture, but they want to protect the large expenditures that modernization will bring. In contrast, outside groups will attempt to influence Congress by public and private claims that LRSO is too costly.<sup>39</sup>

The views of the President and Secretary of Defense will prevail on a program with as much visibility and importance as LRSO. On other

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<sup>38</sup> Two laboratories, Los Alamos National Laboratory and Lawrence Livermore National Laboratory do design work for new or modified warheads. Between 2020 and 2026, two warheads will be undergoing significant development work to support life extension. Los Alamos will develop the life extension for an interoperable ballistic missile warhead for both SLBMs and ICBMs. Livermore will adapt an existing cruise missile warhead for the LRSO. If LRSO is cancelled or delayed, Livermore would have no intellectually-challenging warhead development work during that period. See Report to Congress, Figure 2.10 in *Fiscal Year Stockpile Stewardship and Management Plan*, Washington, DC, March 2015.

<sup>39</sup> See William J. Perry and Andy Weber for an argument that LRSO is destabilizing because its stealth will allow attack without notice. It remains to be seen if this argument will gain traction. "Mr President, kill the new cruise missile," *The Washington Post*, 15 October 2015

programs, not as visible, the outcome will not be as obvious. This simple example demonstrates the complexity of the American system for nuclear security. Culture is an important factor, but it is not the only important one. And cultural differences, both in the overall nuclear culture and among varying elements of the nuclear establishment interact in complex ways.

### **Conclusions**

American nuclear culture is shaped both by the complex nuclear establishment with its multiple separate cultures and by the changing nature of global relations. Under the definition of nuclear culture given at the start of this essay, today's culture is not fully coherent. While some values are widely shared, there are significant disagreements on the purpose and future of both nuclear weapons and deterrence.

The contradictions in U.S. nuclear culture are unlikely to disappear in the coming years. Cultures change slowly and there is little reason to assume American nuclear culture will be an exception. Internal tensions will remain, although the dispute over the long-term relevance of nuclear weapons is becoming less shrill as President Obama's Prague vision of nuclear weapons abolition has failed to capture the support of most other nuclear weapons states and as Russian and Chinese behavior has reinforced American belief in the long-term need for nuclear weapons.

Continued disagreement over the long-term role of nuclear weapons need not be alarming if it does not undercut the current effectiveness of the deterrent. That effectiveness depends on maintaining strong cultures in the various parts of the nuclear enterprise. It will be important to continue efforts to restore the appropriate culture in the Air Force, to maintain a focus on nuclear issues within the Defense Department, and to prevent further morale erosion within the national laboratories. It will be important that future Presidents pay attention to nuclear issues. The key is leadership. Organizational changes can make leadership more effective, but cannot substitute for it. If the President and his or her top leadership take nuclear issues seriously, regardless of which of the two competing views of the long term role of nuclear weapons they embrace, a reasonable nuclear policy is likely.

If national leaders become disinterested in nuclear issues, then there are some serious risks. One is driving good people out of the field. If a perception arises that nuclear weapons are no longer important to the national leadership, the best military officers and the best scientists will be uninterested in careers supporting the nuclear deterrent. The second risk is failing to manage the strategic and fiscal challenges associated with nuclear modernization. Sustaining adequate funding and focus depends on a shared recognition of the importance of the nuclear deterrent. A third risk would arise should America's allies chose to accommodate potential aggressors because those allies doubted either American resolve or its competence.

Most dangerous of all would be if potential adversaries were to believe that internal disarray in the U.S. nuclear culture was a reason to doubt U.S. security assurances. In such cases they might be tempted to take aggression against a U.S. ally, only to discover – as they certainly would – that they had misjudged American resolve and that they were now embroiled in a military conflict with a nuclear-armed state. As Americans continue to wrestle with complex discussions about the future role of nuclear weapons and the continued relevance of nuclear deterrence, it is vital that they continue to do so in a way that gives neither adversary nor ally any reason to doubt their current resolve.

# Nuclear Culture in the United Kingdom

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*Tom McKane*

Effective nuclear deterrence depends on a mixture of physical, psychological and political factors. As at least one commentator on these matters has observed, it is ultimately about understanding and influencing the “minds of others”.<sup>40</sup> At its heart it is about credibility. A potential adversary needs to believe that the potential benefits of aggression might be outweighed by the consequences of a nuclear response. He therefore needs to be convinced that one’s deterrent force would work as planned and that there exists the political will to employ it in circumstances where vital national interests are threatened. For this reason the public pronouncements of political leaders matter profoundly, as does the evident ability of the state to sustain a ready and reliable weapons system. One aspect of this is nuclear culture, which in this context embraces knowledge about and the value placed on every aspect of the nuclear deterrent by the national security community and, indeed, the wider public.<sup>41</sup>

Within the community of people who think about such matters it is generally assumed that nuclear culture is less solid within the United Kingdom than in the other Western Nuclear Weapons States, France and the United States. This may be so, but it does not necessarily follow that nuclear culture in the United Kingdom is fragile. The purpose of this short article is to assess the health of the various dimensions of nuclear culture in the United Kingdom. It is necessarily somewhat impressionistic because it is not easy to find publicly available data on every aspect of the question.

