HOUSE OF COMMONS

Public Accounts Committee

Oral evidence: Armoured Vehicles, HC 1102

Wednesday 30 March 2022

Ordered by the House of Commons to be published on 30 March 2022.

Watch the meeting

Members present: Dame Meg Hillier (Chair); Dan Carden; Sir Geoffrey CliftonBrown; Peter Grant; Antony Higginbotham; Nick Smith; James Wild.

Gareth Davies, Comptroller and Auditor General, Adrian Jenner, Director of Parliamentary Relations, National Audit Office, Tom McDonald, Director, NAO, and Marius Gallaher, Alternate Treasury Officer of Accounts, HM Treasury, were in attendance.

Questions 1-114

Witnesses

I: David Williams, Permanent Secretary, Ministry of Defence, Lieutenant General Sir Christopher Tickell KBE, Deputy Chief of the General Staff and Portfolio DG for Ajax, MOD, Andrew Forzani, Director General of Commercial, MOD and Dr David Marsh, Ajax Programme SRO, MOD.

HOUSE OF COMMONS

Report by the Comptroller and Auditor General

The Ajax programme (HC 1142)

Examination of witnesses

Witnesses: David Williams, Lieutenant General Tickell, Andrew Forzani and Dr David Marsh.

Chair: Welcome to the Public Accounts Committee on Wednesday 20 March 2022. Today we are looking at armoured vehicles, in particular the Ministry of Defence's Ajax programme—a programme to modernise the armoured vehicles that are currently in use. Some of the equipment that is in use is from the 1970s. The modernisation programme is pretty critical to our battle preparedness and to improve wider capability.

The £5 billion programme has been beset with challenges, which have been well recorded and looked at by our sister Committee, the Defence Committee, as well as ourselves. There have been serious allegations that there are problems with the health of the service personnel who use the vehicles. Today, we are looking at how the programme has been run, what the issues are with delays and costs, and when we will see these armoured vehicles in service for the British Army.

I welcome today's witnesses from the Ministry of Defence. We have David Williams, permanent secretary; Lieutenant General Christopher Tickell, deputy chief of general staff and the portfolio director general for Ajax; Andrew Forzani, director general of commercial; and Dr David Marsh, the Ajax programme senior responsible owner. Dr David Marsh, how long have you been the responsible owner for this project?

Dr David Marsh: Since October of last year.

Q1 **Chair:** Thank you.

I acknowledge that the Minister yesterday laid a statement about the terms of reference for the lessons learned review on Ajax. A senior QC, Clive Sheldon, has agreed to lead that review. The timetable is as yet unknown, as he explains in his letter to me, while he determines what exactly he will be doing and how long that is likely to take, but it is pretty clear that it will not be looking at the individual issues around service personnel and health. That is not within the remit; it is about the culture of the MOD and how it communicates lessons and information through the Department to decision makers. We won't be asking many detailed questions about that today because all of the witnesses in front of us will be witnesses to that review. We will keep a very close eye on it, alongside our sister Committee, the Defence Committee.

To lead off on the knotty issue of Ajax and when we will see these vehicles in play, I will hand over to Sir Geoffrey Clifton-Brown, deputy Chair.

Q2 **Sir Geoffrey Clifton-Brown:** Good afternoon to our witnesses. What we are really keen to do this afternoon is try to find out what went wrong

with this programme and prevent it from happening in the future. It is with that in mind that I start my questions.

General, I will start with you, if I may. Having seen what is happening in Ukraine, particularly with our anti-tank missiles being supplied, is Ajax still fit for purpose?

Lieutenant General Sir Christopher Tickell KBE: It is definitely fit for purpose. I think you will understand that, within the land environment, we have a phrase called the "system of systems". We would always expect to see any platform or capability paired with others. You would always expect to see armoured vehicles working with infantry, working with indirect fire or artillery and of course the ISTAR capability—the ability to see targets. That is the most effective way of operating in the land environment. Of course, we would pull in aviation and so on as well.

I think history will reflect closely on the lessons learned from Ukraine. I would reflect that what is interesting to us at the moment is that the Russian ground forces are not operating in what I would describe as combined arms manoeuvre. They are not pairing the sorts of capabilities that I have just described, which is allowing, for instance, their tanks seemingly to become very vulnerable to anti-tank weapons, which are, I would agree, being very effective.

I think that is writ large across other campaigns as well. You can look at Nagorno-Karabakh, which demonstrated the utility of unmanned air systems, as you are seeing in Ukraine. We have to be really careful that we take a holistic view from these campaigns, to work out what is relevant and what is not relevant and to make sure that we are adjusting our posture on capabilities to the threat.

Q3 **Sir Geoffrey Clifton-Brown:** Sticking with that theme for a minute, these vehicles are over 40 tonnes in weight. There are six variants, but one of the important variants—well, they are all important—is forward intelligence. Presumably in some theatres of war we will need to get that variant into the theatre quite quickly. Normally, I suppose that you would transport these vehicles by rail or sea, but in that instance, you might want to transport them by air. The Report goes into some of the detail but can you just describe for us whether they can be transported by the A400M, how much you need to dismantle them and whether they need to go into a bigger aircraft—the Globemaster—and how many of these vehicles can you get in each of those aircraft at a time? In other words, how many will you be able to forward project quite quickly?

Lieutenant General Sir Christopher Tickell KBE: We would put them into C-17s—our own, or indeed our allies'. You are quite right that if we wanted to put them into an A400, we would have to strip them down and take off some of the extra size. That is all part of the reconstitution that you would expect to see when you get into a theatre. What we call RSOI—the reception, staging and onward integration—allows armed forces to flow into a given theatre, but we would always presume that we will spend time then

preparing those forces, whether through training or making sure their equipment is working, before we move out on to the frontline.

Q4 **Sir Geoffrey Clifton-Brown:** I have been on this Committee for a long time. In the beginning of the '90s the Army was trying to procure a similar sort of vehicle. Even then, the problem was that they continually changed the specification because they wanted the latest bells and whistles. How do we stop that culture? We will go into a lot of the detail, but that is really what has given rise to a lot of the problems? Indeed, we procured a vehicle when we did not even know how some of the specification was to be designed—the cannon, for example.

Lieutenant General Sir Christopher Tickell KBE: I think we have undoubtedly learned the lessons of previous years. Clearly, I cannot comment on decision making back in the 1990s, as I was rather younger and doing different things.

Q5 **Sir Geoffrey Clifton-Brown:** But it's recurred in this whole business.

Lieutenant General Sir Christopher Tickell KBE: The requirement for Ajax was defined back in 2011 and 2012—that is 10 years ago.

Q6 **Sir Geoffrey Clifton-Brown:** The contract was let in 2010.

Lieutenant General Sir Christopher Tickell KBE: If you look at the contemporary programmes—Boxer, Challenger, Challenger 3 or indeed the Apache Echo model—you will see a fundamentally different approach. If you look at the number of key-user requirements for those platforms, they are similar in number—somewhere between 10 and 14—to Ajax. But underneath that, for Ajax, as it says in the NAO Report, the capability requirements figure was 1,200. In terms of Boxer or indeed Challenger, the requirements are nearer 200 or 150. That was a deliberate change, because in Boxer's case we are taking a platform that is in use already, and therefore we have been very careful not to add on our own requirements, stand fast the need to integrate communication systems. When we were developing the requirements for Challenger, we did that in conjunction with industry, so there were no surprises.

Q7 **Sir Geoffrey Clifton-Brown:** On the noise and vibration, DSTL warned as long ago as 2014 that there was a problem here. I am interested to know, in terms of the culture within the MOD and the Army, why that advice was not acted on at that time—it was certainly six or seven years ago when we knew about that problem. It did not really surface until 2019. Why did it take so long? Is it part of the culture in the Army, and the review will get to some of this, that people are not encouraged to report problems?

Lieutenant General Sir Christopher Tickell KBE: The first thing to say is that I thought David King's report was very helpful in terms of our outlining shortcomings across the system. Self-evidently, we have injured some of our soldiers and that is unforgivable.

In terms of the very early observations from DSTL, as a programme is going through very early development, you would expect to see problems emerging and for us to be able to deal with them. I will not try to summarise what David King has put in his report, but for me, it rightly identifies that the system is, or has been, complicated in terms of how issues should be raised. Importantly, there are a number of recommendations in it and we—the Army—and Defence are very much on the front foot in terms of dealing with those recommendations.

Q8 **Sir Geoffrey Clifton-Brown:** Others will come in on this later. My time is limited and I have a lot of questions that I want to ask, so short answers would be helpful. You are one of the most senior people in the Army. This thing was originally put in the design phase in 2010. Here we are in 2022: we are not expected to have an IOC—let alone an FOC—before 2025. We don't know when that is going to be. We have a reputation for the efficiency of our armed forces in the UK. It must be a source of considerable embarrassment that we can't even order a key piece of equipment within a decade, mustn't it?

Lieutenant General Sir Christopher Tickell KBE: It is a complex platform. Stand fast the chassis, we have, in effect, developed it from scratch. It will be a gamechanging capability, and I don't think we should lose sight of that. Clearly, we are not moving it at the moment, but when you talk to soldiers who have had their hands on the platform, they are very clear that it is a game-changing capability. It is game changing because it is right at the cutting edge of that technology, and the fact that it is cutting-edge technology means that there are going to be challenges. Stand fast noise and vibration, there is a linkage between complexity and emerging technology with time.

Q9 **Sir Geoffrey Clifton-Brown:** I get all that, but we have to procure better in the future. We have to stop changing the specification. I hope we have learned that lesson and that we won't be changing the specification any more from hereon in, so that we can at least try to make this one work, complexity and all.

My time is fast running out. Dr David Marsh, you have at long last been made the full-time SRO for this project. There were a lot of part-time SROs in the past, which seems unforgivable. Are you actually full time now? Are 100% of your time and duties devoted to this project?

