SUBMARINES IN BRITISH DEFENCE POLICY: MAKING THE CASE?

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INTRODUCTION

In January 2008, the Royal United Services Institute (RUSI) hosted, with Defence Event Management, the first SUBTECH conference, looking at capability requirements, technology options and industry infrastructures for delivering effect in the Under Water Battlespace. Attended by almost 150 participants from across the international submarine community, the conference provided a unique opportunity for the community to discuss issues, from short- to longer-term and from strategic to tactical, affecting the use of submarines and other underwater assets in support of defence policy. This paper provides an analysis of the conference discussions, set in the context of the wider debates regarding both the role of submarines in British defence policy, capability requirements, industry infrastructure issues, and the affordability of the UK and other nations' currently-planned force structures.

The conclusion of the two days' discussions appeared to be that much discussion still needs to be had to answer many outstanding questions. Much of the debate in the conference focused on cost and industrial infrastructure, perhaps to such an extent that the core issue – *why* an underwater capability is important in the first place – remained marginalised, as it has been in much of the UK debate, despite (as shown by the conference debates) burgeoning global underwater capabilities. As with the conference itself, the paper will focus on why an underwater capability is important, what capabilities and effects it can deliver in support of national policy, and how all stakeholders – notably Government and industry – can and must come together to deliver the right capability at the right time and at the right price.

SSNs: Operations, Capabilities and Force Levels

In the 1998 Strategic Defence Review (SDR), the British Government set out an expeditionary defence strategy to support Britain's global interests. SDR stated that:

> 'In the post Cold War world, we must be prepared to go to the crisis, rather than have the crisis come to us. … Maritime forces are inherently well suited to most force projection operations. Their reach, ability to sustain themselves without reliance on

> host nation support and flexibility are invaluable attributes. A joint maritime force often provides the opportunity for early and timely intervention in potential crises.'[1]

Notwithstanding the argument that Britain may be in urgent need of a new strategic defence review and arguments that operations in Afghanistan and Iraq are enduring as opposed to expeditionary, SDR's expeditionary posture remains the centrepiece of British defence policy. A coherent maritime capability remains vital in supporting such a strategy. Deploying and supporting military force at distance, alongside ensuring the unrestricted movement of the maritime trade upon which the world relies, requires the safe and secure use of Sea Lines of Communication (SLoCs). The Commander of the US Navy's Submarine Forces, Vice Admiral John Donnelly, and the USN's Director of Submarine Warfare, Rear Admiral Carl Mauney argued last year that a submarine can provide a solution in the context of many of the uncertain alternative futures facing the world as a whole, whether those futures include any or a combination of: what is known as the Campaign against Transnational Terrorism (CTT); the 'constant potential' for major combat operations against a peer competitor; defence of national borders and wider interests; or general instability at a regional or global level.[2]

A nuclear-powered attack submarine (SSN) is a vital tool for any nation wishing to project and protect interest at distance[3]: an SSN does this principally by means of sea control.[4] By 1998, UK attack submarine force levels had been reduced to 12 from a Cold War force level target of 27.[5] The background operational analysis behind SDR itself argued for a force level of at least 14 SSNs, yet SDR reduced the number further to 10 boats. The 2003 Defence White Paper, '*Delivering Security in a Changing World'*, sliced the number further to just eight boats, with that force level to be attained by December 2008.[6] Reinforcing the White Paper's position, Minister for the Armed Forces (MinAF) Minister Bob Ainsworth stated, in a December 2007 response to a Parliamentary Question, that an eight-boat SSN flotilla – made up of remaining SWIFTSURE- and TRAFALGAR-class (S and T class) SSNs and new ASTUTE-class SSNs - would be sufficient *in the medium term* to meet the full range of RN tasks.[7] However, the improved capability and availability to be provided by the ASTUTE-class boats has prompted the Government to reduce the flotilla further still by the time all ASTUTE boats are in service in 2022. In December 2007, in responses to Parliamentary Questions, Armed Forces Minister Bob Ainsworth stated that 'for the future, the more capable ASTUTE submarines will represent a significant addition' to UK capabilities, enabling a review of planning assumptions which has envisaged 'an attack fleet of seven submarines after 2022'.[8]

Yet despite the improved capability and availability provided by ASTUTE, there remains a lingering concern that affordability, not capability and availability, remains the single determinant factor in UK SSN force level generation. The 2005 Defence Industrial Strategy stated that the ASTUTE-class might number eight, but only 'subject to affordability'.[9] With the number reduced already to seven boats, there remains concern that the flotilla will be cut once again to six boats: at the RUSI SUBTECH conference, it was made clear that, while the planning assumption is seven boats, the seventh boat 'was not a line under which the Government would put concrete'.[10] Most significantly, with an SSN force level which has come down to seven from 12 at the end of the 1990s, while SDR's operational analysis argued for 14 and while the taskings for SSNs has anything but decreased, it was stated at the conference that 'being asked what we are being asked to do with seven is a very big ask'. Clearly, despite MinAF stating that UK SSN force levels 'remain subject to review', the UK is still facing significant operational risk trying to tackle a range of tasks which is growing in

both number and type, with almost 50% less boats, no matter how significant any improvements in capability and availability may be.

