Ministry of Defence: Type 45 Destroyer

Thirtieth Report of Session 2008–09

Report, together with formal minutes, oral and written evidence

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The Public Accounts Committee

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Committee staff

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Summary

The Type 45 Destroyer is being procured to form the backbone of the Royal Navy’s air defence capability for the next 30 years, and will provide a very impressive capability compared to the Type 42 Destroyers which is it designed to replace. There have been a number of problems on the project, meaning it will enter service over two years late and £1.5 billion over its original budget.

The Department has had to extend the life of the Type 42 Destroyers for longer than originally planned as a result of the delays to the Type 45. These ships are increasingly expensive to maintain, provide a more limited capability than the Type 45 and are more vulnerable to the most up to date threats from a modern enemy.

The Department originally planned to buy 12 ships. However, because of reduced threat, revised planning assumptions and an intended improved network capability, this number shrunk to eight and eventually just six. Despite this, the Department’s requirement to have five ships at sea at any one time remains unchanged. It will be more challenging for the Department to meet this requirement with only six ships.

The problems on the Type 45 project result from the Department’s failure to take sufficient account of the technical risks involved in such a complex project in its estimates of the likely costs and timescales to deliver, or in the commercial construct which it agreed, which led to a poor relationship with industry. Following a far-reaching review of the project, the contract was renegotiated in 2007, and there have been no further cost increases or delays since then.

Although the Type 45 will enter service in 2009, it is a disgrace that it will do so without a PAAMS missile having been fired from the ship, and will not achieve full operational capability until 2011. Other equipments and capabilities which will enhance the ship’s ability to conduct anti-air warfare operations will not be fitted until after the ship enters service in some cases.

It is essential that the Department learns the lessons from both the failures and successes on this project, and applies them to its other programmes such as the Carrier, if it is to avoid a repeat of the cost overruns and time delays that have been a feature of so many of its major Defence projects. The Department also needs to apply the lessons in taking forward its longer-term support arrangements for the Type 45, which have yet to be finally agreed.

On the basis of a report by the Comptroller and Auditor General,1 we took evidence from the Department on capability provided by the Type 45 Destroyer, the reasons for the cost increases and delays on the project, and the lessons learnt for the Carrier project and support contract.

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Conclusions and recommendations

1. **The Department made serious mistakes in the early stages in the procurement of the Type 45 Destroyer, and set unrealistic cost and time objectives.** In line with our recommendation in our report on the Major Projects Report 2008, when making the main investment decision on projects, the Department should develop quantified measures against which to assess how well it has:
   
   - understood the capability required and avoided over-specification;
   - assessed whether the technology can be delivered by industry within the agreed cost and time envelopes, and
   - assessed whether there is sufficient funding available to deliver the project.

2. **Although the Type 45 was based on 80% new technology, the Department failed to take sufficient account of this in its assessment of technical risk or in the commercial construct that it agreed.** The Department needs to improve its understanding of technical risks at the start of its projects. It should factor in more realistic allowance for risk on its more technically complex projects.

3. **As we see on so many defence projects, the Department was over-optimistic in its estimates of the costs to deliver the Type 45.** The Department needs to spend more time at the start of projects to ensure its cost estimates are robust and realistic. In particular, it should:
   
   - build time in at the start of projects to estimate costs more thoroughly, and
   - routinely check the realism of its cost estimates using different methods such as historical trend analysis.

4. **Many of the problems on the Type 45 result from the commercial arrangements the Department put in place. Inappropriate commercial structures are a major cause of slippage and cost growth in the early part of the lifecycle of large projects.** The Department needs to give greater consideration that the arrangements it agrees with industry are realistic, sensible and appropriate for specific types of project. It should:
   
   - build in time at the start of projects to get the arrangements right;
   - agree an appropriate means of incentivising the contractor;
   - make sure that it does not set a fixed price too early, and
   - assess whether the risks in the commercial arrangements are appropriate and develop a joint strategy with industry for addressing risks, in line with the Committee’s recommendations in its report on the Major Projects Report 2008.
5. **Project management arrangements on the Type 45 project were poor and allowed the culture of over-optimism to persist for too long.** For its high risk projects, the Department needs to ensure someone sufficiently senior has a high level overview of the project, and aligns responsibility with budgetary authority. The individual tasked with the overview must be in a good position to oversee capability delivery across all the Defence Lines of Development.

6. **Following the contract renegotiation, project management is much improved and there have been no further costs increases and delays.** Much of this is because of the work of the Project Director. The Department needs to recognise the importance of the role that good project managers play and keep key individuals in place during the critical stages of projects, albeit without hampering their career development. It should align the career development of such individuals with significant developments on projects, and if necessary keep them in high risk posts for longer periods of time. The Department must be prepared to promote key individuals in post so that people do not compromise their career development by remaining in projects to provide important continuity.

7. **The first Type 45—Daring—is forecast to meet its Key User Requirements when it enters service in 2009, but will not achieve full operational capability until 2011. There are a number of improvements in capability that will be installed incrementally after Daring comes into service.** The Department needs to measure the delivery of its equipment against milestones which are meaningful, and which correspond to the provision of capability. It should:

   - avoid working to two different sets of dates (target and most likely), which can cause confusion and a lack of clarity;
   - develop a clear route map of when it will achieve capability, which is not necessarily linked to the Key User Requirements, and
   - approve a series of milestones for the introduction of meaningful capability, rather than basing plans around the In-Service date alone.

8. **Equipment which will enhance the ship’s ability to conduct anti-air warfare operations will not be fitted until several years after the ship enters service.** This is in line with the Department’s planned approach to improve the capability of the ship incrementally to meet changing threats. While the development and addition of new technologies progressively is a sensible approach, the Department needs to be clear as to how the destroyers can be tasked until full capability is achieved.

9. **The Department has learnt a number of lessons from the Type 45 project, which it needs to apply to other projects and, in particular, to its other surface ship projects, the Carrier and Future Surface Combatant.** The Department needs to manage its surface ship capability in the round. It should maximise the transfer of technology from the Type 45 to these projects, and should build on the improvements it has made in its relationships with Industry as it takes the Carrier project forward.
10. The Department has access to the contractor’s Integrated Cost Model for support cost data, but only has limited resources available to enable it to understand and challenge the information. The Department needs to ensure it is able to benefit fully from the access it has gained to the contractor’s cost model for the support solution, and that it has the appropriate skills and resources in place to be able to challenge the contractor’s costs and assumptions where appropriate.

11. The reduction in the number of destroyers to be procured from eight to six means it will be more challenging for the Department to meet its policy requirement of five destroyers available for tasking at any one time. The Department believes that the longer-term support arrangements for the Type 45 will help give it the best chance of meeting this requirement. The Department is already later than planned in putting support arrangements in place. The Department must avoid repeating the early mistakes of the procurement of the destroyers in finalising its support arrangements. It should:

- spend time ensuring that the costs and timescales are realistic and that the commercial arrangements are appropriate to the project;
- put in place effective ways to incentivise industry, linked to the need to have five ships operational at all times, and
- maintain the good relationship with industry going forward, ensuring it continues to improve in the medium to long term.
The Type 45 Destroyer capability

1. The Ministry of Defence (the Department) is procuring a fleet of six Type 45 Destroyers, fitted with the new Principal Anti-Air Missile System (PAAMS), which are intended to form the backbone of the Royal Navy’s air defence capability for the next 30 years. They will replace the ageing Type 42s, which have been in service since the 1970s and are now coming to the end of their lives. The first of class, Daring, is due to enter service in November 2010, three years later than originally planned, although the Department is working to an earlier ‘target’ date of December 2009. (To avoid confusion, we refer to the earlier target date throughout this report.) The remaining five destroyers will come into service at regular intervals over the following three to four years. The current forecast cost of the project is £6.46 billion, an increase of 29% (£1.5 billion) on the original budgeted cost when the main investment decision was taken.

2. The Type 45 will provide a superior capability to the Type 42s, and is a sophisticated piece of technology, with new gas turbines, engines, radar and weapons. The Committee visited both types of ship, and was particularly impressed with the manoeuvrability, speed and ability to accelerate and stop of the Type 45 Destroyer, and by the accommodation provided for the ship’s crew. The Type 45 is designed so it can be upgraded and updated with new capabilities throughout its 30-year life. In particular, the amount of space, installed power, and operating systems should make it easier to add upgrades and new equipments at a later date.

3. As a result of the delays to the Type 45, the Department has had to extend the life of some of the Type 42 Destroyers past their original planned retirement dates, at a cost of £195 million. This figure would be higher were it not for the Department’s cost cutting measures, most notably retiring three Type 42s up to two years early in 2005, saving £119 million, and using spare parts from other retired destroyers. The Department does not consider that £195 million is the net additional cost of running on these ships for longer, as it needs to be set against the support costs not yet being incurred for the Type 45. The Department is aiming to achieve continued capability as the Type 45 Destroyers enter service progressively.

4. The five Type 42s still in active service are increasingly expensive to run and maintain, and their declining effectiveness means that they offer a much more limited capability than the Type 45. The Committee was deeply concerned about the potential impact on the UK’s air defence capability of relying on just five ageing Type 42s, in particular, their greater vulnerability to sea-skimming missiles and their ability to deal with the most up to date threats from a modern sophisticated enemy. The Department did not share these concerns and considers that the Type 42s are still competent ships, which will cope with most of the

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2 C&AG’s Report, para 1.1
3 C&AG’s Report, para 2
4 Qq 1, 15, 75–76
5 Q 53
6 Q 40; C&AG’s Report, paras 1.5–1.8
7 Qq 39–41
military scenarios except the most operationally demanding. However, they will not cope well into the future, which is why the Type 45 Destroyers are badly needed. An additional three Type 42s were removed from active service in 2008, and could be made available if required, although only at considerable cost and not within any short period of time.

5. The Department is now only procuring half of the 12 ships that it originally planned to when the project was first approved in 2000. The requirement for 12 ships was reduced to eight in 2004 because of changes in the perceived threat, revised planning assumptions, and improvements in network enabled capability, and finally down to six ships in 2008. The Committee remains deeply concerned that the reduction to six ships will make it very challenging for the Department to meet its operational requirement to have five ships at sea at any one time. This requirement remains unchanged despite the cut in numbers to six. The Department cannot commit to always maintaining this level of availability. It told the Committee that it will be able to maintain four ships at sea, and while there is very high probability of maintaining five, there is a small risk it will not.