Dr David Marsh: Yes, my full-time post is as SRO of the armoured cavalry programme. Like all other senior civil servants, there are other corporate roles and responsibilities I pick up, but this is absolutely full time.

Q10 **Sir Geoffrey Clifton-Brown:** That's what I feared. How much of your time is taken up by those other responsibilities?

Dr David Marsh: One of my key responsibilities is as head of profession for the project and programme management profession in the MOD. That role varies, but I would estimate that something like 5% of my time is spent on that.

Q11 **Sir Geoffrey Clifton-Brown:** Mr Williams, shouldn't you really have an SRO for whom this is the sole responsibility? We have spent £3.1 billion; we are going to spend over £5 billion on the actual vehicle itself, and well

over £6 billion by the time you have added on the other equipment. Shouldn't that warrant somebody giving 100% of their time and, above all, 100% of their thought to trying to make this highly complex project work?

David Williams: It is an allocation that we will keep under review. Actually, the experience and insight that Dr David has as head of profession— he is effectively head of the SRO profession in the Department—is mutually reinforcing to his role as the SRO for Ajax. The difference between 95% and 100%—in comparison to previous SROs at 50%, 30% or 10%—is very small. That is a substantial step change. But we will absolutely keep the role under review and if Mr Marsh thinks he needs to step back from that corporate role, we will do that.

Q12 **Sir Geoffrey Clifton-Brown:** There are complex bits in terms of the addon equipment. Others will ask about this, but I will ask you directly, Mr Marsh: does your role encompass all the bits that have to go on to the Ajax, or is it just the Ajax itself?

Dr David Marsh: No. As SRO, I am responsible for all the elements that support not just the equipment, but the training systems, logistics and information requirements, as well as planning around the introduction of the equipment into service—into normal business, if you like—for the Army. It is policy and doctrine and an introduction of all the relevant aspects around the equipment programme itself.

Q13 **Sir Geoffrey Clifton-Brown:** Mr Williams, how can you justify 1,200 capability requirements as being essential rather than gold-plating? It is the point I was coming back to the General on. Your role as perm sec, surely, is to say to the military, "You've got to stop continually changing the specifications." Okay, we know what has happened on this project. As a highly responsible accounting officer and permanent secretary, what steps will you take to ensure that future procurements will not have this process of continually changing the specifications and therefore not getting value for money, which increases the price hugely?

David Williams: I agree with you; with hindsight, it seems pretty obvious. The 1,200 detailed requirements have clearly not helped us deliver the capability we want in the way that we expected. There is a balance, and General Tickell has set out the way in which that has changed for more recent programmes, between setting key user requirements at a higher level and needing some more detailed articulation to provide the basis for a commercial and contractual relationship, so that you can hold your industry partners to account.

Q14 **Sir Geoffrey Clifton-Brown:** Yes, but the thrust of my question was, what are you personally doing to ensure that it will not happen in future?

David Williams: There are a couple of strands in train. As part of our acquisition reform programme, we have a particular strand of work about requirement setting, building on the role of our new—certainly new since Ajax was set in train—joint requirements oversight group, chaired by the vice-chief of the defence staff. There is a particular challenge for us around not falling into the trap of buying off-the-shelf products to then bespoke those requirements, so they become pieces of equipment that are effectively new. Clearly, if you are developing something from scratch, that is a different argument.

We are putting more effort into an early risk assessment, using Infrastructure and Projects Authority tools to understand how to set projects up for success at the beginning. So there are a range of process things that we are doing. But in the end, it comes down to the behavioural point that, "We will not approve projects that have that level of user requirement". Then we need to be really, really firm—certainly once we hit the main investment decision—that those requirements are locked in and will not change.

Q15 **Sir Geoffrey Clifton-Brown:** That is a really good point: being really firm when you hit the main investment decision. When the Elizabeth Tower project in this place was first started, they told us it was going to cost £29 million. It ended up costing £88 million. I have been extremely critical of that. The reason—and I know quite a bit about this, as a professional surveyor—is that they did not scope the project properly. So why can't you have a system in the MOD where, before you get to that investment sign-off, you get all the parties involved to sign off on what the specification is or should be? Then you have an absolute agreement that it will not be altered unless there is some radical reason and, again, it is signed off by all the parties that it should be altered. Why can't you just have a simple procedure like that?

David Williams: We do have a system in which those requirements are set at the initial investment decision. Indeed, those 1,200 user requirements, in large part, were there in the 2010 decision, confirmed in 2014.

Sir Geoffrey Clifton-Brown: Twelve hundred? No wonder poor old General Dynamics has had problems manufacturing it.

Chair: A rare bit of sympathy from PAC.

David Williams: On the other hand, we had 11 key user requirements, and 11 is not right for a contract either, so you have to get the balance right. Being more disciplined about not changing requirements when a project is in flight is an important part of addressing the issues here. It is also being clear. We see this on Boxer—there is an element of it in Ajax, but it just has not delivered in the way you would want—where you are thinking about a base platform, taking that and getting that in, and then thinking about spiral development thereafter, rather than constantly changing the requirements before you get your base capability into service.

Q16 **Sir Geoffrey Clifton-Brown:** Others will have detailed questions around this, but may I take you to paragraph 2.18 on page 33? Summarising that paragraph, it says that by January 2020, 11 milestones—the 11 you talked about—have been missed. It says, "Schedule assumptions were

still over-optimistic…The Department still had inadequate resources to deal with safety cases…Technical issues remained…Issues with the cannon's fire control panel delayed delivery of the turreted variant." That was after you had set the design contract in 2010. You set the actual contract in 2014. You reset it and nullified some of the liabilities in 2018. Still, here we were, at the end of 2021, with all these problems, and I might add a fifth one to those problems: you've got vehicles that can't properly communicate with each other on an ISTAR basis. How long is it going to take to overcome all these problems, and when do you expect the in-service date to be?

David Williams: If I start at the end of your question and work back, Ministers have been clear—indeed, I and other officials have been clear to the Committee—that we will not set new dates for the initial operating capability until we understand the route through.

Chair: As you set out clearly in your letter.

Sir Geoffrey Clifton-Brown: We all understand that.

Chair: We've got the letter.

David Williams: I think it's quite an important lesson from our previous experience of recasting a contract.

Q17 **Sir Geoffrey Clifton-Brown:** It is very, very important. And what is very important in that letter is that you intend to make this vehicle work. When can the Committee expect you to come up with firm dates for the IOC?

David Williams: Well, the NAO Report says later in 2022, and I think that is certainly a reasonable expectation.

Q18 **Sir Geoffrey Clifton-Brown:** We can expect you to stick to that, can we?

David Williams: Yes. So, we currently have trials under way, as the Minister set out in his written ministerial statement yesterday, and Mr Marsh can talk to those trials in a bit more detail if you would like. It is really about testing whether GD's proposed solutions to noise and vibration issues are acceptable to us. Once we have completed those trials and got the data and analysed it, we will need to understand what that means for the programme moving forward. At that point we will want to look at a realistic schedule that we can deliver.

I think one of the disappointing aspects of the recast is that although it locked in, in theory at least, programme dates, albeit with reduced levels of capability earlier on in the programme, it addressed a number of technical risks—there was a net zero issue financially—but nevertheless, the schedule that underpinned it, clearly, with the benefit of not very much hindsight, has

turned out not to be very realistic because GD was then instantly into missing loads—

Q19 **Sir Geoffrey Clifton-Brown:** A final question from me for the time being, because otherwise the Chair will cut me off. What is really important to this Committee is the value for money. You are now owing £1.1 billion to General Dynamics. Can we have your assurance on exactly how and when that will be paid to them, and what you will have expected from them before you pay any of it?

David Williams: I might pass to Mr Forzani on the contractual aspects, if that's all right.

Andrew Forzani: I think we estimate that we owe the suppliers just over £750 million for milestones and work that they have done, but the contract is constructed in such a way that there are critical milestones, and if the supplier misses those for any more than two calendar quarters, then they cannot claim payments for anything. And because of the delays that we have got on the programme, we do not contractually have to pay the supplier any more money. So, as it stands, it is up to GD to find a solution and to make up on the programme.

David Williams: Just for clarity, we recognise and agree with the NAO on the figure of just over £1 billion that you mentioned, Sir Geoffrey. That is the amount that GD would have earned had they delivered everything, but they have missed milestones, so we have not been paying them for work done, and we do not assess that they have done everything that we were expecting, so the £750 million figure is our assessment of the value of work completed. That is the difference between the two numbers.

Sir Geoffrey Clifton-Brown: Ah, I get it so far.

David Williams: If it helps in budgetary terms, we have, against our departmental extension limits, accrued within DE&S that £750 million, so there is a cash payment to follow, so that when that money goes out the door it will not hit our budget.

Q20 **Sir Geoffrey Clifton-Brown:** So can we be absolutely assured about two of those milestones, Mr Forzani? One is resolving the health and safety issues—all of them: the vibration, the steering and everything else. Secondly, we are getting reports that it is likely that for a lot of the 329 hulls, every one is different from every other one, which is going to make resolution of some of those milestones even more difficult. Can we be absolutely assured that you will look at both of those very serious issues before you pay out another penny?

Andrew Forzani: I think we have demonstrated that we are holding the supplier really strongly to the contract. We have not made a payment since late 2020, so in order for them to get any payments going forward, they are going to have to catch up with the milestones and comply with all aspects of the contract.

Q21 **Sir Geoffrey Clifton-Brown:** You are not quite answering the question. I understand that of the 329 hulls, not one of them is thought to be the same as the next one; in other words, there is not a very good, tight specification in the making of those hulls, which could exacerbate a number of problems. I gather you have only tested four of them so far, so that is a very small sample. I don't mind who answers this question,

but one of you needs to answer it and say how you are going to resolve this problem.

