



House of Commons  
Committee of Public Accounts

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# Delivering Carrier Strike

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to the report*

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## Summary

Carrier Strike is central to the Government's plans for Britain's future defence. It incorporates two Queen Elizabeth class aircraft carriers, new F-35 Lightning II jets and a new radar system—Crowsnest. The defence budget is very strained in the light of commitments made in the last Strategic Defence and Security Review. Carrier Strike is expensive, and despite the Ministry of Defence (the Department) assuring us that it will manage costs, there is a threat to the future of other programmes if it goes over budget. In addition, there are aspects of Carrier Strike that still need to be fully costed as the three elements come together. For the Department to secure value for money from its significant investment in this long-term capability, it will need to ensure that the carriers and jets can be fully and flexibly used alongside other military equipment, and can be upgraded to keep pace with technological advances. The Department must also seize opportunities to bring high-tech and skilled jobs to the UK by securing further global support contracts for the Lightning II jets. Completion of transformation within the Defence Equipment and Support organisation (DE&S) is key to ensuring it has the necessary commercial skills and capabilities, and is well placed to win such contracts.

## Introduction

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The Ministry of Defence (the Department) is buying two new aircraft carriers, a fleet of new Lightning II jets and an airborne radar system called Crowsnest fitted to Merlin helicopters. Deploying a single carrier, a squadron of jets and Crowsnest is referred to as Carrier Strike. The Department expects to spend over £14 billion on this equipment up to 2021, when Carrier Strike is to be first used in military operations. Between 2021 and 2026, the Department will then introduce the second carrier and more jets, and complete trials and training to enable the carriers to undertake a range of roles such as acting as helicopter carriers or transporting troops. This represents the full Carrier Enabled Power Projection capability.

The Department is planning for the carriers and jets to be in use for 50 and 40 years respectively, and the Government considers they will form a significant part of its response to changes in global security. The previous Committee reported on Carrier Strike in 2013, concluding that the Department faced major challenges around the affordability of the programme. In November 2013, the Department re-baselined the contract, agreeing a price of £6.212 billion for both carriers with the manufacturing consortium, the Aircraft Carrier Alliance. The Carrier Strike programme is a very high priority for the Department and we expect to return to it as the programme progresses towards being operational in 2021.

We initially took evidence from the Department on 11 October 2017. We subsequently wrote to the Department with some follow-up questions, but the Department's written response was unsatisfactory. We therefore recalled the Department to give further evidence on 4 December 2017. As part of that recall session, we also took evidence from the outgoing Chief Executive of the Defence Equipment and Support Organisation about lessons from his time in office.

## Conclusions and recommendations

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1. **Value for money will only be achieved if the carriers are flexibly and fully deployed.** Re-introducing a Carrier Strike capability represents a very significant investment for the Ministry of Defence (the Department). The carriers will offer greater flexibility in how the Government can respond to global events, support the UK's political influence, and enable cooperation with allies. They will also fundamentally affect how the Navy operates, and incur significant operating costs. The Department has choices as to how it utilises Carrier Strike and is undertaking modelling to look at the cost of these options. The decisions it makes are likely to require some compromises because of the available budget, equipment and personnel. Given the significant investment, it will be important that the Department can demonstrate that the carriers are being used to their full potential, and able to be deployed flexibly alongside a range of other military equipment. However, concluding definitively on the value for money of Carrier Strike, as for other military capabilities, is difficult because the benefits cannot easily be quantified. To maintain value for money over the life of the carriers and jets, the Department has sought to future-proof the designs so that they can be upgraded in light of technological advances. Predicting future changes is inherently difficult and the Department will need to continue to develop the equipment over time. It believes that budgets are sufficient to enable the capability to evolve to the point when the budgets end in 2026.

**Recommendation:** *In firming up its plans, the Department must ensure they are designed to use the carriers flexibly and to the fullest extent possible in order to secure value for money from the investment. We will continue to monitor this.*

2. **Changes in the naval fleet and the availability of other vessels at particular times may limit how the carriers can be used.** The carriers will not be used on their own. Depending on what they are tasked to do, they will be supplied and protected by other warships, submarines, helicopters and other equipment. The Department told us that the first carrier would be modified to allow it to provide air and helicopter support to amphibious operations. However, the carriers would not themselves be used to launch amphibious craft. We are concerned to hear speculation in the media about the future of the current amphibious ships. We were told a review is underway, but welcome the Department's confirmation that there were no plans to take them out of service. Changes are also planned to the fleet of frigates, with the new Type 26 replacing the fleet of Type 23s currently in service. These vessels perform an anti-submarine role that is necessary to support the carriers in use. The Department recently signed a contract to buy an initial tranche of Type 26s, the first of which is expected to enter service in 2027. The Department told us that it was confident that a capability gap would not emerge between the Type 23s being retired and the Type 26s coming into service, which could limit use of the carriers.

**Recommendation:** *In the event of unforeseen events in the manufacture of the Type 26 frigates creating a capability gap, the Department should write to the Committee setting out how it will manage the impacts.*

3. **There are a number of technical issues with the jets, which may delay operation of Carrier Strike.** The Government has sought to influence the design of the jets by a close relationship with the US government, from whom the UK is buying the jets under a memorandum of understanding. The UK contributed \$2 billion to be a Tier 1 partner and so have influence over the design as well as be part of the testing process. There have been a number of independent reports of technical problems with the jets. The Department asserted that the level of technical challenge with the jets is normal when compared to other aircraft, and considerable progress has been made in many areas reported on. In response to the specific concerns we raised, the Department told us that although the test jets were overweight, they could land vertically on the carriers. The Department also dismissed concerns regarding the size of the computer memory of the jets. As the design phase of the jets comes to an end, currently planned for 2019, so does the UK's Tier 1 status. At that point, the UK will become a 4.5% shareholder in the Lightning II programme, reflecting the number of jets ordered by the UK out of the total planned production.

**Recommendation:** *The Department should set out how it plans to maintain its influence on the US Lightning II programme after 2019, for the purposes of ensuring that the jets purchased fully meet UK needs.*

4. **There is uncertainty over some support and operational costs, which are not fully included within current budgets.** The Department stated that the cost of procuring both carriers, 48 jets and Crowsnest radar system are fully included within the defence budget. It gave a commitment that the carriers will be delivered within the approved cost of £6.212 billion, despite projected cost growth of between £62 million and £124 million (1% to 2%). For the jets, the most recent approval was for 30 at a cost of around £3 billion, equivalent to £100 million each, although the Department's estimate of the whole life cost to 2048 of each jet was £270 million. The full cost of the remaining 90 jets is less certain because the Department is still to decide when it will buy them, and whether they will be used for Carrier Strike. There is less certainty regarding the costs of supporting and operating Carrier Strike because the Department does not yet have experience of using the equipment, and the Department is undertaking modelling work to assess these costs under a number of different scenarios. This work is crucial given the need to integrate the routine use of the carriers with wider defence responsibilities at a time of constrained finances. We note also and completely agree with the Defence Committee's recent call for greater transparency around the total cost of the Lightning II jets.

**Recommendation:** *The Department must develop its estimate of the costs of supporting and operating Carrier Strike and we will expect more detailed estimates when we undertake a follow-up inquiry.*

5. **The Department is exposed to significant cost pressures in the event of changes in foreign exchange rates.** Buying the jets in US dollars means that they are sensitive to fluctuations in the exchange rate. The Department's current estimate of the cost of the programme is based on a rate of \$1.55 to £1, although in October 2017 the rate was \$1.32 to £1. The Department has sought greater certainty on the cost of the programme by using a three-year programme of forward purchase currency contracts with the Bank of England. The previous Committee recommended that the Department works with Treasury to resolve whether it was required to fill a

funding gap created by differences in exchange rates, or if Treasury would provide relief. We heard that discussions with the Treasury were still ongoing and that, to date, the Department is managing costs pressures within its programme budget.

**Recommendation:** *The Department should urgently resolve ongoing discussions with the Treasury regarding current forward contracts. Given the Department's tight financial position, the Department should establish with Treasury if relief can be provided, and write to the Committee with an update.*

6. **In line with the Government's new Industrial Strategy, the Department must continue to improve its commercial capabilities so that it is well placed to secure additional support contracts and bring high tech and skilled jobs to the UK.** UK industry is set to benefit from a 15% share of build of the jets, the largest share of any partner after the US. This is estimated to be worth some £13 billion to British companies. The UK economy will also benefit from securing international contracts let by the Joint Program Office to support the jets worldwide. The UK has already been successful, securing a contract to be a global repair hub providing maintenance, overhaul and upgrade services for F-35 avionics and aircraft components for European-based aircraft. Further opportunities are expected which could bring additional high tech and skilled jobs to the UK. The UK's chances of winning future contracts will be strengthened by the successful completion of Defence Equipment and Support organisation (DE&S) transformation. The outgoing Chief Executive told us that DE&S was improving its skills and capabilities, but he also recognised that it will take time to complete transformation. DE&S will need to build on recent improvements on the terms secured in contracts and encourage competition and innovation wherever possible, as well as fill gaps in key roles such as programme managers and other commercial staff.

**Recommendation:** *The Committee will in future hold the Department and Defence Equipment and Support Organisation to account for its progress on improving skills and capabilities, including how they are making the most of DE&S's bespoke trading agency status to recruit and retain the staff it needs.*

# 1 Delivering the capability

1. On the basis of a report by the Comptroller and Auditor General, we took evidence from the Ministry of Defence (the Department) on Carrier Strike.<sup>1</sup> We initially took evidence from the Department on 11 October 2017. We subsequently wrote to the Department with some follow-up questions, but the Department’s written response was unsatisfactory. We therefore recalled the Department to give further evidence on 4 December 2017.<sup>2</sup> As part of that recall session, we also took evidence from Tony Douglas, the outgoing Chief Executive of the Defence Equipment and Support organisation, about lessons from his time in post.

2. The Department is buying two new aircraft carriers, a fleet of new Lightning II jets (also known as ‘F-35s’) and an airborne radar system called Crowsnest. It plans to deploy a carrier, a squadron of jets and Crowsnest—collectively referred to as Carrier Strike—for the first time in 2021. This will be an ‘initial operating capability’ where Carrier Strike can be used on operations, but with some limitations. Between 2021 and 2026, the Department plans to further develop Carrier Strike, introducing the second carrier and more jets, and completing trials and training to enable the carriers to undertake a range of roles, for example, acting as helicopter carriers or transporting troops. This represents the full ‘Carrier Enabled Power Projection capability’. The schedule to achieve this is tight and leaves little room for any delays.<sup>3</sup>

3. The Department expects to spend over £14 billion on the Carrier Strike programme to the end of March 2021. This figure includes the build costs of the carriers of £6.212 billion, £5.8 billion on the programme to buy Lightning II jets and £0.3 billion for Crowsnest. It has also forecast additional support and other costs at £2 billion.<sup>4</sup>

## Value for Money of Carrier Strike

4. The Government sees its new aircraft carriers as central to the UK’s future defence strategy and symbolic of the country’s standing internationally in the coming decades.<sup>5</sup> The Department told us that the carriers afford a “degree of flexible strategic military and diplomatic presence for the UK”, which it has lacked since the retirement of the last carrier in 2010. They will allow the UK to deploy a Carrier Strike capability almost anywhere in the world. Carrier Strike will have a number of roles in the event of escalation of a crisis, from what the Department called “strategic messaging” to an opponent, providing humanitarian assistance, through to “delivering military effect” and war-fighting including alongside allies. The carriers also provide the ability to embark a large number of helicopters or troops. The Department told us that it wanted Carrier Strike to have “maximum utility”, given the size of the defence budget.<sup>6</sup>

1 Report by the Comptroller and Auditor General, [Delivering Carrier Strike](#), Session 2016–17, HC 1057, 16 March 2017

2 Q 153; [Correspondence with Ministry of Defence](#), 20 October 2017

3 [C&AG’s Report](#), paras 1.2–1.3, 13, Figure 2

4 [C&AG’s Report](#), Figure 7

5 [C&AG’s Report](#), para 1.4

6 Qq 16–17, 60, 84; [C&AG’s Report](#), para 1.4

5. The Department is now managing the transition from the build phase of the programme to planned first use of Carrier Strike in 2021 and routine deployments from 2023. Carrier Strike is being introduced at a time of resource constraints and will require the Navy to change fundamentally how it operates and make judgements on priorities.<sup>7</sup> As part of its planning, the Department is modelling the cost of the carriers, varying how often they are deployed, for how long, and the number and type of embarked aircraft. This work has identified that it is impossible to satisfy all demands for the capability all the time, based on the current level of equipment, budget and personnel planned.<sup>8</sup>

6. We asked whether the Department has considered value for money of the capability. It told us that it was inherently difficult to determine value for money of military effect and it is not normally assessed in numerical or financial terms. However, the Permanent Secretary had no doubt that the projection of British influence and power across the globe would be significantly enhanced by having the carriers.<sup>9</sup>

7. We also questioned the Department on how it was future-proofing the capability. The Department told us that the ships were designed with a large amount of additional space and power, and were fully networked with fibre-optic cables to allow for future development. It was also looking 20 years into the future, and considering the implications of innovative technologies such as unmanned systems. The Department told us that it was confident that budgets to 2026 were sufficient for the future development of the capability as far as it could “realistically foresee”. However, the carriers and jets will have a much longer life and the Department will need to decide how to develop further the capabilities in the future.<sup>10</sup>

## Carrier Strike and other defence capabilities

8. The Department cannot use the carriers on their own. Depending on what they are being tasked to do, warships, submarines, helicopters and auxiliary ships will be deployed alongside to protect and re-supply them. They will also be used alongside the UK’s allies, and the Department told us that when it comes to war-fighting, in most cases, the UK will not be operating alone. The exact requirements for support to the carriers will remain uncertain until the Department has completed its operational planning.<sup>11</sup>

9. While the Department has flexibility in what other equipment is deployed alongside the carriers, the Type 23 frigates are required for anti-submarine support.<sup>12</sup> It recently signed a contract to buy three of the eight planned Type 26 frigates to replace the Type 23s, which are due to come out of service from 2023 onwards.<sup>13</sup> The Department told us that the roll-out of the Type 26s has been scheduled precisely in line with the Type 23s coming out of service, so that there would be no gap in anti-submarine support to the carriers. Industry is incentivised to deliver the ships to schedule.<sup>14</sup>

7 [C&AG’s Report](#), paras 1.1, 1.8, 1.14–1.19

8 [C&AG’s Report](#), paras 1.18–1.19, Figure 4

9 Qq 62–65

10 Qq 37, 66, 72–76

11 Qq 17, 18

12 [C&AG’s Report](#), para 1.9

13 National Audit Office ([DCC0001](#)), para 16

14 Q 197

10. In response to widespread speculation in the media concerning the withdrawal of the UK's amphibious ships, we asked the Department what role the carriers would have in amphibious operations. It told us that this would depend on the operation. The carriers are not designed as bespoke amphibious ships but were designed to have a significant role in amphibious operations by providing air support, both by fixed-wing and rotary-wing aircraft, and could deliver troops to the shore by air. It had developed plans to optimise HMS Queen Elizabeth (the first carrier) with communication systems for amphibious operations, improving services aboard for Royal Marines, and other modifications.<sup>15</sup> The Deputy Chief of Defence Staff confirmed at our follow-up session on 4 December 2017 that there were currently no "submitted plans" for the two current amphibious landing craft, HMS Albion and HMS Bulwark, which have out of service dates in the 2030s, to be withdrawn earlier.<sup>16</sup>

## Lightning II

11. As a Tier 1 partner in the US-led Lightning II programme, the UK has contributed \$2 billion towards the early development costs of the jets.<sup>17</sup> The Department told us that its contribution has secured important influence on the design of the jets at a price that had not changed.<sup>18</sup> This influence had helped ensure the jets can carry UK weapons.<sup>19</sup> We asked the Department how the UK will continue to have influence when we lose Tier 1 partner status in 2019. It responded that the original investment has secured the UK's position inside the US-based Joint Program Office (JPO) managing the programme.<sup>20</sup> It also believed that membership of the programme's Joint Executive Steering Board, and the signing of an agreement in 2006 on the follow-on development of the jets, will ensure that it continues to have an influence on the programme after 2019.<sup>21</sup>

12. Lightning II is the most technologically-advanced aircraft ever created. Design and testing are happening in parallel, which increases the risk that delivered jets require modification if design or technical problems are identified. The US Government Accountability Office has reported on significant issues that must be resolved before the jets can be used.<sup>22</sup> There have been a number of reports in the media on technical issues with the jets. The Defence Committee has also explored some of these issues recently. We raised examples of the reported technical problems, including a concern that the test jets may be too heavy to land correctly on the carriers. The Department corrected its earlier evidence that they are not overweight, but it rebutted the claim that the jets are too heavy to land vertically on the carriers. It also told us that claims that the computing memory of the jets was less than that of an iPhone were "wildly inaccurate", and there are between 500 and 1,000 separate processors, depending on the model, most of which carry computer memory. Two of the associated memory chips had 96 gigabytes of storage.<sup>23</sup>

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15 Qq 29–32, 52–59, 84, Qq 191–195; [Correspondence with Ministry of Defence](#), 20 October 2017, paras 9–10

16 Qq 192, 193

17 [C&AG's Report](#), para 3.11, Appendix Four

18 Qq 38, 45

19 [C&AG's Report](#), para 3.11

20 Qq 38, 47–48

21 [Correspondence with Ministry of Defence](#), 20 October, para 21

22 [C&AG's report](#), Appendix Four para 8

23 Qq 39–43, 50–54, 76, 142–143

13. In written evidence, the Department asserted that as technical issues with the jets are identified, solutions are developed, and the UK is part of that testing process. It added that it would be unreasonable, given the complexity of the jets, to expect there to be no technical issues to resolve. However, the Department judged that given that the jets had completed 100,000 flying hours, the level of technical issues identified was normal when compared to other jets. It noted that the majority of points reported on by the media were drawn from technical reports dating from 2016, and it was not expecting any such issues to prevent achieving initial operating capability for the jets from December 2018.<sup>24</sup>

## 2 Uncertain costs of the capability

14. The current estimated costs to build the carriers is £6.212 billion. The Ministry of Defence (Department) expects to spend £5.8 billion on the Lightning II jets and £0.3 billion on Crowsnest to the end of March 2021. The Department will continue to buy jets after 2021. The NAO reported that important additional equipment needed to support Carrier Strike, such as communication technology and data programming for the Lightning II jets, were still not yet funded.<sup>25</sup> As part of its inquiry into Carrier Strike in 2013, the previous Committee recommended that the Department must allocate appropriate funding for the programme.<sup>26</sup>

15. Personnel and basic operational costs up to the end of March 2021 are estimated to be £0.6 billion. The Department is undertaking modelling on how it would deploy Carrier Strike from 2021, and the implications for Defence. Current budgets reflect a sustainable level of use, but costs above this are not included within budgets.<sup>27</sup>

### Uncertainty in the cost of buying equipment

16. The Department told us that the costs of building the core elements of Carrier Strike (the carriers, Lightning II and Crowsnest) are on budget.<sup>28</sup> The Department had not accepted the potential cost growth of between 1% and 2% on the carriers, and work was ongoing with the Aircraft Carrier Alliance to eradicate it. Savings are being made by applying lessons learned from building the first carrier, through scheduling and by taking judgements on whether modifications are needed. This was seen as a normal part of programme management to ensure that every single cost is justified. The Permanent Secretary stated that the whole project is “within its cost envelope” and that he was not aware of any compromises being made to stay in budget.<sup>29</sup>

17. The Department told us that the memorandum of understanding, under which the UK is buying jets from the US, included a commitment for the nine international partners to work together to reduce the costs of the programme. It believed that its incentives are aligned to the US Government’s because each wants to get the price as low as possible. The most recent negotiations had seen nearly a 7% reduction in aircraft price from the previous tranche.<sup>30</sup> The Joint Program Office—which includes UK staff—is negotiating with Lockheed Martin to drive the cost of the capability down, which will benefit all participating countries.<sup>31</sup>

18. The Department was following an incremental approach to buying the jets.<sup>32</sup> The Permanent Secretary told us this was right given future uncertainty and he wanted to be able to negotiate as the programme evolved over the coming decades. The Deputy Chief of Defence Staff told us that the Department had planned for each carrier to operate up to two squadrons of 12 jets, with the ability to surge to 36. In order to have 24 frontline jets, a

25 [C&AG’s Report](#), paras 2.32–2.33, Figures 7 and 11

26 Committee of Public Accounts, [Carrier Strike: the 2012 reversion decision](#), Eighteenth Report of Session 2013–14, HC 113, September 2013

27 [C&AG’s Report](#), paras 2.16, 2.19

28 Qq 19, 35

29 Qq 20, 25–26, 32–34

30 Q 48; [Correspondence with Ministry of Defence](#), 20 October 2017, para 30

31 Qq 46–48

32 [C&AG’s Report](#), Appendix Four

multiple of that was needed in the fleet.<sup>33</sup> To date, the Department had approval to buy 48 jets against a commitment of 138 over the life of the programme. The most recent approval was for 30 jets, initial support and administration for around £3 billion, equivalent to £100 million per jet.<sup>34</sup> We endorse the Defence Committee's recommendation for greater transparency on the total cost of the Lightning II jets.<sup>35</sup>

19. The Permanent Secretary stated that he had “no indication” from either political or financial sources that the ambition to buy 138 jets had changed. The Department has still to make decisions on when the remaining 90 jets would be ordered and mix of the variant of the jet that would be selected. The Deputy Chief of Defence Staff told us that there were a number of variables that would make this “almost impossible to predict”, and that it was “several parliaments away” from making decisions.<sup>36</sup> Planning was immature and the Department did not know how much the jets would cost, since they had reduced by 6% every order block.<sup>37</sup> There were advantages and disadvantages to buying the carrier variant of the jets and these factors would be reflected in decisions on future orders.<sup>38</sup>