SSBNs: Force Levels and the Survivability of the UK's Strategic Deterrent

As well as developing a nuclear-powered attack submarine capability, the UK also deploys its independent strategic nuclear deterrent capability under the sea on four nuclear-powered ballistic missile submarines, or SSBNs.[11] Deployment of the UK's only nuclear weapons system on submarines ensures the survivability of the deterrent when the four boats operate in a Continuous At-Sea Deterrent (CASD) patrol cycle. On 4th December 2006, the British Government gave notice of its intent to renew Britain's independent strategic nuclear deterrent by developing, amongst other things, a new generation of SSBNs.[12] The decision was approved by a vote in Parliament on 14th March 2007.[13]

As with the SSN flotilla, a central element of the debate surrounding the UK's next generation SSBN – known at this stage as 'Successor' – is the number of submarines which will be built, and why certain force levels are required. When developing both the Polaris and original Trident programmes, operational analysis suggested that a force level of five boats would provide maximum risk reduction. However, cost limitations capped both programme at four boats.

On 14 June 1968 the SSBN HMS *Resolution*, fitted with *Polaris* A-3 Submarine Launched Ballistic Missiles (SLBMs), put to sea for Britain's first strategic deterrent patrol. In April 1969 HMS *Revenge* sailed for the first patrol in the CASD patrol cycle.[14] Since then, the deterrent has been securely maintained by a boat on patrol every second of every day since in the CASD cycle. This cycle, supported by four boats, and has proven to be very effective – notwithstanding the significant availability, capability and operational challenges faced.

At a RUSI seminar on 7th March 2007, Secretary of State for Defence the Rt Hon Des Browne MP stated that one reason for maintaining CASD was to continue to exercise and develop the skill set of the Royal Navy Submarine Service...

> ... 'a group of people who we deploy and have now… [deployed] 300 times into the sea in boats asking them to keep themselves at a high state of readiness, operationally deployed day-in and day-out .... The people who have experienced [this] tell me "don't play around with this: if you don't intend to maintain this system continuously and maintain that skills set, bring them home and stop doing it, because you cannot play around with this, this is a deeply dangerous thing to do." … I am persuaded by that … Nobody else who deploys this system has any other view, and that is based on the experience of the people who have actually experienced doing the job. These people are operationally deployed. They are not out on training. They are actually out on operations.'[15]

Part of 'not playing around with' this capability is maintaining a force level with sufficient redundancy to ensure that no undue risk is taken with Britain's independent strategic nuclear deterrent. Certainly, the Royal Navy would argue that four boats is a minimum requirement.

Yet, as with Britain's SSN force levels, a debate continues about the number of boats to be procured in the Successor programme. The UK MoD's 2006 White Paper titled 'The Future of the United Kingdom's Nuclear Deterrent' stated that:

> '[the UK is] not yet in a position to make a firm judgment about how many submarines we require in the future because we do not yet understand comprehensively the likely operational availability of the replacement SSBNs. We will investigate fully whether there is scope to make sufficiently radical changes to the design of the new SSBNs, and their operating, manning, training and support arrangements, to enable us to maintain continuous deterrent patrols with a fleet of only three submarines. A final decision on the number of submarines that will be procured will be made when we know more about their detailed design.'[16]

Commodore John Gower Royal Navy, the MoD's Director Equipment Capability for Under Water Effect, told the conference that the UK was looking at a force level of 'at least three, maybe four' boats. Clearly, there remains doubt that the fourth boat will be built. The reason for not building four boats cannot, unlike in the case of ASTUTE, be attributed at this stage to improved capability: the capabilities of the submarines are not yet determined, and the short time for delivering the new boats (only 17 years from the 2007 decision date to the required date for the first successor boat to be in service) will limit significantly opportunities to bring in radically-different capability approaches. Improvements in design, build and maintenance – not least through building the boats with a single reactor which will see them through their entire planned 30-year life – may mean that availability of the boats will be substantially improved, which *may* enable the Royal Navy to generate the same level of availability from four boats with only three. The UK's reduction in its warhead and missile levels, as announced in the 2006 deterrent White Paper, may also be creating a political premium on reducing the SSBN flotilla to four boats so that the UK can show to the international community that it has, unilaterally, reduced all three capability elements of its independent deterrent. However, given the scars which the Royal Navy carries from trying to maintain the deterrent even with four boats, there remains significant concern that the three-boat option is being driven through for affordability reasons.

THE RUSI CONFERENCE: ISSUES IDENTIFIED

Two days of focused debate provided much discussion and food for thought for a healthy cross-section of the international submarine community. Yet there remains much debate still to be had, much understanding to be improved and many questions still to be answered, if for no other reason than the future remains uncertain and because many nations are developing submarine programmes.

The critical issue here is not so much why nations are developing a submarine capability, but more the fact that they are. Moreover, arguably the best way to offset a submarine threat is with another submarine. From the UK's perspective, the key issue first and foremost should be not how much submarines cost – or even how many of them you need – but why you need them in the first place – and that is because, should the UK continue to wish to have a global international role, offsetting the potential threat posed to UK interests by this burgeoning number of submarines will require an active submarine programme. Is the UK, with its reducing force levels, risking a mistake which will have similar consequences for capability, industry and affordability as the order, design and build gap between the VANGUARD-class SSBNs and ASTUTE, a gap which generated significant problems for the early stages of the ASTUTE programme? Rear Admiral Andrew Mathews, the UK MoD's Director General Submarines, argued at the conference that the UK has learned the hard way what not to do: surely, there is an argument not to risk making a similarly catastrophic mistake again? Given

the enduring underwater threat, as shown by the number of nations actively developing submarine programmes, the UK requires a sustained and sustainable submarine capability through the ASTUTE-class to the new deterrent submarine and beyond. However, is the Government's short term lack of commitment to the full eight-boat flotilla of ASTUTE submarines undermining the long-term sustainability of the UK's submarine capability?