Dr David Marsh: There were recognised concerns around the quality and specification of the early manufactured hulls in the manufacturing process, and there was a deep dive check on the four you referenced there. They were laser-checked to ensure that they were within the tolerance of the manufacturing. I guess like any new manufacturing line, some of the early items did have tolerance issues. We understand those, and the company have tagged those and recognised them and believe that the tolerance is manageable. Subsequent hulls have all been managed within the quality management system that the company has put in place, and they are regularly checked and they are within tolerance, so we are assured that that is the case.

Q22 **Sir Geoffrey Clifton-Brown:** I'm really grateful for that answer, Mr Marsh. Just to be absolutely clear, in case anybody misinterprets what I said, it is a matter for GD to resolve, but for you to check.

Dr David Marsh: That is correct. GD manufactures under a recognised quality management plan that is part of the contract with us, and we oversee and monitor that plan through the defence quality assurance field force who are embedded on site at Merthyr Tydfil.

Sir Geoffrey Clifton-Brown: Thank you very much indeed.

Q23 **Chair:** I just want to go back to Lieutenant General Tickell. In your first answer to Sir Geoffrey, you were talking about the lessons learned from the war in Ukraine. You indicated that there might need to be some changes to this, but how quickly would that happen? For Mr Williams and Dr Marsh, that could lead to major contractual changes if something needs to be done differently. I am just trying to unpack your answer.

Lieutenant General Sir Christopher Tickell KBE: I am sorry. I was not talking about changes in capability within Ajax or a given platform. My point is that whenever campaigns occur, we draw the lessons out to look at our tactics, techniques and procedures.

Chair: It is more about tactics than about equipment.

Lieutenant General Sir Christopher Tickell KBE: Absolutely.

Q24 **Chair:** But could there be changes to equipment that are needed?

Lieutenant General Tickell: Ajax, Boxer and Challenger are all being designed with an eye to through-life capability management. As emerging

technology arrives—that could be robotics and autonomous systems; it could be AI; it could be ML—we need to have the wherewithal to be able to drop new software in, or team it with unmanned ground systems or unmanned air systems. In that respect, the capabilities will evolve, but that is absolutely what we should be doing to keep pace with the threat.

Q25 **Chair:** But then, Dr Marsh, as SRO, you have to make sure not only that what you have commissioned works, but that you have the capacity to

drop in new technology as it emerges. Are you confident that as it stands at the moment, that is possible?

Dr David Marsh: That is absolutely true. As General Tickell said, it is normal that for any vehicle or any equipment like this that has a 30 to 40-year life, you would expect to do technology upgrades. Of course, one of this vehicle's features was its open software architecture. It was thought in advance that that would be beneficial for future upgrades as well.

Chair: Colleagues will go into this in more detail. I may have slightly misunderstood what you were saying; that was why I wanted to clarify.

Q26 **Peter Grant:** Mr Williams, you have given an explanation as to why you are not paying any more money to the supplier just now, so they have been paid about £1.1 billion less than they would have got if they had delivered everything on time. Is that position one that the supplier agrees with?

David Williams: It is a position that is consistent with the terms of the contract and the scheduled payment list for delivery against milestones, anchor milestones and so on.

Q27 **Peter Grant:** Has the supplier confirmed that they accept that what you have done is entirely in keeping with the terms of the contract? ***David Williams:*** I might ask Mr Forzani just to cover the detail.

Andrew Forzani: It is true to say that we are in dispute with the supplier under the contract. The contract allows for a dispute resolution process, as most contracts do, and we are in the early stages of that process. We do disagree on some points. The supplier has made claims for payments, but it's very clear, under the contract, they are not able to get payment, because they have missed the critical milestones. So it's actually pretty black and white under the contract.

Q28 **Peter Grant:** I appreciate that there will be aspects of this that can't be discussed in a public forum, but has it reached the stage yet where you need to consider recognising a contingent liability, just in case the dispute gets to a stage where you get an answer that isn't what we expected?

David Williams: Actually, as I was saying in response to Sir Geoffrey, we have recognised already in our accounts an accrual for the work that we assess to have been done for which we have not made payment, so they are being recognised as an accrual rather than a contingent liability.

Q29 **Peter Grant:** In that case, are you satisfied still that there is no significant risk that the original £5.5 billion price will have to be exceeded? Are you confident that the terms of the contract are tight enough on that?

David Williams: Well, it's a firm contract, and we are working with GD to allow them to meet the terms of those contracts and deliver the vehicles within the price that we have agreed. That is very much our focus.

Q30 **Peter Grant:** Thank you. I think, for the record, we can record the fact that Dr Marsh was nodding quite enthusiastically in agreement with you at that point.

This will be the final question from me for now. Lieutenant General Tickell, Sir Geoffrey Clifton-Brown asked about changes in culture within the Army and within the MOD generally. Has there been a culture change as to how the Army regards the risk of hearing loss, for example, to its solders, compared with what happened in the past? Would it be fair to say that there was a time in the past when soldiers were just expected to accept that if they were using small arms all the time, their hearing was going to be affected, and if they were in an armoured vehicle a lot of the time, they would get vibration or noise impacts? Have we seen a change in the Army's approach to that, such that the Army is now accepting its responsibilities as an employer in a way that possibly it wasn't—

Lieutenant General Sir Christopher Tickell KBE: I have been in the Army for 39 years, dare I say it, and the Army today is very different from how it was when I first joined. In terms of the contemporary Army—that is, in the last 10 or 15 years—I think our culture has been absolutely one of safety and looking after our people, while recognising that we of course sometimes put them in harm's way, because that's what we do.

For me, one of the key issues has been our ability to risk-report. That's got to, in David King's report—we have now introduced a system called DURALS, which allows soldiers to have an app on their phone. This was introduced in January 2022 and it is allowing significantly more reporting and near miss reporting in a way that we, frankly, have not been able to do hitherto. To give you a statistic, we have seen a 40% increase in reporting of near misses since January. That is hugely positive, because it's giving the wherewithal to our soldiers to identify where there are risks and what we need to do about them.

We continue to be on a learning curve in terms of our approach to safety. I think we have made huge strides over the last few years, but it is, for want of a better phrase, a journey that is never going to end, because we have got to continue to go hard at it.

David Williams: While our Ajax experience, set out in the health and safety report, highlights some particular areas for the Army, I have been struck by the fact that there is a broader issue around noise-induced hearing loss in the armed forces. It is the single largest category of claim under the armed forces compensation scheme. So I have asked the vicechief of the defence

staff and the second permanent secretary to do some work on the causes of those claims to see what else in that specific area of noise-induced hearing loss we should be looking to do.

Q31 **Peter Grant:** Thank you. As well as a clearly different response to problems once they arise in the field, do we have a position here such that, although the culture had started to change, there was still the old mentality in play when the specification was set 10 or 15 years ago? Was it in fact being specified with a similar level of regard, or lack of regard,

to the wellbeing of soldiers? I suppose I am saying, would that contract under those terms be agreed now, or would someone look at it and say, "No, we need to be more specific about not having people use these vehicles"?

Lieutenant General Sir Christopher Tickell KBE: I don't think I can comment on the detail of the contract. What I can reflect on, as David King highlighted in his report, is that the way in which some of that was managed needed to be addressed. For example, the introduction of noise and vibration working groups within the Army headquarters, with the DE&S, is a key part now of our approach to ensuring that we are managing those risks for our new platforms in the way that we should.

Q32 **Nick Smith:** My real hope is that we can get this project back on track. Eight hundred jobs in Oakdale and Merthyr depend on it, and 4,000 across the UK, and we need a fit-for-purpose armoured vehicle programme with great communications. General Tickell, if we were in a land war in Europe this year, do we have the fall-back capability that you have just talked about to give us the reconnaissance vehicle with good communications that would be needed now?

Lieutenant General Sir Christopher Tickell KBE: As I alluded to at the beginning of the session, the Army is at the start of a massive transformation journey over the next 10 years—

Nick Smith: That is in the future.

Lieutenant General Sir Christopher Tickell KBE: No, I absolutely recognise that. My point was that, over that period of transition, as legacy platforms go out—that is, as current platforms leave service—and we introduce new platforms, whether it be Ajax, Boxer or Challenger 3, our responsibility is to ensure that we can meet our NATO commitments. That of course drives what I have described as the Jenga puzzle of making sure that we have the right capabilities to deliver the right effect at the right point. That is what I, on behalf of the Chief of the General Staff, and the team are addressing continually to ensure that we can meet our NATO commitments and, indeed, can meet the threat at a given point in time.

So, yes, to answer your question, we can absolutely deliver the right capability now, but the whole point about Ajax, Boxer, Challenger 3 or indeed AH Echo is that they are the next generation of capability. We have

to introduce those to continue to keep pace with both the threat and the emerging technology.

Q33 **Nick Smith:** I am looking for confidence from you now that you can have this capability now. You have talked about working with NATO partners and about the future. I just want confidence that, when I go home to south Wales, the people in the Welsh regiment who will be doing this work, in the reconnaissance units, have got the kit they need now to do their job now.

Lieutenant General Tickell: We would not be introducing Ajax, Boxer or Challenger if we did not think that we needed to upgrade the current capabilities but, for example, I was with the Royal Welsh two weeks ago, as they moved out to Estonia—you will know that they are there—and, as you don't need me to tell you, they are in great form and confident in the equipment that they have, and they deployed in great order.

Q34 **Nick Smith:** Mr Marsh, how likely is it that you will be able to salvage this programme and to resolve your differences with General Dynamics?

Dr David Marsh: We are working very hard with the company, and the company are working extremely hard to develop—

Q35 **Nick Smith:** It is in a bad place now, isn't it?

