

The ‘Trident Decision’

Evidence-based policy or policy-based evidence?

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Evidence-based policy making is very much in vogue, both in the UK and around the world. Few would dispute the principle that high quality technical analysis should play a central role in the policy making process. Nonetheless, what constitutes ‘high quality technical analysis’ is rarely indisputable. Most policy debates involve interested parties analysing and disputing one another’s evidence extensively. An important exception is procurement decisions about military technologies. Here, the evidence (about whether a new system is needed or whether it will prove value for money, say) is often classified, all but eliminating the opportunity for meaningful scrutiny. As a result it can be impossible to know whether policy is indeed based on evidence, or whether evidence has been constructed to support a pre-determined policy.

The recent debate in the United Kingdom about the future of its nuclear deterrent provides a useful case study. This paper analyses one aspect of that debate—the question of whether to build a new class of nuclear-powered, nuclear-armed submarines (SSBNs) or extend the service lives of the existing ones—and asks whether the eventual decision was evidence-based policy or policy-based evidence. It then suggests how the UK could increase confidence in the policy making process where classified technologies

¹ I would like to thank Juli Rick for research assistance with this paper.

are concerned. Finally, it argues that the emphasis placed on technical issues in the debate was at the exclusion of a more fundamental political question.

Background

The UK government set out its plans for the future of the British nuclear deterrent in a White Paper published in December 2006.² Although widely referred to as the ‘Trident White Paper’, this was something of a misnomer since its focus was not on the Trident D5 missiles themselves but on the Vanguard-class SSBNs which serve as their launch platform. The UK possesses four such submarines and under current policy at least one of them is on patrol at any given time—a doctrine known as continuous-at-sea deterrence (CASD). To maintain CASD the Royal Navy requires at least three submarines. Thus, the eventual withdrawal of the second vessel, HMS Victorious, will mark the point at which CASD can no longer be ensured unless another launch platform has been introduced. The White Paper examined the likely timeline for the withdrawal from service of the Vanguard-class SSBNs and possible options for replacement.

The Vanguard-class SSBNs were brought into service during the 1990s and, according to the White Paper, ‘had an original design life of 25 years’.³ The government assessed that ‘it should be possible to extend the life of the submarines by around five years’.⁴ Under this scenario, the retirement of HMS Victorious would occur in about 2024. The government also estimated that it would require about 17 years to bring the first

² The Secretary of State for Defence and the Secretary of State for Foreign and Commonwealth Affairs, *The Future of the United Kingdom’s Nuclear Deterrent*, CM 6994 (London: The Stationery Office, 2006), http://www.mod.uk/NR/rdonlyres/AC00DD79-76D6-4FE3-91A1-6A56B03C092F/0/DefenceWhitePaper2006_Cm6994.pdf.

³ *Ibi.* para. 1-3.

⁴ *Ibid.*

submarine of a new class into operation and hence argued that Parliament needed to authorise work on designing a successor in 2007.⁵

Reading the White Paper suggests that the central issue—at least as far as the government saw it—was the question of what should replace the Vanguard-class SSBNs. This question was analyzed in much more depth than any other in the White Paper.⁶ Specifically, four alternatives launch platforms—a new SSBN class, ship-launched ballistic missiles, ground-launched ballistic missiles, and air-launched cruise missiles—were analysed and compared. The government reached the conclusion that a new SSBN class offered significant operational advantages over any other choice and ultimately represented the best value for money.

Predictably, the ensuing debate, both inside Parliament and outside, did not focus on what the Vanguard-class SSBNs should be replaced with but on the ‘zeroth-order’ question of whether they should be replaced at all. However, the debate also threw up a number of interesting ‘first-order’ questions including whether a decision needed to be made in 2007. In particular, a number of commentators argued that the service lives of the Vanguard-class submarines could be extended for considerably more than five years and hence that a decision about their replacement could be delayed. This issue is the one I focus on here.

