



International Relations and Defence Committee

Corrected oral evidence: Defence concepts and capabilities: from aspiration to reality

Wednesday 15 June 2022

11.40 am

Watch the meeting

Members present: Baroness Anelay of St Johns (The Chair); Lord Alton of Liverpool; Lord Anderson of Swansea; Baroness Blackstone; Lord Campbell of Pittenweem; Baroness Rawlings; Lord Stirrup; Baroness Sugg; Lord Teverson; Lord Wood of Anfield.

Evidence Session No. 10

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Questions 69 - 74

Witnesses

[I](#): Air Marshal (Retired) Phil Osborn, Chief of Defence Intelligence (2015-18); Justin Bronk, Senior Research Fellow, Airpower and Technology, RUSI.

Examination of witnesses

Air Marshal Phil Osborn and Justin Bronk.

Q69 The Chair: Good morning. Welcome to this meeting of the International Relations and Defence Select Committee. It is my pleasure to welcome our two witnesses: Air Marshal Phil Osborn, Chief of Defence Intelligence from 2015 to 2018, and Justin Bronk, senior research fellow in airpower and technology at the Royal United Services Institute. Thank you very much for joining us today as we make progress in our inquiry, "Defence concepts and capabilities: from aspiration to reality".

As ever, I remind witnesses and my colleagues that the session is broadcast, transcribed and on the record. If when we come to questions my colleagues have any relevant interests, they should declare them at that point. I shall begin with a general question. My colleagues will ask more focused questions, and I anticipate that they will also wish to ask a supplementary.

Here is the first, rather general, question. What is your assessment of the UK's airpower, as set out by the Integrated Review and the Defence Command Paper? Is the balance of emphasis between the Air Force and the other services appropriate? Air Marshal, can I start with you and then go to Justin Bronk? After that, when we come to the other questions, may I leave it to you to decide which of you goes first?

Air Marshal Phil Osborn: That will be Justin most of the time. Thank you very much for inviting Justin and me along. It is a pleasure to be asked to give evidence.

Turning to your question, I probably want to step up a little from airpower specifically, if I may. I think the Integrated Review and the Command Paper are well written and have really good areas of emphasis. I would say this, wouldn't I, as a former Chief of Defence Intelligence, but I think the emphasis on intelligence and digital capabilities is right, as is the sense of needing to be as integrated as you can, with multidomain integration?

However, the papers, or the process, still struggle to reconcile ambition with resources. As I read the Command Paper in particular, I get a sense of resource constraining how the ambition manifests itself. This brings me to the airpower question specifically. Both papers identify Russia as a key threat. Circumstances would underline that that judgment is correct. What both papers then miss is the "what" that comes from that. What does peer aggression actually mean for forces and structures that have been configured over decades for discretionary warfare? That is the translation that may be missing.

For example, I think there is a problem of capable mass to cope with needing to operate in a survival environment and, perhaps, needing to operate in circumstances not of your choosing. There is very little about deterrence by denial. There is lot about the deterrent, but there is a whole bunch of deterrence that sits below that. There really is not enough

on resilience and defensive capabilities, particularly control of the air and other defensive capabilities. There is probably insufficient mention of sustained and survivable intelligence collection.

Air and space are critical to all those gaps. Because those gaps in emphasis are underplayed, the role of air and space is underplayed. From my perspective, I would probably like to have seen a bit less on global persistent engagement and a bit more about hard power and deterrence. Air and space are key to that. The short answer is that I think that it underplays the role of air and space and their importance in an aggressive, peer-on-peer context.

Justin Bronk: In the balance between the various elements of the Joint Force, the force as a whole assumes air superiority as a *sine qua non* for operational viability. If you look at the force structure of the maritime force and, in particular, the Army, a very high proportion of their assumed lethality or defensive capability against ground, maritime and air threats is air-delivered. We have a situation where the Army does not quite know what force structure it wants to fight with in a major war, but it is busily trying to do the actual evidence gathering and exercising to figure that out. The Navy knows, broadly speaking, what it is going to fight with. The carriers are the answer and, therefore, the rest of the fleet fits around that. Both of them still assume that control of the air is a given, and that overhead ISR and responsive fire support will be there when called upon in almost any operational context.

The RAF structure as set out in the Command Paper is a relatively balanced-looking force on paper. There is a decent amount of combat air in fast-jet squadrons, although, notably, far less than comparable powers such as France. There are about seven or eight front-line squadrons of fast jets at the moment, compared with 13 in France. The problem is that if you look below the force structure—just below the surface—the munitions stocks are simply not there, the training in ~~any sort of~~ realistic high-end scenarios is just not there and the resource to enable that is not there.