Dr David Marsh: We have done an awful lot of work together in the last 12 months to really understand the characteristics of the vehicle and the root cause of the problems we have seen manifest themselves with it. We are at the stage now when we are just coming to the end of testing the proposed modifications that the company has made to improve the system. We have not yet got the data and been able to verify it, but we are on the cusp of doing that work. I would say that I am cautiously optimistic that we will get through that period and be able to move on to the next phase of this work.

Q36 **Nick Smith:** Okay. Mr Forzani, how much are you going to have to spend to recover the programme and deliver the intended capabilities?

Andrew Forzani: We are still very much expecting GD to work within the current financial limits of the contract. The discussions are still around that contracted envelope. That is still our expectation.

Q37 **Nick Smith:** So you don't think you are going to have to spend any more money at this moment in time?

Andrew Forzani: We have been very clear with GD that we have contracted for those vehicles under a particular specification. It is for them to deliver against that. We are working very collaboratively, as Dr David said, to try to fix the problems we currently have, but we are making it clear to them that it is their responsibility to deliver those vehicles under the contract.

Q38 **Nick Smith:** Back to Dr David. When will you have enough data to understand the causes of the noise and vibration issues?

Dr David Marsh: We have completed a very comprehensive set of tests around the base characteristics of the vehicle and the proposed modifications.

Q39 **Nick Smith:** For a long time in the past you were not collecting that data in the MOD, were you? You were relying on General Dynamics. When are you going to have this data that gives you confidence?

Dr David Marsh: The formal report of the most recent period of testing at the Millbrook proving ground will be with us within the next couple of weeks to review and validate—and for colleagues at DE&S too. I think it is true to say that because of the problems there have been, we have been through and characterised the vehicle to a huge degree. It was not previously understood. That is necessary and important to make sure that we are resolving the problems. We have a huge amount of data to go through. It is not possible until we have been through that data to say whether there are any parts we may need to look at again, redo or add to. I would not sit here and confirm that everything we need to see has been done. We hope that is the case, but I cannot confirm that until we see the data.

It is a hugely comprehensive set of tests. We have a lot to get through in terms of assessing it. That is the next phase of work that can happen within the next month.

Q40 **Nick Smith:** What evidence do you need to let General Dynamics get on with fixing the vehicles?

Dr David Marsh: We need to validate the results we have seen from these trials. Importantly for us, we need to add to that the user experience of Army crews in vehicles with modifications.

Q41 **Nick Smith:** Give us more detail. What do you mean by that?

Dr David Marsh: In terms of vibration, there have been proposed modifications around hand controllers, the damping of hand controllers and seating and improved body posture—those sorts of aspects. That is something that a user needs to assess to verify that it has made the positive benefit we would want. In terms of noise, the system is more complex. It starts with the basic characteristics of the vehicle and is added to by the fact that we have a communications system, an interface with the human between headsets and an electronic interface as well. That whole system from end to end needs to be taken as a whole. There are proposed modifications to all those aspects, and therefore you do need to test that as a whole system. The way to do that is to have user verification trials.

Q42 **Nick Smith:** This is sort of related to that point. General Tickell, why does the Army continue to use the headsets that provide insufficient protection for our soldiers? I understand that the Army has been aware of issues with headsets for other armoured vehicles over the years. Wouldn't changing the headsets resolve this noise issue? What has been going on all these years, and why hasn't that been addressed?

Lieutenant General Sir Christopher Tickell KBE: There is a new headset programme, which is gathering significant momentum. We were always planning to upgrade the mark 2 headset, which is the one currently in use, with a new headset. That programme is progressing well and is being brought into sharp focus by these events, of course.

Q43 **Nick Smith:** You told us 10 minutes ago that you had the capabilities already dropped in for great communications and great digital support, but as of today you have got poor headsets, haven't you? When are you going to be able to change those headsets and be confident that they are fit for purpose?

Lieutenant General Sir Christopher Tickell KBE: I am not sure that I completely agree with your summary of what I just said, but as I say, in terms of the revised programme for the new headsets, I would expect to see the flow of new headsets starting to come into the Army by the autumn of this year.

Q44 **Chair:** That is the start, so when will they be completely rolled out to all personnel?

Lieutenant General Sir Christopher Tickell KBE: I would have to come back to you.

David Williams: Just to come back to the question of the contract, the contract with GD is to produce the vehicles at an acceptable level of noise, using the combat mark 2 headset that we have specified. There is a separate contractual element of whether GD is delivering against the requirements that we have set, alongside our thinking about how we might review and enhance a range of headsets in service with full fleets of armoured vehicles for the future. In thinking about that, you need to understand both the element of hearing protection, the level of in-vehicle communication that you need to complete the mission, as well as the interface between the headset and the radio system, the headset and helmets—it needs to be something that works with the helmets, so that you have ballistic protection if you are a crew member with your head out of a hatch. There are range of issues that we will need to look at. Our assessment—

Q45 **Nick Smith:** It sounds like you are going to get some new headsets this autumn and then they are going to be replaced by the newer General Dynamics designed headsets.

Lieutenant General Sir Christopher Tickell KBE: Not necessarily.

David Williams: The contractual position is that the headsets are Government -furnished equipment, so it is not that GD would be producing headsets of their own design. The contract itself is to work with combat mark 2, and our assessment of the performance of that headset is that it holds up well against what we assumed it was going to do when we let the contract in 2010. There has been some modelling and assumptions since then that it may have offered higher levels of protection, which turns out

not to be right, but there is a contractual point and then there is a programme point about ensuring that our soldiers have the headsets to allow them to complete their missions in the future in a way that is effective and safe.

Q46 **Nick Smith:** That is good. The most important thing is that our soldiers have the best kit as soon as possible, although it does sound as though there will be further contractual negotiations, possible delay and further expense—that would be my shorthand and my understanding of all that.

David Williams: It is likely, for example, that we will use some of the same headsets that GD has been using to allow the next phase of trials to proceed, when we are happy with the wider modifications. But that is not the same as saying that we think that is the solution for all crew in service.

Q47 **Nick Smith:** On vibration issues, Mr Marsh, are there simple fixes that can be made, or are the problems more fundamental? Is this a WD-40 issue or are you going to have to re-machine the equipment?

Dr David Marsh: I think the NAO Report was very helpful in setting out that there are likely to be choices in the way that we address the problems that we have seen. Like any vehicle or any piece of machinery, there are vibration characteristics of the vehicles. There are basic ways to address that. You can go back to basic design and you can redesign from the start point, which would result in fundamental work and fundamental redesign. You can, if you are able to, address more modifications and reduce the impact of the interface with the human. In effect, that is what we are talking about here.

The real question for safety management is about taking action to reduce the risk you are presenting to as low as is reasonably practicable. If you are able to do that through the more modest modification work to an acceptable level, clearly that will have less impact on the programme and allow us to proceed more straightforwardly. If that is not possible and you need to go back to basic engineering and design, that will have a much bigger impact on the programme. What we are assessing at the moment is whether the proposed solutions, which are not addressing going back to basics and fundamentally redesigning the vehicle, will be adequate. That is the point we are at.

Q48 **Nick Smith:** Mr Marsh, you are saying what is in the Report already, which is that the scale of the work is not yet known—I get that—but what we are looking for from you today is some comfort that you have a better detailed understanding of what the problem is now and whether you will have to go back to redesign and remachine, which sounds like a really big job, very expensive, and a lot of work and time, or are there aspects of the vibration problem that can be addressed more easily, more quickly, more cheaply?

Dr David Marsh: What I would say is that, as a result of the testing that we have done over the past 12 months, we really do understand the signature, the basic characteristics, of the vehicle and the interaction with

the human that that produces. What we are now looking at, as the company has proposed modifications to seating, hand controllers and damping of vibration, is whether those provide suitable reduction in the impact to the human so that we can accept that as an acceptable design. We will not know that until we have seen the data over the next few weeks, as I explained earlier. That is the proposal we are looking at, and we are optimistic that we will be able to agree those design changes to a point at which they are acceptable in terms of the safety risk presented.

Q49 **Nick Smith:** How certain are you that there is not a noise and vibration type of issue around the corner?

Dr David Marsh: Any engineering development like this has a huge number of risks, challenges and issues that need to be resolved as you go through the development lifecycle. There are always a large number of items that are being watched, worked and resolved as you go through development of this type.

Nick Smith: How certain are you?

Dr David Marsh: You can never be 100% certain, because we are only part way through the development—

Nick Smith: Are you 50% certain, 70% certain—

David Marsh: It is not possible to put a number like that on our certainty at the moment. The Report is clear that we have seen test evidence to prove roughly 30% of the multiple requirements, as we talked about earlier, are on the programme, so we are at that kind of stage of proving the testing and the compliance with the specifications. So, there is quite a long way to go yet to go through all those items and to prove against them. It is really not possible to put a percentage figure on confidence at this stage.

Q50 **Nick Smith:** Sorry to concentrate on you, but you are the key person at this point. The new tactical communication system, Morpheus, has been delayed for at least three years now and faces large cost increases. The NAO says that this delay means that Ajax's full digital capability will not be available as early as anticipated. Earlier on, I was looking at the range of vehicles in the Report, and that is particularly important for the 112 command-and-control variants—for all of them, but particularly those—isn't it? When will Ajax achieve its full digital capability, do you think, please?

Dr David Marsh: The Ajax contract and the project approval always assumed that we would be reaching full operating capability with the BCIP—the Bowman—5.6 version of the communication system and that the upgrade to Morpheus was a future development. In terms of the scope of this project, entering service with Bowman at version 5.6 was always the plan, and that remains the baseline, if you like. If the Morpheus programme does indeed slip out into the future, that is unfortunate for us as a

programme, but it was not in the scope of our project to enter service with Morpheus as the communication system.