The Political and Strategic Requirement for an Underwater Capability

Commander Marc Delorme from the French Naval Staff and Captain Andre de Wet from the South African Navy's Fleet Headquarters made strong cases for the strategic significance of the underwater battlespace. Cdr Delorme highlighted the immensity and impenetrability of freely accessible underwater battlespace as providing significant scope for the expression of political and military power and will, while Captain de Wet argued that submarines themselves provide comprehensive defence capabilities at the military-strategic level, act as a force multiplier at the operational level, and deliver deadly virtues at the tactical level.

Clearly, many navies are taking advantage of the accessibility of the underwater battlespace and the capability of submarines, with the world witnessing a significant increase in the number of submarine operators and number of submarines. Why nations are doing this is nice to know, but the need to know is that these submarines are out there conducting patrols. While the increasing use of submarines may enable nations to increase their politico-strategic influence, Cdr Delorme, Dr Andrew Davies from the Australian Strategic Policy Institute and General Dynamics Electric Boat's Rear Admiral John Padgett argued that the possession of a submarine capability also gave greater credibility and relevance to smaller navies, as well as enabling nations to jump the queue in establishing naval force structures and capabilities which other nations then would find impossible to ignore.

Yet, despite this strategic context, the UK MoD – not to mention the Royal Navy – continues to find it difficult to make and argue a strong case the case not only for seven or eight ASTUTES but also for the Maritime Underwater Future Capability (MUFC), the conceptual programme which is defining the UK requirement for an underwater capability beyond ASTUTE and Successor. The conference heard from several speakers that the UK needs to take a long term view, starting from now, on the need for an underwater capability beyond 2030 and how to deliver it, as re-constituting the capability will be very difficult. The United States Navy's submarine programme office representative, Captain Rick Nicklas USN, made the generic point of the challenge facing many navies here in how to maintain an affordable force structure in the light of short-term budget pressures, while also developing a programme which could adapt to changing strategic, operational and tactical scenarios both in the short- and longer-terms.

Concepts of Operations

As many submarine services face the twin challenges of having to meet higher levels of operational taskings with smaller flotillas driven down in size by defence budget pressures, submarine services are seeking to develop more affordable systems with sufficient flexibility to meet changing requirements. However, arguably there remains insufficient discussion of how submarine operational and capability requirements will develop in the future because of the rate at which technology changes.

Yet the conference debates highlighted the strategic significance of the persistent stealth provided by a submarine and other underwater capabilities. First, the range of effects – in particular sea control - generated by underwater assets is vital in achieving the maritime superiority so critical to the effective execution of expeditionary operations. Second,

underwater assets, notably a submarine, offer opportunities for unique political discretion in the delivery of effect either through overt or covert means – in the latter instance in particular, with plausible deniability.

The conference also discussed the interesting issue of forward-basing of assets, whether this is Swedish SSKs in San Diego or US SSGNs in Diego Garcia. With many navies seeking a greater global presence, is forward-basing an increasingly attractive option? Might the Royal Australian Navy be able to pre-empt debate about its need for nuclear-powered submarines by forward-basing a boat? Might the Royal Navy show interest in such a concept, for example in basing boats in Diego Garcia should the Indian Ocean become an area of greater strategic interest for a greater number of submarine-capable nations?

In relation to how concepts of operations add to understanding of the significance of submarines in supporting policy, Captain de Wet highlighted the utility of South African SSKs in peacetime operations, such as fisheries protection and counter people- and drug-smuggling operations. This raises the question of whether employing submarines for such roles, and highlighting this publicly, strengthens the case for a submarine capability.

Capability

Discussion of particular capability requirements and challenges raised many issues, both generic and specific.

Different speakers also highlighted the need for improved capability obsolescence management, more commonality, more Commercial Off The Shelf (COTS) technology, more modularity, more open system architectures, and more rapid capability insertion and reconfiguration to respond to new technologies and threats. Each of these new approaches to capability development arguably may help to reduce cost.

Given that, for example, each British SSN has grown in size from its predecessor but that both Britain's Successor deterrent submarine and its SSN after ASTUTE may decrease in size from their predecessors, but given that US speakers highlighted the significant capability and operational benefits delivered by a boat the size of an SSGN, a critical issue – one which clearly needs further discussion – is that of size. Is less more, or is bigger more beautiful?

In terms of specific capability issues, several key issues emerged. First, the need for Mine Counter Measures (MCM) is increasing, as improving mine warfare capabilities amongst potential adversaries is generating an increased threat, particularly in sea control and force protection terms. Commodore Gower raised the question of whether non-state actors have realized the full potential of maritime-based Improved Explosive Devices (IEDs) such as mines, and argued that the UK needs a better shallow-water MCM capability, as well as the ability to pre-position an MCM asset such as a submarine to improve the speed of reaction to an MCM threat. Unmanned Underwater Vehicles (UUVs) will present a significant hedge against the MCM risk, but Commodore Gower questioned whether the UK was as far forward in UUV developments as it believes it is.

Communications have always been the Achilles Heel of the underwater community. Whilst needing to develop functional interoperability, so as not to negate and/or compromise the strategic and operational significance of a submarine's stealth, developing improved communications capability at depth and speed is a pre-eminent capability requirement for

underwater assets if they are to improve their contribution to situational awareness in the maritime and broader joint battlespace.