20. We also asked the Department whether important enabling equipment needed to support operation of Carrier Strike was still unfunded. The Department told us that it had recently funded technology to allow for communication within the Carrier Strike task group and with allies (tactical data links), and had taken action to ensure stores can be moved within a Carrier Strike task group. There were other areas where it would like to develop the capability, but doing so would depend upon available resources. However, the Deputy Chief of Defence Staff was confident that the Department had in place what was needed for Carrier Strike.<sup>39</sup>

### Uncertain operating and support costs

21. The Department is developing new arrangements to support the carriers and jets once they are in service, including for maintenance, engineering and repair and provision of spares. The Department has estimated the cost of support, but it had low to medium confidence that these estimates were accurate. This was because the equipment was new and the capabilities were still evolving, meaning that there was limited data currently available on how frequently the equipment will need maintenance or spares.<sup>40</sup> In relation to the jets, the Director Carrier Strike told us that a recent report from the Joint Program Office showed that there was still a lot of variation in cost estimates of the latter half of the F-35 programme, including support. This variation stemmed from the jets still being in their development phase and the Department did not fully understand what performance would be when the jets are flying thousands of hours.<sup>41</sup>

22. The Department told us that it does not know what the cost of operating Carrier Strike will be to the same degree of accuracy as the cost of building the equipment, because the capability was still evolving.<sup>42</sup> The Department has estimated that the whole

33 Qq 163, 170, 171

34 Q 157; [C&AG's Report](#), para 2.27, Appendix Four

35 Defence Committee, [Unclear for take-off? F-35 Procurement](#), Second Report of Session 2017–19, HC 326, 19 December 2017

36 Qq 168–171

37 Q 159

38 Qq 171, 175

39 Q 49, 50; [C&AG's Report](#), Figure 11

40 Q 24; [C&AG's Report](#), paras 2.18, 2.37, 3.12

41 Q 163

42 Q 24

life cost of the first 48 jets is £13 billion, equivalent to over £270 million per jet. The estimate included the cost of buying the jets (around £100 million for the most recent 30), bespoke infrastructure, training simulators and provision for operational costs to 2048. The Department emphasised that this was an estimate to “give a feel for the range of costs”.<sup>43</sup> The Department told us it was also in the early stages of establishing the costs of operating alongside US allies, including the first deployment of HMS Queen Elizabeth, from which US jets will be embarked. Which costs the UK will cover in relation to the US deployment is still to be finalised.<sup>44</sup> The Department is undertaking modelling to assess the costs of operating the carriers under a number of different scenarios.<sup>45</sup> The Deputy Chief of Defence Staff told us that the Carrier Strike capability was a very high priority, and the Department would not make compromises on funding.<sup>46</sup>

## Foreign Exchange Currency Risks

23. A substantial proportion of defence costs are in foreign currencies, with the majority in dollars or euros. The Department is buying the Lightning II jets in US dollars, and the costs of the jets could therefore change because of exchange rate fluctuations.<sup>47</sup> The Permanent Secretary told us that across the defence equipment programme, movements in currency exchange rates pose a big risk, with the biggest being against the dollar.<sup>48</sup>

24. Including the Lightning II programme, the forecast demand across the Department over the next ten years is for \$33 billion and €8 billion.<sup>49</sup> Its current forecast cost of the Lightning II programme is based on an exchange rate of \$1.55 to £1.<sup>50</sup> However, at the time we took evidence from the Department in October 2017, the rate was \$1.32 to £1.

25. The Department told us that it reduces cost uncertainty from changes in foreign exchange rates through a three-year rolling programme of hedging with the Bank of England. In 2017–18, only 10% of forecast demand for spending in dollars or euros was not hedged, compared to 30% in 2018–19. The Department told us that it did not hedge against movements in the currencies beyond three years because the currency markets would factor in greater uncertainty and risk into the price, and therefore this would not represent value for money. There was also significantly more uncertainty about the likely demand for spending in foreign currencies beyond that point.<sup>51</sup>

26. The Permanent Secretary told us that foreign exchange rates are not working in the Department’s favour at the moment.<sup>52</sup> In its written evidence, the Department stated that there is some provision for costs increasing but, if necessary, it would need to prioritise.<sup>53</sup> The Permanent Secretary also told us that difficult decisions would be needed if there was a fundamental change in foreign exchange rates that went against the Department.<sup>54</sup>

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43 Q 162

44 Qq 153–156

45 Qq 21, 27

46 Qq 78–79

47 [C&AG’s Report](#), para 2.28

48 Qq 165, 166

49 [Correspondence with Ministry of Defence](#), 20 October 2017, para 4

50 Comptroller and Auditor General, *Equipment Plan 2016 to 2026*, Session 2016–17, HC 914, National Audit Office, January 2017

51 Qq 199–202; [Correspondence with Ministry of Defence](#), 20 October 2017, paras 4–6

52 Qq 44, 70

53 [Correspondence with Ministry of Defence](#), 20 October 2017, para 7

54 Q 204

27. The previous Committee recommended that the Department engage with Treasury on the management of exchange rate fluctuations.<sup>55</sup> The Permanent Secretary told us that the Department was “constantly” in discussions with the Treasury on foreign exchange hedging, and whether these pressures should be managed within the defence budget. He was unable to provide us with an answer on what solution might be found.<sup>56</sup> The Permanent Secretary of the Treasury confirmed in a separate session with us that discussions were ongoing with the Ministry of Defence. However, the Treasury had not looked at the additional costs added to programmes as a result of exchange rate volatility following the decision to leave the European Union. It cautioned against considering this in isolation, instead of the impact of the Brexit bill across the whole of public finances, because there would be “a number of things pointing in different directions”.<sup>57</sup>

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55 Committee of Public Accounts, [The Defence Equipment Plan](#), Fifty-sixth Report of Session 2016–17, HC 957, April 2017

56 Qq 199–200

57 Committee of Public Accounts, [Oral evidence: Government Borrowing](#), HC 463, Wednesday 29 November 2017, Qq 49–51

### 3 Exploiting commercial opportunities

28. The Defence Equipment and Support organisation (DE&S), the Department's arms-length organisation, is responsible for buying and supporting military equipment, including the Lightning II jets. In 2013, DE&S initiated a transformation programme to tackle long-standing skills gaps and prioritise higher-risk commercial areas.<sup>58</sup>

29. The F-35 programme (Lightning II) is an international partnership consisting of nine countries. The US contracted with Lockheed Martin to build the jets and with Pratt & Whitney for the engines. The eight other partner nations purchase jets under a memorandum of understanding with the US. Lightning II is the largest defence project in history, with a total expected value of more than \$1.5 trillion, and an expected total production run of 3,100 aircraft. The jets are being built using parts constructed in different countries.<sup>59</sup>

30. Support for all Lightning II jets (F-35s) is overseen by the US Joint Program Office and will be organised globally via regional hubs. Nations taking part in the programme are competing for contracts to maintain and repair the jets. Defence Equipment and Support has a key role in supporting UK bids for these contracts. Contracts for regional warehousing have been awarded recently to the Netherlands and Australia. The Department will use the global support arrangement for UK Lightning II jets, but is also investing in RAF Marham so as to reduce its reliance on other nations.<sup>60</sup>

#### UK industry share of Lightning II manufacture and support

31. The Department told us that, at its peak in the late 2020s, the Lightning II programme is expected to provide some 25,000 UK jobs across 500 businesses in the supply chain. Those figures include UK industry benefiting from a 15% share of the build of the total number of aircraft to be produced.<sup>61</sup> We heard that this could equate to around £13 billion of investment, with the UK having the largest share of the non-US work.<sup>62</sup>

32. On support, the Department believed that it was in the UK's interests for more than one nation to be involved in repair and overhaul of the jets, because that would "lock" the partner nations into the F-35 programme.<sup>63</sup> The UK has won a contract for avionic support for European nations. The Defence Electronics and Components Agency in North Wales has secured the contract, estimated to be worth hundreds of millions of pounds for UK industry. Tony Douglas considered that winning this contract was a signal of the capability in the UK and would bring high-end capability and value-added jobs to the UK economy.<sup>64</sup>

58 Comptroller and Auditor General, [Reforming Defence Acquisition](#), Session 2014–15, HC 946, National Audit Office, February 2015

59 [C&AG's Report](#), 3.11, Appendix Four; Lockheed Martin F-35 website, [Building the F-35](#), accessed on 3 January 2018

60 [C&AG's Report](#), 3.12, Appendix Four; Lockheed Martin F-35 website, [Building the F-35](#), accessed on 3 January 2018

61 Q 92, Q 150; [Correspondence with Ministry of Defence](#), 20 October 2017, para 22

62 Qq 150, 151

63 Q 151

64 Q 102; Ministry of Defence, ['UK chosen as a global F-35 repair hub'](#), accessed 3 January 2018

33. The Department told us that the UK was bidding for future contracts and UK propositions are well received in the United States. Our technology and industrial capacity was seen as leading the world, although productivity in some defence companies required improvement.<sup>65</sup> The DE&S Chief Executive believed that equipment support, accounting for 50% of expenditure, was an area of future opportunity to drive improvements.<sup>66</sup>

## DE&S Transformation

34. We heard that DE&S was organising its transformation around six objectives: ‘hitting our objectives’; ‘delivering our plans’; ‘putting more support in the agenda’; ‘satisfying our customers’; ‘delivering the transformation benefits that have been laid out’; and ‘developing our people capabilities’. DE&S has a target to achieve £3.4 billion of savings through transformation over a 10-year period. To lead change, it had developed a network of over 1,000 volunteers of all grades and ages.<sup>67</sup> The DE&S Chief Executive told us that DE&S had been successful in recruiting external staff to fill gaps in its 11,000-strong workforce. DE&S is no longer subject to civil service rules on pay or departmental controls on headcount, and has benchmarked its pay and grading structure to that of 44 companies.<sup>68</sup>

35. The DE&S Chief Executive set out four recent examples that he believed demonstrated that DE&S was improving its skills and capabilities through transformation. DE&S had improved its contracting for typhoon support, letting a contract based on specifying ‘availability’, rather on a ‘cost-plus’ arrangement to save money and allow for re-investment in additional capability. Foreign military sales had been selected as the way of buying the Maritime Patrol Aircraft to lower both purchase and whole life support costs. The recently agreed contract to buy the Type 26 frigates was said to be the first time a ‘target cost incentive fee’ approach had been agreed with industry for shipbuilding. The Department and industry would share, on a 50:50 basis, any profits or costs over the target cost. On the Type 31 frigates, DE&S had requested from industry proposals for ship designs with a cost of £250 million, which would be designed also to be exportable.<sup>69</sup>

36. The Chief Executive believed that significant progress had been made on transformation and that DE&S was ahead of nearly all its targets, including being “well and truly on track” to achieve the savings. A set of indicators had been developed to measure progress.<sup>70</sup> He told us that transformation was not yet complete, assessing the current state as 6.5 out of ten, and stating that there was an “awful lot” for his successor to continue with.<sup>71</sup> He considered that DE&S “needed to get better at getting better”. It now had project management tools, but it would take time for it to become expert. It did, however, continue to have gaps in certain areas, in particular project controls, project management and commercial administration.<sup>72</sup>

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65 Qq 102, 151, 152

66 Q 119

67 Qq 94–96

68 Qq 107–111

69 Qq 101, 103, 129

70 Qq 94, 134

71 Qq 98, 132, 141

72 Qq 102, 113, 132, 134

## Formal minutes

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**Wednesday 10 January 2018**

Members present:

Meg Hillier, in the Chair

Sir Geoffrey Clifton-Brown	Nigel Mills
Chris Evans	Stephen Morgan
Caroline Flint	Bridget Phillipson
Shabana Mahmood	Gareth Snell

Draft Report (*Delivering Carrier Strike*), proposed by the Chair, brought up and read.

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

Paragraphs 1 to 36 read and agreed to.

Introduction agreed to.

Conclusions and recommendations agreed to.

Summary agreed to.

*Resolved*, That the Report be made to the House.

*Ordered*, That the Chair make the Report to the House.

*Ordered*, That embargoed copies of the Report be made available, in accordance with the provisions of Standing Order No. 134.

[Adjourned till Monday 15 January 2018 at 3.30pm]

## Witnesses

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The following witnesses gave evidence. Transcripts can be viewed on the [inquiry publications page](#) of the Committee's website.

### Wednesday 11 October 2017

*Question number*

**Stephen Lovegrove**, Permanent Secretary, **Lieutenant-General Mark Poffley**, Deputy Chief of the Defence Staff (Military Capability), and **Rear-Admiral Graeme Mackay**, Director Carrier Strike, Ministry of Defence

[Q1–92](#)

### Monday 4 December 2017

**Tony Douglas**, Chief Executive, Defence Equipment and Support

[Q93–141](#)

**Stephen Lovegrove**, Permanent Secretary, **Lieutenant-General Mark Poffley**, Deputy Chief of the Defence Staff (Military Capability), and **Rear-Admiral Graeme Mackay**, Director Carrier Strike, Ministry of Defence

[Q142–211](#)

## Published written evidence

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The following written evidence was received and can be viewed on the [inquiry publications page](#) of the Committee's website.

DCC numbers are generated by the evidence processing system and so may not be complete.

- 1 National Audit Office ([DCC0001](#))

## Published correspondence

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The following correspondence was also published as part of this inquiry:

- 1 [Correspondence with Ministry of Defence](#)

## List of Reports from the Committee during the current session

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All publications from the Committee are available on the [publications page](#) of the Committee's website. The reference number of the Government's response to each Report is printed in brackets after the HC printing number.

### Session 2017–19

First Report	Tackling online VAT fraud and error	HC 312 (Cm 9549)
Second Report	Brexit and the future of Customs	HC 401
Third Report	Hinkley Point C	HC 393
Fourth Report	Clinical correspondence handling at NHS Shared Business Services	HC 396
Fifth Report	Managing the costs of clinical negligence in hospital trusts	HC 397
Sixth Report	The growing threat of online fraud	HC 399
Seventh Report	Brexit and the UK border	HC 558
Eighth Report	Mental health in prisons	HC 400
Ninth Report	Sheffield to Rotherham tram-trains	HC 453
Tenth Report	High Speed 2 Annual Report and Accounts	HC 454
Eleventh Report	Homeless households	HC 462
Twelfth Report	HMRC's Performance in 2016–17	HC 456
Thirteenth Report	NHS continuing healthcare funding	HC 455
First Special Report	Chair of the Public Accounts Committee's Second Annual Report	HC 347

# Public Accounts Committee

## Oral evidence: Delivering Carrier Strike, HC 394

Wednesday 11 October 2017

Ordered by the House of Commons to be published on 11 October 2017.

Watch the meeting

Members present: Meg Hillier (Chair); Bim Afolami; Martyn Day; Chris Evans; Caroline Flint; Luke Graham; Nigel Mills; Bridget Phillipson; Gareth Snell.

Sir Amyas Morse, Comptroller and Auditor General, Adrian Jenner, Director of Parliamentary Relations, National Audit Office, Jeremy Lonsdale, Director, NAO, and Richard Brown, Treasury Officer of Accounts, HM Treasury, were in attendance.

Questions 1-92

### Witnesses

[I](#): Stephen Lovegrove, Permanent Secretary, Ministry of Defence, Lieutenant General Mark Poffley, Deputy Chief of the Defence Staff (Military Capability), Ministry of Defence, and Rear-Admiral Graeme Mackay, Director Carrier Strike, MOD.

Written evidence from witnesses:

– [Add names of witnesses and hyperlink to submissions]



Report by the Comptroller and Auditor General  
Delivering Carrier Strike (HC 1057-I)

Examination of witnesses

Witnesses: Stephen Lovegrove, Lieutenant General Mark Poffley and Rear-Admiral Graeme Mackay.

Q1 **Chair:** Good afternoon, ladies and gentlemen, and welcome to the Public Accounts Committee on the afternoon of Wednesday 11 October 2017. We are here today to discuss the National Audit Office's Report on the value for money of carrier strike—the Elizabeth-class aircraft carrier and its military capability. Before I get into that, I want to take the opportunity while you are here, Mr Lovegrove, to raise with you our concern about Tony Douglas's resignation as chief executive of the Defence Equipment and Support organisation, which was a surprise to us. Was it a surprise to you?

**Stephen Lovegrove:** It was a surprise when he told me. It wasn't a surprise the day it was announced, because clearly he had told me a couple of weeks before. I can't pretend it was welcome news. Mr Douglas has been a real force for change, and has provided an enormous amount of positive momentum in DE&S. I know that it was only because of the particular attractions of the offer he was made by his new employer that he felt he had to take it up. In his words, it was an offer he couldn't refuse.

Q2 **Chair:** So it was money, in the end?

**Stephen Lovegrove:** You would have to ask him.

Q3 **Chair:** But it was a significant offer.

**Stephen Lovegrove:** I don't know the details, but I would be very surprised if it wasn't considerably in excess of what we pay at DE&S. I think there were other factors involved as well. He leaves with a heavy heart, because I know that he thinks that his work is far from complete there.

Q4 **Chair:** That is my next question. What happens now? He made a lot of change, as you say.

**Stephen Lovegrove:** He has made a lot of change.

Q5 **Chair:** A change for the good, but it is not yet delivered, so what are you going to do now?

**Stephen Lovegrove:** The first thing we are going to do—I have been spending a lot of time with the chair of DE&S, Paul Skinner—is put in place very rapidly a process for getting his successor in. I think we will be



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aiming to kick that process off within a matter of days, let alone weeks. I do not know how quickly we will be able to get a successor in place and extract them from their existing employment. I think we will be doing very well if we manage to get someone to take over from Tony when he leaves, which will basically be 1 January. Realistically, I suspect it may be a bit longer than that. It needs to be as quick as we can possibly make it.

Q6 **Chair:** What is happening in the meantime? I understand that we would all be on long notice periods for a job of that kind. Who is going to be in charge?

**Stephen Lovegrove:** Mr Douglas will be working up until Christmas, and then he will be starting his new job on 1 January.

Q7 **Chair:** So are you planning—

**Stephen Lovegrove:** We have a planning assumption, which has not yet been confirmed, and nor has it been agreed by the Secretary of State, so I am not in a position to tell you what that is.

Q8 **Chair:** Do you know when we will know that? It is important for confidence in how you spend money on these programmes.

**Stephen Lovegrove:** I think we should be in a position to be able to tell you the identity of the interim CEO, should we need one, within a matter of days, if not a couple of weeks. I am very happy to write to the Committee on that matter.

Q9 **Chair:** We would be very grateful. We are keen to know who they are and to talk to Mr Douglas before he leaves, because I think there will be lessons that he learned. If you can alert him that we will be interested in calling him in before he leaves, that would be helpful.

**Stephen Lovegrove:** I will. I think that you want to talk to me about the uncomfortable and unpleasant subject of contingent liabilities.

Q10 **Chair:** Not today, actually. We will be seeing you again shortly, so we will pick up that one. I also want to ask you about the two big, important nuclear roles that have now been filled. Julian Kelly is now Director General Nuclear. We are just catching up a bit after the election—although we saw you on Monday—on defence matters. Then, of course, Ian Booth has been at the submarine delivery authority since August.

**Stephen Lovegrove:** Yes.

Q11 **Chair:** It is early days. We had some concerns about these two jobs covering some of the same area. How is that bedding in? Have you got any areas of concern that you are watching, as the permanent secretary, to make sure that this critical part of defence is well managed?

**Stephen Lovegrove:** It is bedding in very well. Julian—

**Chair:** Mr Kelly.

**Stephen Lovegrove:** Mr Kelly has been in post for longer than Mr Booth, and Mr Kelly has made a very positive impression not only on the



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important constituencies around nuclear in the UK, but on the very crucial relationships we have in the US, because it is very much part of a single effort, in some ways. That is going well; the clarity of thinking and analysis regarding the financial position around the successor that you would expect to be brought to the situation from a former director of public spending at the Treasury has indeed been brought to it. We are having plenty of discussions with Treasury about how we best manage that and make sure that the cash flows are aligned appropriately on what will be a very long-term and very large build process.

Mr Booth, of course, has been in post for much less long—indeed, he has only just moved across from carrier to the submarine delivery agency, or SDA. We have a great deal of confidence that he is the right appointment for it.

**Chair:** I hope so! If you didn't have confidence now, that would have been a problem.

**Stephen Lovegrove:** Looking back at how he has been able to manage the Aircraft Carrier Alliance, we are confident that he is the right person to bring—

Q12 **Chair:** I just want to flag our interest, really. These are two big jobs, but they are covering some of the same ground, and we had some concerns about how they will hang together. We will want to talk to them at some point, so we are just flagging up and giving good notice of other interests.

I know that the Comptroller and Auditor General also wants to ask you a couple of questions about the nuclear deterrent capability.

**Sir Amyas Morse:** I just wanted to flag my concerns about access to the nuclear enterprise for the purposes of examining value for money, efficiency and effectiveness. We had a good discussion going with the Department up to July 2016, but at that point, after your appointment, you asked me to agree to a delay until the appointment of DG Nuclear. I did so, but I felt that up until then, things were going well. Since that appointment in May, I think that things have not moved forward particularly promptly, and I would like to know what idea the MOD has got about this. In other words, is this a plan, or is it just a series of very unfortunate coincidences?

It is not possible for such a huge and expensive project to proceed without appropriate levels of scrutiny. We have shown a great deal of sensitivity to the question of military secrecy—we fully understand that—and I think we demonstrated that sensitivity to you when we had a chance to talk to you about it, but for quite some time now, we have not made material progress, nor particular progress, even having met DG Nuclear. What we need to do is get this moving forward again, or hear from you what reason there is for not moving it forward.



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**Stephen Lovegrove:** I can assure you that there is no plan. I am afraid that I cannot answer the question very much more fully than that at the moment, because I am unsighted on the obstacles you are talking about.

Q13 **Chair:** So you are committing to co-operating fully with the National Audit Office on scrutiny of this important spend.