David Williams: And that 5.6 drop—

Q51 **Nick Smith:** Just a second. I will come back to you, but the point is, given that 2017 was when we originally hoped to have Ajax, there has been a six-year delay so far. You would have hoped that Morpheus was sufficiently prepared to be able to fit on to Ajax as it comes forward now, wouldn't you, rather than for Morpheus to be delayed and for there to be this difficulty where things are not integrated as quickly as it would be good for them to be?

Dr David Marsh: Because of Ajax's open software architecture, as I described earlier, it was always expected that upgrades such as Morpheus could be made to the vehicle once it was in service. Our assumption under the project and our approval in our contract is based around the Bowman

5.6 version of software, with the ability to upgrade to future systems, whether that is Morpheus or anything else, with the vehicle as a through-life capability plan once the vehicle is in service.

Q52 **Nick Smith:** It is just a real shame that Morpheus has slipped nearly as much as Ajax has, and they are not going to be able to work together as early as would be preferred, I am sure you would have to say. Mr Williams, I interrupted you.

David Williams: I was just going to underline the point that the Bowman 5.6 capability, which is the main element of the land environment tactical comms programme, hit its full operating capability in December 2020, so that will be the system embodied in Ajax as it comes into service. The Morpheus work is late, and we are currently reviewing potential ways ahead on that element of the programme. It is about moving from the vendor proprietary architecture of Bowman into an open system architecture.

Actually, we have made quite a lot of progress on that open system architecture, but there are aspects of the software development of that programme that need more work. In terms of getting that right and thinking about the future spiral development of Ajax through life, that absolutely remains the ambition. But, as Dr Marsh says, the Bowman 5.6 standard is what we had assumed for initial service.

Q53 **Nick Smith:** That is a shame, but thank you. Mr Forzani, given this difficult relationship you have with General Dynamics now, how will you ensure that the future commercial arrangements—I think you said that the MOD owes General Dynamics £700 million at the moment— **Chair:** It is £750 million.

Nick Smith: Yes, £750 million.

Chair: Just £50 million—loose change in the Ministry of Defence.

Nick Smith: That must be causing bad blood. How are you going to ensure that the future commercial arrangements create the right incentives to deliver the required capability? How are you going to mend this relationship?

Andrew Forzani: To be fair, the Department and the suppliers have been working together really closely over the last 12 months. There was definitely a sense of collaboration and working together, although we are very clear that it is their contractual obligation to deliver this, and we should not forget that GD are certainly in the top five defence companies of the world. Their turnover last year was $40-something billion, so it is a significant sum of money, and it has been really important to hold them to account. It is strong leverage to make sure they are really focused on fixing this problem.

I would not say that the relationship is broken at all; I would not characterise it as that. They are very keen to get that money—of course they are—and they are very keen for us to look at how the programme changes in the future and how the contract might support that. My job is to make sure they are really focused on fixing the problems in front of them, so I would not say that it is a broken relationship.

Q54 **Nick Smith:** Good. Last question from me, Chair. Mr Williams, which of your major programmes is at risk of being the next Ajax?

Chair: You might as well tell us now, Mr Williams, because we will find out eventually.

David Williams: Well—

Chair: It is such a long list, you are trying to choose.

David Williams: I was going to fall back on the reporting of delivery confidence, in which the panel had a disagreement with Mr Francois at the last hearing. If you are looking at those programmes whose delivery concerns us most, it is those rated red by departmental SROs and by the Infrastructure and Projects Authority. On the next set of those programmes, the data cut-off for the publication is tomorrow.

Chair: Which is good or bad timing, depending on your perspective.

David Williams: Given the confusion that arose last time on whether we were using later data or published data, I am keen not to cause more confusion. I would be happy to share offline what our current assessment of those red programmes are.

Chair: We are due to have a private session with you on a number of issues, so we can wrap up some of that then, but we would like to have as much as we can in the public domain.

David Williams: I would be happy to pick that up in that session.

Q55 **Chair:** And we would like, as Mr Smith has indicated, to have some of this in the public domain as well. Do you want to throw anything to us now? I know you sleep soundly, but—

David Williams: I deliberately did not bring the list of the red projects with me so that I could not have an argument about them. I would be happy to share them offline.

Q56 **Chair:** But they will be public tomorrow?

David Williams: No, they won't be public tomorrow. The IPA tends to publish annually either in the summer or early autumn, but the data cutoff is projects across government as at 31 March. I will at least know tomorrow what the publication will be.

Chair: So you will share that with us privately tomorrow and then we will be able to deal with it publicly in due course. I think Mr Smith will not let it go, so never fear; we will be on it.

David Williams: I don't think it will be very surprising.

Chair: I am afraid it very often feels like groundhog day, as I am sure it does for you as well as for us. I say that without any pleasure. Antony Higginbotham MP, over to you.

Q57 **Antony Higginbotham:** Thank you, Chair. Good afternoon to our witnesses. Initial operating capability is defined in the NAO Report as the minimum level at which the MOD can usefully deploy a capability. That was initially set at 2017, then revised up to 2020, then changed to 2021, and now we don't have a date at all. Mr Williams, as the accounting officer who has spent £3.167 billion, are you comfortable with that?

David Williams: Well, there are a couple of points in that question. First, as I have discussed with the Committee in previous hearings, it is in the nature of complex, technologically advanced defence programmes that involve a high degree of development that we spend quite a lot of money in the development phase in advance of the manufacture phase, and therefore you would expect to see the profile of spend front-loaded before the manufacturing starts kicking in. Although, as you will see from the NAO Report, under our current contract GD has already manufactured a number of complete vehicles and a number of hulls beyond those that we have accepted for testing. So the profile of spend across a development and manufacture programme does not particularly surprise me.

Clearly, whether it ends up being value for money—the Comptroller and Auditor General sensibly reserved his position on this—depends on whether in the end we get the capability that we have contracted for, which genuinely we believe to be a real step change in the way in which the Army thinks about its battlefield missions.

On the change in that IOC date, I think there are some interesting points in the Ajax programme about where you prioritise time or capability or cost.

The initial change from 2010, with an IOC date of 2017, to the main contract in 2014, with a three-year slip to 2020, was us holding on to capability and trading time, with one eye on affordability during that period as well, whereas in the recast contract in 2019 we have held the dates, in theory, in the contract and accepted an incremental build-up of capability. So different judgments about the balance between cost, time and capability were taken at different points in the programme.

Part of the challenge of that recast approach is that, in a programme where actually I think simplicity would help us all, it has added a degree of additional complexity in the fielding of vehicles, and that is something we will need to reflect on.

Q58 **Antony Higginbotham:** That all sounds fine, but I am not sure it fully answered my question, which was a reasonably simple one. You have spent more than £3 billion and the IOC date is now unknown. The Army said we need a minimum capability by a certain date. We don't have it. Then they reset the date, and we don't have it. And then they reset the date, and we don't have it. As the person in the MOD responsible for that £3 billion, are you comfortable that we still even have an IOC date?

David Williams: Well, to reflect on some of the conversations—if I think back to the position I was in when I gave evidence to the Committee last summer, I do feel more confident about the position that we are in now. Last summer we didn't really understand the problem, whereas now we are in a position where we are looking to understand and assure ourselves that the solutions proposed by GD are acceptable. So that is material progress over the past year.

My point, though, was that in any development programme where you are investing money up front to develop a capability before you start manufacturing at scale, midway through that programme you are nevertheless making a bet that you are going to end up with the capability that you have spent money on so far. Would I prefer us to be delivering against the contract on all the anchor milestones and to have a clear view of when the equipment is going to be in service? Yes, of course, but that is just not the position we are in. I am really clear, and Ministers are absolutely clear even if I wasn't, that one of the lessons we must learn from Ajax is not to set those dates until we are confident that GD, working with us, can then hit them.

Q59 **Antony Higginbotham:** Part of the concern from that, though, is this. Setting those dates is important, because it allows us as a Committee, Parliament, the public and the armed forces that rely on this kit to understand what is coming when. If you are not setting those dates and are still spending taxpayers' money, how can we be assured that that is securing value for money? How do we know that you are not just spending money that will go nowhere?

David Williams: Well, at the moment we are not spending money.

Antony Higginbotham: You have already spent £3 billion. That's why.

David Williams: Yes, we have already spent the £3 billion, so we are not paying the company until we are satisfied, as we have already discussed, that there is a route to resolution. The contract sets out provisions for termination if we end up in that place, although it is absolutely not where we want to be. We are all working to ensure that, actually, within the firm price of £5.5 billion, we get the 589 vehicles that do what we want. If we deliver that, I will be satisfied that that was good value for money.

Q60 **Antony Higginbotham:** You might be satisfied then, but I am asking about your view now. But let us move on to the issue of full operating capability. That is still set for April 2025, but the NAO Report says that the Department "has no confidence" that that will be met. Can you tell us whether you are confident that you will meet FOC by April 2025?

David Williams: Well, I am not very confident in it, no, given that we don't yet have a timeline to hit IOC. So my expectation is that, in agreeing a schedule with GD, we will need to look at that FOC date as well. There will be some choices, no doubt, about whether you set a date with a capability that you want or whether you think about incremental development of the vehicle. So we need to have those conversations. I don't know whether Dr Marsh wants to add to that.

Dr David Marsh: Yes, just to set out our plan. We have been talking to the Infrastructure and Projects Authority and to HM Treasury about our plan for getting the programme back into proper governance, which would see us going through a stage where the next phase is to resolve the technical issues we have at the moment, move forward through the defined initial operating capability, and then come back to the approving authorities with a revision of the programme out to full operating capability. That is an opportunity, as Mr Williams has said, for us to take another look at the definition of full operating capability—it is currently defined as the last vehicle manufactured coming off the production line. Personally, I feel that it would be right to look again at that definition to see whether, in capability terms, it still makes sense or not. I will not forejudge that, but I think it would be right to look at that question, as we go through that reapproval, through a review note in the last quarter of the next financial year.