## ***Maintaining the British Nuclear Deterrent***

The United Kingdom needs to replace its existing Vanguard Class SSBNs, starting in the early 2030s, in a similar timeframe to France and the US.

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<sup>40</sup> Gordon Barrass, “US Competitive Strategy during the Cold War”, in Thomas G. Mahnken (ed.), *Competitive Strategies for the 21st Century. Theory, History and Practice*, Stanford, CA, Stanford Security Studies, 2012, p. 75.

<sup>41</sup> In commissioning this piece, Dr. Corentin Brustlein offered the following definition: “Nuclear culture is the set of values and knowledge, shared between individuals across the national security community, about (1) the relative importance of nuclear weapons in the country’s defense posture; (2) the distinctive features of nuclear weapons in terms of security, safety and operational requirements; and (3) the workings of deterrence”.



There will be a vote in Parliament by the end of 2016, perhaps sooner, to approve the entry into full-scale development and production of the new boats. The Trident D5 missile system will remain in service until at least the 2040s.<sup>42</sup> A new warhead (which could be a remanufacture of the existing design) may be needed in the 2030s.<sup>43</sup> Given the long lead times, a decision on the option to be pursued is likely to be needed by the early 2020s. Meanwhile, it will be necessary to continue to undertake sufficient research and development to keep options open.

The Government elected in May of this year has stated that it will take the necessary steps to sustain continuous at sea deterrence into the future.<sup>44</sup> In its election manifesto, the Conservative Party had made clear its intention to proceed to procure a fleet of four new SSBNs<sup>45</sup>, a commitment which was reaffirmed by the Defence Secretary, Michael Fallon, following the election.<sup>46</sup>

In July 2015, the Chancellor of the Exchequer, George Osborne, announced that the United Kingdom will meet the NATO target of spending 2% of GDP on defense.<sup>47</sup> This will be achieved by including in the calculation certain categories of expenditure previously not counted, such as war pensions and spending on intelligence. Nonetheless, it bakes in real increases in the defense budget of 0.5% per year, and probably more, depending on how a new £1.5Bn per year fund is shared between the Ministry of Defence and the intelligence and security agencies. This matters because the procurement of new SSBNs will consume a sizeable proportion of the defense equipment budget over the next decade and more.

In August 2015, in a visit to the Clyde Submarine Base, George Osborne announced that the Ministry of Defence would spend £500M over the next 10 years on infrastructure at the base.<sup>48</sup> Even if this expenditure had already been planned and is not solely for the benefit of the deterrent, the political message was clear.

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<sup>42</sup> Ministry of Defence of the United Kingdom, *The Future of the United Kingdom's Nuclear Deterrent*, London, Cm 6994, December 2006, p. 11.

<sup>43</sup> Cabinet Office and National Security and Intelligence, *Securing Britain in an Age of Uncertainty: the Strategic Defence and Security Review*, Cm 7948, London, October 2010, p. 39. Repeated in Prime Minister's Office, *National Security Strategy and Strategic Defence and Security Review 2015: a Secure and Prosperous United Kingdom*, Cm. 9161, London, November 2015.

<sup>44</sup> *National Security Strategy and Strategic Defence and Security Review 2015*, *op. cit.*, paragraph 4.65, p. 35.

<sup>45</sup> The Conservative Party, *The Conservative Party Manifesto*, London, April 2015, p. 77.

<sup>46</sup> The House of Commons, *Hansard for the House of Commons*, column 886, London, 8 June 2015.

<sup>47</sup> The House of Commons, *Hansard for the House of Commons*, column 337, London, 8 July 2015.

<sup>48</sup> "George Osborn confirms £500m Faslane investment to boost jobs on the Clyde", *Daily Record*, 31 August 2015, available at: <http://www.dailyrecord.co.uk/news/politics/george-osborne-confirms-500m-faslane-6355142>



### **The British Public's Attitude towards Nuclear Deterrence**

Public opinion is not included in the definition of nuclear culture referred to in the introduction to this article. But the attitudes of politicians and, indeed, the defense community engaged on nuclear matters, are shaped to some extent, at least, by the attitudes of society as a whole.