Submarine capability developments arguably have been hindered to an extent by what is known at the tyranny of the 21-inch torpedo tube. The utility of a seven-foot-wide Trident D5 SLBM vertical launch tube in an *Ohio*-class SSGN in enabling the delivering a seven-pack of *Tomahawk* Land Attack Missiles (TLAMs) or Special Forces personnel and equipment, or of developing a larger-still tube (as the USN may do for its Batch 3 *Virginia*-class SSNs, and which could take much larger Unmanned Vehicles) is beginning to revolutionize the delivery of effect from submarines. A wholly different approach to tubes and their muzzle hatches will open up many different capability opportunities.

However, delivering capability improvements is not only a question of technology. Commander Jonas Haggren from the Royal Swedish Navy's submarine staff highlighted how spreading maintenance over a longer period of time can improve hull availability. Moreover, improving the performance of submarines also requires upgrades in all Lines of Development, not least designing future boats around people and not just around capability.[17]

All capability developments will generate critical Balance of Investment choices. However, it was heartening to hear of discussions already in the UK MoD of how many and what type of forces are required to protect the future deterrent.

Industry

The second day of the conference was devoted to the critical issue of how industry must work together and with its customer to deliver a more effective – and more affordable – capability. In the UK, making the case for a future underwater capability is perhaps unduly dominated by cost and industry infrastructure and capacity issues, at the expense of an adequate understanding of the unique political and military value delivered by the capability itself. As Captain de Wet argued, in making the case for a submarine capability, nations which buy their boats off the shelf on the international market have to make a case for retaining a submarine capability without the political lever of industry (ie., sovereign, capability, national financial investment, and employment) issues. This may force them to develop a more coherent operational case.

Notwithstanding this, many nations – and the UK in particular – are faced with a variety of significant challenges for their submarine industrial bases. In the conference, much discussion focused on the cost issue. In the case of both US and UK submarine programmes, up-front Unit Production Cost (UPC) is improving, and its drivers are better understood. However, understanding the Through-Life Cost (TLC) of nuclear submarines remains a significant challenge[18]: in this case, refreshing methods in design, build and through-life management and developing TLC models will help to reduce both overhead and ownership cost and improve cost certainty.

However, there is a need to set the cost issue in its proper context. As Admiral Mathews argued in *Jane's Navy International*, it is not possible to make Balance of Investment decisions without coherency in the programme and a full understanding of the costs.[19] He argued also, at the conference, that the submarine community needs to get to grips with costs or face extinction. But Value For Money (VFM) should be the key, and VFM not just about reducing cost and squeezing as much life out of programmes as possible: it should also be about assessing the value of the political and military advantage delivered by the asset and its

capability. The conference discussed the issues of the utility of underwater assets on the first day and their cost on the second: perhaps the real challenge for the community is, together, to reduce the latter but also to maximize the understanding of the former.

Several questions persist relating to cost issues in particular. First, does driving down unit cost impact on TLC and, if so, how? Second, how do you strike the right balance between UPC and TLC? Third, more complex boats – not to mention design and build methods - may also give you different – and, perhaps, harder – upkeep problems. For example, how might vertical outfitting and deck module build approaches affect maintenance and refit? Finally, what is the right level of affordable, sustainable industrial capacity? In this latter case, reduced refit requirements through improved boat design and capability also will affect industry capacity requirements. Despite a burgeoning need to reduce cost, there remains however a need to preserve both what are clearly unique skills (including design, build and project management) and the strength of the supply chain.[20]

A core element of improving coherency in the programme and, thus, reducing cost is improving the relationship between customer and supplier. Such a strong relationship sustains the industrial base and also – perhaps critically – grows confidence amongst other stakeholders, for example (in the UK's case) the Treasury. In the UK's case, in the ASTUTE and Successor programme a very open, positive and integrated relationship has been developed. This, however, needs to be sustained. The Submarine Enterprise Collaboration Alliance (SECA) is the next phase in rationalizing the UK's submarine industrial base and reforming the nature of the customer-supplier relationship.[21] However, the conference discussions highlighted the need for SECA to be the 'means' for re-shaping the submarine industrial base to improve productivity and affordability – and not just to be an 'end' in itself. One fundamental challenge facing SECA is to develop a framework within which different industrial business models can be rationalized or made to work together. Also, while SECA provides a strong structure, there is a need now to add the meat of commercial construct and reality to the bones of this structure. There is also a need to foster continuous culture change within both customer and supplier. Industry experts, whilst welcoming both MoD's involvement in SECA and the creation of the Director General Submarines post (which Admiral Mathews holds currently), still see the need for further organisational and cultural change in the MoD. Despite these and other immediate challenges, the relationship remains very positive: a slide back to the confrontational relationship of the early days of the ASTUTE programme arguably would risk confining the UK submarine programme to the log of history.

Finally, the frequency and numbers of submarine orders clearly will have the most fundamental impact on the future of the UK's submarine industrial base. BAE SYSTEMS Submarine Solutions Managing Director Murray Easton highlighted at the conference the potentially catastrophic effect for not only his company, but also for the industry in general and for the UK's submarine capability, of a gap generated between the end of the ASTUTE programme and the Successor programme if the ASTUTE programme is capped at seven – or even six – hulls. With this in mind, building only six boats may not deliver the savings required by Government if BAE SYSTEMS needs to continue to pay people to ensure they are not lost to the company before design and build work on the nationally-critical Successor programme begins in earnest. Finally, the UK Government has been holding back for some time on announcing the build of ASTUTE boats five to seven, in part because the TLC for later ASTUTE boats has been piled up Boat Four alone, making that one boat seem very expensive: batch orders deliver more value, as overheads can be spread more widely.