Q61 **Antony Higginbotham:** That does sound slightly like you might just redefine the parameters to go, "Ta-dah! We've now delivered the capability," even though you have not delivered the capability.

Dr David Marsh: I wouldn't recognise that characterisation. I think things have changed since the full operating capability was defined all those years ago—not least of which is the future soldier, which has now redefined the structures within which this vehicle will be used in terms of fighting elements—so it would be right to reassess it in the light of that, to make

sure that we are defining full operating capability at the right moment in time.

Q62 **Antony Higginbotham:** The NAO Report also makes it clear that, for one of the IOC dates, the Army had to refine what could be achieved and had to refine its requirements. That resulted in some technical constraints around armour and the weapon system. When we achieve FOC, will that be full operating capability, as originally envisaged, or will those same constraints around armour and the weapon system still be there?

Dr David Marsh: It is true that the history of the programme has shown that there have been various changes to the definition of the initial operating capability, and there have been concessions against the original intent, which, to go back, was pre the recast agreement. Originally, the initial operating capability would have been a limited number of vehicles, but at a much more mature state of development.

Q63 **Chair:** Can you be clear about which of the vehicles? There are six different models.

Dr David Marsh: The initial operating capability defines a mix of vehicles representing a fighting capability, but essentially that is a squadron of vehicles. I think we can provide the detail if it is not in the Report, but it is a mix of the vehicle types. But it is true that, in order to preserve the programme, the definition was reduced at a number of steps in the past. What I would say is that the full operating capability is designed against what we define now as capability drop three—the full development capability. Looking forward, the focus on capability drop three and its route towards a declaration of full operating capability is the really important future milestone for this programme, and that is what I think the next piece of work needs to really focus on.

Antony Higginbotham: Okay. I want to move on to where we are going. FOC will ideally be in 2025, but we accept that it will probably move forwards.

Chair: Move backwards—to be delayed.

Q64 **Antony Higginbotham:** Yes, it will move further away from us. The integrated review has Ajax peppered throughout it. It is obviously a key part of the future operating model for the armed forces. Paragraph 7.4 of the integrated review refers to "multi-domain integration", which we know is a key feature of Ajax. We cannot get there if we do not have Ajax by 2025, can we?

Lieutenant General Sir Christopher Tickell KBE: As I described, we are in a period of significant transformation for the Army. That will see our legacy platforms being withdrawn, and we operate as a system. Dates will veer and haul. The Boxer programme, for instance, which—whisper this quietly—is actually ahead of schedule at the moment, will offer capabilities that we had not necessarily assumed, at a given date, when the integrated review is published.

My point is that we are dynamically adjusting our plans as we move forward. We have always said that the Army in 2030 is the target point in terms of the full change. As I said earlier, we need to make sure that we continue to meet our NATO targets throughout that period, and that will mean that the size, shape and capabilities of the Army will adjust during that transitional period. That is the nature of what we do. For me, focusing solely on when Ajax will or will not arrive is not really the issue; it is actually about looking at the full system to understand how we will meet those NATO targets and deliver the capability that we need in the field.

Q65 **Antony Higginbotham:** I do accept that, but the integrated review is really quite clear, and the Prime Minister was clear when he announced it—as was the Defence Secretary—on where we were going. It refers to a deep recce strike brigade combat team using Ajax's formidable sensors and enhanced fire systems. We just will not have that by 2025. My worry is that we cannot set IOC; we do not know the FOC; so all this might be pie in the sky. We might never actually get to that point. Or we cannot give you, the Army, the confidence that you will have a date on which you will switch over platforms.

Lieutenant General Sir Christopher Tickell KBE: Right now, that is clearly true, but I remain—to re-use the phrase—cautiously optimistic that Ajax will get into service and will be the game-changing capability that we know it can and should be.

The deep recce strike BCT, as you rightly identified, has a number of different constituent parts—not least, for instance, the recapitalisation of our multi-launch rocket system, which is on schedule, on contract and will deliver significant punch. You combine that with the AH-Echo, which is now flying in Wattisham as you know, and you already have a very meaningful capability that will allow us to take the fight to the enemy's depth, which is of course what the deep recce strike BCT is all about.

So, yes, we want the whole orchestra in terms of that BCT, but let us not pretend that, by 2025, we will not be delivering significant capability just through what we are already doing.

Q66 **Antony Higginbotham:** It is very reassuring to hear that some projects are on schedule, on track and delivering, but the model we are moving to is the sum of its parts—it relies on each part developing, moving forward and working together.

With the few minutes I have left, I want to move on to the fleet size. In 2014, the Army set a minimum fleet requirement. What is the logic behind doing that?

Lieutenant General Sir Christopher Tickell KBE: There are a number of processes that are, in policy terms, governed by the Department, which allows us to identify what the minimum fleet requirement is, and what is known as the FDDOL—the forward fleet—which gives you a size of fleet.

As we did the integrated review and restructured the Army, which you will recognise, we took into account the 589 platforms that Ajax represents, and they are attributed against the armoured BCTs—the two of them—and the deep recce strike BCT, recognising also that you need to be able to deliver a training capability and so on.

I am completely comfortable that we have the right size and shape of the fleet, as currently envisaged.

Q67 **Antony Higginbotham:** The original fleet requirement was significantly higher than where we have landed. Does that mean that the Army goldplates the numbers it needs at the start, recognising that it then has to move backwards?

Lieutenant General Sir Christopher Tickell KBE: No. I would say two things: of course, the size of the Army has clearly adjusted, but I would go back to the point about teaming manned or crewed platforms with unmanned or uncrewed platforms. The opportunities, I would suggest—using Ajax as an example— to team the ground platform with unmanned air systems and uncrewed ground systems will significantly increase the reach and capability of the platform, and that is one of the huge opportunities that we see over the next few years as emerging technology is incorporated into our core platforms.

Q68 **Antony Higginbotham:** The reason I ask the question is that when you get to sufficient scale, you get economies of scale, which is very helpful; you can buy more. As things get chipped away, the cost will often just increase per unit, and the worry is that if the Army starts here and ends up there, the cost does not go down proportionately.

Lieutenant General Sir Christopher Tickell KBE: Indeed. I think I might refer to my good friend to my right in terms of fixed contracts and so on, but that is all taken account of.

Chair: In the business case. Do you want to go to Mr Forzani on that?

Q69 **Antony Higginbotham:** Do you want to add anything, Mr Forzani?

Andrew Forzani: I was just going to be clear that contractually, there is no question of changing the quantity from the 589, is there?

David Williams: For context, the 589 was set in the 2010 contract as the minimum order quantity. It was confirmed in 2014, with approval in the 2015 contract, and has been maintained throughout.

Q70 **Antony Higginbotham:** Although the Army's minimum fleet requirement was higher to start with.

David Williams: Yes, and some of that—as the general said—will depend a bit on the way in which the Army is thinking about how it is going to fight, but there are also questions around assumptions on availability, how many of the vehicles are in a repair loop rather than in the frontline, and whether

you can use whole-fleet management techniques to get the same number or more in the frontline for a smaller fleet size. The fact that the numbers change over time should not surprise us, since some of that is positive. Equally, though, in the period between 2010 and 2014, the defence budget was under a lot of pressure, and in getting to an affordable equipment plan, we chose to order fewer vehicles.

Q71 **Antony Higginbotham:** We have all seen the scenes in Ukraine—the amount of armoured vehicles that have been taken out. Do you factor losses in when you are setting a minimum fleet requirement?

Lieutenant General Sir Christopher Tickell KBE: Yes, there is an attrition rate included.

Q72 **Antony Higginbotham:** What is the attrition rate for Ajax?

Lieutenant General Sir Christopher Tickell KBE: I could not tell you without referring back.

Q73 **Antony Higginbotham:** Could you possibly come back to us with that?

Lieutenant General Sir Christopher Tickell KBE: Yes.

Q74 **Antony Higginbotham:** My final question is this: Ajax is replacing Warrior, which is already 10 years beyond the in-service retirement date that was planned. How much is it costing to keep that fleet in service? As that fleet gets older, maintenance costs keep going up, so how much extra are we spending?

Lieutenant General Sir Christopher Tickell KBE: Of course, Ajax is not just replacing Warrior. We will withdraw Warrior as Boxer comes into service, so I go back to this dynamic planning process that we are in. Any costs associated with either running on Warrior or, indeed, withdrawing it earlier based on the Boxer programme that I described earlier, we will manage within the Army equipment programme, and I am comfortable that there is adequate provision within that.

David Williams: The principal cost for Warrior was the capability sustainment or upgrade programme, which we have chosen not to pursue further. The current fleet annual operating cost is something like £20 million to £30 million a year, but we can check that and confirm.

Q75 **Antony Higginbotham:** How long do you think you could continue to operate the Warrior fleet and be effective, given what we are seeing in Ukraine and what we are sending over to the eastern flank of NATO?

Lieutenant General Sir Christopher Tickell KBE: The reason we were running a capability sustainment programme was because we needed to upgrade Warrior, so it is a legacy platform that we are looking to withdraw from service in and around the middle of this decade.

Q76 **Peter Grant:** Lieutenant General Tickell, in answer to Mr Higginbotham, you said you were cautiously optimistic that Ajax would come into service. Did you attach a date to that statement, because if you did I didn't hear it?

Lieutenant General Sir Christopher Tickell KBE: No, I didn't, for reasons that my fellow witnesses have described, namely that we are working through the results of the trials at the moment and indeed a revised schedule, and when we know that we will be able to affix a date to it.

David Williams: The date is that he is cautiously optimistic today. No, we can't put a date on it until we—

Q77 **Chair:** The Minister's statement laid out very clearly that there is no date at this point.