**Stephen Lovegrove:** We will certainly co-operate as fully as we possibly can with the National Audit Office, but that obviously has to be consistent with issues to do with national security.

Q14 **Chair:** Absolutely, but let us be clear that the National Audit Office has many cleared auditors who deal with matters that are legally so secret that we cannot even discuss them.

**Sir Amyas Morse:** I made that clear.

**Stephen Lovegrove:** I am very much aware of that, and obviously have had these conversations with Sir Amyas in the past. I hope that I have been relatively clear as well. I have to be honest, though, that I am not aware—it has not been brought to my attention since May—that there have been difficulties of access. I have not received any brief internally, nor have I received any representations from the NAO personally, so I am slightly unsighted.

**Chair:** Let us hope that we can take this offline and get it sorted.

**Stephen Lovegrove:** We can happily take this offline.

Q15 **Chair:** I am sure he can ask you himself, but may I ask you to write to Sir Amyas and to the National Audit Office this week to clarify this?

**Stephen Lovegrove:** With pleasure.

**Chair:** As I have flagged up, we want to follow the spend on nuclear. It is a huge pot of money for the taxpayer, it is very important to our defence capability, we want to keep an eye on it, and we cannot do so without the good support of the National Audit Office.

**Stephen Lovegrove:** I understand.

Q16 **Chair:** Thank you. That brings me to our hearing today. We are looking at the new Elizabeth-class aircraft carriers, which were planned some years ago and are finally arriving, and the F-35 jets that, together, make up the carrier strike capability for the UK. After the nuclear deterrent—this is one of the reasons why we are interested in the nuclear deterrent—this is the most strategically important defence programme in the country. It has a 50-year capability, so it is not surprising that we want to keep a close eye on it. I am sure that Mr Lovegrove will agree that it is now at a critical stage.

The overall MOD budget has also been under enormous pressure since the last strategic defence spending review, which is alarming this Committee, so we will want to probe that in this hearing. We also want to probe the trade-offs necessary to make sure you are keeping in budget,



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find out how this will deliver safety to the UK, and look closely—as this Committee does—at the financial risks to the country.

I welcome our witnesses. On my left, we have Rear-Admiral Graeme Mackay, the Director of Carrier Strike at the Ministry of Defence. In the centre, we have Stephen Lovegrove, permanent secretary at the Ministry of Defence, and on my right, Lieutenant-General Mark Poffley, Deputy Chief of the Defence Staff at the Ministry of Defence. For anyone following on Twitter, our hashtag today is #carrier.

Let us start with Mr Lovegrove; if you want to deflect to someone else, that is fine. The decision to buy these carriers was taken in the late 1990s—before I became a mother, which makes me feel very old. How relevant to capabilities today are these carriers that were planned then?

**Stephen Lovegrove:** I certainly will defer to my military colleagues, but from my comparatively untutored perspective, clearly they are very important. They afford a degree of flexible strategic military and, indeed, diplomatic presence for the UK, which we have been short of since the retirement of the last carrier. Obviously, they are untethered by geography in a way that our other assets typically are not. They re-establish an ability for carrier strike pretty much anywhere in the world. They are flexible, in that not only can they project air power, with the fast jets that no doubt we will talk about later, but they are capable of embarking very large numbers of helicopters and troops, and therefore are able to land troops in coastal areas, which is an important part of defence capability. They can also do a mixture of those two roles. Really, I think there is unparalleled strategic choice being developed for the nation, which will last for many decades to come, as you say.

Q17 **Chair:** But it is taking up about 25% of naval capability, is it not? So it is a very big leap of faith—perhaps that makes it sounds too trivial—or rather, an important step to put that much capability into two carriers, of which one is not yet operational and one is not yet built.

**Stephen Lovegrove:** I hope my colleagues will confirm this: devoting 25% of the Navy to support for the carrier envisages a position in which you are basically fighting a war and somebody is trying to sink that carrier. There are lots of situations in which we would deploy the carrier where there would be nothing like that kind of support involved. For instance, humanitarian assistance is one of the roles envisaged for the carrier. It is extremely unlikely that it would have anything like that level of support in that type of role. I think that 25% is a very maximalist view of what the carrier would need to support it; it is hopefully a situation that would not happen at all, but I defer to colleagues.

**Lt Gen Mark Poffley:** Perhaps I could add a little? First, I endorse all the points made by Mr Lovegrove about the versatility and utility of a platform such as this. I think one needs to place it in the strategic context of an escalation of a crisis. Clearly, it has a number of roles right the way through that escalation process, through strategic messaging, through to the far end of that process: delivering direct military effect to an opponent. I would add that one of its key characteristics is that it provides



dilemmas to the opposition. That is something that other platforms simply are not able to replicate at the same sort of level.

With regard to its place inside the rest of the Navy and what is required to support it, there is a variable geometry here between that sort of humanitarian role at one end and the sovereign deployment of a carrier strike group by the United Kingdom. Of course, our working assumption is that when we get into war fighting, in the vast majority of cases we will not be there alone. The Royal Navy, like many navies, practises routinely in a multinational task group. It contributes, through the earlier part of that spectrum of options, in a multinational role, as much as in a UK role.

**Q18 Chair:** What percentage of naval capacity would it take to send HMS Queen Elizabeth to one of the recent hurricane sites, for instance?

**Lt Gen Mark Poffley:** Well, taking a humanitarian aid example, it quite clearly would go with some force protection alongside it. That can routinely be as little as a single anti-submarine destroyer. Depending on the scenario—this is very much risk-dependent—you could come down even further below that. Percentages are a misleading metric here, because in a routine deployment, a sovereign carrier strike group would have two air-defence destroyers and two anti-submarine warfare frigates. You probably would want to deploy with a submarine and similar air assets around it, and of course they would have to go with their own support shipping. But that is a sovereign carrier strike group at the maximum level.

**Chair:** Okay. I suppose that is there in case it is necessary, but let's hope that doesn't happen.

**Lt Gen Mark Poffley:** But I would not recognise even that carrier strike group as a percentage—as 25%—of the Royal Navy. That is not quite how I see it.

**Q19 Chair:** These carriers are very expensive—they are the second biggest expense after the nuclear deterrent—and we have seen pressure on the budget. To deliver them, especially given that the costs have now escalated and you are under increasing financial pressure, what things are not going to be delivered? What capability is not going to be available? I suppose you could put it the other way around: what would the £14 billion have got if it had not bought these carriers?

**Stephen Lovegrove:** The process of managing capabilities within the Ministry of Defence is, as the Committee will be more than well aware, a constant process of prioritisation against risk. It is not the case that everybody always gets what they want. If they did, defence spending would not be 2% of GDP; it would be 100% of GDP, pretty much. However, the carrier project, broadly defined—the F-35s, the helicopters, Crowsnest and the carriers—is on budget and on time, so it does not constitute one of the biggest risks in the Department at the moment. We do not consider it—

**Q20 Chair:** You say it is on budget, but there is an estimated increase in costs,



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isn't there, of between £60 million and just over £120 million?

**Stephen Lovegrove:** At the moment there is potentially a pressure of 1% to 2% on the carriers, but that is not something that we have accepted yet. We are certainly working with the Alliance to eradicate that. My view is that this whole project is within its cost envelope and is on schedule.

Q21 **Chair:** What compromises are you going to make about capability in order to eradicate that? I do not know whether it is Rear Admiral Mackay's place to answer that.

**Rear-Admiral Graeme Mackay:** I can assure the Committee that we have looked very carefully at how we would operate the carriers in contingent war fighting. We have discussed the full scale of how that would be done against a very high threat envelope. We have also looked at how it would be operated in a medium-scale conflict and, backing off, in terms of the other bits we have described. That is what we call contingency, and we have done a lot of work around modelling it. We have engaged colleagues in the Treasury on that. The modelling work we have done includes costs, and we have scaled that so that it does not denude the Navy from the entire outputs. That is an important point.

What we would envisage—this is advice that would go through to Ministers—is that you would generate a task group, which would then be ready as a contingency should the country need to call on it. You would then be able to deploy a scalable task group, which would be commensurate with what the geopolitical situation was at the time—it would depend on what the threat was—and you could then reconstitute that, as required, to conduct a live operation as it happened. The unique point of carriers is that you can put them in harm's way as a crisis emerges, and it is that first reaction that is the unique part of the capability.

That is what we have done so far. The other work that we have done, which complements it, is called the routine operating model. Again, that is very carefully understanding how we sustain across the Department the output of the carrier capability, balanced with the other elements of the Department. Again, that is a process that we go through to the defence board, to report that work up.

That will be incremental because, of course, the carrier and the capability will be delivered at IOC in 2020 and then will be moved into FOC over a period of six years.

Q22 **Chair:** For people here who might not follow what those initials stand for, would you explain IOC and FOC?

**Rear-Admiral Graeme Mackay:** Sorry. The initial operating capability is a lesser capability, so it is that initial entry, which is very wise to do, because that means you have got elements of training, equipment and sustainability coming on line. You can then understand how you are going to operate the capability put in service and then we will naturally grow that to the full operating capability in 2026.



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Q23 **Chair:** One of the challenges when you talk about full operating capability is that these have got to last for 50 years, so how flexible are you and what are the financial risks of ensuring that you can future-proof them for future need?

**Stephen Lovegrove:** Let me have first crack at that. If I may dwell briefly on these IOC and FOC figures, it is quite important.

Q24 **Chair:** The worry is that FOC just becomes a shopping list.

**Stephen Lovegrove:** I appreciate that. There is a little misunderstanding, particularly in the press, that there is a moment at which the carrier and indeed the carrier group emerges fully formed: it is off or it is completely on.

That just is not the case with this. It is an immensely complex dynamic network of capabilities, all of which will evolve over a long period of time. IOC is definitely going to be less capable than FOC in due course. Indeed, the initial operating capability of the carrier group, with helicopters on, is a good two years before it is with the fast jets on.

The whole thing is like a town that will evolve and change in shape and role over 50 years. That is a very important mental map or image to get to grips with what the carrier group can do and how it will evolve over time.

In terms of knowing how much this is going to cost when it is operating, it is absolutely right—the NAO Report is completely correct in this—to identify that the build costs are pretty well known and controlled at the moment. This is, however, a new fifth-generation carrier, with fifth-generation jets on it, all of which are evolving. We simply do not know, with the same level of fidelity, how much it is going to cost to operate and maintain.

Q25 **Chair:** But you have made a commitment that the costs will not be beyond the £6.2 billion approved cost, haven't you?

**Stephen Lovegrove:** Yes, and that is still the case.

Q26 **Chair:** That is still the commitment.

**Stephen Lovegrove:** Yes. That is still the case but those are predominantly the build costs.

Q27 **Chair:** So, there is still the full operational capability.

**Rear-Admiral Graeme Mackay:** What we are doing at the moment is modelling that in service. It is not particularly difficult to do. Clearly, if I talk first about manpower, we deliberately designed the ship so that the manpower is very similar to that of the previous class of ships. The ships' company is around 600, 700, 800 people. That is a very important fixed cost that will happen throughout the life.

The other part is the equipment and support budget and, again, we have done extensive modelling to understand what it costs to support this capability in service. As for the rest of the maritime task group, we are not



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changing the scale or size of the surface ship navy from the 16/19 DD/FF we currently have.

We have a very good understanding of what it costs to operate those in terms of manning Portsmouth dockyard and maintaining those ships. Indeed, we are just going through quite a successful first planned engineering period with Queen Elizabeth today and that will be a precursor to her sailing again later this October for her second period of sea trials.

**Q28 Chair:** I think it would be helpful, especially for people watching this, for us to bottom out what exactly it would be delivering on. Currently, it is planned that it will take Merlin helicopters. Am I right that all helicopters should be able to land on this aircraft carrier?

**Lt Gen Mark Poffley:** We are conducting first of class flying trials next year. The anticipated fleet of aircraft will certainly include Merlin. We will be considering also clearing other types on to it, including the Apache and the Chinook, which, again, gives us greater versatility. There will then be a debate about which further types of aircraft, in the multinational sense, we may wish to clear on to the platform over a period of time. Clearly, those are the mainstays of the UK rotary fleet and it makes sense therefore for us to include them in the portfolio of options for the carrier.

**Q29 Chair:** So your plan, subject to these tests, is that all UK-enabled helicopters will be able to land—obviously, the F-35s, which we are going to go into in a moment. What about carrying equipment that will allow troops and/or equipment to access shore from sea?

**Lt Gen Mark Poffley:** We need to be quite clear. These are designed as aircraft carriers, not as bespoke amphibious shipping, and therefore their ability to launch surface manoeuvre, as we call it, in the littoral environment, is not there. That will come from other platforms. What we have got to be clear on is that there needs to be a very clear articulation of how we wish to conduct littoral warfare going forward and the level of support we need in the surface-to-surface environment. The carriers are not there for that purpose; they are there to deliver air power and rotary support to a littoral operation.

**Q30 Chair:** So they won't carry amphibious craft, then?

**Lt Gen Mark Poffley:** They will not carry amphibious craft.

**Q31 Chair:** Is there any adaptation—just imagine a situation where one goes to a hurricane site without the full back-up or a devastated area on humanitarian aid, and there is a need to do something like this. Is there no capability to add that on later?

**Lt Gen Mark Poffley:** Again, one needs to be careful that we do not try to compare it with its extant platforms. This is not an amphibious ship, it is an aircraft carrier, and, like HMS Ocean, which is a helicopter carrier, not a dedicated surface manoeuvre platform, its role is there to provide air support, both in the rotary sphere and the fixed wing sphere.



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**Stephen Lovegrove:** I think—in fact, I know it is the case that in the SDR of 2015 we stated that we would look at modifications that might enable a degree of amphibious operation for the carrier. Clearly, the more flexible we can make it the better it will be; so, again, if you would like us to write back to you on that we are happy to do so.

Q32 **Chair:** Yes, that would be very helpful, because I sense that we are going to be coming back to this repeatedly.

We talked a bit about the compromise of the cost envelope that you have now absolutely committed to, but in order to do that and because of the other pressures on the budget, you are already making compromises on capability, as the report touches on. What compromises are you having to make, or are prepared to make, to ensure that you stay in budget but we still have capability?

**Stephen Lovegrove:** I am not aware that we are making compromises to stay in budget in the carrier programme at all.

Q33 **Chair:** There was a projected budget increase, which I highlighted earlier, of £62 million-plus. You are saying that you don't accept that, so you are trying to make sure that is tied down.

**Stephen Lovegrove:** Yes.

**Chair:** How are you doing that? If it is not a compromise, what are you doing?

**Lt Gen Mark Poffley:** This comes about largely as a result of experience that we have already learnt through taking Queen Elizabeth to sea. There is clearly work experience that is being transferred to HMS Prince of Wales.

Q34 **Chair:** So you are making savings with HMS Prince of Wales—

**Lt Gen Mark Poffley:** Well, there is some learning experience. In terms of productivity and making sure that we have learnt from the experience of building Queen Elizabeth, that experience is being transferred on to the Prince of Wales. Clearly, there is a certain amount we can do in terms of scheduling, which perhaps reduces costs in Rosyth. There are some judgments that we can make in terms of modifications that are either critical or able to be adjusted on some of the build profiles. However, none of those are outwith the normal tolerances that you would expect of a programme of this type. It is between us and the Alliance to now drive those costs down to the lowest level. I am sure the Committee would expect us to do nothing but that. It is part of the normal process of programme management to ensure that every single cost is justified and that every piece of work is essential and is configured to the objectives of the programme. As the permanent secretary said, we believe that there is some way to go in that discussion with the Alliance.

**Luke Graham:** I know there have been cost challenges with the actual carriers themselves, and there has obviously been the challenges with the 30 Lightning II jets as well. We have been given some assurances



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today that the carrier's overall cost will come in at £6.112 billion. Does that include the guarantees with the Lightning II jets also? *[Interruption.]*

**Chair:** Apologies, I forgot to mention at the beginning that we are on a running vote. We will aim to start the Committee again in 10 minutes, or as soon as we are quorate, if Committee members agree to that.

*Committee suspended for a Division in the House.*

*On resuming—*

**Chair:** Welcome back to the Public Accounts Committee on Wednesday 11 October. We are resuming our hearing on carrier strike, the MOD's capability for aircraft carriers and attendant aircraft, and Luke Graham was rudely interrupted as the bell went, so I will ask him to pick up, but since we have had a 45-minute break, if you want to call it that, I think we need to cut to the chase and keep answers short, if we can, and keep questions short too. I think we know where we are heading with this, as I outlined at the beginning.

Q35 **Luke Graham:** I think we were just on the question about overall spend; and obviously we had some reassurances about the overall programme, and we are looking specifically at some of the £3 billion spend on the 30 Lightning II jets. I think that Lieutenant-General Poffley was just replying on that.

**Lt Gen Mark Poffley:** I was going to make the point that we have currently got a programme; it is just over £9 billion. I think it is catalogued in the NAO Report. We remain inside that envelope, and that is for the delivery of the first tranche of 48 aircraft. That remains on track and within our programmed figure, so, from my point of view, in terms of cross-displacement elsewhere, I am not concerned about that at this stage.

Q36 **Luke Graham:** Understood; and just to follow up on that, in terms of those costs that have been outlined, are they original purchase costs, or do they include all future spares, upgrades and forecast development costs as well?

**Lt Gen Mark Poffley:** The budget breaks down—and, again, this is in the Report should you need it—as about £1.8 billion, associated with systems development and demonstration, which is the early developmental stage of the programme; and then the balance, some £7.25 billion, is there for production, sustainment and then future development. Inevitably, as you go through the first tranche of aircraft in a series of tranches of aircraft, that development accrues as problems are resolved and new challenges are addressed.

Q37 **Luke Graham:** Reflecting on some of the technical issues that the fighter has had, which have been picked up by the press and also in previous Committee hearings, do you think this budget is sufficient to be able to fix future problems and develop the technology over the next 20-plus years?



**Lt Gen Mark Poffley:** Certainly there is provision in there for future development. Much of the press reporting I suspect reflects the very early stages of the programme. Indeed, many of the challenges set out in some of the media articles have been well and truly corrected since the programme started. Certainly many of them we did not recognise.

**Stephen Lovegrove:** It may be worth saying that in relation to the figures quoted in the NAO Report, it would be misleading to think about those as buying an aircraft. What you are doing is buying a system. There is a huge amount of infrastructure spend associated with that: remediation work, support, spares and training is in that. As General Poffley said to me the other day, it is not so much like buying a car, but like setting up a driving school. You have to buy the car, the trainers—the whole system is being set up. Some of these things will last for the 40 years that we will be flying F-35s. The investment in RAF Marham will be there until it is no longer needed. Again, we need to be quite careful about the conceptualisation of the expenditure.

Q38 **Luke Graham:** Understood. I have one more follow-up on that. I understand that during the development phase we paid the £2 billion in advance so we are a tier 1 partner in the development of the jets, which obviously has given us more influence over how the jets developed to make sure the capabilities were compatible with other British assets. I think we lose that tier 1 status in 2019. Moving forward, how can we make sure we can manage costs? If we are not a tier 1 partner, it could be that America makes adjustments to reflect their new assets and the costs will just be shunted to us. What comfort do you have that you can prevent that?

**Chair:** We were a 4.5% stakeholder.

**Rear-Admiral Graeme Mackay:** Correct. Initially, we paid the fee, which has given us a very important influence over the design. That is the most important phase for delivering the aircraft system. We will retain an important influence in the programme going forward into production, sustainment and follow-on development, which is the technical phrase for the aircraft being in service, and then throughout its life until circa 2050. So we will retain a significant influence inside the joint programme office through that period. That investment has secured us that position, most importantly during the early phase.

**Chair:** I will bring in Mr Snell and leave the issue around the aircraft.

Q39 **Gareth Snell:** Thank you for what you have said so far. It is very interesting, but the Defence Select Committee heard, and it was reported in the press that, having paid £100 million for each of the F-35s, the first four that we take delivery of will be too heavy to land correctly on the carrier. I don't know whether that is something you want to discuss today or whether you have a response to that, but I want some assurances that if that is the case, how will that be met within the existing cost envelope? How can we ensure that any retrofit that is necessary to fix that problem does not end up being an additional cost to the overall programme? And



how has that been allowed to happen?

**Rear-Admiral Graeme Mackay:** The design of those aircraft remains within their specification—those aircraft are flying now—and they are largely aircraft that are instrumented, so they are recording and being used specifically for that purpose. That is the employment they are on at the moment and they are meeting those tasks fully.

It is important to set the record straight on weight. We have deliberately designed a technique for recovering the aircraft to the carrier through a thing called shipborne rolling vertical landing. We started that programme circa 2007. We had a VARC Harrier aircraft, which had an F-35 control system. There has been speculation that we have come to this not knowing what we are doing, and I would characterise that as not being correct. Indeed, we have done a lot of testing at Pax river as well. So the aircraft will be meeting its design. We will continue to manage weight through the life of the programme. We have a particular technique to get the aircraft off through the ramp at the front of the ship, and to recover the aircraft in service.

Q40 **Gareth Snell:** For absolute clarity, you are saying that the issues reported in the press and in the Defence Committee—that they are too heavy to land safely—are not true?

**Rear-Admiral Graeme Mackay:** Those aircraft that we are procuring will be able to land vertically in the carriers. We will also be able to design—

Q41 **Chair:** Sorry, maybe I am being picky about the wording, but you have just said “those that we are procuring”. I think Mr Snell was referring particularly to the first four.

**Rear-Admiral Graeme Mackay:** Those aircraft are not overweight. They can recover and will be used by the trials programme in the carrier as we go through the life of programme. So it is not an issue.

Q42 **Chair:** So in simple terms, they can land on the carrier. They are not too heavy.

**Rear-Admiral Graeme Mackay:** They can, and that report was incorrect.

Q43 **Gareth Snell:** You said that they are part of the trials programme, so presumably there will be no particular change to the specification or make-up of the design of the planes that you will procure subsequently as a result of the first four that we have received?