If you talk to the front line, as I am lucky enough to do sometimes in multiple countries, including the UK, the refrain that comes from pilots is fairly universally, “We go through the motions a lot of the time, but we know that the warfighting plans we train for are not credible, because the force is not survivable in terms of either being defended or being dispersible on the ground against long-range precision strike”, which we have seen a huge amount of in Ukraine. It is one of the two bits of the Russian military instrument that have worked as advertised, along with ground-based air defence. For example, they do not actually practise large-scale live weapon drops in exercises on a sustained basis to exercise the logistics chain, the rearming, the maintainers, the safety cases and the approvals cases, all of which would have to be done very quickly, if required. We have got very used to operating from Akrotiri, where all that is done, or out in Nellis, for Red Flag, whenever live weapon drops are going on.

That is on the combat air side of things. There is almost no credible suppression or destruction of enemy air defences capability. If control of the air is the first and most important mission of the Air Force, it has the air-to-air side covered very well, but it has relatively conveniently ignored the fact that, as the Russians and, indeed, the Ukrainians have shown in Ukraine, if you cannot go after, reliably track, detect and kill mobile medium-range SAMs, let alone better-integrated, longer-range systems, then your fighters are useless. You cannot sustainably operate at medium or high altitude, as we are used to doing.

In high-end warfighting capability, the RAF has a reasonably credible top-line force structure in terms of platforms, albeit that more mass would be good, but just below the surface there is a huge amount of hollowness in the force. That is part of the inability to restructure. Notably, the Command Paper sets out a lot of ambitions on what to do. It says very little about what we are going to stop doing in order to pay for it. While you saw some cuts, with the earlier retirement of the C130 fleet, although there was an uplift of A400M to compensate partially, and the withdrawal of Puma, ~~and~~ although that is going to be replaced by a medium helicopter, the demands for everyday support from the other services, particularly on mobility and logistics, are such that the RAF cannot really afford on its current budget to resource the sine qua non, which is control of the air.

The Chair: Thank you for setting out very clearly some of the difficult matters that we are going to consider.

Q70 **Lord Teverson:** That is a good way to finish that one: we do not have a capability to control the air. I was going to ask how you would characterise the future air and space operating environment, looking more into the future. Will the importance of these domains increase? As a non-specialist in this area, I tend to assume that this will be where it is at, but I presume that it is not as simple as that.

Justin Bronk: From my perspective, I suggest the primary threat to the ability to operate in the air, particularly if we are talking about projecting to protect allies or projecting power overseas for other purposes, will be the ground-based threat. It is an incredibly cost-effective way for nations that are worried about western airpower to increase the costs and risk of deploying it. If you look, for example, at the investments made by a relatively extreme smaller nation, Algeria, the RAF would have almost no ability to project power there because there are layered, serious modern air defences backed up by serious electronic warfare capabilities purchased from Russia at a far lower price than our combat air was purchased. That is not to say that one could not work out a way of doing it through a Joint Force, but it would take months and a huge amount of planning and high-risk appetite and all of that.

There is a high risk that nations around the world will continue to pursue that option. Where there is an air-to-air threat, the RAF has the air-to-air side covered pretty well, as do most NATO air forces, but that assumes that the confrontation would take place in a vacuum. As we have seen,

where there is a ground-based threat that you cannot easily attrit or get rid of quickly, you probably cannot exercise your anti-air options because you are stuck with ~~very~~ high risk, either medium-~~altitude~~ stealthy penetrations or lower-~~altitude~~ sorties where your sense of picture and weapons options is poor.

The Americans have a superb suppression or destruction of enemy air defences capability, but it is still a bottleneck in their force and it is primarily and ever-~~more~~-increasingly focused on the Indo-Pacific. In the American response to the invasion of Ukraine, in airpower terms, they have been very cautious with what assets they have pushed into theatre; they have quite a lot of combat power in Europe already, but we have not seen large-scale deployments of things like F-22 squadrons, additional F-25-35 squadrons, or B-2s — the things one would expect to see if they were gearing up to be ready for a serious suppression or destruction of enemy air defences operation.

I would say that will continue to be the primary threat. Not everybody in NATO needs to do it, but, in the Cold War, Italy and Germany handled that mission primarily and the RAF had its own capabilities. At least one or two of the major European NATO members need to take on that mission as a speciality, at which point the air instrument becomes fairly usable again. Once you have inflicted enough attrition on ground-based air defences, the vast bulk of NATO's airpower, relatively non-stealthy, very capable multi-role fighters, can come in and do their thing. Until that happens, they cannot.

As for unmanned systems, anything remotely piloted is unlikely to be particularly relevant in a high-end state conflict because the electronic warfare capacity to interfere with or to deny, at least partially, the command links will be a problem, at least for assuring your capability ahead of time. You will see increasingly, if there are unmanned systems—there are unmanned systems being designed—in a state-on-state context, that they will be quite highly automated in flight. They are things like the BAE Systems Taranis demonstrator and the American X-45 and X-47B programmes. Interestingly, the Chinese have something called the Gongji-11, which they claim is already operational. It looks like a small bat-winged UAV, as you would expect.