THE CASE FOR SUBMARINES IN BRITISH DEFENCE POLICY

Operations conducted in and from the underwater environment, particularly in the case of the UK those undertaken by SSNs, will have continuing political and military significance because of the unique strategic significance of its covert nature. Submarines and the underwater battlespace remain relevant to a nation which sees itself as a global power and which has an expeditionary military posture. Yet the future of submarines and other assets employed in the underwater battlespace will be driven by decisions on the balance of investment in British defence policy, decisions which appear to relate today to an apparent trade-off between preparing either for current CTT and Counter-Insurgency (COIN) operations or for major state-on-state High Intensity Conflict (HIC) which the UK MoD predicts may happen within the next 15 years.[22] Any capability trade-offs between these two contexts appears to be forced by the MoD's acute financial constrictions. Policy is led by key strategic ends, but – as Admiral Mathews argued at the conference – it must keep in mind the art of the possible in terms of budgetary and capability means. However, as shown by the pace of UK military operations, the requirements for employing the military instrument have not changed: the UK's area of geostrategic interest and focus is growing, and the requirement for using the underwater battlespace for political or military effect, from strategic to tactical levels, is increasing. As shown by Iraq and Afghanistan, there is a growing argument that UK policy should be based on the ability to support concurrently two medium scale operations, although this (what is known as the 'double medium') is not something the UK would desire to have to support and although this would have significant implications for capability requirements and the defence budget. Affordability must not be the only driving factor. Yet money has driven force levels down.

The conference discussed core submarine capabilities at length. The debates highlighted clearly the wide array of strategic, operational and tactical benefits delivered by underwater capabilities, including: intelligent, covert battlespace preparation; force protection; power projection (with TLAM – global reach, covering 100% of earth's surface with the improved-range Block IV variant); and access into theatre and onto target on a global scale. Such impact is multiplied significantly by the large volume of a submarine hull, which provides providing for a wide, flexible and expanding range of capability options in one forward-deployed, ready hull. Indeed, Commodore Gower argued that navies need to pack as much capability into a submarine hull as they can afford.

Three particular points, however, merit more detailed discussion.

Sea Control

First, with the oceans remaining opaque, and with the underwater environment much harder to regulate than other environments, submarines and other assets using the underwater battlespace retain the unique ability to control the sea and to deny its use to others. At the conference, an argument was put forward that other platforms can provide the capabilities which a submarine can offer (something which complicates significantly the case for the importance of submarines, particularly at a time of significant resource and Balance of Investment battles). This may be true, but other platforms do not bring the strategic added value of stealth. No matter how hard the world has tried – even at the height of the submarine battle in the Cold War – the oceans remain as impermeable as ever and there is no indication of that situation changing in the foreseeable future. The ability to be overt or covert gives greater – and arguably unique - choice. Two key effects generated by a submarine are sea

control and – perhaps most notably, because of the simple fact that a submarine's stealth means that its presence can be neither confirmed nor denied - sea denial. Sea denial, a sub-set of the concept of sea control, is defined by *BR1806: British Maritime Doctrine* as a 'condition short of full sea control that exists when an opponent is prevented from using an area of sea for his purposes.'[23]

Sea control and sea denial are vital to the protection of SLoCs. Such protection is vital at a politico-strategic level, in terms of protecting national strategic interest as well as global maritime commerce. It is vital also at a military-operational level, in terms of force protection – for example of the deployment chain - from threats which might come in environments which Captain Dickie Baum (from the Royal Navy's Fleet Submarine Staff) argued are increasingly hostile, and from a growing number of nations with a greater number of submarines and a greater range of capabilities, such as anti-ship cruise missiles and 300mph torpedos. The simple possible of the presence of an opponent's submarine risks denial of access to an area of interest. Such a threat can be best offset by another submarine. Threats to deployment and access might be threats which have only recently become an area of significant focus in the UK MoD, and some might argue that Anti-Submarine Warfare is a forgotten art. However, Rear Admiral Alfred Thayer Mahan and, in particular, Sir Julian Corbett would be comforted to know that sea control is far from a forgotten principle. Sea control, arguably, is the underwater community's trump card today.

Balancing Operational Taskings and Force Structures

Second is the question of the nature of the force structure and level required to support the tasks. Submarine tasks are classified, but a rudimentary understanding of submarine operations and capabilities would lead to the conclusion that UK submarines, available at high readiness, would be required to undertake the following tasks:

- Contribution to current operations, of which there are two. Captain Baum's brief raised the question of whether just one such operation requires the presence of two SSNs
- Protection of the strategic deterrent, ie the SSBNs
- Strategic intelligence-gathering
- Special Forces insertion
- Protection of the UK's two new 65,000-ton aircraft carriers (CVF)
- A conventional strategic coercive capability. When making its original purchase of 65 TLAMs (the Block III variant), the stated reason for such a purchase was that these weapons would give the UK a conventional strategic coercive capability. The calculus behind the procurement was that the UK would need as many as three submarines in theatre on one operation to deliver the necessary coercive effect.