It is difficult to obtain a reliable impression of the British public's attitudes towards the nuclear deterrent, because it is of less direct day-to-day concern than issues such as jobs, housing, education and health. On the other hand, it is commonly agreed that the Labour Party's commitment to unilateral nuclear disarmament in the 1980s was one of the factors that made it unelectable, which implies that most people favored the retention of the deterrent for as long as other states were in possession of nuclear weapons.<sup>49</sup> Focus group work undertaken in the course of preparing the December 2006 White Paper on the deterrent suggested that opinion was evenly divided on whether or not to sustain the deterrent.<sup>50</sup>

More recently, in 2013 an opinion poll coinciding with the publication of the Trident Alternatives Review<sup>51</sup> suggested that, although voters would prefer a less expensive deterrent, the majority believed it should be retained. 35% favored a less expensive solution, while 26% favored a more expensive solution, ensuring that continuous at sea deterrence would be maintained. 25% favored scrapping the deterrent.<sup>52</sup>

In January 2015, in the run-up to the General Election, in which the Scottish National Party secured 56 of the 59 seats in Scotland (though less than half the voters cast), a poll conducted for *The Times* revealed that only 25% of people in the United Kingdom favored scrapping the deterrent, compared to 48% in Scotland.<sup>53</sup> Surveys conducted after the Election, in which the Conservative Party achieved a slim overall majority, found that more than 60% of those polled in the United Kingdom as a whole favored the maintenance of the deterrent,<sup>54</sup> while in Scotland the equivalent figure was 53%.<sup>55</sup>

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<sup>49</sup> See, for example, "Corbyn: 'Politically neutral' armed forces chief should not have spoken about Trident concerns", *Heraldscotland.com*, 8 November 2015; "Matthew Harries: Trident and the spectre of unilateralism", *The Survival Editors' Blog*, 23 January 2015, and "How my party was betrayed by KGB boot-lickers", *The Spectator*, 4 November 2009, where he explains why he described the 1983 Labour Party Manifesto as "the longest suicide note in history".

<sup>50</sup> Ministry of Defence of the United Kingdom, *The Future of the United Kingdom's Nuclear Deterrent*, *op. cit.*

<sup>51</sup> The Cabinet Office, *Trident Alternatives Review*, London, 16 July 2013.

<sup>52</sup> Will Dahlgreen, "Public support for nuclear weapons," *YouGov.co.uk*, 16 July 2013.

<sup>53</sup> "Poll: 25% of Brits and 48% of Scots think UK should scrap Trident," *Heraldscotland.com*, 27 January 2015.

<sup>54</sup> "Why Jeremy Corbyn's supporters don't care about winning," *Prospect Magazine*, August 2015.

<sup>55</sup> "Poll shows 52% would vote no to Scottish independence," *Thecourier.co.uk*, 12 September 2015.

On the other hand, opinion columns in the news media in recent years contain more hostile pieces than favorable ones, though this is largely a reflection of the fact that there are more organizations campaigning against nuclear weapons than in support of them.

Taken in the round, what the polling seems to show is that the majority of the population of the United Kingdom favours the retention of the nuclear deterrent in some form. Even in Scotland, opinion seems to be evenly divided, with perhaps a slim majority supporting retention of the deterrent, though they are much less vocal than Trident's detractors.

### ***Political Parties' Views of the Nuclear Deterrent***

Prior to the election of Jeremy Corbyn as Leader of the Labour Party in September 2015, the leadership of both the main political parties, Conservative and Labour, supported the maintenance of continuous at sea deterrence. The only difference was that Labour suspended judgment on whether three or four submarines were required in order to achieve this.

The Conservative Government has the support of almost all of its backbench MPs for its policy on this issue. One rare but notable exception is Crispin Blunt MP, the chairman of the House of Commons Foreign Affairs Select Committee. The Labour Party, by contrast, is in a state of some disarray. While its formal policy remains to support the maintenance of the deterrent, and the shadow cabinet contains a number of supporters of nuclear deterrence, the new leader is a long-standing opponent of nuclear deterrence. Corbyn has indicated that there will be a debate in order to establish Party policy. However, at the Labour Party's annual conference in September he was frustrated in his desire to have the issue debated.<sup>56</sup> In October 2015, Mr Corbyn accepted the position of Vice President of the Campaign for Nuclear Disarmament. At the beginning of November 2015 he welcomed a vote by the Scottish Labour Party to scrap Trident.<sup>57</sup> And, later that month, he announced a review of the party's defense policy, including its policy on nuclear deterrence.

So, as of the time of writing, Labour policy on this subject is in flux. However, the very fact that the official leader of the opposition has indicated that, if he were Prime Minister, he would not be prepared to authorize the firing of the UK's nuclear weapons under any circumstances<sup>58</sup> is potentially damaging to the United Kingdom's deterrence posture, as the Chief of the Defence Staff noted in an Armistice Day interview.<sup>59</sup>

The most recent vote in Parliament on the deterrent took place in November 2015.<sup>60</sup> On that occasion a motion to scrap Trident, tabled by

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<sup>56</sup> "Jeremy Corbyn suffers blow as Trident vote rejected at conference", *The Guardian*, 28 September 2015.

<sup>57</sup> "Scottish Labour votes to scrap Trident," *BBC News*, 1 November 2015.

<sup>58</sup> "Interview with Labour leader Jeremy Corbyn," *BBC radio*, 30 September 2015.

<sup>59</sup> Speaking on the Andrew Marr Show on BBC television on 8 November 2015.