⁵ *Ibid* para. 1-7. In contrast, an urgent decision about the missiles and warheads was not required. The UK originally purchased 58 Trident D5 missiles from the United States (of which 8 have been used in tests). Although these missiles will reach the end of their planned service lives in about 2020, the United States has initiated a life extension programme which the UK has joined. The warheads, of which there were ‘fewer than 200’ at the time of the White Paper’s publication, are designed and manufactured in the United Kingdom. They are expected to last into the 2020s and no decision about their future was required at the time of the White Paper.

⁶ See *The Future of the United Kingdom’s Nuclear Deterrent*, Appendix B.

Summary of the debate

Those who argued that it was possible to delay a decision about the future of the UK nuclear deterrent also believed that it was desirable to do so. Their arguments ran along three lines. First, given the large expenditure associated with designing and building a new SSBN class, there might be a significant cost saving (because of discounting) associated with a delay. One estimate placed this saving at around £5 billion (although this figure does not include the additional costs associated with life extension).⁷ Second, it was also argued that missiles with single warheads mounted on attack submarines would be much better suited to British defence requirements than missiles armed with MIRV (multiple independently targetable warheads) launched from large Vanguard-class submarines and that '[a] hasty commitment to a simple Vanguard replacement would foreclose' the former option.⁸ Others, particularly those opposed to the British nuclear deterrent entirely, argued that a decision to replace the Vanguard-class submarines would undermine Britain's disarmament credentials and consequently damage its efforts to fight proliferation. They advocated delaying a decision for as long as possible, but certainly until after the 2010 Nuclear Non-Proliferation Treaty (NPT) Review Conference.⁹

⁷ Richard L. Garwin, Philip E. Coyle, Theodore A. Postol and Frank Von Hippel, 'Memorandum from Professor Richard L Garwin', para. 7 in House of Commons Defence Committee, *The Future of the UK's Strategic Nuclear Deterrent: the White Paper (Volume II: Oral and Written Evidence)*, Ninth Report of Session 2006–07 (London: The Stationery Office, 2007), Ev 92–96, <http://www.publications.parliament.uk/pa/cm200607/cmselect/cmdfence/225/225ii.pdf>.

⁸ *Ibid* para. 20.

⁹ 'Memorandum from British American Security Information Council (BASIC)' in House of Commons Defence Committee, *The Future of the UK's Strategic Nuclear Deterrent: the White Paper (Volume II: Oral and Written Evidence)*, Ev 96–100.

Of course, just because a delay might have been desirable did not automatically make it feasible and debate naturally focused on the technical question of whether it was actually possible to extend the service lives of the Vanguard-class submarines significantly beyond 30 years. The most forceful attack on the government's position came from Richard L. Garwin, in the form of written evidence to the House of Commons Defence Committee's enquiry co-authored with Philip E. Coyle, Theodore A. Postol and Frank von Hippel. Garwin *et al.*'s position was that 'it [is] likely that the Vanguard-class submarines can safely and economically be operated for 40–45 years rather than 30'.¹⁰ Garwin testified in person to the Defence Committee on 23 January 2007.

Garwin *et al.*'s arguments ultimately boiled down into three. First, they observed that the US had extended the service lives of its Ohio-class submarines (the US launch platform for Trident missiles) to 44 years and, moreover, that the US SSBNs spend more of their lives at sea than their British equivalents.¹¹ This observation provided a *prime facie* case that the service lives of the Vanguard-class submarines could be extended to 40 years or more.

The second issue addressed by Garwin *et al.* was feasibility. Any life extension programme involves the careful monitoring of parts and components that might fail along with efforts to extend their service lives and, ultimately, replace them if necessary. Debate about the feasibility of a life extension programme initially focused on the steam generators, which according to the White Paper, 'were only designed for a 25-year life'.¹² Garwin *et al.* argued that, in reality, with careful monitoring and management their lives could probably be extended significantly. Moreover, even if this were not possible, replacement of the steam generators was an option. They observed that HMS Vanguard

¹⁰ 'Memorandum from Professor Richard L Garwin', para. 2.

