SHOWING THE US THE WAY?

PLEASE NOTE: THIS IS A SPEAKING NOTE, NOT A SCRIPT, AND SHOULD BE READ IN CONJUNCTION WITH THE SLIDES FOR CONTEXT

Baseline programme

Astute progress

The Royal Navy, and I suspect the French have been conducting an **important experiment on behalf of the US**, let me explain:

Dodo = extinct

Dreadnought 1910
Vanguard 1950s

Why did the battleship become extinct?

- Vulnerable to air power
- Carrier made it defunct – could not strike in land
- But most importantly they were **too expensive**

Dreadnought 1960
Vanguard 1995

In **December 2006** the UK Government published a **White Paper** on the Future of Deterrence which argued that we should replace our existing VANGUARD Class Deterrent Submarines and **maintain Continuous At Sea Deterrence**, with the Trident D5 missile **until the 2040s** and this was ratified by a vote in parliament in March 2007.

The Government's decision shows **Nuclear Submarines have a bright future.**

Why?

- **Opaque** nature of the **Oceans**
- **Widened capability**

- TLAM
- Special forces
- ASW
- ASUW
- Surveillance and intelligence gathering
- Sea Denial

- For US – **Ohio conversion to SSGN**

- A further widening of capability with still further untapped opportunities.

So there is **no sign of the nuclear submarine becoming extinct** – or is there?

What would happen if the government had not chosen to continue with deterrence?

Could we have just sustained our current SSN numbers?

- Probably not, not economically, and thus what is apparent is that the UK is **close to critical mass**, if that is a good term to use in a nuclear discussion, in short nuclear submarines could be in the endangered species category.

- The **fundamental reason is cost**.

    - The **US** has only just gone ahead with **2 Virginias per year** – production was frozen at 1 per year until the price fell **below $2bn per boat.**

    - We too have struggled with the cost of ASTUTE and have committed, with BAES Systems Submarine Solutions, to drive down the cost for the later boats through what we have imaginatively called **Design for Cost Reduction.**

        - aim to save **£100m plus per boat** and so far so good
        - jointly come up with a number of **innovative ways to take out cost** but not capability

- ASTUTE is absolutely **fundamental to our forward programme**,

- primarily to retain **the essential range of capabilities** that SSNs bring

- but also importantly because it **builds confidence with our key stakeholders** by demonstrating that we have recovered the UK's nuclear submarine design and building capability.

- When Astute was launched on the 8th of June last year, she was the **first UK nuclear submarine launched in nearly 10 years**.

- Why we allowed that gap to happen, is now history and of course we had no intention of the gap being that long, but **we failed to recognise the impact that a gap of more that 2 or 3 years would have**, we therefore didn't anticipate the consequences or put ourselves in a position to manage them, or account for the costs of them.

- So the lesson, of course, is to **manage your submarine build programme as a long term, indeed a very long term programme** and aim for continuity not boom and bust. You can only do this if you have an open and honest relationship with industry.

- So **ASTUTE** not only **builds confidence** with our key decision makers that we can still build submarines affordably, but it also **sustains industry** with our optimised build drumbeat of 22 months between each boat to get us to the future deterrent programme.

    - Here again we have worked with BAES to define the **best long term build rate to optimise programme costs.**

    - This we have **agreed with the NAO** who have allowed us to score some additional costs against ASTUTE, not as cost growth but as long term sustainment. To sustain industry through to the future deterrent programme.

- Finally, ASTUTE is vital to the future because it allows us to **derisk the next deterrent programme** by maturing new technology in the later Astute hulls before they go to sea in the new first of class.

And hence my title.

What we have been doing for the US is **demonstrating that**:

- **if you don't exercise** your submarine **design capability**,
- if you don't exercise those **specialist submarine build techniques**,
- in short **if you don't build submarines regularly**,

you haemorrhage the capability to build submarines, very quickly, and it costs more

- Building surface ships, such as 2 Auxiliary Oilers was no substitute and the ASTUTE programme paid the penalty.

And all of this is perhaps quite interesting, but it is a little tactical, but my point is to demonstrate that the **submarine programme is long term**, has **big time constants** in terms of gestation of new classes and **requires long term thinking and commitment** if it is to be managed in the most cost effective way. You have to manage submarines just as we manage endangered species – such as the Hen Harrier.

But we also face a difficult and underlying conundrum:

- **Cost of nuclear submarines has outstripped inflation**
    - they are more **complicated, bigger, better** and ever **more capable**
    - but as the **costs creep up**, the **numbers decrease**. (The overall defence budget is not creeping up as fast)
    - We are also making them **last longer**.
    - So the net result is that **we are building fewer**.
- So whilst we in the UK can now see a build programme out to 2030 at one submarine every 2 years, we are already having to make **planning assumptions of what comes beyond** to **justify infrastructure decisions**
    - such as for the new reactor core manufacturing capability at Derby. That investment decision can only be made if we

have a long term programme. Hence we have already, for planning purposes, decided that the Maritime Underwater Future Capability will be a nuclear powered submarine. Sustaining beyond 2030 will be difficult unless we plan it and that will need action in the next decade.