6. The Department judges this to be a manageable risk and is looking to mitigate it through the support arrangements it agrees for the ship, through other elements of air defence, and through capabilities on other ships such as the Future Surface Combatant, although the Committee notes this will not enter service until at least 2018. Should only four ships be available, the Department will have to “juggle and hope”. The Navy would adapt its tactics and techniques accordingly to reduce the risk of a successful attack to an absolute minimum.
2 Reasons for cost increases and delays

7. It is disappointing that it has taken the Department so long—over 20 years—to deliver its replacement for the Type 42s. Two previous attempts at a destroyers programme—the NATO frigate replacement programme for the 1990s, and the Horizon project with France and Italy—were abandoned in 1989 and 1999 respectively because of their prohibitive costs and the failure to agree commercial arrangements. The Type 45 Destroyer itself will enter service over two years late and £1.5 billion over budget.\(^\text{13}\)

8. As with so many other Defence projects, the problems on Type 45 Destroyer result from the Department’s unrealistic and over-optimistic assessments of the likely costs and timescales to deliver technically complex equipment. Although it was aware that the Type 45 was to use 80% new equipment and technology, the Department did not take sufficient account of this in its estimate of technical risk or in the commercial construct it agreed. The Department accepts fully that it under-estimated the scale of the technical challenge and identified its inability to identify correctly what a highly advanced ship ought to cost as the real failure on the project.\(^\text{14}\) It agreed that the process for estimating costs needs to be more systematic and that it needs to build into its contracting process a careful analysis at each stage of what projects should cost by comparison with other countries.\(^\text{15}\) Indeed, the comparative analysis prepared for the Comptroller and Auditor General’s report showed that the price the Department is paying for six ships is broadly in line with what they ought to have cost if development costs are excluded.\(^\text{16}\)

9. The Department’s over-optimism and underestimation of the technical challenge was also reflected in the commercial construct, which it agrees was ill-suited for this project. The Department failed to identify at the outset that the project would be high risk in managerial terms and many of the later problems stem from these inappropriate commercial arrangements. The Department entered into a fixed price contract, even though many of the elements had not been specified or priced, which created a massive risk that costs would increase. The Department accepts that in a sector dominated by single suppliers, where there is not a natural competitive market, a fixed price is not necessarily the best way forward and it would not adopt this approach again.\(^\text{17}\) Furthermore, the Department was responsible for the delivery of other significant parts of the project, such as the Principal Anti-Air Missile System. This allowed the ship contractor BVT to claim compensation when delivery of these equipments was delayed. The commercial arrangements and premature agreement of a fixed price were the main reasons for the antagonistic relationship which developed between the Department and BVT. Because the initial price was unrealistic, the response was to increase the price when problems arose on the project. The Department described this situation as a recipe for a poor relationship.\(^\text{18}\)

\(^{13}\) Q 1; C&AG’s Report, para 1.3
\(^{14}\) Qq 1, 5, 95
\(^{15}\) Q 15
\(^{16}\) Qq 5, 98
\(^{17}\) Qq 1, 81–85, 95–96
\(^{18}\) Qq 22, 101
10. The problems were compounded by failings in project management, which allowed the culture of over-optimism to persist for too long before the Department took action. The number of organisations and groups sharing responsibility for the project was a contributory factor. The Department agreed that it needs to have clearer governance around its major projects, with one or two key people taking an overview. It believes it is now addressing these issues in two ways: firstly through its programme board, which includes stakeholders from both the Department and Industry; and secondly, by having a Senior Responsible Owner or single point of accountability on equipment programme projects.  

11. Following the far reaching review in 2006, and renegotiation of the six ship contract in 2007, the project has been turned around, with no further cost increases or delays since the new arrangements were finalised. Under the restructured contract, the relationship with industry has been transformed, with the Department and industry now working in partnership, rather than wasting their efforts disputing responsibilities for cost growth. Both project control and governance arrangements are much improved, with the Department having much better sight of the contractor’s project information. The work of the Project Director has been crucial to this success, and we very much welcomed the Department’s commitment to keep him in post until the project has been delivered. The Department accepts that, in general, it needs to do more to ensure greater continuity in lead roles on its bigger projects, without hampering the career development of those who stay in these roles for longer periods of time. It is now being more proactive in the management of its senior project managers’ careers.  

12. The first Type 45, Daring, is due to enter service in late 2009, but will not achieve its full operational capability until July 2011 on current forecasts. A number of risks remain to achieving these dates and delivering full capability in the longer term. It is a disgrace that Daring will enter service in December 2009 without a PAAMS missile having being fired from any Type 45 Destroyer, and this gave us concerns about the ship’s ability to fulfil its anti-aircraft role. The Department had always planned to adopt this approach and believes that it would be able to deploy the ship anywhere in the world once it enters service, as all the Key User Requirements will have been met. The missile has been fired twice from a longbow barge in the Mediterranean, which the Department believes will reduce the risk to the programme as this system is as close to a Type 45 as it is possible to get without actually testing on the ship itself.  

13. Many capabilities which enhance Daring’s ability to conduct anti-air warfare operations will not be in place when it enters service. Key communications equipment such as Bowman and Skynet, which enable the destroyer to share information more effectively with other military units, will be fitted incrementally at a later date. The United States Co-operative Engagement Capability (CEC) project allows the destroyer to join up with other vessels to provide a clearer picture of the battle space, significantly improving its ability to undertake anti-air warfare operations with other nations, particularly the United States. However, this equipment will not be fitted until at least 2014, five years after Daring

19 Qq 17, 19–21, 32–36  
20 Qq 1, 15, 26–29, 61, 74  
21 Qq 10–13; C&AG’s Report, paras 1.14–1.15
enters service. The Department had never planned to fit these equipments from initial service as they are not key requirements for air defence or for the Navy to deploy the ships. CEC will provide additional capability to achieve a higher operational output, in line with the Department’s expectation of growing the capabilities of the ship over its lifetime to meet changing threats. It will be fitted widely across the fleet and not just on the Type 45 Destroyer. The Department was very confident that the ship will be deployable anywhere in the world at its In-Service date and that it will achieve its planned date of 2011 for Daring to achieve Full Operational Capability.22
3 Lessons learnt for other projects and for the support contact

14. There are a number of lessons to be learnt both from the problems on the Type 45 project and from the actions that the Department has taken to turn the project around. Many of the failings are ones we see all too often when looking at major Defence projects. It is vital that the Department applies these lessons to other programmes in order to improve its performance in procuring key military equipment. Although not tasked to produce a specific report on the Type 45 project, the Department is working in more general terms to improve its capabilities in procurement, and has recently commissioned a further review in this area.23 The Department is procuring two new aircraft carriers for approximately £4 billion and it is crucial that it learns from its experiences on Type 45 Destroyer as it proceeds with the design and build of these platforms. The Department believed that the lessons will be applied, and indeed already have been in a number of areas.24

15. In taking forward the Carrier project, the Department must work to avoid the over-optimism that was so prevalent on the Type 45, particularly in the assessment of technical risks and in estimates of likely costs and timescales to deliver. Many of the problems on Type 45 stemmed from the inappropriate commercial constructs, which were subsequently renegotiated and are now greatly improved. The Department believes that the arrangements it is putting in place for the Carrier, which are similar to the new arrangements on Type 45, should mean there is a better prospect of cost and time targets being met on this project.25

16. Agreeing a fixed price too early and not pricing all the requirements at the time of the contract meant the Type 45 was at risk of cost growth. The Department believes it will not fall into the same trap on the Carriers, as it has not yet committed to a final target cost. In addition, many of the same individuals who experienced the lessons on Type 45 are now responsible for the acquisition and technology strategies on the Carrier and can bring their experience to bear.26 The project management arrangements on the Type 45 added to the problems on the project, and the Department is confident that it will avoid making the same mistakes in the project management arrangements it agrees for the Carrier. It is working more closely in partnership with its industrial alliance from the beginning of the project. Furthermore, it also has a single overall view of the project, which is shared with industry, and is working with industry to develop a common understanding of the project through shared schedules, risk registers, cost models, joint working and ‘open book’ accounting.27
17. The Department believes that both the Carrier and Future Surface Combatant programmes will also benefit from the technology and equipments generated on the Type 45 programme. For example, the high-tech integrated electric propulsion system will be used on both the Carrier and then on the Future Surface Combatant, as will the design developed for the Type 45’s cabins. Technical risk should be lower on these projects because equipments such as the command management system and long range radar will have already been proven in the naval environment. Cost savings have already been achieved on the Type 45 Destroyer as the build process has incorporated lessons learnt and therefore improved with each successive ship that is completed. This ‘learning curve’ has now levelled off. The Department forecasts that it will achieve ship build man hour savings on ships two to six of 33, 35, 40, 42 and 43% respectively, and that the forecast cost saving between the first and the sixth ship, excluding PAAMS, is £170 million. The Department is confident that these lessons will be transferred to the Carriers and more pertinently, to the Future Surface Combatant.28

18. Although it is encouraging to hear that the Department appears to be applying lessons learnt to the Carrier programme, there are signs that it is still being over-optimistic in some areas of the Type 45 project. The Department reports in the Major Projects Report using its ‘most likely’ date of November 2010, which takes into account an analysis of risks remaining on the project. It manages the project internally, however, working to more challenging ‘target’ dates which assume no risks will materialise and are earlier than those reported corporately. The Department’s justification for the use of the earlier date is to keep the team focused and ambitious, but the use of two dates risks creating confusion for staff. Funding for the support solution is based on the later date, but the Department is working to an earlier ‘target’ date in its plans for starting negotiations. Should this be achieved, it will have to provide funding early to pay for its support solution.29

19. It is crucial that the Department applies lessons learnt from the procurement of Type 45 to the development of its support solution, as this solution will help the Department meet its policy requirement to have five ships available at all times. The long-term support solution has yet to be finally agreed, but the destroyers will be the first major type of warship to adopt a ‘contracting for availability’ approach, with 85% of the support costs managed by the contractor. The Department has adopted a staged approach to introducing the new arrangements, which are being put in place later than planned because of the difficulties on the procurement. Ahead of this, a one-year £22 million interim support contract for Daring and PAAMS is in place, and could be extended if required but this is likely to be costly.30

20. Support cost data is held by the contractor, and the Department has access as required. This arrangement is understandable as the support solution is being delivered through the contractor but given the project’s history, it was worrying to learn that the Department did not appear to be making best use of this access. It has only limited resource available to understand and, if necessary, challenge the costs in the model, although a member of staff was appointed for this role in November 2008. The Department believes that the visibility

28 Qq 69–73, Ev 15
29 Q 37; C&AG’s Report, paras 11, 3.3, 3.8
30 C&AG’s Report, paras 12, 3.4–3.6
it has of the cost model, including the detailed make up of costs, puts it in a ‘virtuous’ position, but has been working to improve resources in this area, including recruiting a specialist to examine the PAAMS cost data, which is over a year old. The team responsible for PAAMS also has staff shortages, but the Department did not believe these were significant enough to prevent it from managing PAAMS successfully. The Department is currently recruiting personnel for vacancies within the commercial and in service support areas of the PAAMS team and expect the outstanding vacancies to be filled within weeks. The team has recruited an expert from the Department’s Equipment and Support Continuous Improvement Team who specialises in delivering optimised support solutions.
Formal Minutes

Monday 1 June 2009

Members present:

Mr Edward Leigh, in the Chair

Mr Richard Bacon  Geraldine Smith
Mr Ian Davidson   Rt Hon Alan Williams
Mr Nigel Griffiths

Draft Report (Ministry of Defence: Type 45 Destroyer), proposed by the Chairman, brought up and read.