¹¹ *Ibid* para. 3.

¹² *The Future of the United Kingdom's Nuclear Deterrent*, para. 1-3.

had already had its reactor core replaced (an operation that involved cutting open the hull) and argued that '[a] proper evaluation should be made of the cost of access through the Trident hulls and replacement of their steam generators'.¹³

Finally, and most interestingly, Garwin *et al.* discussed how incorrect technical judgements can become entrenched in large bureaucracies (an argument with a distinctly sociological flavour). They argued that once an incorrect assumption about the service life of a weapons system has been made, it becomes regarded as fact because senior officers or policy makers do not have the technical knowledge to challenge it.¹⁴ In support of this argument, they cited a number of instances on which questions from outside government prompted an governmental review that overturned a judgement about the infeasibility of life extension. These included US Air Force claims in the 1960s that metal fatigue necessitated replacement of the B52 bomber,¹⁵ US Navy claims in the 1970s that the Polaris submarines needed to be replaced because of hull corrosion,¹⁶ and more recent claims about the effects of plutonium aging on the pits of US nuclear weapons.¹⁷

The UK government responded to Garwin *et al.* at the Defence Committee's hearings on 6 February 2007, when the Secretary of State for Defence, Des Browne, and a number of senior Ministry of Defence (MoD) officials testified (although its arguments had been defended earlier in the hearings by other witnesses). Browne's rebuttal focused on the first two of Garwin *et al.*'s arguments. First, Browne argued that comparison with the

¹³ 'Memorandum from Professor Richard L Garwin', para. 5.

¹⁴ 'Oral evidence' in *The Future of the UK's Strategic Nuclear Deterrent: the White Paper (Volume II: Oral and Written Evidence)*, Ev 24.

¹⁵ 'Memorandum from Professor Richard L Garwin', paras. 9–13.

¹⁶ *Ibid* paras. 14–16.

¹⁷ *Ibid* para. 4.

Ohio-class submarines was unhelpful because 'the Ohio class are different submarines, they were designed differently and they were built and maintained for a longer life than our boats were'.¹⁸ To this Rear Admiral Andrew Matthews, Director General Nuclear at the MoD, added that 'the time that we have our submarines operationally available is in excess of 50% and that is pretty comparable with the US Ohio class' and, moreover, that because the US has many more Ohio-class SSBNs than the UK has Vanguard-class SSBNs there was less risk for the US in carrying out a life extension programme.¹⁹

In terms of the feasibility of life extension beyond 30 years, the government's position became somewhat more nuanced. Although Browne stated that 'there is also serious concern as to whether it will be technically feasible', he now identified the 'key point' as being that it was 'highly likely to represent poor value for money'.²⁰ He gave more detail about the challenges of a life extension programme (including a shopping list of components that might require replacement) and Matthews discussed the difficulties caused by the poor availability of the Resolution- and Swiftsure-class submarines as they neared the end of their lives.²¹

Underlying all of this was the suggestion that policy was not being driven so much by the costs and risks of a life extension programme *per se* but by a desire to ensure the UK maintained a healthy skills base for submarine construction. There was an 11 year gap between the end of design work for the Vanguard-class and its start for the Astute-class of nuclear-powered, conventionally-armed attack submarines (SSNs). During that interval, the UK's skills base for submarine manufacture was significantly degraded and as a result there were considerable unanticipated difficulties at the start of the Astute

¹⁸ 'Oral Evidence', Ev 57.

¹⁹ *Ibid* Ev 58.

²⁰ *Ibid.*

²¹ *Ibid.*

programme.²² One possible reason for wishing to start design work on a replacement to the Vanguard-class in 2007 was the desire to avoid a similar gap at the end of production of Astute-class SSBNs. This justification was given more or less explicitly at various points in the debate. In particular, the submarine industry argued that to remain viable the UK must produce one submarine every 22 months.²³ Nonetheless, this was not the primary argument made by the government to justify the need for building a new class of submarines.