- It is the scale of the infrastructure required for nuclear submarines that is part of this cost headache.

- As submarine **hull numbers** have continued to **drift down**, we have seen **nowhere near** a **comparable reduction** in the **nuclear infrastructure**.

    - Devonport, Faslane, Barrow, Derby and Aldermaston all have unique capabilities and the only significant duplication is in dry docks.

- But we **must drive down infrastructure costs**, if we are to have an affordable future.

Part of the answer lies in our design for the **Next Generation Nuclear Propulsion Plant NGNPP** –

- a **modern** and much **simpler plant**, which will be **even safer** than our current class plants and make much **less onerous demands on shore facilites**

    - **simpler infrastructure** with **greater flexibility** and much **less demanding safety cases** must be our aim.

    - But our existing PWR2 will be with us until at least 2050. So we need to **continue to improve the safety case for our existing plant** as well. We need to better demonstrate the inherent safety in our plant.

    - it is worth pointing out that **our nuclear safety record is second to none** – no other nuclear power programme that I am aware of has a perfect record on fuel integrity. We have never ever suffered a fuel plate failure, they are common place in the civil programme.

- So tackling infrastructure costs helps a simpler power plant helps but **we need to tackle build and support costs**.

- We really need to get to grips with through life costs and **designing for through life** – not just pay lip service to it.

- Here I believe that we have to not only think long term but **contract long term and contract differently**.

    - The 2005 **Defence Industrial Strategy** set out the pan MoD view of such a strategy, Version 2 will move this model on, but given the monopolistic nature of our tier one suppliers, their unique capabilities and the long term nature of our business –

        - a **build cycle of 17 years**,
        - a platform **life of 30 years**
        - plus a **production run** of around **16 years for SSNs** and for **SSBNs 12 years**
        - we are looking at a **60 year future**.

    - We celebrated last year our **300th** successive, unbroken, **deterrent patrol** that started in 1968. Our planned future programme should take us up to 750. So we are **nowhere near ½ way yet**.

    - This then, all adds up to a **very long term partnering opportunity**.

        - Clearly both sides will have expectations, **MoD wants something back** for its commitment, but also would wish to see refresh and innovation, and clearly **industry want** to understand the genuine level of MoD's **forward commitment** before being prepared to invest and rationalise.

- But, what we as an enterprise, that's MoD, BAES, RR, and Babcock, are looking at is one step beyond this – **how to work collaboratively at the strategic level** to take out cost right across the enterprise.

- **How do we get away from being an endangered species**?

- This work, the **Submarine Enterprise Collaboration Agreement** or SECA

- builds on the bilateral contracts that we have, or are putting in place, with the 3 companies, but looks at how to create opportunities to remove duplication and **optimise delivery in a genuine through life way**.

- Our aim is to make the 3 key industrial players **less independent and more interdependent.**

- In short, to **make collaboration the norm**.

- To do this, and the first of a number of challenges we face this year to achieve our goal, is put in place a **Public Policy Exclusion Order**.

    - This will then allow us to start **sharing cost information** and enacting a series of **confidence building measures** that we have already agreed.

So far, I have looked at tackling infrastructure costs and through life platform costs, through both the current Astute DfCR and SECA **but we also need to look at the time a build takes and the implications of it**.

- I and many others in the UK, US, FR and AUS have argued that it takes around **17 years to design and build a submarine** and currently it does;

    - all our hard won **lessons of ASTUTE** tell us this.

    - But we must not just accept this.

    - We should challenge it much harder.

- One of our problems is that nearly **every class** of submarine we build is **fundamentally different** – a completely new design.

- Only the **Germans** have seemed to have cracked **evolution** and continuity of production and it shows in production time and the detailed design of their layout.

- **CAD** leads us down the path of potentially **infinite change** and ASTUTE has shown us the impact of this – we need to learn.

- We should **look beyond the next class** and of course chopping, as the UK does, between SSNs and SSBNs does not help. But, for example, our next generation nuclear propulsion plant cannot be for just the follow on deterrent.

So far I have concentrated on platform issues, but we need to also look at the next level down.

- Contrast that 17 year build cycle and 30 year life with the **pace of change of the combat system**, software and hardware require update at an ever increasing frequency
    - but with **increasingly flexible open architecture systems**, the opportunities appear boundless.
- Integration is no longer the problem it once was and should continue to get easier as we work out the old bespoke interfaces – whilst I can predict the end of the complex integration era, its much harder to say what comes next, but perhaps it doesn't matter.
- *We already have proven technology to enable us to replace major equipments quickly; eg a command system complete technology refresh in under 4 weeks. If this is applied across the board and considered at build we can exploit this for all inboard processing – and not only that within the combat system! We can be reasonably certain that we will not give up this flexibility, because it is inextricably related to driving down costs.*
- *The emphasis over the next few years must, therefore, be on exploiting to the full what we already have available. That means applying the technology to remove expensive bespoke interfaces and unique processing throughout our systems. At the same time we must shift the emphasis on development from the underwater sensors which are now world class and "battle winning" to the above water sensors and communications that will enable the submarines' unique capabilities to be fully exploited in the network connected and enabled future battlespace.*
- *We must not, however, get totally mesmerised by the short term possibilities, we also need to maintain an incremental programme to ensure that we have the right combat system to meet successor requirements. This means not only addressing the different demands of the role of the SSBN from those of the SSN, but also*

in applying innovation to simplify the platform interfaces to reduce build costs, and support modular design as well as modular build.