To make sense in high-end conflict, these things must be able at least ~~to~~ have the redundant capability to do their job when communications are denied, and that means they will have to be highly autonomous, lethal aerial weapon systems, albeit ones that you would manage ~~them at~~ under more real-time oversight, ~~higher-level~~ when you could.

Lord Teverson: I was going to come on to those in a minute.

The Chair: Air Marshal, would you like to add to that?

Air Marshal Phil Osborn: I come at many of those points from a slightly different perspective. Over the last 20 or 30 years, the attributes of airpower—reach, persistence, precision—have been able to be exercised

in a relatively uncontested environment. I have spent time in no-fly zones; it was not wholly uncontested but it was not something that kept you awake at night.

Peer-on-peer aggression changes that. You have to fight for the right to be able to do what you want from the air domain. What we have seen in many conflicts, including most tragically Ukraine, is that if you cannot control the air, you either lose or it gets very bloody, very quickly. There is something about a change in context for the future where controlling the air environment such that you have sufficient freedom to do what you want to do but deny the opposition the freedom to do what they want to do will become increasingly important. That means that your operations need to be cleverer, highly informed from an intelligence perspective, and they need to be survivable and you have to have resilience.

The trend towards unmanned systems is inevitable; it gives you mass and allows you to do things that perhaps you would not wish to do with manned systems. Unmanned systems on their own are not clever enough and not controllable enough to deal with the complex nature of warfare. A future where you have manned platforms controlling many unmanned platforms, a mix of manned and unmanned, is inevitable.

That contested environment means that there will be occasions when you cannot communicate over long distances, so you have to have manned platforms rather than ground control stations. The electromagnetic spectrum will become increasingly contested. The future of hard-edged airpower as a mixture of manned and unmanned systems, with manned platforms for control and unmanned systems for mass and for penetration, needs to be backed up by a sophisticated air and missile defence system, which we do not have at the moment. Those assets, those capabilities, need to be truly connected; in the way that we are connected to a cloud, they need to be connected to a cloud such that they achieve on the fly adaption and adoption of what they are doing around available intelligence. We need a far more digitally aware manned and unmanned mix.

Lord Teverson: Thank you very much indeed. My wife persuaded me to go to see "Top Gun: Maverick" last week. At the beginning of the film, the senior commander told the Tom Cruise character, "You're going to be redundant and you're going to be completely irrelevant in the future because of drones and unmanned vehicles". You are saying that will not be the case, which is interesting.

The other dimension of my first question was space, and you did not really cover that. We are not a serious space player in any sort of way; we are way behind probably not Algeria, but a lot of other countries. How is that domain going to work?

Air Marshal Phil Osborn: Given that I did 37 years in the military, I am not as damning as Justin of our current force structures. The fact that Justin and I did not mention space is our omission.

Space is something that for years we have taken for granted. In the future, we need to view it as a contested environment. If we are not prepared to contest that environment, others will. The ubiquity that we have tended to attribute to air is there in space. Our day-to-day life would stop if certain nations chose to exercise their power in space. The domain in and of itself is important, but the way it integrates with other domains of warfare is particularly important. The future is probably not, from a UK perspective, military space alone; we use a lot of space assets at the moment, either allied or commercial.

In the future, we will see lots of space from a dual-use point of view, which is not just intelligence and communications; it can be other things. The most important thing from a UK perspective is to recognise that the space environment will be contested; it is so important that if you are in a conflict with somebody they will want to deny you the advantages that it brings. As soon as you accept that, it changes the way you configure and it changes the way you think about space. Space will be a really interesting overlap between government, military and commercial interests. That in and of itself brings a complexity that perhaps you do not see quite as clearly in frontline operational capability in the air domain.

Justin Bronk: As the Air Marshal says, the increasing dual-use nature of a lot of space capability is increasing reliance on satellites that may have a commercial backbone, for want of a better term, or be leveraging commercial assets for military tasks. We see a huge amount of that in Ukraine, whether it be Starlink or various other providers.

The interesting result of that is that while Russia, for example, has not just very capable hard kill, anti-satellite missile capabilities, but extremely good soft kill or disruption capabilities in the electromagnetic, and indeed with ~~Dazzler~~ dazzlers it has capabilities for certain imaging services, it can inflict serious disruption on orbital services without launching missiles. Most of the time it has not done so, because its own forces are reliant on the same GPS signals. GLONASS does not work terribly well, ~~so as~~ it has not kept its constellations up in the way it would have liked to do. It is also reliant in many cases on the same downlinks for commercial access to connectivity because of its own communications problems. It is interesting that the increasing dual-use nature of things could lead to a degree of mutual reliance between antagonists that might perhaps discourage some of the extremely devastating anti-space use that we could see.