David Williams: But as Dr Marsh has said, we are working through the data and the trials. As I said earlier, we expect to be in a position to confirm those dates later this year.

Q78 **Peter Grant:** But I think there is a general acceptance that 2025 will not happen. In another answer, Lieutenant General, you referred to a key date of 2030 for the changes that are being implemented in the Army. Are you cautiously optimistic that Ajax will be fully operational by 2030?

Lieutenant General Sir Christopher Tickell KBE: Yes, I am cautiously optimistic about that.

Q79 **Chair:** Just cautiously optimistic?

Lieutenant General Sir Christopher Tickell KBE: I am cautiously optimistic about most things in life. *[Laughter.]*

Chair: Probably wise from a General.

Q80 **Peter Grant:** If that doesn't happen, what knock-on effect would it have on the timing of other changes that the Army is undergoing, such as the reduction in the number of soldiers?

Lieutenant General Sir Christopher Tickell KBE: The reduction in size of the Army is not related to the fielding of Ajax as a capability.

Q81 **Peter Grant:** Okay; thank you. Dr Marsh, this might sound like a daft laddie question, but why is it so difficult to predict where the vibration is going to come from in one of these vehicles and why is it so difficult to identify the problem once the vehicle has been built?

Dr David Marsh: I would say that it is not particularly difficult to predict the main sources of vibration in an armoured vehicle such as this. Classically, vibration through the track system is one of the main routes of vibration for a heavy-tracked vehicle. The other would be the engine and the engine mount, as in any other vehicle. So, that basic understanding of where the main sources of vibration will come from is well-known and that is the case for this vehicle.

What we have run into here and what we have discovered and confirmed through the testing that we have done so far is that this vehicle has a complex and unexpected fingerprint in terms of its vibration. And I think that what we have suffered from here is perhaps some assumptions that it would behave in a very similar way to other vehicles, which has proven not to be the case.

So we needed to really understand the detail and I think that is something that we have only really been able to do during the course of the extended testing that we have done in the last year.

Q82 **Peter Grant:** How much of the testing needs to be done once it has been built and how much can be confidently predicted using computer simulations? When you think that the Americans can send people to the moon and all sorts of things, and occasionally things go wrong, but it is usually a fault in manufacture rather than in design. So, if you can simulate the effects of sending a rocket to the moon and know where the problems are and design them out before you actually send somebody up in the rocket, why can't you apply the same techniques to armoured vehicles?

Dr David Marsh: I would say that of course technology and our ability move on through time. However, although computer modelling is hugely more advanced than it was a decade ago, it is sadly true that prototype development and real testing are still a really important part in any engineering development, and that process will still throw up issues and risks that need to be addressed as you go through the cycle.

So, as for completely designing in a computer-based system and being confident that there will be no other features, I don't believe we are at that sort of stage.

Q83 **Peter Grant:** Finally, Mr Williams, I know that you have described the relationship between yourselves and the supplier as being very good, but what is plan B if it all goes horribly wrong and GD just decide, "We're not doing this any more and we're bailing out"?

David Williams: I might, just for reasons of confidentiality, look to Mr Forzani, if that is all right.

Andrew Forzani: I can give you the contractual answer. If we were unable to proceed with a contract or if we felt GD couldn't proceed with a contract, then the contract is clear—they would be in default and we would be able to claim the vast majority of the moneys paid so far under the contract, with the exception of the demonstration phase, which they did successfully complete; I think that is about £360 million. The rest of the money that the Department has sunk into the contract, we believe we would be able to claim back. That may of course be subject to a court settlement, but we think that the contract is clear and that that is the amount of money we will be able to recover. We absolutely hope that is not the answer, but we think that the contract gives the Department a strong basis—

Q84 **Peter Grant:** Even if you get the contractual result you expect and are presented with a wodge of about 4 billion pound coins, they will not do much good if we have to go to war. How long would it take if you had to go back to the beginning and completely retender the whole thing?

David Williams: I don't really want to speculate on that. If I might play back Mr Smith's comments from earlier—or paraphrase them—we want this capability, we want the industrial capacity at Merthyr, we would like the jobs that it supports, and we want a way through, with GD delivering against the contract to get us the capability in the hands of the Army as quickly as we can.

Q85 **Peter Grant:** I can appreciate that there are a number of reasons why you do not want to speculate in public, but you appreciate clearly that this is not just a commercial relationship. If the MOD were a business making money, a contract went badly wrong and you got your money back, that does not affect the business. This is very different. Have you at least considered this and have an idea of what to do—not about getting money back, which in this context is possible—

David Williams: As you might expect, we are doing a range of contingency planning. Let me just say that. It plays to a broader challenge, which I don't think I have discussed with the Committee before, on development programmes in particular: when you hit problems, given that you really want the capability, persevering and trying to make something work is often a better bet than going back to square one and starting again. Being sophisticated enough to know when that calculation is actually the other way around is quite a fine judgment. Mostly, and certainly in this case, our intention is about making the deal work.

Q86 **Sir Geoffrey Clifton-Brown:** Mr Grant asked a really key question, and you have only answered part of it really. Value for money is not only about how much you pay, but over what period. Mr Williams, how long are you prepared to give General Dynamics before you decide to cancel the contract? After all, contractually, you could probably have cancelled it by now. There must come a point when we all say, "This is ridiculous. They cannot produce the vehicle; it has already been in development for 15 years." How much longer are you going to give General Dynamics to deliver it on spec?

David Williams: With the caveat that it will depend a little on what the information that we get back tells us: look, my firm expectation is that we will decide our way ahead on this programme during the course of this year.

Q87 **Sir Geoffrey Clifton-Brown:** I was going to come back on that, too. I took your answer about the end of this year and meeting those milestones. After all, paragraph 2.18 of the NAO Report states: "In December 2021, of the 36 critical milestones that were due, 18 were outstanding, 10 of which were more than six months late."

I do not quite see how all those milestones could necessarily be met, taking into account Dr Marsh's answer on vibration. He actually reinforced what he said earlier, which was that at the moment you are just ameliorating the problem by using vibration seats, control sticks and better—what do we call them—hearing mufflers and so on. If it requires more fundamental work, as Dr Marsh said—possibly a rebuild of the tracks, putting new engine mountings in or something more fundamental like that—those milestones will not be met by the end of this year, will they?

David Williams: It is not necessarily that those milestones will be met by this year, but I am expecting us to make a decision on how we see the project progressing, including whether it is necessary to then re-agree with GD the schedule for key milestones going forward. For me, though, the judgment is absolutely about the degree of rework, as you say, but we need to look not simply at what is an acceptable solution to vibration and noise for day one—whenever that IOC date is set. We also need to have growth potential through life for the vehicle, so that we can keep it in service and develop it in the way that we want. But getting through the noise and vibration decision first is really important.

We then have a programme of reliability growth trials. If those are working properly, they will throw up more issues—that is what they are designed to do. As Dr Marsh has said, there are a range of other issues that we need to resolve as well, although I suspect that every armoured vehicle anywhere in the world still has some of those issues, even in service.

Q88 **Sir Geoffrey Clifton-Brown:** I will look at the transcript very carefully, but can you very simply say how much more time you are prepared to give General Dynamics before you cancel this contract—very simply, and in a sentence?

David Williams: All I can say is that we will make a decision on that this year. When I say, "this year", I mean calendar year, just for avoidance of doubt.

Q89 **Sir Geoffrey Clifton-Brown:** If we have you in by the end of this year, we will have a decision.

David Williams: I imagine I will be back before the end of this year.

Chair: I think you will—don't worry.

Q90 **Sir Geoffrey Clifton-Brown:** General, I very much welcome your new culture of openness within the Army and looking after your personnel. I had not personally heard about the new app until you announced it this afternoon. Can I give you an opportunity now to make it very clear that for anybody from the most junior ranks upwards who uses this app— however minor what they report on the app is—it will not in any way prejudice their career or position, and that they are encouraged to use the app on a full, open and transparent basis?

Lieutenant General Sir Christopher Tickell KBE: Completely. That is the whole point of the app. It is connecting the youngest soldier to the

committee that I chair, which is the Executive Committee of the Army, or ExCo, whereby those near-misses and faults are reported to us on a quarterly basis—more if there is a specific issue that has arisen—for us to address them. Of course, they cover a full range of potential issues. It might be about a platform. It might be about fire safety. It might be about weapon handling. But that is the whole point of DURALS. As you rightly say, we have to make sure that the information flow from the youngest man or woman to people like me is thorough and transparent.

Q91 **Sir Geoffrey Clifton-Brown:** Actually, a very welcome part of that answer was that you will be looking not at the individual but at the accumulated—

Lieutenant General Sir Christopher Tickell KBE: The trends.

Q92 **Sir Geoffrey Clifton-Brown:** The trends. If this system had been in operation, you would have picked up the noise and vibration system much quicker.

Lieutenant General Sir Christopher Tickell KBE: Yes.

Sir Geoffrey Clifton-Brown: That is very helpful indeed.

Q93 **Chair:** How many people have the app? Is it on their personal phones?

Lieutenant General Sir Christopher Tickell KBE: We have told all our soldiers and officers to have the app.

Q94 **Chair:** On their personal phones?

Lieutenant General Sir Christopher Tickell KBE: Yes. It is just like another app that you have on your iPhone.

Q95 **Chair:** Is it hackable? Could our enemies know what the problems are if it is on people's personal handsets?

Lieutenant General Sir Christopher Tickell KBE: Forgive me, I would have to come back. I would be surprised if it does not have all the normal safety protocols that you would expect on any app, but let me come back to you, if I may.

Q96 **Chair:** "On any app" is perhaps not the standard that we want.

Lieutenant General Sir Christopher Tickell KBE: We have moved from WhatsApp to Signal, though, so that is good.

Chair: I am not an expert on what is secure. Perhaps you could reassure

us on that point.