Finally, it is also natural to wonder whether employment considerations played a part in the government's decision calculus. The effect on jobs of scrapping the UK nuclear deterrent entirely was discussed extensively during the debate but the employment consequences of life extension as opposed to replacement were not. Intuitively, one would expect jobs to be lost if a decision not to replace the Vanguard-class SSBNs were taken, but presumably some of these workers would be re-employed as part of the life extension programme.

Analysis of the debate

Comparing the costs and risks of alternative industrial projects is always inherently complicated, not least because there are invariably significant uncertainties associated with all the estimates involved. Moreover, in this case, the highly classified nature of the technology prevented any kind of detailed, quantitative scrutiny of the government's findings from outside. Ultimately, an unbiased observer without access to classified data is forced to conclude that it is impossible to know whether the government or its critics was correct. Indeed, even Garwin himself acknowledged that 'I am not saying that it is

²² House of Commons Defence Committee, *The Future of the UK's Strategic Nuclear Deterrent: the Manufacturing and Skills Base*, Fourth Report of Session 2006–07 (London: The Stationery Office, 2007), paras. 32–69,

<http://www.publications.parliament.uk/pa/cm200607/cmselect/cmdfence/59/59.pdf>.

²³ *Ibid* para. 58.

absolutely sure that life extension is (a) possible and (b) cheaper, but I think it highly likely, especially since the tempo of operations has been reduced beyond the initial plan for the UK submarines'.²⁴ Nevertheless, it is still inherently unsatisfactory in a democratic society that there is significant uncertainty about whether the government made the right call on a decision that had a price tag of £15–20 billion and potentially significant international implications.

Moreover, what is particularly unsatisfactory about this case is the apparent tacit admission by the government that it did not conduct a comprehensive and detailed study of the costs of the different options. Presumably if it had done so, it would have said so explicitly. Not only did it not but its pronouncements about the costs and risks of life extension were generally somewhat tentative. Against this background, Garwin's 'parting shot', included in a brief follow-up memorandum to the Defence Committee following Browne's evidence, seems almost unarguable:

Before the MoD can reach a conclusion ..., there should be a breakdown of costs by subsystem, and a discounted-present-value analysis of the options of new construction vs. life extension, as we indicated in our written evidence. There should be an explicit discount rate for the comparison of the alternatives.²⁵

Ultimately, evidence-based policy making requires exactly this kind of detailed analysis, and, ideally, independent scrutiny of its results.

The debate was unsatisfactory from another angle as well. As discussed above, there was the strong suspicion that the decision to replace Vanguard-class SSBNs was, in

²⁴ 'Oral Evidence', Ev 25.

²⁵ Richard L Garwin, 'Supplementary memorandum from Professor Richard L Garwin' in *The Future of the UK's Strategic Nuclear Deterrent: the White Paper (Volume II: Oral and Written Evidence)*, Ev 206.

reality, primarily motivated by the desire to avoid a significant gap after production of the Astute class ends. In my view, it is entirely reasonable for the government to take such 'industrial factors' into account. Indeed, I agree with the Defence Committee's conclusion that

Decisions on the future of the UK's nuclear deterrent should be taken on the strategic needs of the country, not on industrial factors. However, whilst industrial considerations should not affect the substance of decisions, they will necessarily affect the timing of those decisions. It is not unreasonable for the Government to take these factors into account.²⁶

My criticism is *not* that the government took industrial factors into account but that it was not transparent about doing so. The consequences of a gap in submarine production, being an additional cost associated with life extension of the Vanguard-class SSBNs, could and should have been included in a careful analysis of the costs of replacement versus those of life extension. That such an analysis may have reached the same conclusion as government did (that replacement offered the best value for money) is irrelevant. The crucial point is that evidence-based policy cannot be based on assumption.