**Lt Gen Mark Poffley:** If I can put this in layman soldier language, the reality of life is that on any vertical take-off and short take-off and landing aircraft, you are going to have issues around weight distribution and weight characterisation that will limit the flight envelope—indeed that is true of a fixed-wing aircraft in a conventional landing and taking-off role. The realities of life are that in the early part of the development phase you will have questions about weight. Yes, mitigations were put in place to reduce weight and to improve the performance, but that is something you would expect in the early part of the development of an aircraft of this



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type. The first batch of aircraft that were fitted for this test and evaluation role are still within the limits and we are seeing improvements through the development phase of the programme to the performance and weight characteristics of the aircraft. That is something that we would have expected and is included in our cost envelope.

Q44 **Chair:** Mr Lovegrove, one thing we discussed when you were in front of us before was the challenge of the exchange rate and the price that that adds to the programmes. Particularly given Brexit and the change in the exchange rate—it is not going in the right direction at the moment—how is the MOD factoring that in to ensure that taxpayers do not take an extra hit?

**Stephen Lovegrove:** You are absolutely right to say that foreign exchange is not working in our favour at the moment. After the last hearing in front of this Committee, you recommended that we get into conversations with the Treasury about that, and indeed we are in conversations with the Treasury about it more broadly. In the context of this particular programme, the cost pressures arising from the forex are being managed within the cost envelope.

Q45 **Chair:** Are you having to make any compromises on the aircraft to do that?

**Stephen Lovegrove:** I am not aware of any.

**Lt Gen Mark Poffley:** We are not. Indeed, the first part of the programme secured our interest at a price and that has not been altered. I think the pressure has been absorbed elsewhere in the overall programme, particularly through the United States. From that point of view, the UK is insulated. Where those pressures have arisen in subsequent tranches, and clearly there are still commercial conversations under way, those are accommodated within the funding envelope that we have.

Q46 **Chair:** Earlier, in response to Mr Snell, Rear-Admiral Mackay talked about the £2 billion that secured the British Government a real say in the design and cost of the aircraft. Now, as phase 1 goes, we are a 4.5% shareholder in the next phase, so do we still have the same power over the purchase price of those aircraft and a say in how expensive they will be? We bought that initially, but does it carry on as we move into the second phase?

**Rear-Admiral Graeme Mackay:** No, but the environment and context have changed because you are now in a large production run—the aircraft production run is about 3,000 aircraft—and there is a reduction in price as you take action to procure the aircraft. For example, the programme has entered into a situation of block-buying aircraft—they are looking at buying 455—so we get a different benefit. The lens you need to look through is very different as you go into that production and sustained follow-on development. It is just a different commercial environment because you will get the benefit of volume. That goes down into the tier 2



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supplies as well, so you will see a reduction in price and that is very much the way the best programmes work.

- Q47 **Chair:** You confidently say we will, but if there is any issue about price, what control or influence would the UK Government have over the Americans on that?

**Rear-Admiral Graeme Mackay:** Well it is enshrined within the MOU. There are two MOUs, one is for the first part, and we will then enter into the second MOU, which we have signed and continue to be part of that.

- Q48 **Chair:** So it is signed and that guarantees the price effectively, in simple layman's terms?

**Rear-Admiral Graeme Mackay:** Part of that MOU is designed to bring the cost down among the nine international partners. So within that documentation is the effort to work together to bring the cost of the aircraft programme down.

**Chair:** Mr Lovegrove, you wanted to add to that.

**Stephen Lovegrove:** It might be worth dwelling very briefly on the way in which the purchases are handled. Because this is predominantly an American programme, all the nations are effectively signed up to the negotiations and the prices that can be negotiated by the Joint Programme Office. That is based in the States and it is run by an American general.

**Chair:** We might be meeting him, hopefully in February, when we are at the Pentagon.

**Stephen Lovegrove:** The Joint Programme Office is clearly predominantly negotiating with Lockheed Martin and Pratt & Whitney to drive the cost of this capability down for everybody. We can have a degree of reliance that our incentives are aligned with the American Government's incentives, because they want to get it down as low as possible. Indeed, one of the first things President Trump did when he got into office was talk about how much he wanted to see the price of the F-35 come down. I am not going to comment on his involvement in that negotiation, but it is certainly the case that in the most recent tranche that we have seen, that meant that we saw nearly a 7% drop in the aircraft's price from the previous tranche. The pressure that the JPO is putting on it, and we have people in the JPO, and the mere fact that the programme is becoming more mature—the next of a kind copies are obviously cheaper than the first of a kind copies—gives us some confidence that we will be getting these aircraft as cheaply as we reasonably can.

- Q49 **Luke Graham:** When the Committee looked at this topic back in 2013, it noted that crucial enabling equipment was not funded. Are you confident now that any of these gaps have been closed and that all enabling equipment is sufficiently funded?

**Rear-Admiral Graeme Mackay:** We can give examples, typically the tactical data links is an area that we have just taken funding action on last year, and that is throughout defence, so that is to start moving to a much



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more networked approach. Clearly there are areas where we would like to develop the capability and capitalise on the investment that we have made. That is a very good example. There are other areas where we are looking at how we are going to support the capability when it is in the carriers. For example, moving stores around. We have taken action to close those gaps as well. So it is very much a priority. We now have a risk-based response plan, and then clearly performance, cost and time enter into our calculations for closing those gaps.

**Q50 Luke Graham:** Understood. This is a question for Lieutenant General Poffley. When looking at the enabling, are you now confident that the jets, carriers and all other support vessels will have the right enabling equipment, so that they can effectively communicate and operate with each other? I know that in previous Committees and in the press it has been reported that there have been issues such as software, specifically operating on the carrier, and also broadband capability, and that these would seriously restrict some of the operational capabilities of both jets and carrier.

**Lt Gen Mark Poffley:** I can say that within the programme as we have currently configured it, through to the initial operating capability and then subsequent full operating capability, I am confident that the enabling constituent parts of the programme are in place to allow us to reach those milestones in the way that we have described. But one needs to remember that this is a platform with open architectures, which we are looking to design resilience into, such that as the circumstances change we can make those modifications that we feel are appropriate. But we are certainly in place to provide that capability as per the milestones set out in the programme, including right the way from its role in an amphibious operation through to the full carrier strike capability.

**Q51 Luke Graham:** Understood. You mentioned open architecture and the fact that some of these systems will have to have additional resilience built in. Do you feel that the budgets and the forecast operating budgets are sufficient to enable you to continue this kind of evolution and adaptation, especially considering the level of technological advancement and investment from less friendly powers around the world?

**Lt Gen Mark Poffley:** Yes. We constantly review the threat against not just this capability but the broader portfolio of capabilities that will go and support it. That is part of an ongoing process. Yes, it does require us to take some hard decisions in prioritising the programme in a broader defence context, but as we sit here today we believe that the capability is very credible, is world-leading in many areas and will meet the milestones that we have set down.

**Q52 Bim Afolami:** I want to look again at this point around the amphibious capability, because it has very much been an area of focus for many people. If you had a magic wand and resources were not an issue—I accept that we live in the real world—is that amphibious capability something that you would definitely want to have?



**Lt Gen Mark Poffley:** Let's be quite clear: this platform has a significant part to play in amphibious operations. It provides all the fast-attack aeroplanes that you might want to support such an operation, and it also has capacity to deliver the rotary support to that type of operation. You can quite clearly envisage a raft of different things that you might wish to do to a platform such as this, but it may or may not be the optimum way of delivering a broad suite of capabilities across the fleet, and in service with the Royal Marines, to best effect. There is a judgment to be taken as to what that looks like going forward. Indeed, as part of the national security capability review, that is being actively looked at to make sure that we have the right capacity to deliver amphibiousness that is fit for the contemporary operating environment. It is important to acknowledge that these things don't stand still. There is no point in us designing something for the past. It has got to be appropriate for the contemporary environment and the environment going forward. I am absolutely confident that this platform would play a major role in that type of operation, if we were to commit to it, and the precise nature of it is clearly going to evolve as we go forward.

Q53 **Chair:** Can I extend that before we go back to Mr Afolami? Where would the Royal Marines fit into this? Are they expected to be travelling as part of the crew or travelling with the aircraft carrier?

**Lt Gen Mark Poffley:** It absolutely is fitted for the ability to embark Royal Marines and deploy them through rotary aircraft into the—

Q54 **Chair:** That was my next question. So they will be landed by helicopter, and not by boat or amphibious—

**Lt Gen Mark Poffley:** Correct. It is internally configured to allow both mission planning and the execution of that logistic move of the troops from ship to shore.

Q55 **Chair:** Okay, but you fly them rather than land them?

**Lt Gen Mark Poffley:** By rotary. There are other platforms that are better suited to delivering a surface manoeuvre capability. There is a real distinction between the delivery of troops by air, which this platform is clearly optimised for, and delivering a surface manoeuvre, which would require surface vessels. Clearly there may be modifications that you could do to a platform such as this, but we need to consider whether that is the most optimum way of doing things.

**Chair:** I am going to bring in Mr Snell briefly, and then come back to Mr Afolami.

Q56 **Gareth Snell:** Briefly, because I understand this is the same thing, Marines who are stationed on Queen Elizabeth will be deployed by rotary aircraft or by air. What if there is bad weather and they cannot fly? How would you deploy them then?

**Lt Gen Mark Poffley:** There are always environmental limitations in any operation. Clearly, that is a judgment of whether you conduct the operation in a particular way or, indeed, at all.



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Q57 **Gareth Snell:** I understand that there is a judgment. If there is bad weather and no amphibious capabilities on a particular carrier, how do you deploy the Marines?

**Lt Gen Mark Poffley:** You will deploy them, if you choose to do so, by surface manoeuvre, but it would be through other platforms.

Q58 **Gareth Snell:** So that would be taking them off one carrier, putting them on to something else, and then taking them to shore by boat?

**Lt Gen Mark Poffley:** You may well have to consider the ability of a transfer of some description. However, bear in mind that the sorts of conditions that you are describing would, I suggest, bring into real compromise whether that operation was tenable.

Q59 **Gareth Snell:** I am thinking humanitarian. We have just seen the deployment to hurricane areas. Obviously, a hurricane is a sort of special situation in which I presume you can't fly an aeroplane or helicopter. In that situation—humanitarian aid is required and Marines are being dispatched—how would you do that if you can't fly?

**Lt Gen Mark Poffley:** I think if you find conditions are of that sort of quantum, surface manoeuvre would be equally compromised, because the sea state is likely to be significantly higher than is tolerable within the risk tolerances if you want to deploy significant numbers ashore in that way.

Q60 **Chair:** Not good news, then?

**Lt Gen Mark Poffley:** Hurricanes are generally bad news for amphibious operations.

**Rear-Admiral Graeme Mackay:** I would just add that the useful part of having a ship is you can drive around weather and operate on the fringes of weather or downwind. Having served in all of the carriers, there is incredible flexibility in where you go, because you can physically manoeuvre your platform around.

Q61 **Gareth Snell:** But the military or whoever it happens to be would not be sailing to where the weather is.

**Rear-Admiral Graeme Mackay:** I understand that, but I have also flown in some fairly challenging weather conditions in helicopters.

**Chair:** You have more experience of this than any of us landlubbers, Rear-Admiral—except for Mr Snell, who was on the armed services scheme.

**Gareth Snell:** No, no; I am fully terra firma.

**Chair:** A few of us are part-time soldiers, but not in the same sense as you.

Q62 **Bim Afolami:** Just a quick point around value for money. Obviously, from what I have heard, you are all confident that this represents value for money in an operational sense. In other senses, to what extent have we considered value for money in other contexts—in terms of the ability to



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help train other countries' armed forces, the impact on UK plc or other ways? To what extent has that been quantified and looked at?

**Stephen Lovegrove:** It is inherently quite difficult—

**Bim Afolami:** I can completely appreciate that. Doing a model for it would be quite tricky, I accept.

**Stephen Lovegrove:** Yes. Military effect is quite difficult to think about, in terms of value for money. Global Britain, to use that phrase, is quite difficult to think about in a very precise way. There is no doubt, though, that it is widely acknowledged that the projection of British influence and power around the globe is going to be significantly enhanced by the possession of the carriers. I think that that was very much in the minds of Prime Ministers and Chancellors who have successively approved this project when they have done so. It is a very visible, tangible expression of British power.

Q63 **Bim Afolami:** In the process—the long process, I imagine—of approving a project as large as this, to what extent is there an even an attempt to do that by the Treasury or anybody else?

**Stephen Lovegrove:** I will pass.

**Lt Gen Mark Poffley:** In terms of delivery, some of those effects are quite soft effects. For example, influence—in the context of either military, coercion or deterrence—is very difficult to define. Similarly, diplomatic traction is quite difficult to define.

Q64 **Bim Afolami:** Are they assessed at all?

**Lt Gen Mark Poffley:** They tend not to be in numeric or financial terms.

Q65 **Chair:** Would you say they are dividends of the Defence—

**Stephen Lovegrove:** What the Treasury would call externalities.

**Bim Afolami:** A positive, rather than a negative, externality.

**Stephen Lovegrove:** A positive externality. Exactly.

**Rear-Admiral Graeme Mackay:** As part of the SDSR '15, we spent time with the Treasury under a major programme review group specifically looking at the scalable delivery of carrier strike and the carrier programme. That was examined and numerical work was done, in terms of the costs and the bounce in investment that that delivers throughout the full functionality of the capability, from war fighting down to those softer power issues. The only thing I would also add is that I think there is attraction, and certainly our advice to Ministers resonates, to putting a task group together that isn't just inherently UK-based. That task group would benefit from either NATO or other allies. There is clearly a gain there, depending on what the countries are, and clearly how you operate in that group depends on the geopolitics at the time.

Q66 **Chair:** We could talk about this at length, but really we need to get the focus back on the hard kit. We have talked quite a bit about the jets.



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Obviously they have a different lifespan from the carrier, which has a 50-year plan. How well are you future-proofing this? It seems that the bet is all on vertical take-off F-35s—you have talked about the buy-in you have had to that technology and the price—but what about future technology? We are talking about unmanned craft and drones. Is that planned in or will that require adaptation further down the line?

**Lt Gen Mark Poffley:** It probably falls into my broader portfolio, but suffice it to say that we are actively looking at how we can take forward a range of different initiatives that are operating in all three environments—maritime, land and air—to incorporate that sort of technology into the future of these platforms. It behoves all of us to look back 50 years, imagine how technology was then compared with where it is now, and extrapolate that problem. We are looking 20 years out at the moment. Unmanned systems absolutely apply in this space, as do the manipulation of the electromagnetic spectrum and a raft of other innovative technologies. We anticipate incorporating all of them into this sort of platform and this sort of capability in the round.

Q67 **Chair:** Have you got a plan? Presumably you are not planning to incorporate them all at once.

**Lt Gen Mark Poffley:** At the moment, the programme is focused on delivering in the capability as we have described it. *[Interruption.]*

**Chair:** Our apologies. There is an unexpected vote.

*Sitting suspended for a Division in the House.*

*On resuming—*

Q68 **Chair:** We are now quorate again and are waiting for Mr Graham, who was mid-sentence. I am reluctant to start without him, but I am aware we have waited quite a while. We already went back to the amphibious point, but can we go back to the issue about the foreign exchange rate? You talked about having a conversation with the Treasury, Mr Lovegrove.

**Stephen Lovegrove:** Yes.

Q69 **Chair:** But what is the exposure you are still at risk of now? Do you have a figure for that?

**Stephen Lovegrove:** I don't have a global figure for it. I am happy to write to the Committee.

Q70 **Chair:** Could you? Do you have a range that you could give us?

**Stephen Lovegrove:** I'm afraid I cannot do that at the moment because it is quite a complex calculation, as we have a rolling three-year programme of hedging with the Bank of England. We are getting to the stage where we are renegotiating some of that. I am afraid I do not have those figures in front of me at the moment, but I am happy to write. It is obviously an issue that the Committee has picked up before in previous hearings. It is one we are thinking about very hard.



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Q71 **Chair:** We will also be pressing the Treasury on this as well. For Mr Graham's benefit, we are just probing the forex situation again.

**Stephen Lovegrove:** While I have the floor, could I ask Rear-Admiral Mackay to respond on the point that Mr Graham was making about whether this platform is future-proofed for future airborne capability?

Q72 **Chair:** Rear-Admiral Mackay.

**Rear-Admiral Graeme Mackay:** The answer in simple terms is yes. The inherent design of the ship means that it has a large amount of space and power to allow you to develop other systems as the carrier goes through its life. It has a design life of up to 50 years. Inherent in that design, there is growth within the platform. That would allow you to operate a range of future air vehicles as we develop those out in that sort of timeframe. I say that just to give you the assurance that the ship does have a lot of power generation capability and a lot of ability to grow over time in terms of delivering capability.

Q73 **Luke Graham:** That is great to hear. It goes back to one of our earlier questions about the operational capabilities of the carrier. Again, I go back to the point about broadband, because obviously there will be more and more demands placed. Presumably, if you were operating in a full taskforce in a war-type situation, that would become an issue. Reports previously have said it has been about 8 megabits per second. Are we clear that broadband and internet capability is much higher than that and would support a full complement?

**Rear-Admiral Graeme Mackay:** The ship has a design with large aerials to communicate with at the moment. As part of the work that we are doing on looking to bring US Marine Corps jets on, there will be another dedicated satellite system for them. Because you have got a large ship with a lot of power, we have also designed the ship fully networked with fibre-optic cables, so through the life of the ship, for the first time, you can blow fibre-optic cable almost anywhere in the ship. It is really a different way of thinking about communicating.

We also have ideas, looking into the future. I don't know what the size and shape of modern satellite aerials will be in 10 years' time, so if you look at the design of the two islands of the ship, you can see that we have provisioned space so that you can fit arrays. I would have thought by then that you would be looking at planar arrays.

Q74 **Chair:** For those of us not expert in this, what is a planar array?

**Rear-Admiral Graeme Mackay:** A planar array is a flat array, rather than something you steer towards a satellite electronically. In very simple terms, I am trying to say that inherent in the design is the ability to grow through life, for both the carrier and the F-35. That is the key message to take away. We have designed that deliberately into the platform, so that you do it. You would not wish to fit electronics that go out of date very rapidly. We need to be much more agile in the way we think about developing capability over time. That has been thought about in both the aircraft and the ship.



Q75 **Luke Graham:** Understood. That's great to hear. Are you confident, then, that the forecast budget will enable you to do that growth within the assets?

**Rear-Admiral Graeme Mackay:** At the moment, we have a capability in communication terms that meets our requirement. As we prioritise and understand our budgets going forward, we will clearly prioritise the requirements to deliver the capability over time. That is just a natural process that we go through on a yearly basis under the leadership of the general.

**Lt Gen Mark Poffley:** Just to nail that one out of sight, the reality of life is that the passage of data around the force is a generic problem and, therefore, it needs to be taken as a system. Platforms such as this or, indeed, the aircraft it will operate will inevitably see a slightly different approach through time to how we manipulate data. Some of it will be very targeted data; some of it is unique to a particular function inside things.

As part of the programme, we are looking to ensure we have sufficient resilience in the system—that it has the firewalls and the breaks to ensure that it cannot be compromised. Inevitably, cyber-attacks and their ilk will become an increasing factor as we go through time. We are provisioning for that as part of our routine modernisation, not just of this particular platform, but for the force more generally.

Q76 **Luke Graham:** I appreciate that there are lots of different types of data, and they will have different levels of resilience, but if I understand correctly, you are quite comfortable that existing budgets will be able to give you the capacity to evolve security and capability over the life of the assets.

On the interoperability that we are trying to have with the United States, will we have sufficient funding to ensure that interoperability, with the advancements that they have, and in the light of their significantly higher military spending than ours?

**Stephen Lovegrove:** Existing budgets go up to 2026, and we are confident that we can do everything that we can realistically foresee between now and 2026 within that cost envelope. The platforms will have a much longer life than that. I do not know what the capabilities of the technology available in 2026 will be. That is 10 years out, and I simply don't know; nobody knows. We will have to take a view as to what needs to happen at that point, but within the cost envelope that exists to 2026, we are pretty comfortable.

Some misconceptions, particularly about the F-35, have been in the press recently—for instance, that it has less memory than the iPhone, and things like that. These are wildly inaccurate—I mean, 10 gigabytes. On an F-35, depending on the model, there are somewhere between 500 and 1000 separate processors on one single aircraft. Most of them have got memory associated with them, and two of those bits of memory I know are 96 gigabytes. Among 500 to 1000 processors there is an enormous amount of



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capability, redundancy and so on that is built in already. What it's going to be like in 2026, I don't know, but for the moment we are comfortable.

**Q77 Luke Graham:** That's fine. I will take that to mean that by 2026 you are comfortable, and—to be clear—that the carriers, the jets, the interoperability with allies, in terms of the ability to communicate, the software that we are using and the infrastructure support will be world-class to 2026, as foreseeably as possible.

**Stephen Lovegrove:** Yes, though, for clarity, what will be world-class in 2026 will not be what looks world-class at initial operating capability. Things will have moved on, and we will have moved on with them. It is within the operating cost envelope, yes.

**Luke Graham:** Okay. That is absolutely fine.

**Chair:** We'll be talking to your successor in 2026.

**Q78 Luke Graham:** Maybe some of us will still be here then. I wanted to go on to operating facilities, Chair. Going back to our earlier questions looking at overall naval capability, we looked at the model taskforce that was put forward, which I think is broadly similar to that used by the United States taskforce, in terms of having the complement of missile destroyers, frigates, support vessels and attack submarines, and knowing that would come to 25%-ish of our overall surface fleet. Are we confident that the operating budgets that we have—again, in the period that we have put in, up to 2026—will enable us to form such a taskforce?