Ordered, That the draft Report be read a second time, paragraph by paragraph.

Paragraphs 1 to 20 read and agreed to.

Conclusions and recommendations read and agreed to.

Summary read and agreed to.

Resolved, That the Report be the Thirtieth Report of the Committee to the House.

Ordered, That the Chairman make the Report to the House.

[Adjourned till Wednesday 3 June at 3.30 pm]
Witnesses

Monday 23 March 2009

Sir Bill Jeffrey KCB, Permanent Secretary, Dr Andrew Tyler, Chief Operating Officer, Defence Equipment and Support, and Rear Admiral Paul Lambert CB, Deputy Chief of Defence Staff Designate (Equipment Capability), Ministry of Defence

List of written evidence

Ministry of Defence
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Oral evidence

Taken before the Committee of Public Accounts
on Monday 23 March 2009

Members present:
Mr Edward Leigh, in the Chair
Mr Richard Bacon Keith Hill
Mr David Curry Mr Austin Mitchell
Mr Ian Davidson Mr Don Touhig
Nigel Griffiths Mr Alan Williams

Mr Tim Burr, Comptroller & Auditor General, and Mr Jim Rickleton, Assistant Auditor General, and Mr Tim Banfield, Director, National Audit Office, were in attendance.

Mr Marius Gallaher, Alternate Treasury Officer of Accounts, HM Treasury, was in attendance.

REPORT BY THE COMPTROLLER AND AUDITOR GENERAL

PROVIDING ANTI-AIR WARFARE CAPABILITY: THE TYPE 45 DESTROYER (HC 295)

Witnesses: Sir Bill Jeffrey KCB, Permanent Under Secretary, Dr Andrew Tyler, Chief Operating Officer, Defence Equipment and Support, and Rear Admiral Paul Lambert CB, Deputy Chief of Defence Staff Designate (Equipment Capability), Ministry of Defence, gave evidence.

Q1 Chairman: Good afternoon and welcome to the Public Accounts Committee where today we are considering the Comptroller and Auditor General’s Report on Providing Anti-Air Warfare Capability: the Type 45 Destroyer. We welcome back to our Committee Sir Bill Jeffrey, who is the Permanent Under Secretary at the Ministry of Defence. He is supported by Rear Admiral Paul Lambert, who is the Deputy Chief of Defence Staff Designate (Equipment Capability) and Dr Andrew Tyler, who is the Chief Operating Officer, Defence Equipment and Support. I should say that the Committee, Sir Bill, as you know, had a very successful visit to the ship on Friday, and we are very grateful to all the Royal Navy personnel. We did not manage to sink it, although my colleague Mr Davidson wanted to try and park it but he was prevented by the Royal Navy for some reason; I do not know why. We were made very welcome by Captain Paul Bennett of HMS Daring and Commander Lower of HMS Gloucester, and it was a very, very useful trip. I should say straight away that nobody denies that this is always going to be a superlative ship and I think it is a matter of great pride that, 500 years after the Royal Navy was founded by Henry VIII, we are still producing ships which are possibly the best in the world. There is no doubt that it can beat anything, better even than what the Americans produce. So it is a matter of great pride. Unfortunately, much as we would like to, we cannot spend the whole hearing just saying that because we have to consider the interests of the taxpayer, whether you got good value for money in this contract, Sir Bill. You will be expecting me to ask all the obvious questions and you will have defensive answers which you would have been preparing for days so, rather than just start on a negative note, to try and put more light in this rather than heat, we know that there were initial difficulties early on with the Italians and the French. We know the whole thing had to be restarted. We know that it was going badly wrong at the beginning, that this contract is now costing us £1.5 billion more than we thought it would. We know that two and a half years ago things were turned round—and, by the way, we were most impressed by your contract manager, Dave Twitchin, who clearly is a man of huge competence, who is running it at the moment. So we know all that but to give us a feel, Sir Bill, so we can try and learn lessons for the future, what do you think went wrong before two and a half years ago? What went right after two and a half years ago, when this contract was turned around?

Sir Bill Jeffrey: Thank you, Chairman. Can I say first that we very much appreciate the fact that you and members of the Committee took the trouble to spend the day there and I am glad you found it is useful as you clearly did. I also appreciate very much the spirit in which you have opened the session because I think this is one of the classic cases of trying to understand this business, how it can go wrong and how we can make it better. It is clear that what principally went wrong was that we were substantially over-optimistic about the time it would take to deliver this, about the technical challenge it would represent and about what it would cost. That was for a number of reasons. I think we assumed that there would be more pull-through of work that had already been done in the Horizon programme than in fact proved to be the case but the biggest issue was, clearly, that we under-estimated the degree of technical risk that we were taking on. As the Committee members who were there will have observed, this is a generation of Destroyer that is a great leap ahead from what we have had previously and on the technical side we were talking about new
gas turbines, engines, new radar, new weapons. I think at that time we simply under-estimated—and our suppliers did—what it would take to deliver that sort of capability both on time and cost. Also, we had the wrong commercial construct. We imagined we could transfer risk to the supplier in a way that in practice we could not. We managed significant parts of it separately and therefore when they slipped, we were liable under the contract to our suppliers.

Q2 Chairman: Now, you are being very honest so just stop there for a moment. What we always wonder is why these lessons are not learned by the MoD. They are the same things that happen again and again, particularly over-optimistic budgets. So you think when we deal with the carrier, some of these lessons will have been learned, will they?

Sir Bill Jeffrey: I think they will be. You may say I would say that, wouldn’t I, but for one thing, the general commercial approach that we are now taking, and that is exemplified in the arrangements we now have with the consortium on the Type 45, about which you have heard, and about which, if I may say what you would expect me to say, the NAO Report is as close to glowing as I have seen, that is the model for the future. I also think that, learning what we have learned from this, it ought to be possible to deliver the carrier and in due course the Future Surface Combatant not only relying on much of the technology which the Type 45 has allowed us to generate but relying on the kind of commercial constructs, towards better partnership with the industry, et cetera. One thing I would say though, Chairman, is that the bottom line—and it does reflect bad estimating rather than value for money—is that we, broadly speaking, will have got six Destroyers for roughly what the market and the comparative analysis that the NAO did would suggest we ought to have paid for them. So the real weakness, and this is one we are addressing in all sorts of ways, is about getting our costings right in other parts of the world.

Q3 Chairman: But of course, this is not just a matter of money because, if you had not had this £1.5 billion increase, you would still be able to afford the eight ships you need, would you not? You wanted originally eight ships. If you had not had this increase, you would be able to afford them, would you not?

Sir Bill Jeffrey: Stepping down from eight to six is about more than cost. It is also about the judgement of what—

Q4 Chairman: Did you change the judgement after the costs went up? Was it convenient to change your judgement?

Sir Bill Jeffrey: It is a mixture of the two.

Q5 Chairman: You admit it is a mixture of the two.

Sir Bill Jeffrey: I do not think we would have been able to afford eight because the truth is that we ended up paying roughly what we should have paid. The real failure in this is the inability at the earliest stage to home in on what a highly advanced, unprecedentedly capable ship of this sort ought to cost.

Q6 Chairman: Now that we are only going to have six ships, can you meet the operational requirement to have five at sea at all times? Admiral, can you give us that commitment that you will always be able to maintain five ships at sea?

Rear Admiral Lambert: We cannot give a commitment that we will always maintain five. We will have a very high probability of maintaining five. We will maintain four for the required period of time. There is a small risk that we will not be able to achieve five all the time, and so we are looking at ways of mitigating that risk, including how we support the ships and see if we can reduce that risk a bit. The thing about air defence is that it is more than just the Type 45 Destroyer. The Type 45 is critical but it is not the only element in air defence, and we are looking at how else we can de-risk it when we cannot get five at sea.

Q7 Chairman: Admiral, the Type 42—we also went round a Type 42—has been in service a very long time, served in the Falklands War, has done tremendous service but if we look at paragraph 1.11 we can see that it has falling reliability, increasing obsolescence. Does relying on just five Type 42s make the United Kingdom dangerously vulnerable?

Rear Admiral Lambert: No, it does not. The thing about the Type 42s is that, as you pointed out, there is an increasing problem with availability and reliability. That actually increases costs but it does not mean to say that we cannot achieve the reliability when we want it. The other point is that the Type 42s are coming to the end of their capability path. We have maintained their capability over the years but it has become more and more expensive, and we are getting to the end of that capability path whereas the Type 45 we are just beginning the capability path and, as they go into the future, they will be more cost-effective to upgrade.

Q8 Chairman: Are not Type 42s very vulnerable to sea-skimming missiles?

Rear Admiral Lambert: They are vulnerable but not very vulnerable. We have looked at a whole range of scenarios that we can imagine and the 42s will cope with most of the scenarios but not well into the future, and it is that into-the-future piece where we need the Type 45s.

Q9 Chairman: These missiles are widely available in markets from the Ukraine and Russia, that sort of thing. One can conceive of rogue states, terrorists, getting hold of these sea-skimming missiles. The Type 42 can deal with anything on the market at the moment, can it?

Rear Admiral Lambert: I would prefer to answer that question in a written answer rather than saying that it will be able to cope.
Q10 Chairman: We can have a private session at the end, if you wish. Now let us look, Admiral, at figure 8, about what happens when HMS Daring enters service. You will have obviously prepared for this question, because there was a lot of bad publicity. Here we have an Anti-Aircraft Destroyer which when it enters service will not actually be able to have any anti-aircraft capability yet, so it is an obvious question. Why did you do it this way? You were bound to get very bad publicity.