<sup>60</sup> House of Commons, *House of Commons debate*, London, 24 November 2015.

the Scottish and Welsh Nationalists and the Greens, was defeated by 330 votes to 64. As in an earlier debate in January 2015, which was defeated by 364 votes to 37, most Labour MPs abstained. In a sense it was surprising that the supporters of the more recent motion did not gather more support because, as noted above, following the General Election, the number of Scottish Nationalist Party MP increased from six to 56. In spite of the recent intake of a large number of new Labour MPs, whose voting intentions are unclear, the Government could be expected to win the vote on the procurement of four new submarines with a clear majority.

The Liberal Democrats are a greatly diminished force in the House of Commons, having lost 49 of their 57 seats at the General Election, in spite of winning 8% of the vote (almost twice as many votes as the Scottish Nationalists). Their grass roots support contains a strong unilateralist streak but its electoral weakness means that the party seems most unlikely to wield any significant influence on deterrence policy for the foreseeable future.

Scottish independence remains a live issue. The result of the referendum in September 2014 was greeted with sighs of relief both by those who want to preserve the Union and those who may care less passionately about the Union but are concerned about the potential impact on the UK's nuclear deterrent. And yet, while the threat to the continued basing of SSBNs on the Clyde has receded, it has not gone away. Since the referendum, in addition to sweeping the boards at the general election, the Scottish National Party has quadrupled the size of its membership. The new party leader, Nicola Sturgeon, while making clear her determination that Scotland should become independent and repeating calls for the removal of nuclear weapons from the Clyde, has reined in those calling for an early re-run of the referendum. In October, at this year's annual party conference, she said that, "to propose another referendum in the next [Scottish] parliament, without strong evidence that a significant number of those who voted no have changed their minds, would be wrong and we won't do that."<sup>61</sup>

### ***Understanding of Nuclear Deterrence by Politicians***

Leaving aside party politics, one might question the extent to which today's generation of politicians understand the principles of deterrence and the painstaking efforts required to maintain the nuclear deterrent force. Symbolically, Prime Minister Margaret Thatcher visited Barrow in 1986 to lay the keel of the first Trident SSBN (HMS VANGUARD) and took a close interest in the progress of the project throughout. Both Prime Minister David Cameron and, as noted above, the Chancellor of the Exchequer, George Osborne, have visited the home port of the United Kingdom's SSBN force on the River Clyde, demonstrating publicly their commitment to the nuclear deterrent. And in some of the media coverage leading up to the 2015

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<sup>61</sup> "Sturgeon: new Scottish referendum 'probably unstoppable' if UK votes to leave EU," *The Guardian*, 16 October 2015.

Strategic Defence Review White Paper, the Chancellor exhibited a keen interest in the program to construct the successor submarines.<sup>62</sup>

On the other hand, the history of the 1950s and 1960s shows just how much Prime Ministerial and Cabinet attention was devoted to the question of the nuclear deterrent. This was when the British and US Governments signed the Mutual Defence Agreement and Polaris Sales Agreement, which underpin the US/UK nuclear relationship to this day. That generation of political leaders had served in the Second World War together and their familiarity with military affairs extended into the nuclear realm in a way that is seldom the case today.

And what is true of today's political leaders is equally, if not more, true of back-bench and aspiring MPs, who naturally gravitate towards economic and social questions, because these are the subjects of most concern to the electorate.

A Civil Servant who did not work in the Ministry of Defence once commented to me that he found the defense culture forbidding and impenetrable. The nuclear community is, almost inevitably, even further removed from other areas of government and Parliament than defense in the round. This can be a barrier to fostering a broad base of general understanding of defense nuclear issues. While there exists a scheme to familiarize MPs with defense matters,<sup>63</sup> its focus is not on nuclear forces. This lack of knowledge about nuclear matters is reflected in the Parliamentary debates referred to above.

### ***The Military***

It is sometimes assumed that the senior ranks of the Army and Royal Air Force are unsupportive of the nuclear deterrent. In fact, successive generations of Service Chiefs have supported nuclear deterrence. Unsurprisingly, Chiefs of the General Staff and the Air Staff have been concerned to ensure that investment in their Services does not suffer as a consequence, but the same can be said of Chiefs of the Naval Staff, who would argue that the conventional Navy should not be depleted to pay for the deterrent. It may be true that in recent times the most vocal support for the deterrent has come from senior Naval officers, but there are a number of retired Army and Air Force officers who have also given their public support, including the two most recent Chiefs of the Defence Staff.<sup>64</sup>

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<sup>62</sup> "George Osborne fights MoD for control of Trident project", *The Guardian*, 12 November 2015.

<sup>63</sup> The Armed Forces Parliamentary Scheme.

<sup>64</sup> "Defence of the Nation - An open letter to the incoming Prime Minister 2015", *Defence Synergia*, 29th April 2015, was signed by a large number of former Ministers, Chiefs of Staff and officials, including Lord Richards, Lord Stirrup and Sir Mike Jackson. General Sir Mike Jackson and Julian Lewis MP jointly signed a letter to The Times in support of the deterrent on 22 January 2016.