The improved capability and availability of the ASTUTE-class boats may mean that some of these tasks can be handled concurrently. For example, a boat undertaking one task can move quickly – in no small part due to the speed and stealth of an SSN – to another. Certainly, some of the tasks are likely to occur concurrently – for example CVF protection may be required in the context of an ongoing operation. However, a submarine tasked for TLAM strike operations would not always be able to carry out other tasks – such as intelligence gathering, Special Forces insertion, or force protection – as it may be required to remain in its launch basket at the expense of other such tasks.

What is most significant, however, is that operational requirements for submarines – and for the particular capabilities they offer, not least their stealth – have increased significantly.

Little or no information is available publicly on UK SSN operational taskings. For some time, though, analyses have concluded that the US Navy's submarine service has been struggling to meet operational taskings – which were increasing even before the implications of 9/11 are taken into consideration - with declining SSN force levels, and with affordability issues delaying the two-per-year SSN build rate needed to maintain a force level of at least 48 boats to the extent that the USN currently is facing a dip to as low as 40 boats.[24]

Just as the operational analysis behind the UK's 1998 SDR argued for at least 14 boats, set against the current battle over six, seven or eight hulls, the USN's current planned force level of 48 is set against a 1998 assessment of a requirement for 76 SSNs by 2025.[25] Although now ten years old, both these operational analyses pre-dated 9/11 and the increased operational taskings for SSNs generated by the CTT. A recent article in the *Hartford Courant* argued that the USN has been forced to turn down as many as two out of every five SSN missions requests.[26]

From the UK's perspective, with force levels coming down from the Cold War levels of 27, through SDR's assessment that 14 boats would be required, to a force level perhaps as low of six boats raises several questions. With operational requirements going up, what tasks, if any, are you giving up? How many of these tasks can be handled concurrently? Can you achieve with six 6 ASTUTES what you could do with eight SWIFTSURE- and TRAFALGAR-class boats? Can you get enough availability from seven boats or less? Despite improved availability, capability and connectivity, a submarine, like anything, still cannot be in more than one place at the same time. It is debatable whether there was enough discussion of these questions at the conference. What is important is not the numbers issue in its own right, but whether the right force generation balance is being struck between performance, cost and – most importantly – requirement.

Saving money through reducing force levels leaves the question of how much risk is being bought with the money being saved? There are many different elements to this risk. First, none of the tasks listed above – plus many other taskings which SSNs undertake - are less important in absolute or relative terms that they do not need to be addressed. Second, history has shown a tendency for delivering strategic shocks, Third, despite estimates that ASTUTE boats will spend significantly less time in maintenance and refit, the history of the Royal Navy submarine service has shown that force levels have not always generated the right level of availability, and also that surge capacity often has come at expense of other operations, not from boats putting to sea from the yard at short notice. Fourth, having boats at sea for longer – despite improvements in design, build and maintenance – increases the risk of break down.

Submarines as a Strategic Deterrent?

Finally, with global submarine capabilities expanding, there is no reason to assume that further increases in operational requirements for submarines will not follow. As Commodore Gower argued at the conference, the UK and other Western navies cannot take their superiority in the underwater battlespace for granted. While navies need a capability architecture which can enable rapid technology upgrades to adapt to changing requirement, at a strategic level navies also need a force level which can offset any strategic changes at a global level. Developing an active submarine programme is a deterrent in itself. An adversary will look for strategic capability gaps to exploit. For a maritime nation with desires to retain a global influence and with the ability to secure this influence based around an expeditionary military strategy, maintaining an active submarine capability - and the industrial and

technological development to go with it - is a strategic deterrent in itself, and one also which it is very difficult to reconstitute.

MAKING THE CASE?

It is not RUSI's remit to lobby, but part of explaining the relevance of a particular capability is identifying to whom such a case needs to be made. Perhaps other services are coming to understand the importance of the underwater battlespace. As Admiral Kenny explained in the conference, the US Army leadership has been asking the USN to examine options for deploying UAVs from submarines. Perhaps the submarine's role is today better understood in the UK too: many in the British Army are beginning to understand the need for sea control to ensure that British forces deployed by sea are not at risk of being lost before even reaching theatre.

In terms of the UK's battle over SSN force levels, some argue that the case has been well made and well understood in the MoD and within the Defence Management Board (DMB). Some argue that the case was well understood by previous Minister for Defence Equipment and Support (Min DE&S) Lord Drayson (who was regarded by some as a supporter of the submarine industrial base, and someone who understood its issues), but only time will tell if Baroness Taylor, the new Min DE&S, has the same understanding and view. Is influencing MoD and Ministers enough, however? Do the Treasury, the Prime Minister and – even – the public need to understand the arguments? Arguably, the Royal Navy has not been as successful as it needs to be – perhaps, importantly, relative to the other two services as well – in making its own case. At the conference, Admiral Mathews drew out the links between the names of battleships and submarines as capital ships: the Royal Navy and the UK's submarine community might indeed welcome members of the public chanting 'we want eight and we won't wait'.

CONCLUSION

Planning assumptions, concepts and doctrine, equipment plans and budgets need to balance requirements for current operations, however enduring they may be, with future plans which require investment today, and not to mention with options to hedge against contingencies. There remains a fear that the MoD's latest acquisition planning round will see any programmes with no immediate relevance to today's operations being moved as far to the right of the equipment timetable as they can be. Yet one of the causes of the MoD's current budgetary malaise was previous delaying of many major programmes which resulted in too many critical capability decisions having to be made today, at the same time. Pushing programmes right again is going to risk re-creating today's problems tomorrow.