Q97 **Sir Geoffrey Clifton-Brown:** Mr Williams, I come back to where I

started, which was trying to use the particular lessons learned from this project for more general procurement. I asked about not gold plating and continually changing the specification. But again, going back to the early '90s, the other problem that was continuously present in defence

procurement projects was always wanting to procure our own variant or a completely different piece of equipment from anything that was available on the shelf.

There is an alternative to this vehicle. It is made by BAE. It was not purchased, because at the time we were in the shadow of Nimrod and everybody said, "Anything but BAE". But there is a variant out there that works, so you do have a fallback. Could we learn from the lessons that we always need to procure something individual for the UK, rather than something more generally off the shelf?

David Williams: I think we are being more sophisticated in our approach now, actually, and the defence industrial strategy last year set out a range of approaches and techniques that we can use. Indeed, that is reflected in the current Army portfolio of projects as much as it is anywhere. There will be areas where we want to invest in skills and technology development, and Combat Air is an example of that. There will also be areas where actually it will be good enough. Indeed, against some of the challenges in an uncertain world, against the kinds of demand signals from the integrated review, having an off-the-shelf capability quickly is more important than having something that is exactly what we want but just too late. So I think it is a blend and it depends on the capability.

I think a particular lesson from Ajax is that the GD product was based on the existing ASCOD platform, and we have then set a long range of requirements to make what is effectively a bespoke vehicle. I think there is a place for off-the-shelf and there is a place for development. I think you have to be particularly careful when taking something that is tried and tested and then adding a whole bunch of things to it, which means it is neither one thing nor the other, and that is absolutely something that our requirement setting needs to get after.

Q98 **Sir Geoffrey Clifton-Brown:** But, in answer to Mr Grant's question, if you had to cancel Ajax, it would not be a total disaster, because the BAE vehicle is out there, so you could buy something off the shelf—it might not be as good or as capable, but it is out there, is it not?

David Williams: It is, yes.

Q99 **Sir Geoffrey Clifton-Brown:** So it would not be a total disaster if we had to cancel Ajax.

David Williams: We are fully focused on delivering the contract and getting the Ajax vehicles.

Q100 **Sir Geoffrey Clifton-Brown:** You may be, but there may come a point when you do not meet those milestones and you have to, by the end of the year, make a decision, and it would not be a total disaster, would it?

David Williams: I hope that is not the position we will be in.

Q101 **Sir Geoffrey Clifton-Brown:** May I ask on final question? Dr Marsh may wish to answer this. I think that you are pushing General Dynamics to produce a mix of all six vehicles, but it seems to me, purely as an amateur, looking at the NAO Report—

Chair: Figure 1 on page 15 has some useful pictures.

Sir Geoffrey Clifton-Brown: Thank you, Chair; that is very helpful indeed. Looking at those six variants, it seems to me that some of them are much simpler to produce than others. For example, the Ares personnel carrier would not have the problems of the turret and everything else, and other variants might not have the problem of the communication systems needed. Why are you insisting on all six being ready at the same time? Would it not be a good idea to get confidence by having some of the simpler ones delivered first, to be followed by some of the more complex ones?

Dr David Marsh: It is because the capability itself requires the mix of vehicles that we are procuring through this contract. The military capability that is provided here is not provided by any one single vehicle; it is a requirement—

Q102 **Sir Geoffrey Clifton-Brown:** I understand that, but we are in a difficult situation. Surely if they said, "Well, we could produce 50 of the Ares and 20 of the others in a sequence," would that not be satisfactory?

Dr David Marsh: I am not aware that any particular variant is more difficult to manufacture, and GD has not spoken to us about differences in the difficulty of manufacturing one variant versus another, so that is not a production issue that we are working on with the company. The capability requires that mixture and the company's plans require the mixture, and it is not a driving factor in the efficiency of the delivery programme.

Q103 **Sir Geoffrey Clifton-Brown:** Has the MOD delivered to General Dynamics everything it needs, for example for the design of the turret and the cannon, which was a problem that did delay the programme initially? Has that all been resolved now?

Dr David Marsh: As the Report recognises, yes that was a problem early on in the programme, but it has now been resolved, and particularly the relationship between General Dynamics and Lockheed Martin has been resolved. As far as the turret is concerned, they are now into manufacture and delivery of the turrets.

Q104 **Sir Geoffrey Clifton-Brown:** Finally, Mr Williams, on the Bowman and Morpheus communications issue—the ISTAR issue—that is also a separate contract with General Dynamics, and it is late too. Can we get some of your great milestone predictions on when you will make a decision on that? What dates are we looking at?

David Williams: It is General Dynamics but it is a different constituent part; it is part of GD Mission Systems, rather than GD Land Systems. They have a role in this particular part because it is about moving from the

Bowman architecture—they were the supplier for Bowman—into open architecture. We are currently reviewing next steps on the way ahead. I would expect decisions to be made on that—

Q105 **Sir Geoffrey Clifton-Brown:** By the end of the year?

David Williams: Yes, let's stick to by the end of the year.

Q106 **Sir Geoffrey Clifton-Brown:** Maybe sooner? In the next six months?

David Williams: Maybe sooner.

Chair: That is quite a positive response.

Q107 **Sir Geoffrey Clifton-Brown:** So we can have you back in six months and get an update on both.

David Williams: I look forward to it.

Sir Geoffrey Clifton-Brown: Thank you very much indeed.

Q108 **Nick Smith:** I will pick up on Sir Geoffrey's point shortly, but I want to repeat my earlier remark, which is that we clearly want you to make this work and get it back on track, although my sense from Mr Forzani is that he is pretty well playing hardball here. I just hope your approach works and you have a good relationship with General Dynamics in future.

To pick up on Sir Geoffrey's remarks, Bowman is going to go into early Ajax. However, tech is moving really quickly at the moment on every platform that we all use in our daily lives. Morpheus has been delayed for quite a long time and may be further down the line. How upgradable and extendable is Bowman, given that there might be a longer gap than you had hoped before Morpheus is good to go? We need that tech all the time to be as good as possible as quickly as possible. I am not sure which of you is best able to answer that question, but I am concerned about it.

Chair: Everyone is looking to someone else.

David Williams: I am looking to my right, but—

Lieutenant General Tickell: You are absolutely right in what you say. I reiterate what the permanent secretary has said. Bowman 5.6 is absolutely delivering on a daily basis on operations as we speak. Clearly, as we are looking from the Army perspective at potential delays to Morpheus, we are looking right now at what that means for Bowman 5.6 and whether, therefore, you need to upgrade Bowman 5.6, and whether you need, say, Bowman 6, for want of a better phrase, in order to fill that gap, depending on exactly what the gap is and so on. All I can say is that it is a current discussion. The challenge that you have laid out is exactly one that I would recognise, and it is focusing people's minds, quite rightly, at the moment.

Q109 **Antony Higginbotham:** I have two quick questions. The first is probably for you, Mr Marsh, or maybe Mr Williams. The Ajax family is based on

ASCOD, an existing platform. Has that platform ever experienced any noise or vibration problems that you are aware of?

David Marsh: I am not aware of reports from the ASCOD programme. That is a fact. I am not aware of them.

Q110 **Antony Higginbotham:** Has someone looked into that, though, just to see whether it's stuff that we have built on top of the platform that—

David Williams: I would have to confirm it, but my recollection is that we asked Mr King, as part of his health and safety review, to check that point. Let me come back to you on that.

Q111 **Antony Higginbotham:** My second question is more about getting a clarification and is to you, General. You said we are using Warrior and Challenger 2 to fulfil NATO commitments in the short term, and I think you said you are confident that we will continue to meet them, because Boxer will come online and replace some of it. Does that mean you are confident that there won't be any delays in the Challenger 3 programme, because Boxer will come in and replace as Challenger 2 goes off to be upgraded?

Lieutenant General Tickell: Again, the Challenger 3 programme is looking very encouraging at the moment, in the same light as Boxer is, and therefore I am very—

Q112 **Antony Higginbotham:** We need Boxer to come in so that Challengers can go off the NATO commitments?

Lieutenant General Sir Christopher Tickell KBE: No, no. Challenger will continue to be—is— part of the delivery of our NATO commitments, because armoured BCTs are part of that commitment.

Q113 **Antony Higginbotham:** So we can fulfil our NATO commitments with Challenger 2 as we need to and still do the Challenger 3 programme?

Lieutenant General Sir Christopher Tickell KBE: Yes. Forgive me: this goes back to my dynamic planning, because we have to take Challengers out of the line in order to refurbish and turn them into Challenger 3. Therefore it's all about maintaining the right numbers in the frontline whilst we are doing that upgrade.

Q114 **Antony Higginbotham:** But that means you need Boxer to then take up the slack.

Lieutenant General Sir Christopher Tickell KBE: Boxer won't take up the slack of Challenger, because Challenger, as a main battle tank, is unique. But of course our tank-killing capability is also vested in the Apache Echo—

Antony Higginbotham: So that's what will take up the slack. Okay.

Chair: Thank you very much, Mr Higginbotham. I thank our witnesses very much indeed. This is a hugely troubling programme, and the war in Ukraine really underlines how close it is to the safety and security not just of our

personnel but of those of us that they seek to protect, so we are going to watch it very closely. We note that, at the moment, you are pencilled in, Mr Williams—in case you forget to come back—for June. These things are always subject to change, potentially, but we will be catching up with you then on this issue, as well as other things. We do want you to keep feet to the fire on this—we will keep your feet to the fire on this if you are not all doing that already. I think you are showing some seriousness of purpose, but we are really concerned about the impact on capability.

The transcript will be up on the website, uncorrected, in the next couple of days, and we will be producing a report on this. That will now be after the Easter recess and pretty certainly after Prorogation and the Queen's Speech. Thank you very much indeed.