There are some examples of retired senior officers who have advocated unilaterally abandoning the deterrent. The most prominent are Field Marshal Lord Carver (who died more than 10 years ago), Field Marshal Lord Brammall, General Lord Ramsbotham and General Sir Hugh Beach. While budgetary considerations have impinged on their thinking, their arguments have revolved fundamentally around questions of military utility and morality.<sup>65</sup> They, and others more privately, have argued that the money devoted to nuclear deterrence would be better spent on conventional military capabilities. Although it has never been the case, as some have suggested, that the Ministry of Defence received a ring fenced sum to pay for the deterrent, it would be equally naive to believe that, in circumstances where the Government had decided to abandon the deterrent, it would automatically decide to spend any savings on defense rather than on other government priorities. In practice, most, if not all, officers with any influence at the higher levels of defense understand this.

As to whether the current generation of officers instinctively ‘gets’ nuclear deterrence, the answer is almost certainly no. Indeed, following the end of the Cold War, thinking about deterrence more generally took a back seat as the Services (principally the Army) engaged in the longest sustained period of operations since the Second World War – in the Balkans, Iraq and Afghanistan. More recently there have been efforts within the Ministry of Defence to give more prominence to concepts of deterrence,<sup>66</sup> but this has yet to become embedded in the DNA.

At lower levels there is a long-standing shortage of skilled personnel to fill certain types of Royal Navy posts which are critical to the operation of the deterrent<sup>67</sup>. The short-term remedy has been to provide specialist pay and to ask those nuclear qualified personnel who remain to go to sea more frequently and for longer periods. But the resulting overstretch has the effect of persuading more to resign, particularly when there are opportunities in the civil nuclear power industry where significant recapitalization is about to take place. The longer term solution almost certainly lies in a more coordinated approach across government and industry to educate and train retain sufficient numbers of engineers and technicians with the skills required for both the civil and defense nuclear enterprises.

Sustaining the commitment of the men and women who man the SSBN force is vital. It is generally believed that the adherence to continuous at sea deterrence itself acts as a motivator. And while there

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<sup>65</sup> “UK does not need a nuclear deterrent,” Letter to The Times, 16<sup>th</sup> January 2009, by Lords Brammall and Ramsbotham and Sir Hugh Beach and Foreword by Ramsbotham and Beach to Robert Green’s, *Security Without Nuclear Deterrence*, Christchurch, New Zealand, Disarmament and Security Centre, 2010.

<sup>66</sup> See, for example, General Sir Nicholas Houghton’s speech at Chatham House on 15 September 2015.

<sup>67</sup> For Royal Navy personnel see Ministry of Defence, *Annual Report and Accounts 2014-2015*, Table 2.2.1 “Operational Pinch Points”, London, July 2015, p. 43. More broadly, see *the Defence Nuclear Safety Regulator annual report 2013-2014*, London, pp. 8-9.

may be some in the force who do not support the Government's deterrence policy, the force's sense of service is strong, as was pointed out in the House of Commons debate in November 2015.<sup>68</sup>

### ***The Civil Service***

Within the upper reaches of the Civil Service, debate about nuclear deterrence, is unsurprisingly largely confined to the relatively small community of officials who occupy positions in the Ministry of Defence, the Foreign Office, the National Security Secretariat and the Intelligence Agencies. Even within these circles the number of officials with a deep understanding of the issues is small. The policy in recent years to encourage movement between Departments by civil servants at all levels may have increased the number who have come into some contact with the subject, though this has been at the risk of diluting the stock of understanding of these strategic issues.

It is also necessary to ensure that there are sufficient numbers of the younger generation of civil servants who have experience of working in this field to provide the fresh blood required in the policy making and capability management communities. The FCO has recently tried to rebuild its security policy cadre, and the MOD is conscious of the need to foster nuclear policy expertise, but this requires sustained action over a long period, particularly when the number of available posts is limited and the accent is on a self-regulating internal jobs market, rather than managed careers.

Amongst scientific and engineering staff, the large reduction in Civil Service numbers in recent decades has weakened the resilience of the nuclear enterprise.<sup>69</sup> Moving the management of the Atomic Weapons Establishment into the private sector may have been necessary in order to improve the quality of management, but an unintended consequence has been to fragment the nuclear scientific community, making it more difficult to sustain a viable nuclear specialism inside the Ministry of Defence. One solution is to put in place incentives to encourage more movement between the Ministry and industry.

### ***Industrial Base***

The challenge of sustaining the industrial capability required for the UK's defense nuclear program is not new – references can be found in the

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<sup>68</sup> In the Commons debate on 24 November 2015, Carol Monaghan, a Scottish Nationalist Party MP, whose husband was serving on HMS VICTORIOUS, said that not all the crew agreed with the Government's views on Trident. Responding, the Defence Secretary, Michael Fallon, said, "I have yet to meet a submariner who does not have faith in the job he is doing".