Rear Admiral Lambert: If I could be so bold as to correct you, Chairman—

Q11 Chairman: Well, we have an in-service date of December 2009, figure 8, and you have full operational capability July 2011.

Rear Admiral Lambert: Correct, but at its in-service date it will have the full key user requirements as laid out. The end to end of the missile system will have been tested on the Longbow system that is down in the Mediterranean, which is for all aspects.

Q12 Chairman: How many firings has it had down there?

Rear Admiral Lambert: It is two at the moment.

Q13 Chairman: We were told two, yes.

Rear Admiral Lambert: But the Longbow system is as far as you can make the Type 45 without putting an engine system on the back of it and putting a combat system in it, but it does exactly the same as the Type 45 and that will de-risk the programme. The in-service date is the point at which the Navy would deploy the ship. There are always additional things that we would like to do to hone it up, to add additional capability. It is the point the Navy believes that it provides beneficial use and the in-service date is that point, and although we have not conducted firings from that particular ship at that time, it has been de-risked considerably before the in-service date.

Q14 Chairman: But by the time it enters service it will not have fired a missile, it will not be with the co-operative engagement capability (CEC), without its full communication systems—what exactly will this Destroyer be able to destroy at its in-service date?

Rear Admiral Lambert: What it will destroy is the full range of missiles that you were discussing earlier. It will not have CEC but there are a number of programmes we have which will improve the capability of the ship. The CEC was never designed to be fitted in the ship right at the beginning; it was always going to be on a capability path to improve the capability of the ship, and that will come in some years later. There are other equipments that will be fitted to the ship over the years. So the ship will have the capability. There are other bits and pieces we want to achieve before we declare full operational capability, including such things as on-board training, additional communications, etcetera, but the ship is good enough to be deployed anywhere in the world at its ISD.

Q15 Mr Touhig: Sir Bill, the Type 45, HMS Daring in particular, I think is a terrific ship with a highly motivated captain and crew. Like the Chairman, I was hugely impressed when I visited on Friday. Its manoeuvrability, its speed, the ability to accelerate and to stop—I wish I could turn my car in such a short space as they managed to turn that ship in but I cannot. However, having said all that, the project is still £1.5 billion over budget and two years late. Is that pretty well par for the course? Is there nothing we can do about major projects like this going over time and over cost?

Sir Bill Jeffrey: No, I do not accept that it is par for the course. As I was saying to the Chairman, I think we have to much more systematically, at the point when we are estimating cost, at every level, down to a fine level of detail—and our Commercial Director, soon to be moved elsewhere, as I understand it, has been in the lead on this—build into our contracting processes a very careful analysis at each stage of what we judge it should cost by comparison with other examples elsewhere in the world. That in particular I think ought to avoid some of these pitfalls. The other thing is what is increasingly a more modern way of doing business with this sector, which is to recognise that we are effectively dealing with a single UK shipbuilding provider, to work very closely with them, to have complete transparency of costs and estimates and accounting on either side, and to have the kind of business relationship and atmosphere around the relationship that clearly was not in existence 10 years ago. I think we are doing that now and there is no reason on earth why we cannot continue to do it in relation to the big projects we have coming down the line.

Q16 Mr Touhig: As Ken Clarke said at the weekend, that is more of an aspiration than a commitment. When was the last time that a major project that the Department was responsible for actually came in on budget? I am always keen on trying to say “Where are the lessons learned?”

Sir Bill Jeffrey: We have plenty of examples of projects that have kept to time. These big headline projects like Type 45 are obviously the ones that concern us. They concern this Committee. I do however come back to the fact that the cost increased but it increased to the point of reaching the sort of figure that we ought to have been spending for six Destroyers in any event.

Q17 Mr Touhig: We see in the Report at pages 20–21, figure 13, that the over-optimism about the project did not diminish for a very long time. Why was that? Is that because you did not have a single high-level overview of the project?

Sir Bill Jeffrey: My colleagues may want to add to this. Around 2005—and I can remember when I came into the Department in late 2005—this was a concern. Senior people began to realise that this project was significantly off course. There had been a number of studies in the middle of 2005, particularly of the costs, and in 2006 we put into it a project rehabilitation unit which we had established
within the then Defence Procurement Agency. It examined the thing in some detail in 2006, discovered that the risks were greater than had previously been acknowledged, identified the poor relationship with BAE Systems as being at the heart of the problem, and recommended the kind of approach that we then followed through after a lot of detailed discussions with the industry in 2007. So you might argue it took us longer to get to that point than it might have done but get to it we did.

Q18 Mr Touhig: Does the Department still operate, as it did when I was a Minister, the traffic light check on how projects are going? Does it still operate that?
Sir Bill Jeffrey: It does, yes.
Dr Tyler: Absolutely, yes. It is a variant of that but it is the same philosophy.

Q19 Mr Touhig: But was there not one single high-level overview? There seem to be a multitude of organisations and groups actually having part of the responsibility for this project.
Sir Bill Jeffrey: I think another one of the lessons is that we need to have clearer, in the jargon, governance around projects of this sort. We now have a programme board which includes all the stakeholders from within Defence and includes also representatives of industry, and we have a much clearer, more singular view of the project in its entirety. My sense, although I was not among those present, is that the programme management arrangements were less clear at the beginning than they certainly are now.

Q20 Mr Touhig: But again, lessons learned: is there a lesson? Major projects like this ought to have one or two key people who have the overview and responsibility, otherwise they go off track.
Sir Bill Jeffrey: I agree 100% with that.

Q21 Mr Touhig: And you are addressing that?
Sir Bill Jeffrey: We are.

Q22 Mr Touhig: Your relationship with BVT broke down. Was it their fault or yours?
Sir Bill Jeffrey: I would argue that there was probably some fault on both sides but that it was in some measure a consequence of the commercial construct under which we were operating. Looking back on it, the price that we had settled on was almost certainly too low. The arrangements were such that when things began to go wrong, the response was simply to increase the price, and that is a recipe for poor relationships. Relationships are likely to be better if there is a clearer and more realistic understanding from the outset of both what the commercial arrangements are and a more realistic price.

Q23 Mr Touhig: Clearly, Sir Bill, you seem to be learning some lessons from the difficulties you have had over this project and others. Have you been tasked by your Ministers to present a paper, a proposal, on how, again, lessons learned could benefit the Department to avoid these things in future?
Sir Bill Jeffrey: Not specifically on this project but, as the Committee will know, we have over the last few years, and we discussed this in the session on the Major Projects Report a few weeks ago, been working to improve our competence and capability, in procurement. The start of that process was an internal review that I launched about three years ago when I arrived in the Department. More recently, the present Secretary of State has asked Mr Bernard Gray to undertake a further review, which is partly looking at the effectiveness of everything we have been doing and partly looking forward to ways in which we can improve our processes over the next few years. I think we are making progress, as I have said to this Committee before, but there are plenty of lessons to be learned from projects like this.

Q24 Mr Touhig: Last Friday we met Mr Dave Twitchin, your Programme Director for the Type 45. The Chairman referred to him. Where is he today?
Dr Tyler: He is in Abbeywood, Bristol.

Q25 Mr Touhig: Why is he not here? No disrespect to you gentlemen but he knows more about this project than any of you.
Sir Bill Jeffrey: We could have brought him. It is a useful signal to have from the Committee. I thought it would help to have a view from the senior member of Defence Equipment and Support who oversees all these projects, and as it happens, in his previous role Dr Tyler was the two star official responsible for the whole maritime area. But we could certainly have got Mr Twitchin to this hearing.

Q26 Mr Touhig: Will Mr Twitchin stay in post to see this project through?
Dr Tyler: Certainly as long as I have anything to do with it, yes.

Q27 Mr Touhig: Sir Bill?
Sir Bill Jeffrey: That goes for me as well.

Q28 Mr Touhig: We see on page 4, paragraph 2, “The contract was renegotiated in 2007 and management of the project is now much improved and no delays or cost increases have been reported since.” Our impression is, and I think my colleagues will agree, that this was down a great deal to Mr Twitchin and the way he has organised, with support from the Department. He has got to grips with this.
Sir Bill Jeffrey: I think the underlying point you make, Mr Touhig, is a good one, which is that we need to get more consistency. Sometimes people do these significant project management roles for a number of years. Sometimes, particularly, if I may say, on the military side, there tend to be shorter tours of duty. We are working to avoid that because with big projects like this, there is a lot to be said for having as much continuity as we can manage.
Q29 Mr Touhig: What would you say are the two most important things that Mr Twitchin has managed to do that have kept this project on target and no extra cost?

Dr Tyler: Two things. First of all, revolutionised the relationship with our contractor, and that is something that he and I worked out from the very moment he started, with my relationships with the Managing Director of BAE Systems, as it was then, in Govan. We had changes of leadership. I put Dave Twitchin into his job and we had a similar change of leadership within BAE Systems, as was, and that relationship has been extremely positive ever since. I think that is the first thing. The second thing is that we used the opportunity of contract renegotiation to put in some new project control regimes which allowed us to see the same project control information as the company was seeing and therefore we were able to have much more insight as to what was really going on and were able to head off any problems that occurred very early, before they became out of control.

Q30 Mr Touhig: Do you see, Sir Bill, again, lessons learned from the way Mr Twitchin and your colleagues have managed to handle this and pull this project around?

Sir Bill Jeffrey: Absolutely, and I would also say that I am pleased that the Committee formed such a good impression of Mr Twitchin. I would like to think, although, as I have said to the Committee before, the business of improving skills in this area is a never-ending one, that that is the impression that you would have formed of most, if not all of our IPT leaders. Because this area has experienced the problems it has, and still does to a certain extent, the tendency is to assume that it is all poor in quality, and there are some very good people doing this and working extremely hard on it.

Q31 Mr Touhig: Do you think, if my colleagues would agree, that you might perhaps provide us with a note to say, “These are the lessons we have learned from this, and this is how we intend to transmit these lessons throughout MoD to overcome some of the problems we have on overrun of costs and times of the project”?

Sir Bill Jeffrey: We will certainly do that. Yes.

Q32 Mr Bacon: I will pick up where Mr Touhig left off because one of the obvious lessons is to have someone in charge. You will remember that the Bowman project did not have a senior responsible owner for a while. Do all projects now have senior responsible owners?

Sir Bill Jeffrey: All projects that are significant in size do.

Q33 Mr Bacon: What is the threshold?

Sir Bill Jeffrey: I would need to be reminded what the threshold is but it is quite low.

Q34 Mr Bacon: How many millions of pounds?

Rear Admiral Lambert: Every equipment programme will either have an SRO, a senior responsible owner, or a single point of accountability, and the single point of accountability will do very much the same as the SRO. He will run the smaller type programmes.