It is also worth considering historical cases of flashpoints or proxy conflicts between major powers, the most serious of which would probably be the Korean War before the Ukraine crisis, if you want to see it that way. In the Korean War there was very high-intensity combat between two superpower blocs. It was artificially geographically and politically isolated to try to keep it from spilling over because both sides had huge incentives to stop it spilling over. There is a high degree of likelihood that we would see something similar with, for example, a

Taiwan scenario. In most flashpoint scenarios, no major powers have an incentive to burn the world down, so if they are undertaking military operations or aggression they may well be miscalculating, but there will still be an ambition for a short, geographically contained operation.

Since space is almost by definition out of area, and kinetic use ~~of in~~ space is almost impossible to isolate regarding what happens to that debris—if you are talking missile use or direct collision manoeuvring weapons—there may be very strong incentives not to do the ~~day~~ Day one One denial of space in kinetic terms that a lot of future scenarios assume. Not only is that an escalation far out of area, literally, it is an escalation that is almost impossible to contain within the country or countries that the aggressor power is trying to deal with. For example, if you knock out all of India's communications and GPS capabilities, as China ~~and~~ fighting over Taiwan, you are probably going to be making a geopolitical mistake. There may be more limitations on that in the essential nature of the global commons that it represents in the future than we think, although of course you cannot bank on it.

Incidentally, on "Top Gun", there are UCAVs, or unmanned combat aerial vehicles. UCAVs are designed to be survivable and lethal in contested environments, of which there are very few, and none in the unclassified domain at the moment. As the Air Marshal hinted, they will replace a significant degree of the penetrating and high-end provision of mass for state-on-state conflict if it evolves, increasingly for the Chinese and the Americans in particular, because they have the industrial capacity to crank these things out. Force size is less a function of being constrained by things like pilot training pipelines, if you are dealing with UCAVs.

The last holdout of the piloted fighter will probably be things like Quick Reaction Alert and air policing, because while you can programme a UCAV to be incredibly effective—the Americans were doing this in the mid-2000s against SAM threats—civilians do not operate fire control radars and civilians do not fly supersonic aircraft yet, or any more. In other words, signature targeting in high-intensity environments is not an enormously complex task; we are more constrained by the legal and ethical requirements to clarify things than we are by the technology.

If you look at the basics of Quick Reaction Alert, a UCAV cannot look into the cockpit of an airliner and judge whether the pilot is slumped over the controls or what the body language is, or whether there is someone else in the cockpit with them with a gun in their back. They cannot be programmed easily to interpret aggressive or unprofessional intercept behaviours on complex borders—for example, the Chinese last week, doing unsafe passes in front of an Australian P-8 and ejecting chaff down the engines. If you were going to program a UCAV for that sort of thing, you would either have to make it so responsive that it would become unsafe, politically, so actions like locking on with a fire control radar, or unsafe passes or weapons lock or that kind of thing could be interpreted as hostile; or you make it so safe that it is incredibly easy to bamboozle.

It is worth remembering that on disputed borders an awful lot of UAVs have been shot down without much geopolitical consequence in recent years, including the Americans losing a \$280 million maritime Global Hawk. The Iranians shot one down in the Strait of Hormuz and the response was pretty much nothing. The message, over the last five or six years at least, seems to be that if you were to try to do air policing or air defence of your borders with unpiloted aircraft, an opponent might just shoot them down because they do not fear an escalatory consequence.

Lord Teverson: Thank you very much.

- Q71 **Lord Stirrup:** Thank you very much. I would like to try to move, if I may, into some specifics. If I can summarise some of the things you have said so far, and please correct me if I have this wrong, as a consequence partly of lack of challenge in recent years, we have paid far too little attention to the first priority of airpower, which is to seize and maintain control of the air: air superiority if not air supremacy.

The question must be what we should do about that. What should the RAF do about it and what are the implications for RAF capabilities, equipment and resources? Justin Bronk pointed to the NATO specialisation we saw in the early years of the Cold War. That might be part of the answer, but somebody has to give a lead on this. You painted a fairly stark picture in those terms. As you said, if we do not seize and maintain control of the air, all the rest of the things we are planning on being able to do in military terms on the surface are not going to work.

What should be the consequences for the Air Force's equipment plans, for its training and its priorities, and for its allocation of resources? Are there any other areas where you would wish to see the balance of investment shifted significantly and new priorities allocated? I take as read your very clear and very stark point about the lack of logistic resource, particularly the lack of weapons, which is a problem across the board.

Air Marshal Phil Osborn: I will start from an area that Justin did not touch on when he was unpicking current Air Force capability. Again, I would say this, wouldn't I, but I am pretty confident. The people who serve in the Royal Air Force are as good as anybody in the world; they can adapt and they are agile in what they do. Training can always be better, but their training is some of the best in the world. It needs to continue to improve to keep pace with the complexity of the environment. On logistics and stockpiles, yes, it is hollow and needs to be much less so.

Turning to specifics, the major omission from my perspective is the lack of any form of ballistic and cruise missile defence. You can wrap up in that sophisticated strategic air defence. The fact that we are not able to protect either deployed forces or key parts of the homeland against that type of threat is a long-standing gap. Arguably, it was tolerable previously. I do not think it is tolerable now.