Commodore Gower argued that there are increasing threats in areas of UK interest, but he added this is not always appreciated in policy-making circles. It would be interesting to see how an increased naval presence in the Indian Ocean or the opening up of an Arctic seaway would impact on UK SSN force generation calculations. The unique and growing importance of the underwater battlespace mandates investment today in tomorrow's capability: not investing in the UK's submarine programme today risks both the short- and longer-term future of Britain's SSN and SSBN capability. Without such investment today, as Admiral Mathews argued at the conference, the UK's submarine capability faces extinction.

Clearly, there is a strong case for the importance of the underwater battlespace, and the forces which operate therein, in support of policy. However, the current debate is showing that this still is a difficult case to make at times of tight budgets. The MoD's budgetary challenges arguably are as acute as they have ever been. Notwithstanding the lack of investment, arguing for the importance of particular capabilities remains challenging in its own right. The battle in the UK should be about retaining eight at least, but is now focused on whether to have seven or six. Some fear that UK SSN force levels had reached lowest level of allowable risk with just eight boats, especially in terms of something so critical like ASW capability. To quote the words of Joseph Stalin (words often attributed to Admiral Sergei Gorshkov) quantity clearly has a quality of its own. This also leads to the question of whether, if the UK cannot have enough SSNs, should it bother having any? Eric Grove has argued that the possession of major capabilities like aircraft carriers, amphibious forces and nuclear-powered submarines gives a nation like the UK a '2:1', or 'Upper Second', status as a navy behind the USN.[27] Such status and capability enables the UK to retain its position on the world stage. Reducing further, perhaps effectively relinquishing, a significant component of this capability such as SSNs will raise questions about the UK desire – and ability – to be able to retain a position of political pre-eminence on the world stage.

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[1] Ministry of Defence (MoD). *The Strategic Defence Review*, Command 3999. London: Her Majesty's Stationery Office, July 1998. Introduction, para.6; Supporting Essay Six, para.22, p.6-6.

[2] Donnelly, Vice Admiral John J., USN (Commander, US Navy Submarine Forces) and Mauney, Rear Admiral Carl W., USN (Director Submarine Warfare, United States Navy). Statement on Force Structure Requirements and Alternative Funding Strategies for the United States Submarine Fleet, before the House Armed Services Committee Sub-Committee and Sea Power and Expeditionary Forces, 8 March 2007. Available on-line at: <http://armedservices.house.gov/pdfs/SPEF030807/Donnelly.Mauney_Testimony030807.pdf> . p.3.

[3] The acronym SSN stands for Ship, Submersible, Nuclear. The difference between an SSN and an SSBN is that, while both are nuclear-powered, and SSBN carries nuclear-armed ballistic missiles (specifically, Submarine Launched Ballistic Missiles, or SLBMs). Some nations' SSNs do carry nuclear weapons, such as nuclear-armed torpedoes or cruise missiles, but British SSNs do not.

[4] *British Maritime Doctrine: BR1806* defines sea control as 'the condition that exists when one has freedom of action to use an area of the sea for one's own purposes for a period of time and, if necessary, deny its use to an opponent. Sea control includes the airspace above the surface and the water volume and seabed below' (see: Royal Navy, 2004. *BR1806: British Maritime Doctrine*. Third Edition. By Command of the Defence Council. London: The Stationery Office. p.289). Sea control also concerns denying the use – and control – of the sea to the other side.

[5] The 27-boat force level would have been made up of 17 SSNs and 10 conventional submarines (SSKs). See: Grove, E. Vanguard *to* Trident*: British Naval Policy since World War Two*. Annapolis, MD: United States Naval Institute (USNI) Press. p.353, incl. *n38*: Eliot, C. `Submarines in the Hunter/Killer Role', in *NATO's Sixteen Nations*, vol.84, no.003207. December 1983-January 1984. p.53.

[6] MoD. (2003). *Delivering Security in a Changing World: Defence White Paper.* Command (Cm) 6041-I. By Command of Her Majesty. Presented to Parliament by The Secretary of State for Defence. December 2003.

[7] See: Ainsworth, B. (Minister for Armed Forces [MinAF], UK Ministry of Defence). House of Commons Hansard Written Answers. 3rd December 2007. Column 820W; Scott, R. 'Concern Mounts over UK Submarine Numbers', in *Jane's Defence Weekly*, vol.45, issue 4, 23 January 2008. p.6. Emphasis added.

[8] Ainsworth. House of Commons Hansard Written Answers. 3rd December 2007. Column 820W. See also: Ainsworth. House of Commons Hansard Written Answers. 10th December 2007. Column 55W.

[9] MoD. *Defence Industrial Strategy: Defence White Paper,* Command 6697. December 2005. p.68, para.B2.7.

[10] An article in *The Guardian* also argued that the MoD's budgetary malaise, as typified by the current bloody battle in MoD over Planning Round 2008 (PR08), was so acute that the ASTUTE programme might even be halted at four boats (Hencke, D. 'Cabinet Split over Proposed £15bn Defence Cuts'. *The Guardian*, 4th December 2007. p.1). However, at the RUSI conference, Rear Admiral Andrew Mathews (the UK MoD's Director General Submarines) stated that the UK had already placed contracts for long-lead items for ASTUTE boats five and six.

[11] The acronym SSBN stands for Ship Submersible Ballistic Nuclear (SSBN).