<sup>69</sup> Ministry of Defence, *Annual Report and Accounts 2014-2015*, London, July 2015, paragraph 2.2.73, p. 45; the document stated that civilian numbers had fallen by 27,690 to 58,160 between April 2010 and April 2015. In November 2015, the Government announced that numbers would fall by a further 30% by 2020. *National Security Strategy and Strategic Defence and Security Review 2015*, *op. cit.*, p. 33, paragraph 4.61.



1950s and 1960s.<sup>70</sup> Nor is it a challenge which is unique to the nuclear enterprise. For example, the UK relinquished the capacity to build its own main battle tanks at the end of the last century. But nuclear weapons and propulsion technology is one of only two fields (the other being high grade cryptography) in which successive governments have declared it essential to retain a sovereign defense industrial capability.<sup>71</sup> Although not officially placed in the same category, submarine construction has, in practice, been an essential sovereign capability since the decision was taken at Nassau in 1962 to base the UK's strategic nuclear deterrent on submarine launched ballistic missiles.

At the heart of the matter in both cases is how to retain enough "sufficiently qualified and experienced personnel". References to this can be found as far back as the 1950s and 1960s. Then, as was noted earlier, the concern was how to retain the scientists and engineers at the Atomic Weapons Establishment (AWE) in the absence of new warhead projects beyond the completion of work on the warhead for the Polaris system and the warhead for a new sub-strategic air-delivered weapon (WE 177).

By the beginning of this century, with the Trident system already in service on the first of the VANGUARD class submarines, investment in infrastructure and professional and technical manpower at AWE had been in decline for some years. In one sense, this was understandable, against the background of the post Cold War "peace dividend" and optimism about the future relationship between Russia and the West. This was not a climate in which it would have been easy to argue for major expenditure to replace ageing infrastructure at Aldermaston. It was easy, too, to ignore the fact that the workforce at AWE, as was the case in the US national laboratories, was also ageing. Those young men (and they were mainly men) who had been recruited at the beginning of the nuclear program, were nearing the end of their working lives.

Over the past decade substantial investment has been made in new infrastructure designed to maintain a safe and secure stockpile of nuclear weapons in a post nuclear testing world. This has included laser, plutonium and uranium processing facilities and a warhead manufacturing plant, to say nothing of the collaboration with France, following the 2010

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<sup>70</sup> See, for example, the minutes of the meeting of the Ministerial Committee on Nuclear Policy, dated 28 September 1966, where Prime Minister Harold Wilson refers to the assertion that "we could no longer count on United States cooperation in nuclear defense matters unless we retained a nuclear weapons capability" and a Cabinet Office note for the same Ministerial Committee dated 1st December 1967 which states that, "... a relevant consideration ... in the decisions that need to be taken is the risk that ... Aldermaston may cease to be viable in the absence of a definite program of design and development work."

<sup>71</sup> This was expanded to four areas in 2012. See Ministry of Defence, *National Security Through Technology: Technology, Equipment and Support for UK Defence and Security*, Cm 8278, London, February 2012, p. 27. The two additional areas included in this document are electronic warfare and a more general informed customer capability.

Lancaster House Treaty<sup>72</sup>, on a new hydrodynamics facility at Valduc, in Burgundy. There has also been a campaign to recruit new young scientists and engineers to help reinvigorate the workforce. According to AWE's Annual Review 2013, graduate recruitment had risen from 6 in 2010/11, to 53 in 2012/13 and was projected to rise to 85 by 2013/14.<sup>73</sup>

However, there remain challenges. Unlike France and the US, the UK relies on a single warhead design for its nuclear deterrent. There is a question about AWE's ability to attract and retain the most able of their younger scientists and engineers in the absence of a new warhead program. The establishment has a technical outreach program, which fosters links to the university sector, funds doctorate and post-doctorate research and research fellowships.<sup>74</sup> However, anecdotally, in spite of apparently impressive recruitment figures, problems have been encountered over the retention of new blood.<sup>75</sup>

In the 2010 Strategic Defence and Security Review White Paper<sup>76</sup> the then Coalition Government announced that it would not be necessary to take decisions on a new warhead until after the 2015 election. At the time of writing, it remains to be seen what, if any, decisions will be taken in the current Parliament which runs until 2020. Meanwhile, the cost and time taken to complete new infrastructure at AWE (said to be the largest construction program in the UK since the London Olympics) appear to be turning out to be greater than was first envisaged.<sup>77</sup>

The Ministry of Defence has also experienced serious delays and cost escalation with the ASTUTE class SSNs, which are currently being brought into service.<sup>78</sup> The problems stem from the reduced number of submarines being constructed and, particularly, the gap between the completion of the VANGUARD class SSBNs and the start of the ASTUTE class. Since then, several studies have been conducted to establish the optimum 'drum beat' to match future requirements for submarines to the minimum sustainable industrial capacity.<sup>79</sup> Advice in managing the program

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<sup>72</sup> *Treaty between the United Kingdom of Great Britain and Northern Ireland and the French Republic relating to Joint Radiographic/Hydrodynamics Facilities*, London, November 2010.