**Lt Gen Mark Poffley:** Absolutely. This capability forms a very high priority in the defence portfolio of capabilities. If it were coming down to, "Is this the place where you would make a compromise?", I think the answer to that question is no, at this juncture. We are quite clearly aligned with the Americans—indeed, we have done a lot of work with the Americans. We have got people in the United States in a significant number to make sure that we are interchangeable as regards their thinking and ours, particularly giving us the option, should we choose to do so, of accepting American aircraft on to our carriers. I think the suite of capabilities that we are assigning to a carrier strike group is absolutely funded inside the programme at the moment, and I don't imagine us not being in that position in the foreseeable future.

**Luke Graham:** Understood.

**Q79 Chair:** To be clear, it is absolutely a top priority that you will not seek compromises here. If the budget is pushed, it will come from somewhere else.

**Lt Gen Mark Poffley:** I did not say it was the top priority, because that would be wrong; we do not think of it in that way. However, quite clearly it is one of the senior priorities inside defence. It is well above the threshold at which you would be having a conversation about resource allocation.

**Q80 Luke Graham:** I understand about the priority, and that is reassuring. Do



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you foresee any problems coming in the time gap after the T-23 frigates go offline? We have a four-year gap before the T-26s are due to come into service, and that, as I think was outlined earlier, would be required for a fully operational taskforce. If we combine that with the fact that we have the retrofit to fix on the propulsion systems of the T-45s, are you concerned that, although we may have the budget in place to have such a taskforce, we may not have the operational capability because of commitments, decommissionings and retrofits?

**Lt Gen Mark Poffley:** We have scheduled the roll-out of the Type 26 precisely in line with the drawdown of the Type 23s. It is absolutely the case that we will have to actively manage the fleet between now and the point at which all the Type 23s have been decommissioned. As for the Type 45, there is an active programme in place—

Q81 **Chair:** Sorry, can I just go back to pick that up? If you are “actively managing”, there is going to be a gap?

**Lt Gen Mark Poffley:** No, there is not going to be a gap.

Q82 **Chair:** Can you be clear, then? You will keep the Type 23 going until—

**Lt Gen Mark Poffley:** There is an overlap between the introduction of the Type 26 and the decommissioning of the Type 23s.

**Chair:** Right. Just so we are clear.

Q83 **Luke Graham:** So we will have some T-23s available up until 2027, which is when the Type 26 is expected to enter service. Is that right?

**Lt Gen Mark Poffley:** Correct.

Q84 **Luke Graham:** Touching on what is going on in the whole carrier capability, we talked before about some of the amphibious capabilities. Obviously, there have been reports about some of our amphibious vessels, Albion and Bulwark, being decommissioned. I appreciate the point you made earlier about this being an aircraft carrier strike group and not a solely amphibious group. However, if we want to mobilise our assets around the world and project power, and if the aircraft carriers themselves do not have the flexibility to deploy amphibiously, do we still need to ensure that there are amphibious vessels, such as Albion and Bulwark, in a broader task group to make sure that we have that capability?

**Lt Gen Mark Poffley:** Let me reiterate the point: the carriers have a very significant role in any amphibious operation. They will be there and they will be providing both air and rotary support to the Marines in an intimate way. If there is an aspiration for us to deliver what we are describing as surface manoeuvre, then clearly you will need additional platforms. The complete mix and make-up of those is under review, and again, I think quite a lot of the speculation in the press at the moment is exactly that—speculation.

We have yet to take any decisions as to the full make-up of the capability suites that we are going to recommend as part of that capability review.



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That will depend on what our ambitions are, and how they fit into the contemporary operating environment. We are not designing something for the past; we are designing something for the future. It needs to service a range of different contingencies and have the maximum utility, given the amount of money that we have in the defence budget.

- Q85 **Luke Graham:** Lieutenant General, I understand that point. The question I am asking is: if we were trying to deploy Royal Marines from HMS Queen Elizabeth II, it is my understanding that even with a Chinook we would not be able to take a full complement of Royal Marines with all their equipment and deploy it just by rotor; it would require amphibious support. If I am wrong in that assertion, sir, then please correct me; but if that is the case, and we are to make sure that we want the Royal Marines to deploy first—and I would imagine that in many tactical situations that would be the case—do we then need amphibious support with the aircraft carrier?

**Lt Gen Mark Poffley:** As someone who is charged with delivering coherence across the entire capability, straight across defence, I would love as many options as I can possibly have to deliver people in a particular way. This is all about scale. If you want to conduct operations at a certain scale, you are quite clearly limited by the pure logistics of this. How many people you can get on an aircraft and then deliver ashore is a function of how many aircraft you have, how many people can fit in them and how far you are going to go. There is a multitude of different variables.

If surface delivery is required, then clearly it will need to be through a platform other than the aircraft carriers. It will need to include some form of amphibious-rolled shipping, but again, there is a multitude of different options that might apply. We happen to have some in our inventory at the moment, and clearly the press have speculated on some of those issues; but we have yet to take a decision as to exactly what fit—

- Q86 **Chair:** You are talking about taking decisions. Who is the most senior Royal Marine officer involved in this discussion? You have a job across the forces in your current role, but is there somebody high up in the Royal Marines at the table, having these discussions with you?

**Lt Gen Mark Poffley:** The Vice-Chief of the Defence Staff is late Royal Marines. He is No. 2 in the military hierarchy inside the Department.

- Q87 **Gareth Snell:** My colleague mentioned needing some sort of amphibious support on the carrier, and you said that that would all depend on the aspiration for the make-up of the carrier's team when it is on deployment. Is it not simply the case that one of the things that curtails your ability to make up that team is the number of personnel available to you, and that what we actually need is more people in the Navy?

**Lt Gen Mark Poffley:** I don't think there is a limitation on the carrier operations as a result of manpower numbers inside the Navy. There are clearly pinch point trades in the Navy, as there are in all three services, but volume is not the issue. There are some specialist trade groups, but



again, this comes down to prioritisation. Would I place those specialist groups inside the carrier group? The answer is almost certainly yes.

- Q88 **Chair:** We have had a notification that there may be another vote. I think this is going to get to the point of ridiculousness, so can I quickly go over to you, Rear-Admiral Mackay? Problems with the carrier were identified in March that meant that you could not go to sea at the time. Have those technical problems been resolved? What were they?

**Rear-Admiral Graeme Mackay:** Yes, they have. One of them was because we had taken a decision, which was the right decision, to do a lot of the power propulsion trials in Rosyth alongside. It was a brand-new plant and we did not know whether it was going to perform, so extensive working was done trialling the plant alongside. That was for reasons of efficiency, particularly financial efficiency. We did not build a shore-based power plant to replicate the ship, so we needed to do that with the ship alongside in Rosyth.

That work went ahead very successfully. The end of that work then required us to take off the special blades that were on the propeller. We removed those blades and put the full service blades on. During the process of fitting one of those blades, which is done underwater, in very dark, dismal water—

**Chair:** I love the description, but time is not on our side.

**Rear-Admiral Graeme Mackay:** The blade was not fitted properly, so we had to take the ship into Invergordon and change the blade. We then took the ship back to sea, and the plant and the ship performed exceptionally well at sea.

- Q89 **Chair:** Was there a cost to resolving that and any other problems?

**Rear-Admiral Graeme Mackay:** No, because it was conducted within the relationship that we have with the Aircraft Carrier Alliance.

- Q90 **Chair:** But she did leave Rosyth before she was fully ready.

**Rear-Admiral Graeme Mackay:** No, she was—*[Interruption.]*

- Q91 **Chair:** I hate to say this when we have not really finished our hearing, but we are getting to the point where we are not going to manage to continue this today, because I am aware that colleagues will not be able to stay. I think we may have to write to you on a number of issues with dispatch.

**Rear-Admiral Graeme Mackay:** Of course.

- Q92 **Chair:** I hate to do this, because we should have a hearing in public, and there were a number of other questions to ask. Just one thing while the bell is ringing and we still have time to get to the vote: what about the wider benefits to jobs in Britain? A certain percentage of the F-35 parts will be made in Britain, but what consideration has been given to jobs in Britain, Mr Lovegrove? We may not be able to get to the answer to your question, but let me at least ask that on the record.



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**Stephen Lovegrove:** Very, very real benefits. Clearly the carrier itself is going to create, and has already created, an enormous amount of additional work for the BAE and Babcock yards in the UK. The F-35 has—

**Lt Gen Mark Poffley:** Shall I pick this up? The reality is that, at its peak, the F-35 programme will deliver some 25,000 jobs into the United Kingdom across 500 businesses in the supply chain. From our point of view, it is a significant out-turn. That includes a 15% benefit on the 2,700 or so aircraft that we envisage being built across the entire programme.

**Chair:** One of the things that we will perhaps explore in a letter is the maintenance of the defence capability in our industry in the UK, especially in the light of Brexit.

I am really sorry, gentlemen, but votes are votes—that is what we are here for—and realistically I do not think we are going to get this hearing going again after so many interruptions. Mr Lovegrove, may I direct questions through you to the other witnesses? May I urge you all to be candid in your responses to our letter, because it is not the same at all? We may come backwards and forwards and then incorporate any of the answers to those questions in our report. We will try to do that with real dispatch, if that is possible. I say that so that you are prepared. We will get that letter off quickly to you in the next couple of days. I am sure it is all in your mind; if you imagine you are sitting in front of us and answer in that way, it will be really helpful. I can only apologise again.

# Public Accounts Committee

## Oral evidence: Delivering Carrier Strike, HC 394

Monday 4 December 2017

Ordered by the House of Commons to be published on 4 December 2017.

Watch the meeting

Members present: Meg Hillier (Chair); Bim Afolami; Geoffrey Clifton-Brown; Martyn Day; Luke Graham; Stephen Morgan; Gareth Snell.

Sir Amyas Morse, Comptroller and Auditor General, Adrian Jenner, Director of Parliamentary Relations, National Audit Office, Jeremy Lonsdale, Director, NAO, and Richard Brown, Alternate Treasury Officer of Accounts, HM Treasury, were in attendance.

Questions 93-211

### Witnesses

[I](#): Tony Douglas, Chief Executive, Defence Equipment and Support.

[II](#): Stephen Lovegrove, Permanent Secretary, Ministry of Defence, Rear-Admiral Graeme Mackay, Director, Carrier Strike, Ministry of Defence, and Lieutenant-General Mark Poffley, Deputy Chief of Defence Staff, Ministry of Defence.

### Examination of witness

Witness: Tony Douglas.

Q93 **Chair:** Welcome to the Public Accounts Committee on Monday 4 December 2017. Our hearing is in two parts today. First, I would like to welcome Tony Douglas, who is head of Defence Equipment and Support. When you leave, you will have been head of the organisation for two years—is that right, Mr Douglas?

**Tony Douglas:** It will be a little bit more than two years.

**Chair:** And you are leaving at the end of the year to take up the role of chief executive of Etihad Airways?

**Tony Douglas:** The group chief executive of Etihad Group, so all the airlines and the other associated businesses.

Q94 **Chair:** So an even bigger job than we thought. It is fair to say that Mr Douglas has been responsible for a significant transformation programme in DE&S that has been a subject of interest to this Committee over the years. In your last weeks in the job, we are keen to hear from you how it has gone; we hope to get some candid answers about what has and has not gone well and what advice you may have for your successor.



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On appointment, you were very clear that you set out to deliver the armed forces' requirements to the best-quality standard you could—I think "utmost quality" was the phrase you used. Have you achieved what you set out to do?

**Tony Douglas:** First, I would like to thank the Committee for the opportunity to give evidence like this. In my 38-year career, it is the first time I have had an exit interview.

**Chair:** Really? That is shocking. Let us hope you will be candid, then, because it is only useful if you tell us what you really think.

**Tony Douglas:** I shall do my level best. Interestingly, I was in Bristol earlier today because we have been running a review with our change advocates network. May I explain what that is all about for a moment?

Within DE&S, we have 1,066 volunteers to be personal sponsors of this change. It is not just about senior leadership and the normal textbook approach to these things; it is about trying to build a more sustainable way of taking a change through an organisation. For management and everybody who is part of DE&S, we have it organised around six very clear objectives: hitting our numbers; delivering on our plans; putting more support in the agenda; satisfying our customers; delivering the transformation benefits that have been laid out; and developing our people capabilities and our processes. We have a balanced scorecard, and what we have been doing today, and in an executive review last week, is marking off our progress against all those things.

I think it is fair to say that the organisation has made significant progress and is on or ahead of nearly all the targets that were set for it. On objective No. 5, which is about the transformation taking effect, the £3.4 billion savings that were set as the target for DE&S over the 10-year period are well on the way. More importantly, we can evidence a very clear set of indicators that show that the team are doing what they said they would, and I leave with a sense of pride that they have fulfilled their obligations and are on track.

Q95 **Chair:** You say these are volunteers. Can you remind us of the total numbers working for DE&S at the moment?

**Tony Douglas:** We have 11,000 working across the whole of DE&S, so the people within the change advocates network make up just short of 10%. They are people who have said they want to be part of something special.

Q96 **Chair:** In terms of grades through the system, how senior and how junior are those people?

**Tony Douglas:** It is a complete representation across the grade spectrum and the age spectrum, from young graduates to a gentleman presenting today who had been with us for 40-plus years, and everybody in between. The common denominator is the fact that they have put their hands up and self-selected that this is so different that they want to be a part of leading it within the organisation.



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Without going into this in more detail than necessary, the classic triangle of any big organisation is that when one tries to pour change in from the top, it quite often hits a kind of permafrost. What this was designed to do was almost from the bottom and from the side to be able to self-generate and build a clear understanding of what we are doing and why we are doing it. It has worked to great effect.

Q97 **Chair:** Is there some experience of transformation that you have brought with you from your previous experience in the private sector?

**Tony Douglas:** I have to say that I have done it like this in the past, but somebody asked me when I was doing a closing speech in Bristol earlier today what I would steal and take to the Etihad Group, and my honest and very clear answer to that was: this approach. I think DE&S has done it better than anywhere I have ever witnessed before. It is a piece of good practice that one would encourage to continue.

Q98 **Chair:** So that is the good news. Is there anything you regret that you have not yet achieved in the two and a bit years?

**Tony Douglas:** First, this is a big agenda. Everybody is fully aware of that and therefore, for anyone to suggest that "work in progress" is not an appropriate summary would be to mislead a Committee like this. There is work in progress and an awful lot for my successor to continue with. Have I any regrets? There is nothing in life that I am overly tormented by, frankly, but I really enjoyed setting up the submarine delivery methodology, establishing a completely different approach to contracting it and delivering an operating model through an alliance. For all the right reasons, the logic of separating out the submarine delivery agency, which has now been successfully implemented, means that DE&S is around two thirds of the size it was when I first started.

Q99 **Chair:** Is there anything that we should be watching out for in DE&S as a whole with that separation of the submarine delivery agency?

**Tony Douglas:** I would not suggest as a result of the separation per se, but I would always offer this counsel on big mega-projects, no matter what the context: chase time, and cost will follow; have an absolutely fanatical and forensic approach to driving time out of programmes of this nature; get off to a fast start and you will dilute risk significantly, but get off to a slow start and you will end up carrying risk for the future. I would offer that counsel to the team, just as I would to High Speed 2 or anything else with comparable complexity.

Q100 **Chair:** So you do not have any particular worries because of that separation of responsibilities?

**Tony Douglas:** Not with regard to the separation.

Q101 **Chair:** You talked about the transformation programme that you were celebrating with the team today and you are proud that you got there, but can you give us some precise examples of what has changed in practice as a result?



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**Tony Douglas:** Perhaps, if I may, I will give three or four hard commercial examples because they have teeth and they will bring colour to this, and then some of the more behavioural and capability-orientated things. In terms of the commercial ones, we have saved £500 million-plus on Typhoon sustainment. That is a programme where, for the first time ever, we have implemented a completely different methodology in the way in which the supply chain has provided support to our fast jet programme. For those of you who are familiar with the traditional contractual forms that Defence has been using, many have been cost-plus or cost reimbursable-type models. I have a personal problem with that form unless it is absolutely necessary.

With Typhoon on sustainment, we have put in place an availability contract that is similar to a power-by-the-hour type of arrangement that you would see in the commercial aviation sector. Not only has that taken just short of a third out of the cost of Typhoon sustainment, but it has allowed a way in which we can invest in additional capability. It is a fundamentally different contracting strategy and it is one that has hit the numbers very much to the benefit of the Royal Air Force. That is one of a number of examples that I could offer.

The next one is what we did with maritime patrol aircraft; we have taken over £300 million out of that programme. The way in which we have gone about that is by engaging with foreign military sales with our ally in the United States in a completely different way. I think it is fair to say that we would all acknowledge—including them—that this is a reference example of a foreign military sale commercial structure, and there is absolutely no doubt whatsoever in our mind that we could not have got anywhere close to the commercial outturn on the P-8 maritime patrol aircraft had we not gone with this methodology.

The final one I would use in some ways has the potential to be even more profound. As you are perhaps collectively aware, an historical terms-of-business agreement on maritime naval shipbuilding meant that all future naval ships would always have been built in the UK as cost-plus. We have negotiated a different shipbuilding construct, and on Type 26 it is the first time ever we have engaged with BAE Systems on a TCIF—target cost incentive fee—contract. We have finally put to bed any cost-plus-type methodology and replaced it with an incentive-based contract with the 50:50 pain and gain share. I would be bold enough to offer that that is one small step for mankind and a giant leap for the way in which we historically contract with BAE Systems for naval shipping.

I said three, but I have now thought of a fourth—

**Chair:** If you could be quick with the fourth, because we have a lot to get through.

**Tony Douglas:** What we have done in engaging the market on Type 31e is, again, the next step in the evolution of transforming the way we contract with industry. We have gone to the market with the clear illustration that we can only afford £250 million in outturn and that it has



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to be an exportable proposition. We have taken an output specification as a set of parameters, and we now have 22 separate industrial organisations bidding against each other to provide us with a solution. Those are four really good examples of practices that, two years ago, we were simply not doing.

**Q102 Chair:** Clearly, one of the main reasons you came into the job was to try to deal with some of that transformation and the costs, but there are also issues about the capability of UK industry. Take the maritime patrol aircraft, for example. You have talked about the changes there. Do you have any concerns about the impact on UK industry and the capability of our defence industries to provide those facilities, services and products in future, because of the approach you have taken? Was that built into your thinking at all?

**Tony Douglas:** I would respond to that in two ways. One is what I believe to be an overpoweringly positive example. I was personally involved in leading the F-35 MRO bid, which is where we have the avionics packages for the European nations—

**Chair:** That is the north Wales site?

**Tony Douglas:** Yes. That is DECA Sealand in north Wales. To win that was a massive signal of the capability present in the UK. To get on a fifth-generation fast jet programme, which builds high-end capability and value-add going forward, will potentially yield billions over the fullness of time. Of course, off the back of that we are in the process of bidding for the next series of packages that come out of the back of it. To those who perhaps proffer doom and have the view that we have less capability today, I suggest that sometimes that is a frame of mind. The example I offered was, I believe, a great Team GB affair, where everybody was involved in putting positive energy into trying to get the right outcome, which clearly benefited us in the end.

The second part, which is the flip, is that I believe innovation is the key. The face of defence economics is changing; like just about any other sector, it is seeing massive changes all around the world, whereby capability every year improves and the cost of providing it in some markets comes down significantly. Innovation as a mindset, as opposed to the science and technology end of it, is something that defence contracting, in particular, needs to reflect on more. It has never been as agile when it has had CapDevs the size of me from the Ministry of Defence. What we have done a lot to promote is the engagement of a far more innovative mindset in looking at how we collectively get better at getting better, and there are clear signs that in some places that is having an effect.

**Q103 Chair:** Perhaps in a shorter form, when you are delivering on these big contracts, such as the maritime patrol aircraft for example—that is the one I raised in particular—is there a worry for you that there will be bits of the UK industry that will no longer be able to deliver support to those aircraft because of the way the deal has been constructed, and that that



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in itself will have an impact on the UK's capability to bid for some of these contracts, such as the avionic centre, in the future?

**Tony Douglas:** I can probably relate to the sentiment that I sense is behind the question on other platforms more than on the maritime patrol aircraft. It is based upon a Boeing 737-800, which is the most popular commercial airframe that has ever been in production and, as a consequence, the whole-life cost of servicing that machine will be significantly to the advantage of the British taxpayer and the Royal Air Force. It would have had to have been developed upon an existing durable airframe, and one of the many things I would put to my successor and other people around defence is always to look in the early stages at the liabilities associated with the whole-life cost of ownership and, wherever possible, to keep specifications as vanilla as you can, where circumstances permit. In the case of the maritime patrol aircraft, the fact that we have taken on a programme that is mature, is with other partner nations and is based upon a 737-800, a durable airframe, will prove to be inspired when it comes to the whole-life cost of sustaining it.

Q104 **Chair:** That is a long answer, but what about UK industry's capability to provide similar or future aircraft, if its capability to support those has been reduced because the contract has taken it outside the UK? In UK plc, as we know without going into the detail, there is a sense of how some defence projects are procured to make sure that we retain that capability, but in this case that did not happen.

**Tony Douglas:** I completely get the question. For the benefit of the Committee, I ran the UK's last commercial aircraft manufacturer as the managing director. I was building the Avro RJ in Woodford before the programme came to an end. We do not have a civil aircraft platform that is comparable with a long time ago, hence the reason I have commented before. This is one that I perhaps do not see quite the parallel on. Getting on to some of these programmes, look at the F-35: with 15% of the workshare on F-35, we are taking far less than 15% of the aircraft. There are other ways in which you can innovate your way into a better position. I cannot imagine that we will be building more than 15%, although hopefully we can get the opportunity to do so, but securing and building off that has to be part of the future.

Q105 **Chair:** In the wider work that you have looked at over the past couple of years and in the transformation programme, how much of a factor has it been, or indeed should it have been, that you look at the wider UK capability to make sure that we have got it to provide the right defence industry support in future? Is that something that you have considered?