There is something about combat air mass. If you have a number of aircraft and an amount of air capability and you are using that in

discretionary air operations, what you have is sufficient by definition. If you seek to control the air, as well as prosecute long-range precision strike and intelligence collection missions as part of a multidomain force, the current mass and the envisaged mass is inadequate.

Then there is something about the way you control the air from a command and control perspective and the way you understand what is going on in the air and on the ground. One of my previous roles was Air Officer Commanding No. 2 Group, where I managed a number of large aircraft fleets but there were very small numbers in that fleet. That gives you real problems when it comes to deploying repeatable assured capabilities.

The fact that we are buying a very good airborne early warning and control platform, the E-7 Wedgetail, is a great thing. The current AWACS capability needs replacing. That we are buying only three is wholly inadequate; it is not enough to do the job. Even as part of a contribution from an international perspective, you could say something similar about a maritime patrol aircraft. I am not saying that you need more platforms like that; I am saying that you need to enhance the breadth of the capability that those platforms represent, and that brings you back to a mix of manned and unmanned.

To come back to your question, Lord Stirrup, yes, the logistics and stockpiles are absolutely taken as read. Then there are some key capabilities that are required to contest the air space, to give you the freedom to operate within it, and I have listed some of those.

Justin Bronk: I absolutely echo the E-7 point in particular. The provision of three aircraft for a mission that, by definition, requires significant time on station, is not only your linchpin for early warning and airborne command and control, but is your core networking node to connect all the different Joint Force communication elements together; for example, with Link 16 and E-3 previously in an area, an E-3 would typically be the gatekeeper and the network manager for Link 16. They are vital to have there, even if, in a contested environment, they are quite far back from the front lines; they are vital to have there, probably more so than anything, other than tankers.

The tanker fleet is excellent. If there are areas on which to commend long-term RAF planning, the MRTT fleet should be cited. It is notable that recently its flexibility was used to bring into service two of the aircraft that were not in regular use, but were part of the contract for provision, to compensate for the extra demand of operations in Romania and Poland.

Three aircraft for E-7 is about the most expensive way of failing to have an adequate capability. You are paying all the money for a superb aircraft, which incidentally the US Air Force has selected for its next AWACS as well, which is hugely useful. You will almost always have to plan on having one in deep maintenance of a fleet of three. I think the

record for an E-7 flight is around 17 hours with air-to-air refuelling, but that is multiple crews; two crews on board rotating, you would hope.

It is certainly not sustainable to plan on those sortie lengths. To guarantee one AWACS orbit, which I believe is our minimum commitment to NATO on AWACS, you need at least ~~three-four~~ aeroplanes. With a fleet of three, and one in deep maintenance, ~~If~~ you have one waiting to be relieved on station and the ~~other-remaining~~ one develops a fault, which is incredibly common with aeroplanes, you simply do not have a capability. There is a reason why Sentinel was always kept at four as a minimum for ISR aircraft, and there is a reason why the requirement was written at five as the minimum.

The reduction to three, I understand, was partly a political intent to send a message to the RAF about budgetary responsibility and about being less optimistic about what it could do within given cost brackets. In light of the seriousness of the security situation in Europe, that is probably not a good position to hold on to. For example, an underspend purchase would be good to get another E-7, but, as we have seen before, underspend purchases sometimes lead to inadequate sustainment and logistics provision in the budget. They need at least one more E-7 just to make the fleet viable for maintaining one orbit where you need it.

The biggest issue in capacity terms for control of the air is not that the platforms are themselves inadequate or that the weapons are inadequate. In fact, there is a combination of the F35B and the new British SPEAR 3—~~select~~ Selective pPrecision ~~effects~~ Effects at ~~At~~ rangeRange 3. It is powered winged and roughly equivalent to Brimstone with wings and a more advanced seeker. The important thing about SPEAR 3 is twofold. First of all, you can carry multiples internally on an F-35, up to eight, four in each bay. You can carry multiples without comprising the stealth signature. If an F-35 two ship is inside contested air space and pop-up threats emerge, it can engage those without dropping one of the two munitions that it would currently be carrying, which would probably be allocated to the primary task that it is there for, which is not the destruction of that pop-up threat.

The second point is that it is a powered weapon with a multi-mode seeker and quite significant inter-weapon co-operation capabilities. The public range is about 130 kilometres, which obviously depends on launch speed and altitude. The point is that the F-35 is better than anything else on earth at one thing in particular, which is geolocating surface-to-air missile threats very, very quickly. I have had it described to me that a single F-35 operating on its own, which it would not be doing, will geolocate a surface-to-air missile threat faster than a four-ship of F-16-CJs, the old US Air Force SEAD specialist aircraft, which would be working between themselves to triangulate things.