- *But the challenge comes then in designing a platform where certain **elements are simply unknown at the early stage of the design** – a place many designers simply are not be comfortable with. But this will be increasingly the norm. The secret then is how to retain flexibility for change, or in other words to make change easier and cheaper.*

- Meanwhile much of the platform **endures for the life of the submarine**

    - **very early design decisions** in the concept phase may **cement key equipment for the next 50 years**

    - So we want **long term reliable equipment, VfM through-life support costs and obsolescence proofing** – nothing new again here.

    - But what we have not been good at recognising what is staying for the life of the platform and **investing up front** to genuinely tackle through life costs.

    - We also have tended to be **wedded to the existing solution**. It has always been that way. So it works, it must be the answer. (*LP Blower example)*

    - We need to better understand the **cost drivers**, before committing to designing equipments in for life – would a COTS approach, with regular upgrade, and a designed in upgrade capability, provide better VfM?

- So the second challenge is to **grow technology**, not just in weapon systems but put much much more in marine engineering. Here, I believe the RN/MoD have been negligent.

    - We have singularly **failed to run a coherent long term technology programme**, successive spending round cuts have reduced it to a series of small projects struggling to gain traction and get sufficient funding to turn the science in to a workable and reliable solution.

- Areas where we really need to do better in the short term are **paints, valves, seals** and using our limited skilled resource to tackle sore thumbs and **make improvements not just fire fight**.

- But longer term we need to **step up and be bold**, **electrical distribution and propulsion architecture** has little changed for years in the UK.

- The **USN have gone back to DC**, we have electric propulsion in Surface Ships, but we simply don't know **what is the optimum** for the secondary plant for an **SSN or SSBN**, indeed it might be very different.

- What holds us back is our **inability to work as a submarine community** to use the total available capability to develop mutually beneficial solutions. This is not about battle winning solutions but **straight affordability**.

- Why don't we collaborate better on **paint** for example. But I am sure there is a long list of items from **hull valves to MARPOL** where the western submarine operating communities could collaborate without exposing any security concerns.

So far I have concentrated on cost as the major threat but there is another threat that will also lead to cost growth if we don't manage it – PEOPLE.

- **Good people**, with the **right knowledge and experience** are an absolute vital foundation for any submarine programme.

- As our programme has contracted, we have not recruited and have lived on the rump of a population who have experience in an era when we owned and managed our dockyards.

- **Under-investment in people** is my biggest worry for the future. Time constants to recover are large, the threats to recruiting are significant – civil nuclear, across London rail link, Olympics, AWE

Nuclear Warhead Capability Sustainment Programme all want good project managers and engineers.

- There is also a second part to this argument, **the mantra of Gershon** and the persuasive argument of industry is that MoD needs to keep **downsizing** – industry can do it better and more efficiently.

- But industry has the right to have an **intelligent customer**.

- A customer who can:

    - make **sound technical decisions**

    - that can **manage the risks** that it rightly needs to manage,

    - that **manages its government** stakeholders

    - and can establish its credentials as a **competent programme manager**.

- All of that requires the **right number of people, with the right experience and knowledge**. A sustainable population, properly managed and trained.

- Here I sense that for MoD the **tide has started to turn**, technical skills, engineering and project management capability and coal face experience are becoming **increasingly valued**. But much much more needs to be done to re-establish fully MoD's technical capability. In short, **we are on the case, but playing catch-up**.

So, in summary, my thoughts for you are:

- The UK has been quietly **modelling the bitter effects of slowly downsizing** the nuclear submarine business; we have learnt a lot – the hard way, and suspect have produce a few good examples of what not to do.

- Unless we get a grip on costs there is a danger that submarines may become and endangered species. If we do not solve the conundrum of increasing platform costs and fewer numbers – we will slip below critical mass.

- We **need to challenge**. I don't just mean a small piece of work to prove that the status quo remains the right answer but set ourselves **tough targets for change** and improvement.
    - The US did it for their nuclear plant – **half the number of components** was the target and they exceeded it!
    - We should set ourselves equally demanding targets in areas such as:
        - Cabling
        - Hydraulics
        - Valves
        - Size
        - Reuse of design
- We have to continue to **challenge infrastructure costs**
- We have to get industry to **work better together** and be **rewarded for innovation**
- We, MoD, need to strive to be the **genuinely intelligent customer** who has the ability to challenge and sensibly demand realistic improvement and contract for it intelligently.
- To do that we need good people and the right number of them.
- We need to **work together** not just **nationally** but **internationally**, and not just bilaterally, as a submarine community, on areas where security just is not an impediment – why not start with paint.
- So, having shown the US how **not** to, hopefully we can show the US **how to** or even better build on our already very close collaboration and keep the UK submarine business off of the endangered species list.