[12] See: MoD and Foreign & Commonwealth Office (FCO). *The Future of the United Kingdom's Nuclear Deterrent*. Presented to Parliament by The Secretary of State for Defence and The Secretary of State for Foreign and Commonwealth Affairs, by Command of Her Majesty. Command 6994, December 2006. Norwich: The Stationery Office (TSO).

[13] See: House of Commons Official Report, Hansard Parliamentary Debates, 14 March 2007. Vol.458, no.61. See also, for example: Willett, L. 'Time to Trust in Trident?', RUSI *Newsbrief*, vol.27, no.4. April 2007. pp.41-43.

[14] Although *Resolution* put to sea in 1968, the 30th anniversary of the CASD posture fell on 28th April 1999 as it was not until that date in 1969 that the arrival of *Revenge*, the second SSBN, made it possible for Britain to initiate the CASD cycle.

[15] Browne, Rt Hon Des, MP (Secretary of State for Defence). Statement at RUSI seminar on 'Renewing the UK's Independent Strategic Nuclear Deterrent: A Debate'. RUSI, London. 7th March 2007. See: http://www.rusi.org/research/militarysciences/maritime/commentary/ref:C45F69446BEF2F/ .

[16] MoD & FCO. *The Future of the United Kingdom's Nuclear Deterrent*. Op Cit., p.26, para.5-9. See also pp.7, 30 (para.7-2), 38 and Fact Sheet 1.

[17] The UK MoD lists its eight Defence Lines of Development (DLoDs) as: concepts and doctrine; equipment; information; infrastructure; logistics; organisation; personnel; training. In addition to the DLoDs, interoperability must be taken into account when assessing all DLoD requirements.

[18] In a Parliamentary Written Answer in December 2007, UK MinAF Bob Ainsworth stated that 'the current whole life cost estimate for the Astute programme, based on a seven boat class, is £42 billion ...., comprising £9 billion for concept, design and manufacture; £32 billion for in-service ....; and £1 billion for disposal' (see: Ainsworth. House of Commons Hansard Written Answers. 10th December 2007. Column 55W).

[19] Scott. 'Can UK Nuclear Submarine Industry Retain Critical Mass?' *Jane's Navy International*. July/August 2006. p.16.

[20] One particular threat to retaining the UK's submarine industrial base skill set highlighted clearly in the conference discussions was the increasing requirement for skilled designers, engineers and project managers in the UK commercial sector, with major projects like the 2012 Olympics, the London cross-rail link, Heathrow airport expansion and – most notably – the UK Government's new programme for nuclear power stations presenting competition to the retention of such core skill sets in the submarine industrial base.

[21] SECA is comprised of four partners: the UK MoD; Babcock Naval Services; BAE SYSTEMS Submarine Solutions; and Rolls-Royce plc.

[22] For reference on the latter point, see: Rear Admiral Chris Parry (then Director General Joint Doctrine and Concepts, UK MoD). Address at `Creating Effect from the Joint Sea Base; The RUSI Future Maritime Warfare Conference 2005.' 13-14 December 2005.

[23] *BR1806: British Maritime Doctrine*, Op. Cit., p.289. See also *n3* (above).

[24] See, for example: Fages, Vice Admiral Malcolm, USN (then a Rear Admiral and Director of the Submarine Warfare Division, N77, in the Office of the Chief of Naval Operations, United States Navy). Interview in Hessman, D. and Peterson, G., 'The US Submarine Force Today', in *Sea Power*, July 1999. Available on-line at: http://findarticles.com/p/articles/mi_qa3738/is_199907/ai_n8869766/pg_1 ; Konetzni, Vice Admiral Al, USN (then a Rear Admiral and Commander Submarine Forces, United States Pacific Fleet). Testimony before the House Armed Services Committee Procurement Subcommittee Submarine Force Structure and Modernization Plans Hearing, 27 June 2000. Available on-line at: http://www.fas.org/man/congress/2000/000627-konet0627.htm ; Giambastiani, Vice Admiral E. USN. Cited in Hellman, C. 'More Subs for the Navy?' in *Weekly Defense Monitor*. Center for Defense Information. Vol.3, no.25. 1st July 1999. Available on-line at: < http://www.cdi.org/weekly/1999/issue25.html> . Admiral Giambastiani argued that SSN operational taskings doubled between 1990 and 1999; Donnelly and Maunay testimony, Op. Cit.. Available on-line at: <http://armedservices.house.gov/pdfs/SPEF030807/Donnelly.Mauney_Testimony030807.pdf> . p.6.

[25] See findings of the 1999 Chairman of the Joint Chiefs of Staff's *Attack Submarine Study*. Summarised in Chief of Naval Operations Submarine Warfare Division (N77), 'Submarine Themes: Force Structure'. Available on-line at: http://www.navy.mil/navydata/cno/n87/themes/forcestr.html .

[26] 'Subs Needed to Keep Seas Free'. *Hartford Courant*. 1 December 2007. Available on-line at: http://global.factiva.com/ha/default.aspx.

[27] Grove. 'Medium Navies and Organic Air', in Wilson, D. (ed.), *Maritime War in the 21st Century*. Sea Power Centre – Australia (SPC-A, Royal Australian Navy). Papers in Australian Maritime Affairs, no.8. 2001. p.91, incl. *n.1*. The terms Professor Grove uses are drawn from the British university qualifications system, under which the qualifications are listed in the following class order: first (highest award); upper second (or 2:1); lower second (or 2:2); or third.