A two ship or a four-ship of F-35s will geolocate a SAM incredibly fast, but it does not follow that you can then kill that thing if you have to get close enough to drop a freefall bomb on it. The risk may be too high, because stealth does not make you invisible; it just makes you harder to get a

weapons-grade track on. It also may take too long to get into range and by that point the SAM may have masked up and moved. With something like SPEAR 3, with brilliant F-35 tracking, if you detect a surface-to-air missile threat, you can launch one or two of your stand-off mini cruise missiles, in effect. It would also have a seeker, if that SAM turns off, capable of tracking it down with a reasonable degree of assurance, and killing it within the target area you put out.

The combination is almost uniquely suited to hunting down and killing mobile, medium-range SAMs. The problem is that we have far too few of the F-35s, which are also primarily the weapon system allocated to the carriers. If you have two front-line squadrons, both of which are on rotation and supposed to be contributing to a carrier airwing, you do not have any land-based task lines on the regular. We also do not have enough SPEAR 3 munitions. ~~If the~~ The current UK chose plan to increase the purchase of both of those, that would give three squadrons, ~~but it~~ is still realistically deeply inadequate. I understand that funding has been allocated, but contracts have not been signed, for 26 additional F-35s in around 2027 or 2028.

~~That sort of approach to beefing up existing capabilities in the shape of F-35 and SPEAR 3~~ would go a long way to giving you the right tools for the job as a specialist SEAD/DEAD contribution to NATO. However, to go back to the point about the best people, it would still require a prioritisation decision to be given to the aircrews on both the F-35 fleet and the Typhoon fleet as support, to focus on exercising and training specifically for the SEAD/DEAD mission. The other thing the Russian air force has shown us is that good capability on paper does not perform in reality if you do not fly enough hours and exercise realistically.

Lord Stirrup: Could I ask you to comment very briefly on this? One of the solutions that has been suggested to this problem of overstretch, trying to do too many things, is role specialisation between nations. Is that a realistic alternative?

Justin Bronk: I think it is probably the only viable alternative, but, as you said in your initial question, it is one of those things where somebody will have to take a lead. Given the current procurement timelines and the political fracas going on in Germany, Germany is unlikely to provide a viable SEAD capability as a European/NATO backstop at any time in the relevant timeframe. Italy does not have the money for munitions and is probably in a similar position to the UK with even less money. Of European air forces that have the potential to reach to that specialisation, I would say the UK is best placed. It would also, incidentally, improve our value proposition to both the US and our allies because they are screaming for European allies to take the lead and do more in credible capability terms. SEAD/DEAD is the biggest capability bottleneck in European airpower.

Air Marshal Phil Osborn: I would take a slightly different view. I would view SEAD as similar to air-to-air refuelling. If you are going to be reliant on another nation to provide something mission critical, that other nation

effectively controls how you will operate your own airpower. The context that Justin has just walked through would apply within a NATO context. If you were then seeking to operate, perhaps against other peer or near-peer threats, it is safe to assume that those peer and near-peer threats will have bought proliferated, sophisticated defence systems from Russia or China. That is already true. Your inability to suppress those air defences and give you freedom to operate would constrain your operations unless you had a like-minded ally with you, so I would probably take a slightly different view.

Lord Stirrup: Thank you very much.

The Chair: Sadly, we only have about 20 minutes left for what is a very engaging session. As I turn to Baroness Blackstone for the next question, I am sadly going to encourage shorter answers while you still give us the great depth you have given us, which has been much valued.

Q72 **Baroness Blackstone:** I want to ask about the future combat air system project. The Defence Command Paper has committed £2 billion over the next four years to be spent on this. Can you tell us a bit about how you assess it and whether some of the problems you have identified can, in any way, be solved by this project?

Air Marshal Phil Osborn: You talked about discussing areas of conflict of interest, Chair. I should declare I used to manage combat air from a capability point of view more years ago than I can remember, so I have some history with FCAS and its predecessor.

It is an essential capability. It is also essential from a UK industry perspective. The capability would bring the service, the nation's air capability, which I think we have unpicked, a control of the air, manned/unmanned mix perspective. It is as important for the aerospace industry as the shipbuilding programme is to our maritime. In outline, it envisages a mix of unmanned and manned systems against an introduction to service-type period, which is over a number of years, and its early introduction in terms of capability.

As I look at it at the moment, the most important thing is how you set the programme up; getting value from that £2 billion over the first four years is very important. Different consortia of nations are coming at the same problem in slightly different ways. The UK, Italy and Sweden are focusing on the efficiencies that digital technology will bring to make this future system affordable. Frankly, if it is done in the same way that Typhoon and then F35 were done, it will not be affordable, even with changes to the defence budget.

Within that digital approach, there are probably two things that are most important from my point of view. The first is a business model, a finance model, that is much more a digital/finance model, with early investment delivering an early return on that investment. Then there is a requirement for a truly collaborative digital working environment across government allies and industry.