**Tony Douglas:** The simple answer is yes. It is a very active part of our consideration. Wherever possible, having a significant UK content to any outcome is beneficial, particularly at the moment because of forex. A significant part of the defence budget that I am accountable for acquiring against has been negatively impacted sizeably by forex.

Q106 **Chair:** In your view, what about Brexit? Will that cast a different light on whether there should be an issue for your successor about looking first at



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UK procurement because we will have a very different relationship with Europe, whatever that ends up being?

**Tony Douglas:** I can honestly say that if I had a really good answer to that question, I probably would deserve not to be sitting here today. The complexities of how that will all play out—

**Chair:** Another set of unanswered questions, then.

**Tony Douglas:** I guess some of it will remain to be seen, but I think the short-term thing, for sure, is forex. We have had a massive impact from forex. There are lots of complexities around European standards, European licensing, the way in which some of our European partnerships are involved in programmes such as Typhoon and so on. All those things will need to be worked through.

Q107 **Chair:** As with many people in your position, no one really knows on Brexit at this point, but we are continuing to look at it.

May I touch on the issue of personnel, which you talked about earlier, and particularly the skills gaps that you still have? Perhaps you could tell me first how many people you are currently trying to recruit, because there were some press reports last week and I want to be clear on the numbers.

**Tony Douglas:** We have actually been successful over the last year in recruiting heavily externally, and the reason why—

Q108 **Chair:** How many are you still trying to recruit?

**Tony Douglas:** We're actually pretty much there now. Obviously—

Q109 **Chair:** That's the 11,000—

**Tony Douglas:** It's just over 11,000, so we're pretty much there now. Where the opportunity for us, within the transformation programme, sat was in the over-dependency on private sector support staff. DE&S is a bespoke trading entity. We sit outside the regular civil service construct. We are held to account by our opex budget, as opposed to the headcount. Since 2015, we have reduced our opex budget by 27%, so in terms of the cost to the taxpayer in relation to the programme, we have reduced it by 27%. The programme, in terms of output, has gone up by in excess of 20%—the other way. That is just a simple statement of fact when it comes to that ratio. The way we have done it is by recruiting more people externally, but being able to retain them. That has been—

Q110 **Chair:** I was going to come on to that. Of course, you are outside the normal pay and conditions of the civil service, and from what you are saying, that freedom has been useful to you.

**Tony Douglas:** Yes.

Q111 **Chair:** How are you retaining people? I ask that because one of the challenges in the past has been turnover. How are you achieving that? It's early days to say whether it has been a success, I guess.



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**Tony Douglas:** From June of last year, we took all our staff out of the civil service pay and grading structure. To familiarise everybody, the civil service has 11 narrow bands. We now have five very wide ones, and we have benchmarked with 44 external companies with profiles that we compete on skills against. We have migrated everybody into that five-band structure.

Q112 **Chair:** So basically, you are hoping that the retention will work because there is not a particular financial benefit for someone moving from DE&S to the private sector, as a result of the benchmarking you have done.

**Tony Douglas:** In some areas, we are still way behind the market, because we just don't have the financial bandwidth to correct things in one annual turn. It will, realistically, take us four or five years to catch up to the market.

Q113 **Chair:** Do you have any particular skills gaps at the moment? You say you are nearly at full recruitment. Are there any particular skills that are hard to recruit and/or where you have gaps?

**Tony Douglas:** Project controls, project management and commercial administration.

Q114 **Chair:** It sounds a bit like the rest of the civil service.

**Tony Douglas:** We have closed the gap as a result of what we did last year, but they are the three big challenges.

Q115 **Chair:** Of course, one of the big partners that you work with is the individual commands. We have looked at that, of course, in this Committee. Do you think they have the right skills in place to help them to determine exactly what they need in order to get you to provide that, or are there also gaps in the commands in this area?

**Tony Douglas:** Without having an intelligent customer in any relationship where you are managing a supply chain to an end user, you run the risk of misinterpretation.

Q116 **Chair:** That's a fine statement, but are they an intelligent enough customer? Do they have the right skills in place?

**Tony Douglas:** I believe they are an intelligent customer, but they are on a learning curve. There is a journey of transformation for the Levene model to mature in that space, in exactly the same way as there is a maturity—

Q117 **Chair:** In your estimation, when will the commands be in the right place to be a smart client—smart enough to make sure they are specifying very particularly what they need so that you—

**Tony Douglas:** In many cases, they are already there. It's not a binary, one-size-fits-all response; I would say the responsibility for DE&S is to ask the right questions as well.

Q118 **Chair:** You say they are on a journey. If they are on a journey, which



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commands have arrived and which ones are still on the journey?

**Tony Douglas:** I would not triage it in that way. I would almost do it programme by programme. For example, what we have just done with—

Q119 **Chair:** Can you give us a good example of one where the skills are in place in the command—

**Tony Douglas:** What we have just done with Type 31e. I would like to think you will be able to hold that up in the future as a reference study of good practice all round. Some of the traditional support contracts are where we have historically not been as on it as we could have been or should have been. I would openly suggest to anybody that the greatest opportunity going forward is still in the support expenditure side of the defence budget—it is in excess of 50%. I chaired the five powers here two weeks ago with the Americans, the Italians, the Germans and the French, and, not surprisingly, it is consistent across with them. The big headline, kind of sexy equipment programmes seem to dominate, yet as commercial people—I imagine many of us here are—if you follow the money, a disproportionate amount is in the support side of it. That is where we could get a lot smarter, going forward.

Q120 **Chair:** So one of the tips for your successor—as well as this Committee, of course.—is to watch that.

**Tony Douglas:** That would be the No. 1 tip.

Q121 **Chair:** That is very helpful. The Committee has watched with interest the cost of the defence budget and the new equipment plan. Do you think there is enough money available to deliver the current equipment plan?

**Tony Douglas:** I will speak as a British passport holder and somebody who is as passionate as anybody else in this room. If it was my money, I would give them more, because defence needs it.

Q122 **Chair:** That is a very neat way of dodging the question, if I may be so blunt, Mr Douglas. We have seen the budget increase but the demand go up immensely. There is very little headroom left. Do you think there is enough money to deliver the current programme?

**Tony Douglas:** In terms of what I have line of sight of, I understand the programme I have got to deliver, but mine is the equipment and support side of it. That has a habit, like it does in all complex businesses, of being a bit of a moving feast. It does change as a result of all manner of iterations, but, none the less, that is what it is. I do not see all the other parts of it; but if the rich uncle had £1 spare, I would give it to defence first.

Q123 **Chair:** Okay. That sounds like a plea for a little bit more money—perhaps a bit more than a pound.

**Tony Douglas:** It sounds like a plea for a rich uncle to me.

Q124 **Chair:** I don't think there is a rich uncle; just the British taxpayer. Given that—and you have got sight of this—is any particular programme



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keeping you awake at night? You said earlier that nothing really worries you too much, but do you lie awake worrying about anything? If so, what?

**Tony Douglas:** I probably gave that up a long time ago, in all honesty. I am not trying to be flippant in any way.

**Chair:** We have some very cool customers in front of this Committee.

**Tony Douglas:** I think if you were predisposed to have a worrying type of demeanour—

Q125 **Chair:** Okay, rather than what keeps you awake at night, when you wake up in the morning, what is the first thing you worry about?

**Tony Douglas:** I tend to go to the other side of it. I tend to go on fuelling myself in the morning with positive energy, so I start with all the things that are going well—

Q126 **Chair:** Okay—we will get there eventually. So, last thing at night, after your worry-free sleep and worry-free morning, what is worrying you before you go to bed?

**Tony Douglas:** Seriously, I am not in any way just trying to play this left and right of centre. There is nothing singly in my mind that if you put scopolamine in my arm now I would say, “There is one headline.” But there are lots of things in the world of complexity and ambiguity that, it goes without saying, are hugely challenging. There are some incredible people working tirelessly hard on resolving it—and it will probably get even more challenging; that is the nature of life. But is there one thing that stands out above all else? In all honesty, for me, no there is not.

Q127 **Gareth Snell:** I want to pick up the defence spending arrangements. You said you welcomed the fact that the submarine delivery authority had been taken out as a separate entity. Do you then worry about the fact that the funding arrangements for that particular authority sit within the MOD budget? Any variations in that will surely have an impact on the work that your successor will have to do in the Defence Equipment and Support service.

**Tony Douglas:** As I suggested earlier on, programmes of that scale—it is going to be running over 20 to 30 years and it is a £31 billion programme—and annualised budgets normally do not sit too comfortably together, particularly if what you are trying to do is challenge how you time compress dramatically. What I would leave to anybody going forward in leadership in those kinds of programmes, as I commented before, be it submarines or of any comparable complexity across Her Majesty’s Government, is: always chase time and get a good commercial structure that gives you the flexibility to do that, as opposed to perhaps having to programme around a constraint on in-year cash level.

Q128 **Gareth Snell:** Would you agree that it would make sense to protect the wider programme of work that the MOD is doing around defence, about equipment and support, if the costs associated with the submarine



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delivery were actually underwritten by the Treasury rather than the Ministry of Defence?

**Tony Douglas:** I clearly cannot comment on behalf of anybody else, but if it was my family business, I suspect that is what I would be inclined to think about.

Q129 **Geoffrey Clifton-Brown:** I have two questions on procurement. It used to be the case that the various organisations, the various sections within the military, would specify something, and then they would keep changing the specification as it went along, which would considerably add to the cost. You said today that you would have a “very vanilla” procurement specification. Are we getting there, or are we still changing the thing as we go along generally, as a generalisation across procurement programmes?

**Tony Douglas:** The answer is yes, we are getting there. The latest Apache helicopter contract that we have let is for what I would describe as a vanilla-specced Apache, as opposed to one in the past that we had heavily modified, for good reason, but at a significant premium in terms of cost; but, more importantly—how that plays out in future expenditure on support and sustainment, because our one is different to the volume of the fleet of Apache helicopters that is already out there. We have done the same with Chinook as well, on helicopters; and the example I used before, with Type-31e—we are starting with that in mind.

The problem you described is the historical challenge within Defence, whereby programmes have not been as tightly specified, and change controlled; and in a cost-plus environment in particular, when I used to be on the dark side, I used to be rubbing my hands together under the table at the prospect of that, because of course I would end up making an awful lot more money as the programme continued to evolve in a less tight fashion. So we made some rather notable changes in the last two years or more in that regard, and we shall have to continue to do so.

Q130 **Geoffrey Clifton-Brown:** The other thing we had the habit of in military procurement is having bespoke solutions. Given your earlier answer about the percentage work share compared to the percentage cost of the F-35B, should we be looking more at worldwide solutions, but negotiating hard on the percentage work share that we get in this country?

**Tony Douglas:** I would say in many cases yes; and I would also concentrate—it is stating the obvious, I guess—on technology high-value-add sectors where we are bringing knowledge work to the table and where we can compete intelligently and on an economic playing field that is level, as opposed to trying to compete in areas where it is tertiary value-add and if it went into free market economics you never would, in a normal way. I think there is great opportunity there, as I was indicating earlier on.

Q131 **Geoffrey Clifton-Brown:** Also, does it not reduce the whole-life costs, because maintenance and all these other things are common with other equipment across the world?

**Tony Douglas:** Yes.



Q132 **Chair:** Can I just go back to some of the issues about the practicalities of the project. We talked about the commands. Are there any barriers still in place that would prevent DE&S doing a good job, and if so, what are they in your view?

**Tony Douglas:** There are no barriers in that regard, but the learning cycle that I described earlier on: first of all, DE&S has to get better at getting better. So the transformation programme that is being managed over the last three years is one that is maturing, but it is not complete.

Q133 **Chair:** And how much has that transformation cost so far?

**Tony Douglas:** I would need to come back with the precise—I have not got it in front of me.

Q134 **Chair:** I was just thinking of the cost-benefit: it costs something to do it, but you are highlighting some of the potential—

**Tony Douglas:** The ROI on it is massively in favour and the whole programme predicated on generating the £3.4 billion savings I referred to earlier. We are well and truly on track for that, but skills such as project controls, using modern tools, P3M and Primavera P6 as planning tools—it is like learning to drive: you can get certified when you can drive, but it does not necessarily mean you are an expert. That takes time.

Q135 **Chair:** So these are skills, you are saying, that are hard to recruit for. What do UK plc and the UK Government need to do to ensure we have the right people coming through in industry and universities, ready to take on those skilled roles? How long will it take to have the right reservoir of people capable of doing that kind of work?

**Tony Douglas:** I think with DE&S we are on that track. In the past we would have trained them and if you were red-blooded capitalists in private sector companies at your end of the table, the minute I had invested in training them, you would probably steal them from the factory gates, so to speak. That would not make you bad people; it is just what you would do. The first problem we had to fix is what I referred to earlier: if we have made the investment in training them, we need the ability to retain them. That is the first major part of this programme.

If it is a competitive market for those sorts of skills and the people on this side of the room are just leaving university and wanting to take a career, we then also have to be able to make an offer that makes us at least as attractive as your end of the table. Quite frankly, the one advantage DE&S has, which many other comparable organisations probably do not, is that our portfolio of projects is to die for—it is as diversified as you could ever imagine.

Q136 **Chair:** That brings me to the question of why you wanted to work at DE&S in the first place. What attracted you to do that, having been at Abu Dhabi Airports Company before?

**Tony Douglas:** Aircraft carriers, nuclear submarines and F-35 aircraft, and the complexity of all the things that go with that.



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Q137 **Chair:** Were there any restrictions when you left Abu Dhabi Airports Company on where you could work after that? Did it have any golden handcuffs on you about where you could work?

**Tony Douglas:** No.

Q138 **Luke Graham:** Mr Douglas, we have heard in this hearing some of the successes you have had, and it is a shame for DE&S to lose you. What could we, or DE&S, have offered you to keep you, rather than you taking on this new role?

**Tony Douglas:** That is a difficult one, because I would have to answer it in three ways. There is a career journey piece, a domestic journey piece and a journey-of-the-self piece. There is a big personal and domestic part of this, which it is inappropriate for me to go into, and which is a fundamental factor in the decision that we have come to as a family. I have explained to many people that, in many ways, this one is bitter-sweet for me, but because of the blend of the three headers I used before, on balance we have elected to take this route. It is not about what DE&S could do to persuade me to stay in that regard.

Q139 **Luke Graham:** To put it a little more bluntly. In this Committee we see—I have only been here six months and already we have seen it a lot—senior civil servants and directors in Government or Government associate organisations leave after a couple of years. They deliver some of these programmes that are much more long term and we would like to see them in place for a lot longer. Yet in the private sector, if you are a CEO, we want you in for five-plus years, if we can. So the domestic bit aside, which I completely understand, is it a remuneration piece, a development piece or culture piece? If you can give us some indication of something that—as I say, the domestic part aside—could have kept you in, that would be very helpful to us.

**Tony Douglas:** It is complicated because of the three factors I have mentioned.

**Chair:** I appreciate your candour on that.

**Tony Douglas:** It really is very sensitive.

Q140 **Chair:** I suppose another way of putting it is: are other people at DE&S in senior positions thinking of moving on in a similar timeframe, and if so, as Mr Graham said, what would help entice them to stay? Take it as a more general point.

**Tony Douglas:** I think there is probably something around accountability. In the world I have come out of—and will soon go back into—you understand that you have absolute accountability. Within a complex system—like any Government is, and should always be, in my opinion—that clarity of accountability is not necessarily the same. I would say that if you are used to that and you have always been used to it, there is an adjustment there. It is not right or wrong; it is just a difference. In the world I am going back into, the bolt of lightning will come out of that index finger on a regular basis, but if it is misplaced, I will pay the ultimate



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price—like that. That is absolutely the way it should be, and it is absolutely fair.

There is something around the level of leadership, accountability and the breadth of mandate for some; perhaps less so for others. I strongly underscore my comment before. Those are necessary differences to make a system like this as sustainable over time as it is. If it is about fine-tuning, that might be something people can reflect on sometimes.

**Chair:** That is very interesting, from our perspective. Mr Clifton-Brown will finish.

Q141 **Geoffrey Clifton-Brown:** On the change agenda that you were describing in such detail this morning and which you are naturally and rightly very proud of, on a scale of one to 10, from the time when you came to DE&S to today, how much of that change agenda have you achieved?

**Tony Douglas:** If it was at two, it is probably at six and a half now.

**Chair:** Thank you. We welcome your candour, particularly about accountability. If I had a tenner for every time on this Committee when I have asked who is in charge and everyone did this, we would probably not be sitting here now; we might well be in Abu Dhabi, or somewhere equally warm on a cold day. I thank you for your candour and your service, and I hope that the UK Government can entice you back at some point. You have certainly given us a lot of food for thought. I thank you and wish you all the best in your new role.

**Tony Douglas:** Thank you very much.

### Examination of witnesses

Witnesses: Stephen Lovegrove, Rear-Admiral Graeme Mackay and Lieutenant-General Mark Poffley.

**Chair:** Welcome back to the Public Accounts Committee on 4 December 2017. This is the main part of our session, which is effectively a re-convened session on Carrier Strike. I apologise again to our witnesses for that very interrupted session. Voting is part of this democracy, and we welcome votes, but they rather cut our flow on that occasion, so we felt it was important to get some answers to our questions.

Mr Lovegrove, had your Department provided a better letter in response to the questions that we asked, the three of you might not be here today; you might want to bear that in mind. It was one of the most opaquely written letters I have ever seen, and some basic questions simply were not answered. It was like someone had just cut and pasted information. I wanted to raise that in the public hearing, because it was very poor. I am sure you will go back, have a look and make sure it doesn't happen again.



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We have a number of questions extant from that hearing. We hope, if you are quick in your answers, avoid technical jargon and opacity and are forthright in your responses, to be able to get through this in an hour. It is a temptation I am hanging in front of you—the hope that if you are short and we are short, we can get through it quickly.

I will reintroduce our witnesses, as we had them here a month or so ago. From my left to right, we have Rear-Admiral Graeme Mackay, the director of Carrier Strike at the Ministry of Defence and the man responsible day to day for making sure that this happens; Stephen Lovegrove, the permanent secretary at the Ministry of Defence; and Lieutenant-General Mark Poffley, the deputy Chief of the Defence Staff for military capability. Welcome. For anyone following on Twitter, the hashtag is #carrier. I will ask Gareth Snell to kick off.

**Q142 Gareth Snell:** Thank you, Chair, and thank you, gentlemen. I will pick up briefly on the issue that we discussed the last time you were here, about the particular weights of the F-35s. Rear-Admiral, when we were last here, I asked a particularly pointed question about the weight of the F-35s. You said that the aircraft are “not overweight”—that was in our transcript—and yet Air Commodore Taylor, less than a week later, gave testimony to the Defence Committee that the first three F-35s bought were test aircraft, that they have instruments fitted and that they are slightly heavier than the baseline weight. Can you possibly reconcile those two statements for me?

**Rear-Admiral Graeme Mackay:** Yes. The first aircraft we bought was 100 lbs more than the operational weight for the aircraft that we will be using operationally. That was the variation in the weight. That doesn't mean the aircraft is not able to land vertically in the carrier.

**Q143 Gareth Snell:** So the first three F-35 aircraft that have been bought already are able to land vertically on the aircraft carrier?

**Rear-Admiral Graeme Mackay:** That's correct. I understand that only one of those aircraft—the very first aircraft—was about 100 lb overweight, which is in the transcript from HCDC.

**Q144 Gareth Snell:** Are those aircraft ever going to be used in front-line operations?

**Rear-Admiral Graeme Mackay:** Those aircraft are test aircraft, so they are specially instrumented. They will be used through the follow-on development phase, where we will be doing follow-on modernisation of the aircraft. They are specially instrumented for that purpose. The plan at the moment, which may change, is that they will not be used operationally.

**Q145 Gareth Snell:** Was that the original plan at the point of procurement?

**Rear-Admiral Graeme Mackay:** Yes, it was.

**Q146 Gareth Snell:** So it was always intended to buy three aircraft that were not intended to be used on an operational basis?



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**Rear-Admiral Graeme Mackay:** Those aircraft are part of the test programme. It may be that we reconfigure them once we have completed the test phase of the programme, and will then use those aircraft operationally. That is, of course, open to us as a course of action.

Q147 **Chair:** You are talking about upgrading. I gather that in the US at the moment, there is a bit of a debate about whether it is worth while for US military chiefs to spend money upgrading older F-35 aircraft rather than buying new. Given that we have a mix of aircraft, is that something being considered by the MOD? It would be interesting to know whether we are thinking along the same lines as our American partners.

**Lieutenant-General Mark Poffley:** We will review what the American experience is, but suffice it to say that we will be looking for as much commonality through our fleet as we can possibly get. It goes without saying that that will be at the highest specification—

Q148 **Chair:** So the new ones are the priority at the moment?

**Lieutenant-General Mark Poffley:** That is our aim.

Q149 **Gareth Snell:** The weight was not the only technical problem with the F-35s. Are there any other technical problems that still need to be worked out that the test aircraft will be used to work out for future orders?

**Rear-Admiral Graeme Mackay:** Yes. The test aircraft will go into a thing called operational test and evaluation. That is a US process—the UK is embedded within it—which will start in 2018, and it is a precursor for going into production, sustainment and follow-on development.

Q150 **Luke Graham:** Welcome back. Mr Lovegrove, I will start with you. To pick up on one item from our last session, we talked about the benefits of having the F-35 global support arrangements. Some of the broad strokes were outlined in the last hearing. Can you be a bit more specific about the benefit for the United Kingdom economy from those F-35 global support arrangements?

**Stephen Lovegrove:** Yes. At peak production, which I anticipate will probably be in the late 2020s, there will be 25,000 jobs supported in the UK as a result of the UK's involvement in the F-35 programme. There will be 500 individual firms involved in that. Among the biggest of them will be BAE up in Lancashire, which will make the rear bits of the fuselage. There will be 1,800 people in BAE in London employed on F-35 business. Rolls-Royce makes the lift fan for all the F-35s. I was listening to Mr Douglas earlier on, and he was talking about the very important win for Britain and north Wales of getting the global repair hub in north Wales. Cobham makes the re-fuelling probe; Martin-Baker makes all the ejection seats. A good 15% of every F-35, which is obviously a very expensive aeroplane, will be made by UK firms and will benefit the UK. Again, as Mr Douglas said, those tend to be at the higher end of the value chain in the F-35, so it is an incredibly important part of the industrial strategy.