<sup>73</sup> *Annual Review 2013: Delivering the UK Deterrent*, London, Atomic Weapons Establishment, May 2014.

<sup>74</sup> Technical Outreach: collaborating with our academic partners, AWE fact sheet, 2013.

<sup>75</sup> This is based on conversations with well informed individuals, not with the establishment itself.

<sup>76</sup> *Securing Britain in an Age of Uncertainty: the Strategic Defence and Security Review*, *op. cit.*

<sup>77</sup> "Pegasus grounded: vital Trident bomb project 'on hold' after problems", *HeraldScotland.com*, 8 March 2015.

<sup>78</sup> "Defence Firms Warned Delays to New Nuclear Submarines Would Put UK at Risk," *The Telegraph*, 21 November 2015.

<sup>79</sup> See for example, John F. Schank, Jessie Riposo, John Birkler, James Chiesa (eds.), *The United Kingdom's Nuclear Submarine Industrial Base, Volume 1, Sustaining Design and Production Resources*, Santa Monica, CA, RAND Corporation, 2005.



has been procured from US industry. In spite of these measures, the construction continues to take longer than planned. This, potentially, has implications for the program to build the “Successor” class of SSBNs. In response the Government has announced that it will strengthen arrangements for the procurement and construction of the successor submarines, while delaying their introduction into service to the early 2030s.<sup>80</sup>

Just as with the nuclear weapons complex, the UK government has shown itself ready to invest substantially to sustain the infrastructure required to build nuclear submarines. For example, in June 2012, it announced the construction of a new reactor core factory at Rolls Royce’s Raynesway plant. This came on top of the £3 billion which it committed in 2011 following the *initial gate* decision to progress the design of the “Successor” SSBNs. There has also been a sustained effort to ensure that all parts of the industrial base essential to the nuclear submarine building program are identified and kept alive.

The technological and engineering challenge of building new nuclear submarines is massive. But this has been exacerbated by having to recruit, in order to replace the ageing workforce, at the same time as the UK is preparing to place orders for new phase of civil nuclear power stations. The civil sector is able to outbid the defense industry in the competition for scarce highly trained personnel. The national shortage of suitably qualified and experienced personnel is a reflection of the long gaps between construction of new nuclear power stations, as well as nuclear submarines, and a wider and long-standing shortage of young people opting for careers in engineering.<sup>81</sup> The Government’s current emphasis on engineering skills and apprenticeships provides some grounds for hope, but the benefits of such initiatives do not appear overnight.

### **Safety and Security**

Safety and security are critically important across Defense as a whole, but uniquely so in the nuclear field. Any major failure could affect decisively public support for the nuclear deterrent, or indeed for the use of nuclear energy more generally, whether for civil or defense purposes. There have been relatively few accounts of accidents in the UK, such as were

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<sup>80</sup> *National Security Strategy and Strategic Defence and Security Review 2015: a Secure and Prosperous United Kingdom, op. cit.*, Paragraphs 4.75-4.76 of Cm. 9161, pp. 35-36.

<sup>81</sup> “Mind the gap”, *The Economist*, 11 April 2015, reported that the Institute of Engineers and Technicians found that 59% of firms surveyed said that the shortage of engineers would be a threat to their business in the UK. “UK needs over one million new engineers and technicians, says Royal Academy of Engineering” *The Independent*, 21 June 2015, reported that the Royal Academy of Engineering estimated that the United Kingdom would need over 1 million new engineers and technicians by 2020.

described in Eric Schlosser's 2013 book, *Command and Control*<sup>82</sup> about the US's defense nuclear program.

Equally, however, the UK record is not entirely unblemished. Recent claims of safety and security lapses by a disaffected junior submariner were strenuously denied by the Royal Navy.<sup>83</sup> However, there has been enforcement action by environmental and safety authorities for relatively minor breaches of regulations<sup>84</sup> and reports of security breaches at both Aldermaston and the Clyde Submarine Base.<sup>85</sup> These examples of human and systems failures underscore the fact that safety and security, in both the defense and civil nuclear programs, are issues which need persistent attention from the top down. All the available evidence suggests that this is well understood, but constant vigilance is necessary.

### ***Academia and Think Tanks***

Academia and think tanks matter because this is where new thinking can be done, away from the *hurly burly* of political life. It is also where official government thinking can be scrutinized by people who have the time and the knowledge to do so in depth – often to a greater extent than those embroiled in the day-to-day business of government. Of course, legislators and the media play a vital role in holding governments to account and it is their contributions which will capture wider public attention. But they, like those inside government, tend to be driven by the events of the day and, therefore, benefit from the output of think tanks and universities.

Whether or not there was ever a 'golden age' of strategic studies in Britain, it is not unusual to hear informed people bemoan the quality or scale of academic output in this field (though it has to be said that governments are, naturally, relieved not to be subjected to too much well informed criticism). In a sense, this is surprising because in recent years there appears to have been an explosion in the number of universities setting up departments devoted to different aspects of international relations and war studies. But, perhaps not surprisingly, much of the teaching and research has been directed towards the challenges the UK has faced since the end of the Cold War, such as failed and fragile states, capacity building, stabilization operations and so on, rather than deterrence.