Q35 Mr Bacon: But not all senior responsible owners are necessarily full-time, are they? They do not necessarily devote 100% of their working time to the project of which they are SRO?

Sir Bill Jeffrey: No, and that would not be feasible in an organisation that does as many projects as we do. I cannot think of any examples across government—or many anyway—where the SRO was actually full-time. As I have said to this committee before—

Q36 Mr Bacon: Perhaps if there were more full-time SROs there would be fewer cock-ups that we would be looking at in this Committee.

Sir Bill Jeffrey: We need full-time project managers but we need our SROs to be people who are senior, well-positioned in the organisation, and able to bring together all the various elements across the organisation. If we had a full-time SRO for each of our projects, we would be employing many hundreds more people than we do at the moment at pretty senior levels.

Q37 Mr Bacon: May I ask about paragraph 19? One of the central criticisms here is that in the early days you were over-optimistic but it sounds from this paragraph as though you could still be being over-optimistic. It says, “The Department is managing the project to a set of challenging ‘target’ dates. These dates assume no risks will materialise and are earlier than those reported corporately. Corporate reporting, external reports such as the Major Projects Report and the long-term financial planning uses later dates based on ‘most likely’ timescale.” So why are you effectively using a set of planning assumptions with dates which assume that no risks will materialise?

Sir Bill Jeffrey: What we are saying is that the projected in-service date meets the 50% test. It is the most likely time that we will actually deliver the capability but, in order to keep the team focused and ambitious, we are setting a target that is a bit earlier than that. To pick up a point in the Report, there is no doubt within the Department about the distinction between the two.

Dr Tyler: It is a bit like a hard and a stretch target. Our hard target would be the target with risk built into it, our most likely outturn, but obviously, what we are trying to do is incentivise not only our own teams but very much the contractor teams to deliver as early as we conceivably can.

Q38 Mr Bacon: But, looking at paragraph 3.8 now on page 25, the most likely planning date is the one on which the funding is based, is it not? That is what it says in paragraph 3.8.
Sir Bill Jeffrey: That is correct, yes.

Q39 Mr Bacon: The Department is aware that “if it meets the earlier date for delivery”—that is your stretch target, Dr Tyler, presumably—“it will have to provide the necessary funding early to pay for the support solution.” Is the Treasury aware of this?

Dr Tyler: That is more complex than that because what we are trying to do is to get a capability continuum here. So as Type 45s come into service, Type 42s go out of service, so as you take a Type 42 out of service, you are clearly making a saving in those support costs and we have sufficient flexibility within our financial arrangements to allow us to be at that level so that we keep a continuum.

Q40 Mr Bacon: So you would be doing it within the envelope; it would just be going on something different?

Dr Tyler: That is exactly right.

Sir Bill Jeffrey: It is a variant of the point the Report makes earlier, that we are spending money at the moment to keep the Type 42s going for longer than we originally planned.

Q41 Mr Bacon: And more money because they are old kit, presumably?

Sir Bill Jeffrey: Probably. It is hard to compare like-for-like but it is certainly not the case that the £195 million quoted earlier in the Report is a net additional cost of having to run them on for longer.

Q42 Mr Bacon: The next paragraph but one worried me slightly. This is paragraph 3.10 where it says, “Support cost data is held in an Integrated Cost Model operated by BVT, with the Department having access to the model as required.” I was tempted to say, “What a relief!” when I read that. Surely, one of your core skills must be keeping very close tabs on your costs. This paragraph makes it sound like the model for the cost data is held by your contractor. It goes on to say that you yourselves admit that you only have a limited resource available to understand and, if necessary, challenge the costs produced in the model and, indeed, you acknowledge that you need to do more and recruit somebody else. How do you get into such a position?

Dr Tyler: This is a virtuous position because it is through BVT that we will be getting the support solution delivered, so there is no point in us making up data and support costs for ourselves. We have to go to the source of those support costs, where we get the full ownership of those support costs. They are doing a lot of work in their supply chain, which is where most of the support costs come from. We are not doing that work; they are doing it on our behalf. The key thing for us—and it goes back to a point we made earlier—is that we have visibility of that cost model on an open basis. We do not just get the bottom line; we get visibility of the make-up of those costs.

Q43 Mr Bacon: Sure, absolutely, but this paragraph is saying that at present the Department has only limited resources available to enable it to fully understand and, if necessary, challenge the costs produced by the model. Surely that cannot be a virtuous position?

Dr Tyler: That is something that is gathering momentum with almost every day that goes by. At the time of this statement it may have been true that we were still resourcing up in that area but I can assure you that there will be plenty enough resources making sure that we have tested all the errors of this cost model.

Q44 Mr Bacon: It says you are recruiting a specialist. Has that now happened?

Dr Tyler: I cannot say precisely whether that has happened or not but we can let you know.

Q45 Mr Bacon: Is there anybody in the room who knows? This is the end of paragraph 3.10: “The Department has recognised that it needs to commit more resource in this area and is recruiting a specialist.”

Dr Tyler: That specialist was specifically for cost data on the PAAMS missile system and I am sorry, I do not know specifically whether that specialist has been recruited.

Sir Bill Jeffrey: We will find out.2

Q46 Mr Bacon: I would just like to ask you about the CEC, the Co-operative Engagement Capability. Can you say what additional capability it provides to the Type 45 destroyers?

Sir Bill Jeffrey: I think the sensible thing is to ask the Admiral to say something about this. Essentially, it is the maritime version of network enabled capability. It is about joining up, and being able to operate with other vessels, including those of other countries.

Rear Admiral Lambert: That is exactly it. It provides a network enabled capability across the maritime area. It is operated by the Americans at the moment.

Q47 Mr Bacon: You are talking about in battlefield conditions?

Rear Admiral Lambert: Yes, and at the moment the ship passes data across using data links, which is probably the difference between a black-and-white TV screen and a plasma colour type screen. The data is passed across, so you get what is called “situational awareness.” You will know where things are using the link data system. What CEC does is that it allows more information and more control across the battlefield, so that one ship can detect and somebody else can do something about it, so the need for so many ships reduces, the ability to conduct operations increases and the tempo increases.

Q48 Mr Bacon: And provide a clearer picture of the battle space and improve the ability of a task force to undertake anti-warfare operations, and so on.

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Rear Admiral Lambert: That is correct.

Q49 Mr Bacon: What I cannot understand about all of this is what is virtuous, to use Dr Tyler’s word, about waiting until the ship is ready in service to add all this stuff on? I think I read somewhere that this is going to take until 2014.

Rear Admiral Lambert: Yes. This has always been a separate programme in the maritime area and CEC we have always wanted to put on the Type 45 but not just on the Type 45. It will be fitted quite widely across the fleet. We have done a number of trials with the programme. We had it fitted to HMS Manchester last year to make sure that we understood all the integration problems, so that we knew how it fitted into the wider picture.

Q50 Mr Bacon: Is that a Type 42?
Rear Admiral Lambert: HMS Manchester, yes, and so we get to about 2014–15 this will be the right time to bring the programme into service.

Q51 Mr Bacon: That is when Bowman will be installed?
Rear Admiral Lambert: Round about that sort of time period.

Q52 Mr Bacon: We looked at Bowman on this Committee a couple of years ago. Is there not a danger that by then Bowman will be “old hat” and you will be coming back to us and to the Defence Committee saying, “Oh, it is past its sell-by-date. We need something new”?

Rear Admiral Lambert: For those members of the Committee who saw both HMS Gloucester and HMS Daring, you saw how important it was to have an integrated solution. One of the things we are very keen on is that, when we move towards a Bowman fit on board these ships, it is an integrated solution, and that is why it will take a little bit of time.

Sir Bill Jeffrey: In the previous generation, this was not a capability that I think we had even thought about putting in Destroyers. It is only because it has this ability to link up with the land environment as well. Bowman is a priority for the Type 45 but it is not the highest priority for the moment.

Q53 Mr Bacon: Just one last question. I am running out of time. One of the conclusions of the Report, or one of the statements in the Report—I think it is a 30-year service life for the ship. One of the important aspects is that its design is supposedly making it easy to update and upgrade throughout its life. Can you give us some examples of the sorts of updates and upgrades that are likely?

Dr Tyler: There are three things it is probably worth focusing on. First of all, you will have noticed that it has an awful lot of installed power. One of the things that you quite often see as the ship has more capabilities added to it is that it has an increased requirement for power. The fact that we have a lot of installed power with some margin in it means that we can add new equipments that require power without having to change main engines and so on. The second thing you will also have noticed is that it is very big. Space is always at a premium on a warship and having space to fit in new cabinets and new equipment gives you that sort of stretch capability. I think the third area worth focusing on is the architectures, the electronic and computer architectures, that have been put in. As you again, I am sure, had pointed out to you, this is running on commercial architectures and operating systems, which means that we have much more of an ability to upgrade, taking advantage of these architectures, rather than having a contractor build us something that is completely bespoke to that particular ship and then, when you try and upgrade, the next thing will not interface or integrate to it. I think those are the three things that have given us a lot of what I would call “future-proofing” in this particular ship.

Q54 Chairman: Just to finish off Mr Bacon’s questions, you admit, Admiral, that these systems—Bowman, Co-operative Engagement Capability, Skynet—will not all be ready by 2014. If you look at figure 15, you will see you still have key risks in infrastructure and training. You still have to negotiate your support programme but you, Admiral, are giving this Committee a firm commitment that you are going to meet all your deadlines and we will have a full anti-air capability on this ship, despite these key risks and despite the fact that Bowman and the Co-operative Engagement Capability and Skynet will not be ready by 2014, and there are these key risks? You are giving that commitment, are you, on behalf of the Royal Navy?

Rear Admiral Lambert: Bowman is required to operate with the land battle space, in the land battle space. It is not a key requirement for air defence. The ships and our concepts and doctrine operating those ships is based around the Link system as already fitted rather than CEC. CEC is an additional capability to achieve a higher operational output. Can I give you absolute confidence that we will achieve the FOC on time. Nothing at the moment would suggest that we would not.

Q55 Nigel Griffiths: The Report, as I think the Chairman said at the beginning, is a source more of optimism than pessimism, summarised in paragraph 14, the Conclusion on value for money, that the inappropriate commercial arrangements, the poor project management and the over-optimism have been tackled by the Department and the conclusion is “now more mature and making better progress”. I am right in thinking, am I, that this is the third attempt, that the NATO frigate replacement programme from the 1990s had to be abandoned, and then the Horizon project with France and Italy abandoned in 1999, and now we are having a third attempt to secure what we need?