Q151 **Luke Graham:** It is good to hear that there are benefits coming through. That has probably been brought up by other Committee members as well.



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Obviously in awarding some of the benefits that are due to come and some of the ongoing maintenance contracts that will be awarded, we have heard recently about the engine overhaul maintenance being awarded to Turkey. Maybe there is a different type of service being provided by Turkey versus some of the services provided by our manufacturers. Are you concerned that the UK will miss out when it comes to the competition element? That in trying to go for future contracts on maintenance we will miss out versus other allies?

**Stephen Lovegrove:** Like everybody in the room, I would always like the UK to get a disproportionately large share of all of the work on F-35. The US is obviously leading on F-35. There are eight other partner nations. We are the largest of those. We are, as it were, the *primus inter pares*, but other countries do have legitimate expectations. That is one of the bits of work that has unfortunately gone away from the UK. We do have by far the largest share of the non-US work. General Poffley will have more details, I suspect.

**Lieutenant-General Mark Poffley:** Just to put a bit of perspective on the size and shape of the investment in the UK, I think Lockheed Martin, in its latest report, suggested that something in the order of £13 billion worth of investment had been placed with British companies as a result of this aircraft manufacture. On the repair and overhaul contract, I think this will be an ongoing process. While Turkey is one of a number of nations that have bid into the process—it is in our interest that there is not just one nation involved in this; we need to lock the partner nations in—we have the opportunity to compete for further iterations of that repair and overhaul contract, and I hope that we will be successful. All of the indications are that our propositions are very well received in the United States.

Q152 **Luke Graham:** I appreciate that and I think the Committee appreciates as well that we are not going to win every contract that we go into competition for. Do you believe we are going to be able to fulfil the ambition in industrial strategy to win more of these contracts going forward and ensure the UK not only keeps some of the skills it has already developed, but continues to develop new talent, new facilities and our industries as a whole?

**Lieutenant-General Mark Poffley:** We are in active dialogue with all of the industrial partners that Mr Lovegrove has already mentioned and a vast array of others, to ensure that our industrial base is able to support not just the needs of the UK Ministry of Defence, but the needs of that broader defence industrial sector. What I have seen so far suggests that some of our technologies and industrial capacity are leading the world. I do not think we should shy away from that. Inevitably—I think Mr Douglas would have been the first to acknowledge this—we have some work to do on productivity in some of these companies, but that is a more collaborative discussion than it has been in my recent past. I am reasonably encouraged by where we are going, and the work we have done in the shipbuilding sector is translating directly across to the aerospace sector.



**Q153 Luke Graham:** Thank you for that. Mr Lovegrove, another follow-up question from our last hearing, if I may. It was question 34 in our written questions that came back, which, just to remind everyone, was: “What costs are associated with operating carrier strike with the US and are those costs funded?” Unfortunately—speaking bluntly—the answer in the letter did not answer the question. It said nothing about whether the costs were funded or not.

Just so everyone is clear, the reply was: “The UK Secretary of State for Defence and the US Secretary of Defense recently announced that USMC F-35B aircraft would embark in HMS QUEEN ELIZABETH’s first operational deployment in 2021. This will be the subject of more detailed planning over the coming years.” That obviously does not answer the question. Could I invite you to answer that question for the Committee today?

**Rear-Admiral Graeme Mackay:** Last week, we embarked US colleagues in the Queen Elizabeth at sea to progress that plan, and we have more meetings, either in the UK or in Washington, over the next couple of weeks before Christmas. That will allow us to go into a firm period of planning, principally around the first deployment. Quite a lot of that is around manning and operating the capability at sea. Quite a lot is around certification, regulation and embarking weapons. We are in the early foothills of that. We have clearly done it before with Harrier and extensively with previous classes of ship embarking US Marine Corps jets. So we have a very good benchmark to work against, but that is the principal focus of the work at the moment.

As you would expect, we are looking at communications nodes and how to operate them together from the ship as well. Some of that we have funded within previous planning rounds. An example is putting additional communications into the Queen Elizabeth to allow her to be able to deliver that output. We are making very strong progress with the US. I am keen that we share that with you to say that that is going ahead as the SecDef in the US has directed.

**Stephen Lovegrove:** Perhaps I can put a simpler gloss on that. Every year we do an annual business cycle planning round called ABC whatever-the-year-is—the one we are coming up to now is ABC 17-18. That allows us to look at 10 years—I think we are the only Department that does look at 10 years; most others only look at five—given the nature of our equipment programmes. Within that, we have a budget set by the Treasury and we seek to cost all our activities, equipment programmes, wage assumptions and so on within that 10-year programme. Obviously, it becomes less certain in the out years—that is obvious—and we do not go beyond that. Within the 10 years, therefore, we have costed the operation of the carriers to the extent that they will be fully operational within that 10 years. Is that a helpful observation or not? I don’t know. By the way, Chair, I accept your criticisms of our letter. We will seek to do better.

**Q154 Chair:** It’ll save you a visit next time.

**Stephen Lovegrove:** I’m always happy to come, but the letter clearly needs to be looked at.



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Q155 **Luke Graham:** So the short answer to the question is: yes it is. It is fully funded, certainly up to the 2021 operational deployment. That is obviously shorter term; we had hoped that we would have more certainty.

**Lieutenant-General Mark Poffley:** I think the correct nuance on this would be—it is not as stark as you have described—that we are still examining what the exercise schedule will be running up to that '21 deployment and the attribution of cost for embarking US aircraft aboard HMS Queen Elizabeth as she heads towards that '21 deployment. That is a function of the planning process that the admiral has set out for you. We will not get to that reconciliation until later in the year once that planning exercise is complete. That said, the UK component of that exercise schedule and the deployment is programmed inside the Navy's budget—there is provision for it. But your precise question, I think, was about the United States costs.

**Luke Graham:** Yes.

**Lieutenant-General Mark Poffley:** They and us will need to work out what the right level of attribution is for a joint deployment of that. We have yet to reconcile that.

Q156 **Luke Graham:** Could there be a substantial increase in costs over and above the planned-in budget? Coming from a finance background, I imagine that at the moment you have a kind of block-in for US-UK interoperability, which obviously you are finding out—as the Admiral said, it will be more detailed. Are we clear on the overall block and the question is about getting the ground-up budget, or do we still need to define the block funding?

**Lieutenant-General Mark Poffley:** By and large, these sorts of deployments—there may be some nuances around the United States deployment that have not yet come to light—operate on the costs being assigned where they fall. When the Americans bring their aircraft, they will pay for the integration of those aircraft. They have certainly already paid for a composite spares pack to be embarked in HMS Queen Elizabeth for that period. They have already made provision in their estimates for that.

Q157 **Geoffrey Clifton-Brown:** I have two questions on that. How far is this dependent on worldwide sales bringing the unit cost of each aircraft down? And, are we allowing the financial dog to wag the operational capabilities tail here? In other words, if the aircraft or the US costs go up, will we have to cut back on the operational capabilities?

**Lieutenant-General Mark Poffley:** We have made provision in the programme for the first 48 of the 138 aircraft that we have agreed to purchase in principle—that cost envelope is set. We believe that the price that will be negotiated on a number of aircraft beyond the first that we have bought is still subject to a negotiation. It will clearly be the case that the joint programme office in the United States, which negotiates on behalf of all the partner nations with the contractor, will take into account sales in the future as part of amortisation of its overheads. We do not



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predict that is likely to significantly change the price. Indeed, the target price of the later block of aircraft that we are looking to deliver is about \$105 million.

Q158 **Geoffrey Clifton-Brown:** And the second half of the question, about finances curtailing the operational capability?

**Lieutenant-General Mark Poffley:** We do not anticipate that for the first 48. There is quite clearly a conversation beyond the 10-year planning horizon, which we deal with on an annual review. That clearly comes into play, as it does for every capability in the portfolio that we operate.

Q159 **Gareth Snell:** Lieutenant-General, you said that the cost envelope has been set already. That is for the 48 aircraft, isn't it? So how much work has been done in hedging against currency variations for the additional 90? That is quite a lot of money. Given that it is 13 billion for the whole lifecycle of the 48, what is the suggested lifecycle cost for the other 90?

**Stephen Lovegrove:** The work on the additional 90 is at a very immature stage at the moment. There are an awful lot of variables associated with that. We do not know how much the cost of the aircraft is going to come down. It has been coming down 6% every block. We do not know what the outlook for sterling or dollars is at the time we need to start placing the orders for the 90, so at the moment it is really too early to start working on hedges—forex or otherwise. Our approach, typically, is to have quite a large contingency within the programme, which allows for variations in either cost increase or currency fluctuations, as any large project would have, and we will certainly be doing the same for that 90 block. But that is quite a way off. Of the 48 how many have we taken receipt of so far?

**Lieutenant-General Mark Poffley:** Thirteen.

Q160 **Gareth Snell:** Does that include the three test aircraft?

**Rear-Admiral Graeme Mackay:** Correct.

Q161 **Luke Graham:** Just to follow up on the cost point, on the F-35Bs, I think we have the whole-life cost to 2048 as about 13 billion.

**Rear-Admiral Graeme Mackay:** Correct.

**Chair:** That is just for the first 48.

Q162 **Luke Graham:** That's right. And considering that the cost for each aircraft is around 100 million, what does the remainder actually cover? I am sure there will be upgrades and things in there, but can you detail that out for us?

**Lieutenant-General Mark Poffley:** The estimate of the whole-life cost for the 48 is, as you say, in the region of 13 billion, through to 2048—it is important to recognise the longevity of this programme. That includes the aircraft, some of the infrastructure that is bespoke to the F-35 in places such as Marham, the engineering facilities, the bespoke simulators and some provision for the operational costs that are predicted over the life of



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the programme. It is an estimate at this stage, through to 2048, but it gives you a feel for the range of the costs and what is included.

**Q163 Chair:** How are you going to work on that figure to make sure that you know when you get the 90 that you are front-managing that cost? That is an estimate, so how are you tracking what you are actually spending, projecting out from that? When will you have clearer figures?

**Rear-Admiral Graeme Mackay:** I think we have talked about this before. This is the US version, which is a Selected Acquisition Report brought out annually. We benchmark against the work they are doing. If you look at that work, in the latter half of it there is quite a lot of variation still. The reason for that variation is when you are in sustainment and when you are operating the aircraft—we have not gone to contracting the global support solution. At the moment, because the aircraft are in development, we haven't absolutely got an understanding of what the availability and sustainment will be when you are flying thousands of hours against the aircraft over time. But this report gives that detail. The variance in the report is quite large, even from just a very light touch on the tiller. For the US programme, they are buying 2,500 aircraft. You see variations that are in the billions in the programme, and that is just them nudging the programme right by a year. So, as has been set out, it is quite a sophisticated piece of work, and what we are doing is building up a head of evidence to understand how the programme is set.

**Stephen Lovegrove:** There is an interesting part in the NAO Report, which I was re-reading over the weekend. It says that the Ministry of Defence has consciously adopted an incremental approach to the purchase of this fleet of aircraft. Given the complexity, the scale and the unknowability of some of the things that we will no doubt come up against in the coming decades, I think that that is the right approach to take. Going out and trying to give an unrealistically high degree of precision about block 3 or block 4 would not be very sensible on behalf of the taxpayer. We as a programme need to keep negotiating as hard as we possibly can as the programme evolves over the coming decades.

**Q164 Chair:** I will bring in the Comptroller and Auditor General.

**Sir Amyas Morse:** On the income that you will generate from the work on repairing and participation in manufacture, how far have you started working on projecting that? Not at all so far? How far have you gone with that?

**Stephen Lovegrove:** The UK plc benefit?

**Sir Amyas Morse:** Yes. I was listening to you say that the benefits are likely to be a higher proportion than our participation in the programme, just as a percentage. I am curious to know how that will work in the longer term.

**Stephen Lovegrove:** I am not sure about the figures in question. We do know that 15% by value of each F-35 is going to come to the UK.

**Sir Amyas Morse:** But your numbers are all gross numbers, right? They



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are gross numbers of cost of aircraft.

**Stephen Lovegrove:** Yes, and there are going to be 3,000 aircraft.

**Sir Amyas Morse:** Yes, but as you get to know more clearly—I am not expecting you to know now—what the value of your industrial participation will be, you are going to have quite a significant income stream coming in the opposite direction, aren't you?

**Stephen Lovegrove:** To the UK?

**Sir Amyas Morse:** Yes.

**Stephen Lovegrove:** Yes, we will.

**Sir Amyas Morse:** So when this programme is established, we might be looking at an income stream and an expenditure against each other.

**Stephen Lovegrove:** We may indeed, yes.

**Sir Amyas Morse:** So we should look forward to that in the future of this Committee.

Q165 **Chair:** I think that is exactly what the earlier questions about the industrial strategy were driving at. If we might tempt you, do you think that there will be any issues with this post Brexit? It is a largely US-driven programme. Is that going to be an issue at all?

**Stephen Lovegrove:** The biggest issue is clearly going to be whether or not there is a long-lasting effect on the value of sterling.

Q166 **Chair:** So really foreign exchange is the biggest risk, in a Brexit sense.

**Stephen Lovegrove:** That is a big risk right across the equipment programme. Clearly, the biggest risk is against the dollar, because we spend a lot more in dollars than we do in anything else.

Q167 **Chair:** Are all these trade agreements on how much support UK business can give—the 15% figure on each aircraft—safeguarded, even with Brexit?

**Stephen Lovegrove:** I am quite often wrong, but I cannot see any reason why that figure would shift.

Q168 **Luke Graham:** Mr Lovegrove, to come back to your previous comments about making sure there is an incremental purchase of the F-35Bs, which makes sense from a taxpayer point of view, reading into that, is there a reasonable probability that we would not go for the purchase of the full 90? That 90 may be our ambition, but knowing that we are taking this incremental approach, we may well end up taking far fewer jets than 90.

**Stephen Lovegrove:** I see no reason at the moment, and I have had no indication from either political sources or our financial sources within the Department that the ambition to get 138 has been at all moved away from. Of course, it is always possible that someone may change their mind, but I have seen no indication whatsoever of that happening.



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Q169 **Chair:** At what points in time do we have to commit to buying what number of new aircraft?

**Stephen Lovegrove:** It is not entirely clear how it will be chunked up, but in future there will be moments of, "Are we going for this size chunk or that size chunk?" Those will be the inflection moments at which those kinds of decisions, if they come up at all, will be made.

Q170 **Luke Graham:** This question is for Lieutenant-General Poffley. We have 138; that is the plan. If we were to have, say, some big FX fluctuations and cost increases because of required upgrades, what is the minimum number of jets that the UK would want to have? If 138 was no longer financially viable, what would be your red line to say, "No, we absolutely cannot have any fewer than X number of jets"?

**Lieutenant-General Mark Poffley:** We have provisioned the carrier to be able to accept 36 jets at any one time. We are making a planning assumption on the basis that we will operate up to two squadrons of 12 at any one time with an ability to surge to 36 in extremis. Beyond that, there is a conversation that we will undoubtedly have about the next generation of fast jets, both carrier borne and land based. That will be part of the debate about the mix in the remaining 90 and about the frequency under which we would need to bring them into the fleet. That will be a function of a raft of different variables that it is almost impossible to predict at this juncture, but that we will take due consideration of as we go through the annual planning process and at various points, such as in the strategic defence review. We are several Parliaments away from the stages of making those sorts of decisions.

Q171 **Chair:** Just to pin you down on Mr Graham's question, that is two lots of 36, which is 72, plus you will presumably need some for breakdowns and so on.

**Lieutenant-General Mark Poffley:** Forgive me, Chair, but I am being deliberately vague about what is a red line here. What I am saying is that we have taken the provision inside the carrier for 36. If, for a raft of different reasons, the operational circumstances required us to perhaps run two carriers or a land based F-35 programme in addition—we speculate into infinity here. The reality is that we have provisioned for 24 as a routine as part of our base planning assumption, with the first 48 being all B variants. We are yet to take a decision on what the future mix or indeed the offtake in time will be to replace our other fast jets.

**Sir Amyas Morse:** Just to make sure we have understood this, there is always a pyramid approach. In other words, to have 24 operational aircraft, you have to have a multiple of that in the fleet.

**Lieutenant-General Mark Poffley:** Yes.

**Sir Amyas Morse:** I was not sure if that came over sufficiently clearly.

**Chair:** Yes, I think that is what we were pushing.

Q172 **Gareth Snell:** Briefly, putting to one side the actual number of aircraft



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that we may have to purchase, how much of the infrastructure work in the broader programme being done now would be redundant if the number of jets was to be reduced from the 138 that we are hoping to purchase down to the baseline that you just discussed?

**Stephen Lovegrove:** Almost none, I think.

Q173 **Gareth Snell:** So everything that we are doing now would still have a value?

**Stephen Lovegrove:** I am not the expert, but yes.

**Rear-Admiral Graeme Mackay:** We have provisioned incrementally, so the work—the simulators and the support arrangements at Marham—is all required for the current purchase of 48 aircraft.

Q174 **Gareth Snell:** And would that therefore need to be expanded if you were to purchase the additional 90?

**Rear-Admiral Graeme Mackay:** It would only be expanded in terms of squadron accommodation—to add further squadrons on. The important investment in the freedom of action facility, the training facility and the engineering facility has been made. As we explained last time, it is rather like a driving school analogy—you have made that commitment and it is then leveraging it with additional squadron accommodation at sea or in a land base.

Q175 **Geoffrey Clifton-Brown:** Lieutenant-General, you hinted that future purchases might not always be the B version. Given that only ourselves, the Italians and the Americans are currently buying the B version, while a lot of other nations in the world are buying the A version, is it likely that we might consider the A version for our land-based operations?

**Lieutenant-General Mark Poffley:** I don't think we would rule that out at this stage, but again, there are some obvious advantages to the B variant and there are some disadvantages to the B variant. You are comparing like with like in the sense that it is an F-35, but there are certain characteristics that make the A variant different from the B variant, and that will factor into our choice and the mix of the fleet in future.

**Stephen Lovegrove:** The airframe price is cheaper.

Q176 **Chair:** Will the same trained pilots be able to fly both?

**Lieutenant-General Mark Poffley:** There will undoubtedly be some transfer of skills, but you will appreciate that, quite understandably, the vertical take-off and landing aircraft carries a training burden in itself. Therefore there will need to be a conversion course if you are going to move from one to the other.

Q177 **Chair:** How long roughly?

**Lieutenant-General Mark Poffley:** I cannot professionally say. It is not unusual for pilots in the Fleet Air Arm and the Royal Air Force to transfer



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between one aircraft and another. That is why we hold an operational conversion unit, and that unit will specialise in doing that conversion. Typically, moving from one jet to another, you are probably better—

**Rear-Admiral Graeme Mackay:** I would not want to call it an exact science, because we are not in a position to do that.

Q178 **Chair:** It depends on the aircraft, presumably.

**Rear-Admiral Graeme Mackay:** Yes.

**Chair:** Okay. It is not the most pertinent point we are asking today.

Q179 **Luke Graham:** Mr Lovegrove, the Lightning II programme was recently downgraded in confidence to amber-red, which obviously means that successful delivery of the project is in doubt. What actions are being taken to lift that grading back up? Is there any leverage that we have over the United States to ensure that UK-specific requirements will be delivered?

**Stephen Lovegrove:** It was recently downgraded to amber-red. In a sense, that for me was an example of a risk framework actually working, and working well. The precise part of it that was downgraded from amber to red was the land component, which is, "Could we be in a position to operate the aircraft from land by 2018?", as opposed to the Carrier Strike part, which is whether or not we can operate them from the carriers in 2020. I recently had a quick look at the risk owner's assessment there, and he basically said, "If we do not put in some further specialist resource"—I will pass to colleagues on that—"we will potentially miss some of these deadlines. If on the other hand we put the appropriate resource behind this, I have every confidence that we will be back to where we need to be." That was the prompt for the action we have taken. Of course we did not particularly want to see it go to amber-red, but the downgrading effectively had the consequence it was meant to have.

**Rear-Admiral Graeme Mackay:** The important thing is to be transparent with the amber-red. It is important for the partners, particularly our industrial partners, so that they understand what the imperative is for delivering the programme. As the permanent secretary has said, this is about IOC Land in December 2018 from Marham; it is not about delivering from the carrier in December 2020. The principal issue around that is flying the production 3F software in the aircraft. Since we last met, that software is flying in UK aircraft in the US. I think the SRO, if he was sitting here, would be very confident that all the levers are in place to ensure that UK weapons can be integrated on time and that the simulators have got the equipment in them that allows full functionality for UK pilots training in UK F-35Bs.

Q180 **Luke Graham:** So, there is concern for 2018, but it is all fine for 2021.

**Rear-Admiral Graeme Mackay:** I think the specification we would use is amber-green for 2020. Of course there is quite a complex period of flying trials to be done in 2018 off the east coast of the States in the carrier. There will be a second period of flying trials in 2019, and then we need to



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train the entirety of the task group up to deploy in 2021. That is an important schedule, and we drive that schedule very hard. We use a risk-based approach to drive that schedule, so that we have got response plans in place where we understand that there are risks within that schedule.

**Chair:** We and our sister Committee will be watching that schedule and we will ensure that we come back to you on that.

Q181 **Stephen Morgan:** I am interested in contingency in the programme. This is probably a question for the Rear-Admiral. Your written response was silent on how much contingency is left in the schedule. How much time do you actually have to play with?

