House of Commons

Public Accounts Committee

Oral evidence: Delivering Carrier Strike, HC 394

Monday 4 December 2017

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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.

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.

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?

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 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 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

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.

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 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 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 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.

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 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.

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?

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.

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 contacts 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.

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 inter-operability, 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 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 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 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.

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 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 levering 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 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 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 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

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 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 amphibiosity. I can categorically assure you that we are not planning to come out of amphibiosity. 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 amphibiosity.

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 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 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

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 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

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.