Sir Bill Jeffrey: Broadly, that is the case. The first of these is quite a long way into the past now. On the second, the Horizon programme, we got with the French and the Italians to the end of a project definition phase and, by mutual agreement with the other countries, we decided not to pursue it because the then joint-venture company could not offer
sufficiently robust industrial arrangements or an affordable offer. The French, however, I think continued to pursue Horizon and indeed delivered it, but in that sense, this is the third attempt. You are right, Mr Griffiths.

Q56 Nigel Griffiths: What that appears to have left us with is just five ageing Type 42s and, as the Report says on page 11, a Sea Dart missile system which was removed from two of the Destroyers a year before they were taken out of service so that the ships could not be deployed on an air defence role. What role are they able to carry out?

Rear Admiral Lambert: All the roles of an air defence. We operate them as general-purpose escorts, and so you will find Type 42s doing anything from hurricane relief to navigational training. They can be deployed like that.

Q57 Nigel Griffiths: Rear Admiral, I am sorry to interrupt you. You are saying all the roles in air defence and the Report is saying these Type 42s could not be deployed in an air defence role.

Rear Admiral Lambert: No, they cannot be.

Sir Bill Jeffrey: There is a difference between the five and the three. The five could be and the three could not.

Rear Admiral Lambert: That is correct. The five can be deployed in the air defence role. The three we put at extended readiness, ie, if we needed to deploy them, we would have to find funds, et cetera. Those three that we have taken, and are using them at extended readiness, could not be deployed in the air defence role within any short period of time.

Q58 Nigel Griffiths: Are we right to have concerns that defending our shores with five ageing Type 42s is quite a tough order when we are replacing them with very much more capable Type 45s and eight of them to do this job?

Rear Admiral Lambert: No. The 42s, as you rightly point out, are ageing but they are still competent ships. What they cannot do is operate at the very top of the operational envelope.

Dr Tyler: I think one of the things you should also observe on page 11 in the graph there is that, aware of the situation with the continuation of our capability in AAW, we have actually used the overall stock of Type 42s, including those that we have taken out of service, and by managing them cleverly, we have actually managed to increase the readiness and availability of the Type 42s, so in actual fact, as we sit today, we are doing better than we were even a couple of years ago in terms of the overall readiness of that capability, and we would expect to sustain that until the Type 45s come into service.

Q59 Nigel Griffiths: On figure 13, pages 20 and 21, it is quite clear that, by not specifying or pricing all the requirements at the time of the contract, the Type 45 was at risk of cost growth, which we saw, and now that the Future Aircraft Carrier has had its contract let, have all the requirements been specified and priced to avoid that error? What steps have you taken?

Dr Tyler: The short answer to that is yes, and perhaps it is the moment to point to some of the direct pull-throughs in terms of acquisition management that have come about through lessons learned on the Type 45. You would find in the maritime area of the DE&S that there were a lot of the same individuals, including myself, who lived a lot of the Type 45 lessons firsthand and are now responsible for a lot of the acquisition strategy and technology strategy for the aircraft carrier. You will also be aware that, as we sit today, we have not yet committed to the final target cost for the aircraft carrier, and that is one of the principal lessons that we learned from Type 45, where we tried to cost the Type 45 capability at far too early a stage, where we could not have visibility of all the risks, and we have not perhaps been able to ensure we had costed up all of the various elements of that. We have been making very sure we have not fallen into the same trap with the CVF project.

Q60 Nigel Griffiths: So you now have in place a single overall view of the Future Aircraft Carrier?

Dr Tyler: Yes, absolutely, and it is shared absolutely between the MoD and industry, and again, another lesson pulled through from Type 45 has been intimate joint working with, in this case, our industrial alliance right from the very beginning so, rather than retrofitting it, as we had to with Type 45, late in the day, this has been the way of life from the outset on the Future Carrier project.

Q61 Nigel Griffiths: I am glad because paragraph 8 on page 6 does show the Type 45 project suffered from poor relationships with industry. What have you done to improve those relationships? How can you assure the Committee that that sort of poor communication and relationship is not continued?

Dr Tyler: As we said at the outset, one of the things that gave birth to the antagonistic relationship that developed with industry was the nature of the contract that we had with industry, coupled with the very poor estimating that we were all party to at the outset. We have restructured the whole contract now, which has made it a much more co-operative contract in the final stages of this project, where the company and the MoD are now working very closely in partnership. I can certainly give you some of the specific details of that if you are interested but the net result of that has been that we are now operating much more in a spirit of co-operation, with a single purpose and objective in mind, which is delivering these ships as quickly as we can to the Royal Navy, rather than, as we were previously, arguing about whose responsibility certain aspects of cost growth were.3

Q62 Nigel Griffiths: Given that the Department is now procuring half the number of ships originally planned, what implications does that have for the protection of the carriers?

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Sir Bill Jeffrey: The Admiral may want to say something. Our judgement is that first of all, we were only ever funded to acquire six or eight. The larger figure was, to quote Mr Touhig, aspirational, but the judgement now is, as the Admiral was saying earlier, that if we have six, we can deploy five at varying states of readiness for most, if not all, of the time and that this is a risk that is manageable, although the Navy will be working hard to find more and more innovative ways of managing it.

Rear Admiral Lambert: I think that sums it up well. We will do what we can on this important solution to try and achieve five for 100% of the time. Where we cannot achieve five, we will look at different ways of reducing that risk but I think that risk is reasonable and manageable.

Q63 Nigel Griffiths: If I read paragraph 4 right, the delays to the Type 45 have been costed at £195 million in terms of the calculation of extending the life of the Type 42 Destroyers but that this is not additional money; it is substitute money for the operating costs of the Type 45. What sort of calculations are you doing? Are you doing similar calculations to apply to the Invincible class of aircraft carriers at the end of their life?

Sir Bill Jeffrey: We are doing calculations of that sort because, as you will know, Mr Griffiths, there was an announcement before Christmas that we were now planning to deliver the aircraft carriers over a slightly longer time frame, and that is exactly the same issue. It is not that there is more spend overall; it is simply that the existing class needs to be supported for a bit longer and the new class for a bit shorter.

Q64 Mr Davidson: As I understand the position, this ship, when fully in operation, will be the highest capability in the world, having been built and launched on the Clyde, where, as you may have spotted, I am a Member. It is now, as I understand it, meeting all the deadlines that were anticipated and it is expected that will continue, as I understand it. Do you have any aspirations to sell this to anybody else? If not, is that because it is too complicated for anyone else to buy?

Sir Bill Jeffrey: I think if you spoke to senior management in the recently established joint venture between BAE Systems and BVT, as I did a few weeks ago, with the Chief Executive, they are very interested in the export market. This is high end capability, it also has some quite sensitive technology, but exporting from the UK industrial base is by no means out of the question.

Q65 Mr Davidson: One of the things we have discussed before when we have been looking at ways in which costs can be reduced is the question of export. There is the question then of whether or not the spec that we are providing to our own forces has been made in such a way that it can be, as it were, modularised, so that a lower spec on some elements can be provided. Has that been built into this?

Sir Bill Jeffrey: Not in terms but the thinking that you have just expounded is very much our current thinking. Our principal responsibility is to deliver military capability for the UK Armed Forces but what we ought to be doing more than I think we have is to work with industry on the exportability of what they are providing for us. If we do that successfully, we will reduce our own costs.

Q66 Mr Davidson: Is there evidence then that in this project exportability has been built in? It is something that has not been drawn to our attention so far.

Dr Tyler: I think there are two things here. One is whether or not you can take the Type 45 as it is presented today and sell that to country X or Y. That is probably unlikely because of the very high end capability of the ship and the fact that most of the countries that can afford that kind of ship have their own indigenous capability to build ships of that nature. What I think is more significant of Type 45 specifically are some of the enabling technologies that are being built into the ship, right across from the engines, the integrated electric propulsion technology, the missile system, the radar systems, the modular way in which we have constructed the ship, of which the company has learned an awful lot about constructing warships more efficiently. What the company would probably point to is a number of areas of the ship where they would seek to pull that forward into export business in the future.

Q67 Mr Davidson: But there is nothing firm? If we asked you in three years’ time, those of us who are still here, will you, do you think, be able to point to any examples where that has happened?

Sir Bill Jeffrey: I would hope so, because I think we are increasingly factoring ultimate exportability into our own procurement thinking. Many of our discussions with industry at the moment, including in the National Defence Industries Council, are around this question of whether, particularly in economic times like these, we can actually, in the current dialogue we are more regularly having with our suppliers, address the question of the extent to which they can build on what they have done for us to improve their own export prospects.

Q68 Mr Davidson: We are building six of these and, as I understand it, it was anticipated that as the drumbeat of orders rolled, costs would come down accordingly, so that had you ordered eight, you would be getting it for next to nothing. Are the costs falling in line with expectations?

Sir Bill Jeffrey: My experience of this business is that you never get anything for next to nothing, no matter how much of it you acquire. I think there is no doubt that, if we had acquired eight or more, the development costs would have been spread over a larger number of vessels and we might have benefited to that extent but, in the end, it was a judgement.
Q69 Mr Davidson: So as we are working our way through the six, have the cost savings that were anticipated been achieved?

Dr Tyler: Yes, if you look at the learning curve. There are two separate things here. One is the development costs, which you would expect to amortise over however many platforms you were going to build but, in addition to that, you would expect to see an efficiency, that each ship they do better than the one before because they are learning the lessons from it. What you would see from the curve, which I am afraid I do not have here but the Committee can be provided with it, is that that learning curve has flattened off, which is really indicating that they have derived most of the benefit of their learning advantage by the time they have got towards the back end of this class. We are certainly reaping the benefit of that in the latest ships in the class.4

Q70 Mr Davidson: Will any of the lessons learned as we roll out these six be carried over to the carriers?

Dr Tyler: Absolutely, and, perhaps even more pertinently, into the Future Service Combatant, which is obviously an escort-type vessel and therefore more analogous to the Type 45 Destroyer.

Q71 Mr Davidson: It is realistic to look at those three sets of ships, as it were, as a continuum?

Dr Tyler: Yes, absolutely.

Q72 Mr Davidson: So as we continue to look at this in future years, will we be able to see that there are continuing cost savings?

Dr Tyler: I can give you two examples at opposite ends of the spectrum. At the high-tech end, the integrated electric propulsion, the architecture for that has effectively been pulled straight through into the carrier, and we expect to pull it straight through into the Future Service Combatant. At the more prosaic end of the spectrum, look at the modular fits of cabins on the Type 45, which has been a real boon in the way the ship has been built. Again, we are pulling forward that build methodology into the carrier, making some improvements as we do so, and we would expect to see that pulled directly into the Service Combatant programme.