**Rear-Admiral Graeme Mackay:** What we would effectively do is take activity out of the programme if we were up against the stops to deliver in 2021. There is always flexibility in your performance to be able to trade performance out against your schedule of time. As we are sitting here, however, we are very confident that the ship will commission on Thursday in Portsmouth. We will then, as planned, be accepting the vessel from the contractor this year. The ship will then go through rotary-wing flying trials in early 2018 and then will deploy in the early part of the autumn. We have got a period of flying trials with the F-35Bs to conduct. So those things are in place.

We have benchmarked it against other operators. We have brought the Infrastructure and Projects Authority in to benchmark the work and the schedule, and we are bringing the IPA in again to benchmark the schedule in February '18, so there is a continual point of checking and looking for float in the programme and ensuring that we can meet the ambitious schedule that we have deliberately set ourselves.

Q182 **Stephen Morgan:** Mr Lovegrove, are the first class flying trials for the F-35Bs really the only point in the schedule that is worrying you at the moment?

**Stephen Lovegrove:** In terms of the schedule, they probably are. I have been in the Department now for 18 months or so, and I have seen problems in the F-35 programme pop up and be dealt with effectively. I cannot see at the moment problems on pure timing that I do not have confidence would not be dealt with in the same kind of way. Across the whole piece, I worry about the foreign exchange position. That is not really the kind of schedule that you are talking about, but I have that problem, and we will just have to deal with that as best as we possibly can.

Q183 **Chair:** Can I go back to the answer about the contingency? You talk about taking things out if you could not deliver to the timeframe. What would you take out if you could not deliver on time? What ranking would you give it?

**Rear-Admiral Graeme Mackay:** It would be about the scope of the trials that we are doing or we would adjust the periods of training. The reason I think we are very confident in the schedule is the fact that we have been at sea in USS Wasp and USS America, so we have seen and been



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embedded in the flying trial. I would not characterise these flying trials as not being difficult, but they are not being done for the first time. We have also flown aircraft at sea for many years, so we have got the very best experts, and it would really be something to trip us up that we had not expected. It would be a black swan event. When you get a black swan, you then need to take quite dramatic adjustments to your schedule. We are not expecting any of those, but we are always wise in making sure we build some contingency into the programme.

So we have been and seen and looked very carefully at how the US have conducted their flying trials, and we are taking the very best practice from them and importing it into our own schedule. Indeed, we are using some expertise in the US during that period of flying trials as well.

Q184 **Stephen Morgan:** Again, with reference to your letter, what do you mean by operational and supplier mitigations? What does that mean in practical terms?

**Stephen Lovegrove:** I think that is one for the Rear-Admiral.

**Rear-Admiral Graeme Mackay:** Sorry, I am—

Q185 **Chair:** Your letter mentioned operational and supplier mitigations.

**Rear-Admiral Graeme Mackay:** Which question?

Q186 **Chair:** We wondered what it meant. I'm looking for the question number.

**Rear-Admiral Graeme Mackay:** Is this Crowsnest?

**Chair:** Yes. Operational and supplier mitigations relates to Crowsnest.

**Rear-Admiral Graeme Mackay:** We conducted a critical design review with Crowsnest on Friday. That programme continues to make solid progress and we are still planning to deliver the ISD for that capability in July 2019, and then IOC is the following year, which is inside the date that we are planning to deliver the initial operating capability for Carrier Strike.

You have been trying to articulate how, if that was delayed, we would take mitigation to that. That would be a matter of the operational commander determining how he would employ the assets that he has got. There are other ways of conducting early warning, which may not be as effective as the Crowsnest system, but they would provide partial mitigation to that. Also, we would hold the supplier to account as well for not delivering to time, with some operational mitigation from them as well.

Q187 **Geoffrey Clifton-Brown:** On Crowsnest, given that the Merlin helicopters perform both anti-submarine capability and protection of these carriers, and you are not going to order any more helicopters, will you have enough helicopters to be able to deploy Crowsnest on time?

**Lieutenant-General Mark Poffley:** We believe we will. Inevitably, we manage the fleet on an ongoing basis, but Crowsnest is going to be a very high priority in the assignment of assets towards a carrier group. On



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Merlin, there is sufficient resilience in that fleet for us to be able to do that.

**Rear-Admiral Graeme Mackay:** I would add that we are fitting all of the Merlin ASW aircraft with the capability to carry Crowsnest. That was an additional piece of investment that we made to give us the maximum flexibility with the 10 equipment fits we have got. That was a piece of mitigation that we took early in the programme.

Q188 **Chair:** Just to be clear, the carriers cannot go out without Crowsnest capability.

**Lieutenant-General Mark Poffley:** They can go out without Crowsnest—

**Chair:** Would you recommend it?

**Lieutenant-General Mark Poffley:** As the admiral described, you would need to take some mitigations if you want to operate it as a Carrier Strike group in the optimum way. Almost every operation I have ever been on has ended up with some form of compromise somewhere and some form of mitigation. In an ideal world, you would have them there. Are there mitigations in place to be able to counter if they are not? You have heard that there are, but the ideal situation is that they go with Crowsnest.

Q189 **Chair:** Is there any part of the world you would never send them without Crowsnest?

**Lieutenant-General Mark Poffley:** I don't think the part of the world is important; it is about the threat scenarios in which you are going to place the Carrier Strike group, and that quite clearly comes down to an operational commander's judgment.

Q190 **Stephen Morgan:** It is very clear that Crowsnest is an integral part of the success of the overall programme. I understand you have brought forward the Crowsnest programme. Can you give us an update on where you are currently at?

**Rear-Admiral Graeme Mackay:** We have flown the equipment, and we are in the process of modifying the initial aircraft in Yeovil at the moment. Our aim is to deliver as planned to the dates. We have got an initial in-service date of 2019, and we will have five aircraft available in 2020, which is ahead of the initial operating capability for the carrier deploying in 2021. That five is the benchmark figure to give you an optimum operational capability.

Q191 **Luke Graham:** I'd like to move on to cover a concern that was raised in the last hearing about amphibious capability. A number of former colleagues, including the former Royal Marines commander, Lord Burnett, raised it, and the former First Sea Lord, Admiral Sir George Zambellas, raised the concern too. The Defence Committee is doing a new inquiry about amphibious capability. Everyone on the Committee accepts that having aircraft carriers is a big strategic change for the way the Navy operates. Obviously, the requirement for up to a third, if you are deploying a full taskforce, is significant. Can you detail what vessels will



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deliver amphibious capability once Bulwark, Albion and Ocean are retired?

**Lieutenant-General Mark Poffley:** Ocean is due to retire. You are telling me that Albion and Bulwark are, but I know of no plans for that outside the current out-of-service date. The reality of our current amphibious force is that Bulwark and Albion clearly provide significant landing craft capabilities—particularly the heavier landing craft, called a landing craft utility, or LCU, which can move heavy stores ashore.

The supplementary shipping would be for the Royal Fleet Auxiliary landing dock, which would again provide some limited landing craft capability but is essential an auxiliary vessel. Albion and Bulwark provide command and control facilities, which you do not get in the Royal Fleet Auxiliary vessels. That sits inside a carrier group, operating potentially in a littoral role, with helicopters embarked. We have made provision inside the programme to do the necessary modifications and clearances to allow that to take place.

Our amphibious suite is as I have described. It will undoubtedly be modernised and developed as we go forward. Much of the debate has been centred on whether we are coming out of amphibiousness. I can categorically assure you that we are not planning to come out of amphibiousness. Its size and shape will undoubtedly be modernised and modified as we go through time to meet both the contemporary and the future threats we see presented to us. I hope that gives you enough reassurance about amphibiousness.

**Luke Graham:** It does, but it lacks a bit on the specifics. Yes, there is an active concern about Bulwark and Albion being retired, and I don't know whether you are in a position to say whether they will be or not—

Q192 **Chair:** Do they have an end-of-service date? Can you remind us?

**Lieutenant-General Mark Poffley:** I think it is 2034.

**Rear-Admiral Graeme Mackay:** The 2030s.

Q193 **Chair:** So what you are saying to us today, categorically, is that there is no intention to remove them from service before that date.

**Lieutenant-General Mark Poffley:** There are no plans currently to move off that out-of-service date. We are in the process of conducting a national security and capability review, and much of the speculation around these platforms is like every other part of our portfolio suite; it is a candidate for whether we would make some modifications. But we have currently submitted no plans for the early coming-out-of-service of either Albion or Bulwark.

Q194 **Luke Graham:** So we can assure political colleagues and the Royal Marines that there is no plan to move from the planned retirement date for Albion and Bulwark for now—obviously it is subject to review. In your previous statement you mentioned that an amphibious capability could be included as part of the aircraft carrier taskforce alongside the aircraft carriers. I know, as per the last hearing, that the taskforce will flex due to



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the needs of the operation, but if we were going for a full taskforce, would it have that amphibious capability through Bulwark, Albion or a similar vessel?

**Lieutenant-General Mark Poffley:** I think we covered this at the last hearing. It would not have the ability to deploy landing craft. It is an aircraft carrier and it is not configured to deliver that service.

Q195 **Luke Graham:** Sorry, Lieutenant-General Poffley, but I am very clear on that. You made it very clear at the last hearing. My question is: will there be an amphibious vessel—a Bulwark, Albion or similar vessel—included in a full aircraft carrier taskforce?

**Lieutenant-General Mark Poffley:** Again, I think it very much depends on the operation. If it is operating as a Carrier Strike group, it could conceivably not have amphibious vessels around it. Indeed, we would look to maximise the amount of fast-jet activity, and that might require you to operate slightly more remote from the littoral. If it is a hybrid version—when you have a mix of jets and amphibious capability—clearly the compromises and the threat scenarios might dictate a slightly different posture. Similarly, in a full littoral mode it will be operating, understandably, within the littoral.

**Luke Graham:** Thank you. It sounds like that is as clear as we are going to get on that one.

**Chair:** Our sister Committee can follow up on that one.

Q196 **Luke Graham:** I think that is as clear an answer as we're going to get on that. That's fine. I want you to follow up on something else from the last session, if you can, Lieutenant-General. We were talking about the use of the T26s and T23s. I think that in most variants of the taskforce, or in most situations, it would require a T26. Obviously there has been a delay to the T26s and T31s. In the last hearing you said that it is fine, that the T23s will be extended in life to cover any gaps. Can you just be specific here today? Which T23s are now earmarked for a life extension? If those extensions require any additional refurbishment, have they been fully costed?

**Lieutenant-General Mark Poffley:** First, we are not considering, at the moment, a life extension on the Type 23s. We need to be clear about the distinction between the 23s. There are some that are anti-submarine warfare equipped and some that are in a general purpose role. The drawdown of the Type 23s in the anti-submarine warfare capability is matched precisely to the growth of the Type 26 programme, such that there is a one-for-one swap at the point at which we introduce the Type 26. The Type 31, which is a general purpose frigate, is similarly matched to the drawdown profile of the Type 23 in the general purpose role. Indeed, there may well be an acceleration of that, depending on how the shipbuilding strategy responds to the tender process that we have laid for the Type 31E, which we hope to bring into service sometime around 2022 to 2023. That will provide some resilience into the surface fleet, and it will also take pressure off ASW—anti-submarine warfare—Type 23s that might otherwise be distracted by general purpose tasks. So we are hoping to



concentrate the anti-submarine warfare fleet on its primary task, which is that of hunting submarines.

Q197 **Luke Graham:** I appreciate that clarification. On that point, if there is a delay with the T26, if you have this one-for-one programme going on, that obviously means that the life of the T23 that is meant to swap out will be extended beyond the original expectation. Have any refurbishment costs been included or forecast, to make sure that that eventuality is funded?

**Lieutenant-General Mark Poffley:** There is risk provision inside the Type 26 programme for that sort of contingency, but I hasten to add that at this stage we have just been through pretty protracted contractual negotiations to reconfigure the contract around the Type 26 to align it to what is known as a TCIF contract—I think and hope that Mr Douglas will have waxed long and lyrical about that in his earlier commentaries—incentivising the contractor to deliver on time.

I am not planning on us not delivering the Type 26 on time. Indeed, they are incentivised to do so, and much of the experience of the work that we have done on the carrier will, I hope, mean that we are able to hold them to that schedule. Should they not, we would quite clearly be looking potentially to draw on contingencies, not only in the Type 26 programme, but held at the corporate level. Be reassured: I will not take anything other than the contractor delivering to schedule on the Type 26.

**Luke Graham:** Okay. Thank you very much for that.

Q198 **Geoffrey Clifton-Brown:** Mr Lovegrove, you have said that the biggest risk to the carrier programme is the forex risk.

**Stephen Lovegrove:** To the F-35.

**Geoffrey Clifton-Brown:** To the F-35, because it is purchased in dollars.

**Stephen Lovegrove:** Yes. The carrier is obviously principally UK; Crowsnest is principally UK. It is the F-35 which is obviously an American-led and very large programme, where the forex risk predominantly is.

Q199 **Geoffrey Clifton-Brown:** You helpfully tell us in paragraphs 5 and 6 of your letter that the forward purchase programme means that “in the financial year 17/18 only 10% of the forecast demand remains exposed to exchange rate changes, while in 18/19 around 30% of forecast demand currently remains unprotected”. You also go on to say that the Treasury “does not purchase foreign currency more than three years in advance”, but those both come within the three years. Given that we have volatility around exchange rates with Brexit, is there more that you and the Treasury could be doing to protect this programme?

**Stephen Lovegrove:** It may be helpful to spend 30 seconds on what we do. For the next year, we are effectively 80% hedged; for the year after that, we are 50% hedged; and for the year after that, we are 20% hedged. That policy has been agreed with the Treasury for many years, because—as much as anything else—of the impossibility of looking at



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more than three years and ensuring against fluctuations. That is what we do, and we roll it forward all the time.

We are following the Committee's recommendation from, I think, a couple of hearings ago, and are constantly in discussions with the Treasury on the subject of foreign exchange hedging and whether or not the pressures that it might put on the Defence budget should be managed within the Defence budget. They have been so historically; these may be different times.

**Q200 Geoffrey Clifton-Brown:** Well, because of Brexit and the exchange volatilities they are, aren't they? Have you had discussions specifically around the exchange volatility that is likely to be caused by Brexit?

**Stephen Lovegrove:** We have had discussions with the Treasury around exchange volatility. I am not really in a position to give you an answer about how those might ultimately end up.

**Chair:** We did actually ask the Treasury that last Wednesday, so we will continue to pursue this.

**Q201 Geoffrey Clifton-Brown:** I suppose your caution in that answer comes from the fact that by stating that you were going to increase your hedge you would be giving away commercial policy in relation to what the Government thought was likely to happen to the pound. Is that why you are so cautious in answering?

**Stephen Lovegrove:** It is partly that. I am not aware of many organisations or corporations that hedged much more than three years out when I was in the City. In fact, most of them did not even hedge three years out, as far as I can remember. It is more that there is a question of how expensive it would be if you wanted to do it any further, given the long-range potential for exchange rates. If you genuinely wanted to buy insurance against pretty much anything in four years' time, it would probably be very expensive and would therefore not represent value for money.

**Q202 Geoffrey Clifton-Brown:** In my first question, I was not actually asking about three years. In your paragraph 5, you say that "in 18/19 around 30% of forecast demand currently remains unprotected." Given the volatility that Brexit may cause, do you not think that that at least needs to be looked at?

**Stephen Lovegrove:** We will continue to discuss the policies around hedging with the Treasury. When we receive a different type of settlement, we will certainly let you know.

**Q203 Chair:** It sounds as if there is a hint of hope that there might be one. I think you are the most exposed Department in Whitehall, are you not?

**Stephen Lovegrove:** We are, yes. I have worked in a number of Departments, and the financial profile of the Ministry of Defence is very unusual. It clearly has a lot of personnel costs, but its main costs are for equipment that most of the time you do not expect or hope to use. That brings certain types of pressures into managing cost within the Ministry of



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Defence that you do not see in other Departments that are much more activity-based.

Q204 **Chair:** So if you had to absorb some or all of that exchange rate challenge, what would you have to stop doing? You are very up against it in terms of your budget.

**Stephen Lovegrove:** Most of the programmes—in fact, all of the programmes, plus the centrally held contingency—are designed to be able to absorb risk, among which we include foreign exchange risk. If there were an absolutely fundamental change in the foreign exchange rate that went against us, clearly there would be a moment at which that contingency would be sucked up. We would have to make some difficult decisions, unless there were a different type of arrangement with Treasury.

**Chair:** Or a bail-out with the Treasury. Well, we will continue this discussion and will obviously alert our sister Committee to it.

Q205 **Luke Graham:** I have a joint question for Mr Lovegrove and Lieutenant-General Poffley. The NAO supplementary memorandum for October 2017 stated that some crucial enabling equipment was unfunded. In paragraph 31 of your response to the Committee, Mr Lovegrove, you wrote: “As stated at the hearing, the planned enabling constituent parts of the programme are in place to allow us to reach IOC and through to the full carrier strike capability.” So the NAO says that crucial parts are not funded, but your written response says that they are. Could you clarify that?

**Stephen Lovegrove:** I think both General Poffley and I are going to hand this one to Admiral Mackay.

**Rear-Admiral Graeme Mackay:** In communications we funded £146 million for Link 16. That is an example of where we would have an unfunded dependency. As you design the contingent tasking of the capability, you understand how you are going to use it operationally and what the mitigation is. As we go to the initial operating capability, we have reduced the operational risk and understood where we have mitigations within the unfunded dependencies. Communications is one example; another is the maritime intra-theatre lift, where we have directed the new Merlin Mk4, which has a folding head, to be used in that role.

We have done extensive work on understanding, with the global support solution, how and at what rate we would shuttle the appropriate spares to the fleet—right down to the tonnes that you move over an operational period. It is a continual effort: pressing down, identifying where the gaps in operational capability are, and then mitigating them, accepting them or filling them with the activity that we do every year through the annual budgeting cycle. All of that is alive; that is effectively what we do as a day job in managing the programmes.

We have looked very carefully at the routine operation. We have a model, which we have shared with colleagues in the Treasury, of how we are



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going to routinely operate the capability and what the costs of that are. We have also now done the same in the contingent space, so we know where the pressures are in that space as well.

Q206 **Luke Graham:** It may be late in the day, Chair, but can I just get some clarity on this? The NAO Report says that some crucial enabling equipment is not fully funded, but the written response says that it is. What I took from your answer is that some bits are and that it is refined in an annual budget process—you work out the detail—but I want a simple answer. Is crucial enabling equipment funded or not?

**Rear-Admiral Graeme Mackay:** The reason there is a difference here is that the work we did with colleagues in the NAO who are here was almost a year ago. At that stage, there was some uncertainty. We have spent a year absolutely driving into those areas to understand what they are. For example, we have done a very detailed estimate of logistics—how do you support this capability at range—and we have got extremely good data. We have done modelling. The Defence Board has directed us in some of that, and we have worked with companies like Shell to look at how they do some of their work and get some of that best practice in. It was just the point that when colleagues in the NAO did the work in the autumn, we had already delayed the NAO audit, so we have been working on some of that information.

Q207 **Chair:** So you have just got up-to-date information.

**Rear-Admiral Graeme Mackay:** Yes, that's correct.

Q208 **Chair:** So the most up-to-date position is the correct position. Can I ask briefly about ballistic missile defence and where that fits in with Carrier Strike? What is providing that capability?

**Lieutenant-General Mark Poffley:** The term "ballistic missile defence" clearly looks at a layered system of defence. Ballistic missile defence at the strategic level is catered for inside a NATO architecture, so we lock into that, and the United Kingdom provides some specific capabilities to that, most notably in target acquisition. With regard to the carrier strike group, it would always deploy with a Type 45 destroyer, and that provides the intimate missile defence. Each of the supporting escorts, similarly, will have their own defence systems, such as Sea Ceptor, embarked to provide a layer below that. Finally, carriers and the supporting vessels will be equipped with the Phalanx gun, which is the most close and intimate support.

Q209 **Chair:** So you are fully covered.

**Lieutenant-General Mark Poffley:** It would be a brave person who said you were fully covered in the context of ballistic missile defence these days. It is part of the threat profile that would dictate where you placed the ship, under what circumstances you would place her in particular sectors and how you might operate her. Again, one would need to be conscious that, in the context of a ballistic missile fight, it is not likely to be a purely UK deployment; you are more likely to see yourself inside a



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NATO architecture, in which case you would be bringing international allies into that portfolio of capabilities.

Q210 **Luke Graham:** To be very specific on that, obviously China has been developing what it calls “carrier killer” supersonic missiles. Is it within our current defence capabilities to be able to defend the carrier against that specific threat?

**Lieutenant-General Mark Poffley:** Threat is always a balance between intent and capability. We are acutely aware of a number of threats that are posed to a carrier strike group, but it would be wrong to draw a conclusion that it is an attritional conflict that you are seeing here between a capability on the one hand and our carrier on the other, because there is a series of things you will do to prevent that missile from ever being fired at your carrier. Quite clearly, I am not sure we would necessarily wish to go into too much more detail than that in open session, but I can give the Committee the assurance that it is a threat that we recognise and it is a threat that we have made provision to mitigate.

Q211 **Chair:** Thank you. On that note, we wish you the best of luck with Thursday’s events. I suppose, Rear-Admiral Mackay, this is your baby being launched, in a sense.

**Rear-Admiral Graeme Mackay:** Yes. I don’t think it’s mine—there are tens of thousands of other people who have gainfully been employed delivering it.

**Chair:** But you are the face of the actual day-to-day operation of it, so good luck with it all on Thursday. We will of course continue to watch it. It is a huge expense—a huge percentage of the Defence budget and the naval capability. As you know, our sister Committee is also interested, and we are working together. If you are not in front of one of us, you will be in front of the other, so you have got that to look forward to. We wish you all the best. It is obviously vital to our national defence and we wish it well, but we will continue to be rigorous and challenge you about the enormous cost to the taxpayer. Thank you very much indeed for your time. The transcript will be on the website uncorrected in the next couple of days, and we will of course notify you when our Report is being published.