Had the government been more transparent about taking industrial factors into account, it would probably have been impossible to assess, on the basis of unclassified information, the submarine industry's claim that to remain viable it must produce one submarine every 22 months (just as it is impossible to assess whether the government's claims about the difficulties and risks associated with life extension are correct). Moreover, given that the industry has an interest in producing more rather than fewer submarines, it is unsatisfactory to accept this claim uncritically. This is not to say that

²⁶ *The Future of the UK's Strategic Nuclear Deterrent: the White Paper*, para. 26.

there was some kind of conspiracy in government or that officials lied but simply that, as described above, incorrect technical judgements can easily become entrenched because it might not even occur to senior policy makers with no technical background to question them.

Facilitating scrutiny where classified technical issues are concerned is an inherently difficult task. I certainly don't suggest declassifying submarine designs; apart from national security concerns, releasing such information would do very little in itself to end any argument. Rather, the UK ought to introduce some form of 'classified peer review'. In broad terms, the government would give security clearances to a small number of well-respected, independent scientists and commission them to review key technical findings made by government scientists. Their findings (after declassification) would then be made public. Peer review is, of course, the norm in civilian science. If generally perceived as independent and technically competent, a classified peer review panel could increase public confidence in the science undertaken by government. In an accompanying paper, Steve Fetter discusses two models that currently exist in the United States.²⁷ It is notable that in a country renowned for the politicisation of supposedly non-partisan organisations, both bodies have an enviable reputation for impartiality and have had a significant effect in shaping the debate about defence procurement.

Beyond the difficulty of adjudicating technical claims about classified technology, one final feature of the extension versus replacement debate stands out. Both the government and its critics tended to view the issue as primarily a technical one—something that could be settled by scientific and economic analysis. It is easy to see why the government wanted to frame the debate in these terms. Having reached a conclusion

²⁷ Steve Fetter, 'Evidence-based policy or policy-based evidence? Nuclear weapons decision making in Europe', paper presented to Euroscience Open Forum, Barcelona, 19 July 2008, http://www.pugwash.org/uk/documents/Fetter_ESOF.pdf.

(for whatever reason) about the need to replace the Vanguard-class SSBNs, technological arguments formed an almost unassailable justification. After all, given that the relevant science was classified (and most of the public would gleefully acknowledge that they wouldn't understand it anyway), it became extremely difficult to dispute the government's conclusion—although, as Garwin *et al.* showed, it was not entirely impossible. In contrast, had the government justified the decision on the grounds of preserving jobs or skills in the submarine-building industry, the population at large would have felt much more 'entitled' to have an opinion and the government would have risked substantial criticism. (This dynamic was hardly unique to this debate, of course; it is a standard feature of debates in many policy areas that involve technical issues.)

Yet, the decision of whether to replace or extend the service lives of the Vanguard-class submarines was *not* a purely technical one. Even apart from the question of whether the UK needs nuclear weapons at all, the timetable for the decision was ultimately set by strategic considerations, namely the need to avoid 'a gap in deterrence at the end of the Vanguard-class submarine'.²⁸ This raises the fundamental question of whether effective deterrence actually relies on CASD.²⁹ This issue was briefly discussed by the Defence Committee enquiry: one witness, Paul Ingram from the British American Security Information Council raised it and MPs did ask the Secretary of Defence about it. However, it was explored in significantly less depth than the technical issues surrounding the feasibility of life extension, even though it is more fundamental; after all, had the government felt that it was no longer necessary to maintain CASD then the dynamics of the debate would have been very different.

²⁸ *The Future of the United Kingdom's Nuclear Deterrent*, para. 1-7.

²⁹ For a recent discussion of this question see James Acton, 'Continuous Deterrence: Still Necessary?' Arms Control Wonk, August 8 2008, <http://www.armscontrolwonk.com/1985/continuous-at-sea-deterrence-still-necessary>.