Q73 Mr Davidson: So it is realistic for us to expect that all the costs and time targets for the carrier will be met in the same way?

Sir Bill Jeffrey: There is a better prospect that they will be, because much of the technological heavy lifting, if you like, has been done by the Type 45 programme and we have made a great deal of progress in delivering it. As Andrew Tyler says, the process of improving the technology will not end but it will be easier, both for that reason and because we believe we have a better commercial arrangement with our suppliers.

Q74 Mr Davidson: I want to follow on one of the points that Mr Touhig made, and that was about the project management role. One of the issues that occurred to us was that, because you generally move people around fairly quickly, partly for promotion, anybody who is staying in a project management role for a long period of time is, perchance, missing out on opportunities and therefore that is a deterrent for somebody to take that sort of function. How do you deal with that?

Dr Tyler: We are becoming very alive to this issue. There is no question about it. Our response to it is to be far more proactive in the management of careers of our senior project managers. In fact, only this morning I was having a conversation about what I call the “managed move” of a very good project manager who has just finished the delivery of a major project inside the MoD. What I am doing is ensuring that he is going on to his next job in a seamless manner and it is a job that is going to fit his career and give him extra skills and develop his career on to the next level. So we are being far more proactive about managing careers so that people do not see it as a disadvantage, getting stuck in a project and missing out on their career path.

Q75 Mr Davidson: One of the points that you mentioned was the modularisation of accommodation, and I think we were all impressed by the contrast between the Type 45 accommodation and the Type 42. It really is night and day. In terms of what that means for retention of staff, do we yet have any indication that that is likely to make the retention of and recruitment of staff any easier?

Sir Bill Jeffrey: I think it undoubtedly will. I had the sense when I visited HMS Daring myself, just talking to people, that there was enthusiasm about living in better conditions than their predecessors had done, or even they themselves have done. I do not think we have anything scientific to point to but we are quite confident that it will help to retain people.

Q76 Mr Mitchell: This is a very sophisticated piece of technology, which, clearly, the Committee—and I was not there—were very impressed with. Can you tell me why we need such technologically sophisticated stuff? After all, it is more expensive, and the chief role is to deliver platforms of power, firepower particularly, quickly at trouble spots that could be better performed if we had cheaper, and more of them, Destroyers.

Sir Bill Jeffrey: This is the Admiral’s specialist subject!

Rear Admiral Lambert: When we invested in platforms such as carriers or our amphibious ships, we have to make sure that they get the degree of protection they need. I think we have seen, in the current conflicts, that when the Army has been ashore and they have been operating in places like Basra, there are all sorts of threats that have come in, and we have had to ensure the protection of our forces with more and more sophisticated equipment because the enemy is always quite good at finding ways round. When we look at how we protect the
carriers or our amphibious ships, we need ships like the Type 45 to protect against what the Chairman was talking about earlier, the sea-skimming missiles which are widely available, you can procure them quite easily, and the Type 45 will reduce the threat to those platforms which can do that power projection.

Q77 Mr Mitchell: Who are we going to use them against? So far as I remember, the only major naval engagement we have been having in the last few years is ramming Norfolk Island. You are not saying that pirates will be equipped with these kinds of missiles? We must be investing in this kind of technology with a view to conflict against some high-technology power?

Rear Admiral Lambert: The sea-skimming missiles can be fired from ashore, they can be fired from the air or they can be fired from the sea, and what we envisage is that we will give the capability to this country so that we can deploy our forces around the world without having to worry about which nation may decide to fire missiles at us.

Q78 Mr Mitchell: I can see the point of protecting the forces, our Army or whatever, but I cannot see the point of investing more and more in protecting more and more technology. These Destroyers are going to be protecting two aircraft carriers, which are highly sophisticated, that we do not yet have. You are going to tie up a large capacity, the bulk of the capacity of the Navy, in protecting other parts of the Navy.

Sir Bill Jeffrey: If I could make a couple of points, Mr Mitchell, the first is that this is capability that we will be using for several decades. This is looking a long time into the future, where the prospective enemies are by no means clear. That is what defence capability, in the end, is about. The other is that, as a matter of fact, the pirates off the Horn of Africa are beginning to develop some quite sophisticated capability, so I do not think we should neglect that. The third point I would make is that the Type 45 does more than perform the air defence role. As those of you who saw it will have appreciated, this is a vessel which is capable of delivering up to 60 deployed troops in the Sierra Leone type eventuality, for example, so it is multipurpose and is about quite a bit more than air defence.

Q79 Mr Mitchell: If you are protecting more and more technology with more and more technology, you are going to reach a situation where the Navy’s ability to respond to small flare-ups and little situations is going to be drastically limited. If you send the aircraft carriers you have to send the destroyers. If you do not have quite enough destroyers to protect the aircraft carriers, therefore your responsive power is going to be less.

Sir Bill Jeffrey: It is certainly the case that the maintenance of military capability depends on a judgment at some point in the future. You might have to use it.

Q80 Mr Mitchell: You cannot tell me you are exercising a judgment when you do not know who you are going to be fighting.

Sir Bill Jeffrey: That is what Ministries of Defence spend a lot of their time doing, thinking as well as they can into the quite long-term future. These are investments right through, as this Committee was observing when we discussed the nuclear deterrent, to the middle of this century. In that strategic environment it is hard to be confident that we will not face threats of the kind that would need as sophisticated equipment as this to respond.

Q81 Mr Mitchell: The Principal Anti-Aircraft Missile system, PAAMS, worries me because it is one of those European cooperation things which always overruns, proves expensive, slow and is always behind schedule. Why could you not buy that sort of system off the shelf from the Americans?

Sir Bill Jeffrey: What we have been doing is to work with the complex weapons industry, which is a mixture of European and other companies, to try to develop a partnership with them which will save cost over time.

Dr Tyler: Although the PAAMS system has been one of the contributing factors in some of the cost and time slippage in growth on the programme, it has also been hugely beneficial for us to be able to defray the not small development cost across three nations. There is also benefit in the longer term within the support environment.

Q82 Mr Mitchell: Are you telling me it would not be cheaper to buy a system from the Americans?

Dr Tyler: I am honestly not sure it would be cheaper. I do not have the specific numbers to hand. I am certain that when we first came to evaluate the capability those calculations were done and those comparisons were made because that is the way we go through our balance of investment decisions at the outset of a programme.

Rear Admiral Lambert: That is the normal process. We would have compared the costs against other systems that were available worldwide.

Q83 Mr Mitchell: The fashion now in defence contracts is not to buy from the Americans who are cheaper but to involve some complex European deal which makes it more expensive and slower.

Rear Admiral Lambert: We do look at the whole life cost, not just the initial cost of procurement. Quite often when one looks at whole life cost figures compared with the headline figures of what you can buy on the open market or from elsewhere, we believe that we are getting best value for money.

Q84 Mr Mitchell: We hope. Knowing the propensity for a European deal—French, Italian, a bit here and a bit there—to go wrong and to prove more expensive, why did you accept responsibility for delivering the key equipment and leave yourself open to claims for compensation when it was not delivered?

Sir Bill Jeffrey: I am not sure if I follow the question.
Q85 Mr Mitchell: Table 13, page 20, says, “The Department was responsible for delivering key equipment which left it open to claims for compensation if these were delayed.” Key equipment was PAAMS and it was delayed. It was more expensive.

Sir Bill Jeffrey: I think that goes back to one of the weaknesses which we have acknowledged in the original contract with BAE Systems. It left us vulnerable to the costs that arose, when other elements of the capability slipped in time, being transferred to us. It does not bear on the wisdom or otherwise of acquiring PAAMS for the Type 45.

Q86 Mr Mitchell: It says also on page 21, “The project team has better technically qualified staff. The team responsible for managing the procurement of PAAMS continues to have staff shortages.” You not only have a system which is inherently going to be late and delayed; but the team supervising it has staff shortages.

Sir Bill Jeffrey: I do not know whether these staff shortages are significant enough to be a concern. If Dr Tyler does not either, we ought to provide the Committee with a note on that. My recollection is that it is short of where it would ideally be, but certainly is not preventing us from managing the PAAMS project successfully.5

Q87 Mr Mitchell: You have been able to vary the contract on the destroyers and cut it down from 12 to six. It says on page 23, “The two PAAMS contracts for development and production still need to be adjusted to mirror the new delivery schedule . . . ” and it says that it is difficult to modify those contracts because they are European contracts.

Dr Tyler: It is not so much the difficulty of modifying the contracts in an absolute sense, it is the time it takes to do it. Sometimes we have, it is fair to say, suffered local area agreements between effectively executing a new plan and getting the thing regularised through the contracts. In the past when we have had to do that, it has not been a problem in the long run but there is some bureaucracy involved in getting those contract changes made. We have been down that path several times before.

Sir Bill Jeffrey: There is no doubt that these projects that are delivered with a number of other partner nations do give rise to this sort of issue. It just has to be managed. If you are delivering something collectively with other European countries in particular, at best there is a prospect of making cost savings by doing it collaboratively but it does throw up this sort of issue that does need to be managed.

Q88 Mr Williams: We are told by the NAO that the reduction in the number of destroyers means that you will only have the optimal availability for two-thirds of the time you envisage needing it. Is that correct?

Sir Bill Jeffrey: We believe we can do better than that and we certainly believe that there will be none of the time when—

Q89 Mr Williams: So you will get it down to 25%. What is the risk in that 25%?

Rear Admiral Lambert: As I tried to explain earlier, what we are trying to do is to mitigate that risk, to reduce it to an absolute minimum. We will do it in several ways. One is by increasing the support solution and, secondly, looking at how we can mitigate it by what we put onto the future surface combatant. It is all part of the risk mitigation.

Q90 Mr Williams: You are not answering my question. What is the military risk in that time when you have less than ideal coverage? You must have evaluated it.

Rear Admiral Lambert: I do not want to give a probability of risk because the Navy will change some of their tactics, techniques and procedures to cover that risk.

Q91 Mr Williams: Unless you know the probability you do not know what changes you need to make, do you? That is self-evident, is it not?

Sir Bill Jeffrey: It is a question of degree. There is no doubt that if there are four ships available then the prospect of a successful attack is that much higher. It is hard to quantify and, as the Admiral says, the Navy’s purpose will be to use all the tactics and techniques at its disposal to mitigate any risk that does arise.

Q92 Mr Williams: You mean you are going to juggle and hope. That is what it boils down to.