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<sup>82</sup> Eric Schlosser, *Command and Control*, London, Penguin Books, 2013.

<sup>83</sup> Reported in a number of newspapers, including "Royal Navy whistleblower to 'hand himself in' after claiming Trident is a 'disaster,'" *The Express*, 18 May 2015.

<sup>84</sup> See, for example "AWE Aldermaston nuclear waste deadline expires," *BBC News*, 24 February 2014 and see "Inspection found AWE has been without key waste management personnel for several months," *Basingstoke Gazette*, 3 October 2014, on the need to reduce holdings of intermediate level nuclear waste and maintain adequate numbers of waste management staff.

<sup>85</sup> See "Ministry of Defence security 'asleep on the job' guarding a nuclear bomb factory", *Mirror*, 14 December 2014 about police "sleeping on the job" at AWE and Ministry of Defence letter responding to a Freedom of Information request regarding a breach of the perimeter security fence at Faslane on the Clyde on 19 March 2014, London, 18 March 2015.

In spite of this, excellent work is being done, including in the cyber field. But, in view of the shifts in the strategic environment brought about by the rise of China, in particular, but also the Russian Government's increasingly aggressive behavior and rhetoric, the India Pakistan nuclear standoff and the tinder-box that is the Middle East, the case for a broader renewal of interest in deterrence in the circumstances of the 21st century, including both the deterrence of new nuclear powers and the difficulty of dealing with 'hybrid' or 'non-linear' forms of warfare, is clear.

The Royal United Services Institute founded the UK PONI (Project on Nuclear Issues), in 2010, in partnership with the much longer established US and related French initiatives, dedicated to fostering dialogue and building expertise amongst emerging nuclear scholars. However, this aside, both France and the US, in particular, appear to have been more successful at creating a community of experts, who move between government and both the profit and non-profit sectors outside government, in the process enriching the external critique and the ability of government to refresh itself. It is beyond the scope of this article to analyze the reasons for these differences, but the UK can learn from the experience of these close allies.

### ***Looking Ahead***

It is customary to conclude a health check by issuing a prescription. In the case of the British nuclear deterrent, the best advice is the physician's creed: 'do no harm'. Certainly, more could be done to educate opinion formers about the rationale for the deterrent. Equally, political leaders could be more active in explaining to the public the need to insure against the extremely unlikely circumstances for which the deterrent is designed. This should include the relatively small cost of this insurance policy in relation to overall government expenditure. And there is a need to encourage interest among the younger generation and bring on new talent.

But, in the round, nuclear culture in the United Kingdom today does not appear to be significantly more fragile than it has been in the past. There is nothing today to match the large-scale direct action in opposition to nuclear weapons of the Aldermaston Marches of the 1960s or the Greenham Common women of the 1980s. Rather, there is apathy, except in Scotland, though even here the views of the electorate as a whole appear not to reflect the policy of the Scottish Nationalist Party.

There is, however, no room for complacency. The government and others who support the deterrent will need to continue to make the case in public for its retention. Recent efforts to foster the interest of younger people, both uniformed and civilian, inside and outside Government, who can form the next generation of strategic thinkers should be encouraged. Equally important, if not more, is work to ensure that the necessary skills and experience are in place, both in industry and government and the Royal Navy. For the time being, this remains an area of fragility.

Against this background, there are two *sine qua non*'s for those who believe in the need to retain the deterrent:

- there should be no egregious procurement failures as the UK introduces the successor submarines and, potentially, a new warhead
- there should be no major safety or security breaches

Otherwise, public acquiescence could be fatally damaged by perceptions of incompetence, whether on the part of government or industry.

In its 2006 White Paper on the future of the UK deterrent, the Government estimated the cost of building new submarines, any new infrastructure required and a new warhead to be £15-20Bn at constant 2006 prices. In the 2010 SDSR White Paper, the Government confirmed that its cost estimates remained within this bracket. In 2011 the government stated that the cost of the successor submarines was estimated to be £25Bn in cash terms but still fell within the overall 2006 price bracket. In the equivalent 2015 document, the government announced that the latest estimate of the cost of the successor submarines was £31Bn in cash terms, but was silent on whether this continued to fall within the 2006 bracket.

Cost escalation in defense projects is such a well-known problem that, even following the latest round of procurement reforms in the UK, there must be a real risk that costs will rise, especially when a project has yet to enter full scale production. Indeed, the most recent announcement states that the MoD will set aside a contingency of £10Bn. Any increases in the real cost of the maintenance of the deterrent will, inevitably, be used to challenge the robustness of the MoD's and industry's ability to plan and control costs effectively. Therefore, the Government needs to be able to explain clearly its own cost estimate and demonstrate convincingly that this represents a good deal for the British public. Failure in this area has the capacity to sour opinion and damage the case for the deterrent.

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