In the interests of brevity, I do not see sufficient momentum in both of those areas. That does not mean it is not irrecoverable. From an FCAS point of view, we should be looking very clearly at the business mechanisms by which you deliver the capability effectively, with perhaps a bit less focus, although we need to do the work, on the capability that it will bring.

Justin Bronk: I agree. It is utterly essential, if the UK wants to keep a combat air industry, that something—it does not necessarily have to be piloted—is done that keeps designers, science and technology professionals, integration professionals and a degree of manufacturing in work. The future combat air strategy was a direct response to industry running out of time, in order to justify making continuing investments to stay in the business. It is essential in that regard.

Will it solve any of the issues for the foreseeable? No, because IOC at its earliest is about ~~2025-2035~~ and full operational capability about 2040, if we are lucky. Without wanting to be flippant, the world could be a waterslide park by then; an awful lot can happen in that amount of time. As for foreseeable problems, the slightly uncomfortable reality, I think, is that FCAS and Tempest, and Team Tempest within that, will inherently be competing for funding for today's and tomorrow's problems in order to develop a capability that will allow us to compete in the late 2030s and 2040s. It is jam tomorrow for jam in a long time as a trade-off. Unfortunately, there is only so much money in the defence budget.

It is worth considering the rough cost in cash terms. An NAO report in 2011 assessed Typhoon R&D and acquisition as £22.95 billion. If you adjust that for 2021 inflation, it comes to about £35 billion; it is probably significantly more now. Even if you assumed that all of the extremely important work being done in digital design development, testing and twinning shows that you can achieve things in a far shorter timeframe, and is significantly cheaper than in previous generations, ~~and~~ continues and delivers as expected, you are still asking for a much more capable and much more complex lethal and survivable system than Typhoon ever was, from a smaller consortium.

That would suggest that it would be a good day if it cost no more in real terms than Typhoon cost, eventually. Let us assume it costs far less than that. If all the stars align, let us say it costs £25 billion in today's money. I still do not see where on earth that comes from. The ~~air-Air command-Command~~ Command budget is about £36 billion for the next 10 years, of which combat air is somewhere in the region of £21 billion or £22 billion. That includes any new F-35s, Protector, new radars for the Typhoon, and all sorts of things. The £2 billion currently sitting in ~~strategic-Strategic programmesProgrammes~~, which is, I believe, £21.5 billion, includes all complex weapons as well as a whole host of other things.

The country can afford a new fighter; we have borrowed enough money to fund it many, many, many times over, much of which is unallocated, in post-Covid recovery funding for industry. The return on investment historically on domestic combat air development programmes, whether

that be Typhoon, Tornado or Hawk, is somewhere between 3 and 4 to 1 over a 20-year period. It is generally a very efficient way to spend money because the Exchequer will get more back in the future, but that should not obscure the fact that it is directly taking money away from what the RAF and the broader Joint Force needs for control of the air over the next 15 years.

Q73 Lord Alton of Liverpool: You have given us a sobering, comprehensive, very realistic view of the capacity and credibility of our forces in the air. I would like to take you into slightly more granular detail about one aspect of capacity building and the threats for the future. Can you tell us a bit about the impact of the equipment plans for the RAF on UK intelligence, surveillance and reconnaissance forces and their ability to detect threats? You mentioned in your earlier evidence—I will forgo a supplementary as well if I can tag this in now—the Indo-Pacific and the dangers perhaps emerging in Taiwan. How are we looking at that and do we need additional capability in the airspace or elsewhere in order to fulfil the Integrated Review vision? What would we bring to the table in the scenario I have just mentioned?

Air Marshal Phil Osborn: I will choose my words carefully. When we talk about air-based ISR—intelligence, surveillance, reconnaissance—today and previously, we should not forget that it sits with a multilayered, multi-service, multidomain intelligence picture. You are using your air assets as part of a broader intelligence collection capability.

When we look at it today and when we looked at it previously, we would have talked about the importance of persistence, which our unmanned systems give us very well, and connectivity. The picture we painted of the future means that you need those things, but you also need survivability. Putting a platform at 25,000 feet in a contested environment is quite different from what we have been using our unmanned systems for over Syria and elsewhere.

There is something about survivable surveillance playing the part that air systems would play in broader intelligence collection that we need to think about. That brings you back to the requirement for mass of survivable systems. You might see more unmanned systems that are still survivable doing intelligence, surveillance and reconnaissance tasks in the future.

This is particularly where space, resilient space, comes to the fore. We have touched on the dual use of space. There is also something about having capabilities that are responsive—your ability to put out probably relatively small space assets quite quickly to fill holes or to enhance coverage. Space will play a much more responsive role in the future. The department and the air force recognise that, but there are budgetary constraints.

From a more air-breathing perspective, on maritime and land surveillance, we need to do more in a non-discretionary context. Again,

that could be unmanned or manned systems, but at the moment the maritime patrol aircraft we bought will cover one combat orbit; they will not cover any more than that. I am not saying that we need more Poseidon aircraft; I am saying that we need more maritime surveillance in that non-discretionary context. You could say the same for land surveillance.