Rear Admiral Lambert: We have looked at the probability of survival of the task force in a number of scenarios using our current procedures. Using those, we believe that we need five ships available. If we only have four, as you rightly point out, the probability of survival of all the elements that we require for success will change. We need, therefore, to change some of the tactics and techniques to reduce that risk to an absolute minimum.

(The Committee suspended from 5.39pm to 5.45pm for a division in the House)

Q93 Mr Williams: We have established the fact that you have what I describe as a policy of juggle and hope and that is in the state of the present technology. You are assuming advances in technology on your side but there are going to be advances in technology in missiles. You have the Chinese with massive investment in cyber warfare. All this is going on over the years while we are waiting for this project to become available. Is it not highly likely by then that it will be considerably out of date?

Sir Bill Jeffrey: I do not think so. As came out of the earlier discussion, one of the strengths of this platform is that it is continuously improvable. You are absolutely right, the threat is changing all the time. The cyber threat is something in particular that

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we are taking very seriously. As the threat changes, there is the prospect on a flexible platform like this to respond to that threat and to incrementally improve it.

**Q94 Mr Williams:** In that case, you must be anticipating you may need to revise your budget at some time in the future as well. We cannot look at it on the basis of present projections, can we, if you are anticipating the possibility to build in technology which you are not even conscious of at the moment?

**Dr Tyler:** What we would expect to do is to incrementally develop a ship over its lifetime through new projects. The cooperative engagement capability is a good example of that, which Admiral Lambert explained is a separate project, costed separately. Those new capabilities will come, as you rightly observe. The threat environment over 30 years is bound to change and we would expect the ship to grow its capabilities over time with new projects added in due course. That is exactly what has happened with the other ships in the fleet.

**Q95 Mr Williams:** What worries me is that when you look at the experience with this contract, you knew that you were going to develop a system based on 80% new kit, untried, unproven technology. We now know that you may need in future to alter it again. Why did you not identify at the outset, knowing what you did about the nature of the project, that it was going to be a high risk project in managerial terms as well?

**Sir Bill Jeffrey:** I know I am here to account for the whole of the past as well as the recent past, but I do not know from direct experience. All I would say is what I said earlier. We clearly underestimated the degree of the technical challenge and the difficulty that our suppliers would face in meeting it.

**Q96 Mr Williams:** Having got into that situation, you then entered into a fixed price contract. When so many of the elements had not been specified or priced, was it not a devil of a risk going for a fixed price contract?

**Sir Bill Jeffrey:** It was. I think that is one of the key lessons that have been learned in recent years. Particularly in this sort of sector, where there is not a natural competitive market and there is in practice within the country a single supplier, getting a fixed price that looks like a good price is not necessarily a good outcome. We would not do it that way now.

**Q97 Mr Williams:** Is the likelihood that you are not getting a good price because they from their side, seeing a fixed price contract and knowing about the vulnerabilities we have already talked about, will have built in an insurance margin to make sure they cannot make a loss? Is not the likelihood that you are being fleeced if it is going well?

**Sir Bill Jeffrey:** It is not so much that we are being fleeced as that there is a misjudgment on both sides.

**Q98 Mr Williams:** How can you prove to us that you are not being fleeced by the nature of the contract?

**Dr Tyler:** The nature of the contract is such that we have absolute and total visibility of the contractor’s costs and, indeed, the profit that the contractor is making on the project. We can get visibility of that under the contracting environment that we are operating in.

**Q99 Mr Williams:** If you have a fixed price, you have a fixed price.

**Dr Tyler:** The contract we have now on Type 45 allows us total, open book visibility because we are now in a contracting environment where we are working jointly to bring this project to a successful conclusion finally. We now have an open book environment where we can see the progress the contractor is making. We have full visibility of their schedule, their costs incurred and, indeed, the profit made and we have an incentive scheme that incentivises the contractor to do well. If the contractor does do well, they will earn more profit but also in doing well they will pass money back to us.

**Q100 Mr Williams:** It was you who used the term “trap” a little earlier in one of your answers. That embodied what I suspect you may have got yourself into. What assurance can you give us that we will not have you back here in two years’ time either asking for more money or, having asked for more money, you telling us that they made higher profits than we might think appropriate?

**Dr Tyler:** We have two things on our side now. We have a very high degree of knowledge about the project. The fact that you were able to go to sea on the ship last week is testament to the degree of maturity the project has now realised. The confidence I would have in addition to that is the fact that all of the milestones over the last two years have been hit in terms of the production of the new ships. That gives me a lot of confidence. The other thing is that the new contracting environment that we are operating in gives us this openness and visibility that we did not have previously. Therefore, we would be able to see very quickly if things were not working
out and over the last two years since we renegotiated we have been getting all of the right information and confidence that the project is going according to plan.

Q101 Mr Williams: With hindsight, we can see that much of your trouble has arisen from the situation where the project team was not suitably qualified at the outset.

Dr Tyler: I do not think that is necessarily the case. We have made a lot of mistakes. I would not have said that the skills of our personnel at the outset were necessarily in doubt. The mistakes were not related to personnel but to the contracting environment that we established and the fact that we tried to secure a fixed price far too early in the proceedings.

Chairman: Thank you. That concludes our public session. We will now go into private session.

Supplementary memorandum from the Ministry of Defence

Question 31 (Mr Touhig): about the lessons learned from the Type 45 project, and how we propose to transmit those lessons to the Department

Lessons from the Type 45 procurement are being applied in future programmes on a number of levels. For example, on the Future Carrier and Future Surface Combatant programmes the lessons being applied include:

— Reduced technology risk. Type 45 had 80% of its equipment new to service whereas the Future Carriers (Queen Elizabeth class) and Future Surface Combatant (FSC) have reduced technology risk through pull-through of equipments already proven in the naval environment (for example, the command management system, electric propulsion and long range radar from Type 45). The FSC project is also using the Type 23 upgrade programme to de-risk the small number of new developments.

— Greater design maturity ahead of manufacture. The level of design maturity achieved for the QE Class ahead of Main Gate Approval and the start of manufacture has been much greater than Type 45 at the equivalent stage which minimises subsequent change and cost.

— Solution (rather than performance) based specification. The Type 45 ship contract was initially based on a Performance Specification, where the contractor bears the risk of ensuring that the design solution delivers the specified performance. Contracting for a design solution has reduced uncertainty in the true level of risk carried by industry (and hence unnecessary contingencies), empowered the MOD project team to manage capability requirements more effectively and enabled savings through the use of appropriate standards.

— Relationships with industry based on joint working. We are developing open relationships with industry (such as those enabled by the Aircraft Carrier Alliance Agreement or the BVT Heads of Terms) that allow us to draw on the strengths, resources and expertise of all parties, provide more effective ways to manage risks and exploit opportunities and promote ‘best for project’ behaviours.

— Improved incentives for industry. The original Type 45 ship contract was Fixed Price which encouraged Industry to seek claims for variation in the price due to changes in the specification or due to lateness in the delivery of equipment supplied by the MOD. This was changed to a Target Cost Incentive Fee arrangement 2 years ago where both the Contractor and MOD benefit from keeping the project on schedule. Building on the success of the last two years of Type 45 manufacture, we are improving the incentives on industry to increase efficiency in pursuit of higher profits.

— Project controls based on ‘open book’ sharing of data. A common (MOD/industry) understanding of the QE Class/FSC projects is being achieved through shared schedules, risk registers, cost models, joint working and ‘open book’ accounting.

— More flexible support solutions with Fleet-wide coherence. We are developing flexible and cost-effective support arrangements for legacy RN vessels through the Transforming Surface Ship Support Programme. Both FSC and QE Class projects will align their support solutions with this emerging framework to gain early commitment for support from the supply chain.

Questions 44–45 (Mr Bacon): about the recruitment of a specialist for work on PAAMS costing

In November 2008 the Department appointed a dedicated member of staff to work with BVT to fully understand, verify and where necessary challenge the Type 45 Support cost data used in the Integrated Cost Model. Additionally, and specifically for the weapon system support cost data, the programme team managing PAAMS has recruited an expert from the MOD Equipment & Support Continuous Improvement Team who specialises in delivering, with programme teams, optimised support solutions.
Question 61 (Nigel Griffiths): about what we done to improve relationships with industry in this project

The review that led up to the renegotiation of the Type 45 ship contract in 2007 was conducted jointly with industry (BVT), resulting in agreement on how to take the programme forward. This joint review provided the foundation for the transformed relationship that exists today. Critical to the improvements in the relationship, and of the management of the programme more generally, is the current commercial framework where industry is incentivised to work with the Department to deliver Type 45 on or ahead of schedule. This is enabled by the use of project controls based on “open book” sharing of key programme data, such as schedules, risk registers, and cost models, which is jointly reviewed by the MOD programme team and industry at monthly meetings.

All of the above has been underpinned by an important cultural change through the adoption of a “Joint Working” philosophy between the MOD programme team and industry. This has been developed over two years and is built around a collaborative approach to delivery, with a greater emphasis on sharing information and joint decision making. This includes eliminating “man-for-man marking” and the establishment of joint collocated MOD/industry teams, led by the MoD but responsible to both the company and MOD, working from the same office.

Ultimately, these initiatives have rebuilt a previously confrontational relationship into an open and transparent one able to deliver challenging milestones.

Question 69 (Mr. Davidson): about the achievement of anticipated cost savings

“Learner curve” savings across the six ships that were anticipated at the renegotiation of the programme in 2007 are being realised. The First of Class, HMS Daring, the only vessel accepted off contract to date, was delivered using approximately 25,000 fewer ship build man-hours than anticipated. The latest forecast “Learner curve” (see below) shows ship build man-hour savings of 33%, 35%, 40%, 42% & 43% for ships 2 to 6 respectively when compared to the First of Class. This equates to a forecast saving of over £1 million ship build man-hours between ship 1 and ship 6. “Learner curve” forecasts traditionally only consider production man-hour elements and not other activities such as equipment costs and test & trials activities. When all factors are considered the forecast cost saving between the first and sixth ship, excluding PAAMS, is £170 million.

Forecast Learner for Type 45 Ship Build (Man-Hours)

Question 86 (Austin Mitchell): about staff shortages in the team responsible for managing PAAMS

In the last six months a number of additional posts have been created to increase capability in the team responsible for managing the PAAMS programme. These new posts are in the Commercial and in-service support area. The PAAMS commercial team is now fully staffed and the most senior post in the in-service support team has also been filled. We are currently recruiting staff to fill the few vacant new posts, and we expect this process to be completed in a matter of weeks.

April 2009