Justin Bronk: I draw attention to the distinction between surveillance before the shooting starts—the key ~~understand~~, map and understand piece—for which the P-8 in particular, is a key part. As well as being a world-class maritime patrol aircraft, it has an extremely good electronic intelligence-gathering suite. The UK will, I am sure, find good use for that ~~form~~capability, although given its non-discretionary taskings around protecting the deterrent, there are probably too few aircraft to use them in the way that the Nimrod fleet was flexibly used, particularly with the R.1s for overland tasks.

Keeping the pre-shooting starting, ~~in effect~~, big-wing ISR piece distinct from ~~penetrating~~ ISTAR—intelligence, surveillance, target acquisition and reconnaissance—in contested areas. ~~Penetrating ISTAR is needed~~, particularly to enable long-range precision strike, whether that be Tomahawk land attack cruise missiles, Storm Shadow or its follow-on, HIMARS, or whatever else replaces GMLRS as the Army's long-range precision strike capability, ~~all of which~~ requires eyes forward. Right now, the only thing in the forces is the F-35, which has double or triple-hatted assumptions for what it will be doing in the Joint Force in a crisis. It is not only that you need those assets, of course; it is that if they are forward in a contested environment, they need a secure and reliable way of passing that ~~data~~ back.

The RAF is doing work with the Nexus program as a module that is being tested on the Voyager tanker, which would be in any air operations area anyway to refuel things. It is quite a good idea to put a magic box that connects things on that. In any case, there will need to be ability to take selective data, because you cannot take all of it—it is too much—from F-35 or any other forward penetrating assets and then have an architecture to distribute it reliably among the other aspects of the Joint Force that need it. Experience from the US would suggest that if you try to approach the problem holistically, with a “We’re going to connect everything to everything” approach, it is just too big; it is impossible to choose where to start and it is also vulnerable to massive bloat and overruns.

If you look at what the US Navy, for example, did with what is called Naval Integrated Fire Control-Counter Air—NIFC-CA—which has been up and running in various guises for about 10 years, it made that not a major acquisition programme but a relatively small programme that imposed interoperability and connectivity standards within other major programmes that it planned to connect; in its case, destroyers with Aegis baseline 9 software, Hawkeye, AWACS and later F-18. They have been able to expand from that. Once it is a programme that works and is providing day-to-day connectivity, ~~it~~ one knows what it entails to add

other things to that ecosystem. That is probably a better model for the UK, given resource constraints, than trying to match something as enormous as the American joint all-domain JADC2 programme.

The Chair: Thank you very much.

Q74 **Lord Anderson of Swansea:** Without a supplementary. Gentlemen, actual combat experience, actual crisis experience, is better than the best simulation exercises. Since the Integrated Review and the Command Paper, we have actual crises in Ukraine and Afghanistan. What are the Air Force lessons and implications from those two crises?

Air Marshal Phil Osborn: From an Afghanistan point of view, they are purely military. They tell you that non-combatant evacuations are never easy. Contested non-combatant evacuations are particularly difficult, so there is something about having an air-aware force protection enablement capability to make those things happen. What we also saw from a UK point of view was the overwhelming advantage of having surge airlift available. Being able to move that number of people in that short period of time is something very few nations could have done. That is the product of years of investment in flexible airlift capability.

From a Ukraine point of view, it is very early for lessons. A few have come out; weapons usage and stockpiles are always going to be, I suspect, more challenging than you hope. There is something about high-end training and how Russia not having high-end training has had a disproportionate impact on the capability that it could bring to bear. There is also something about control of the air. If you do not control the air, you cannot do what you want to do in the other domains. We have covered that previously. The Ukrainian experience has brought that to the fore. Allied to that is what we have been saying about survivability. These are difficult environments to work in. That difficulty has come through in having to fight for the right to do what you want to do.

The last thing I want to say about Ukraine goes back to my point about deterrence. Deterrence by punishment, our approach to that, is now out of date. Deterrence by denial, making it clear to any potential aggressor that they will not be able to do what they want to do, rather than punishing them once they have done it, really comes to the fore from the Ukraine point of view. A number of NATO nations, particularly the Baltic nations and similar, will be very focused on how we shift to a much more substantial deterrence by denial capability, of which airpower is a major player; air and space power is a major player. That comes through as well. There are a few things from Ukraine already that probably highlight what we have touched on in the last hour or so.

Justin Bronk: For me, it is the same starting point: munitions, munitions, munitions. We have nowhere near enough. It is the frog boiling in the water metaphor, (which is actually not true). ~~It~~ That is the metaphor for stockpiles being continually reduced by degrees. I am sure if you had taken a view at the beginning of the 1990s and looked at the stockpiles we have now, people would be aghast, but it has been done

gradually. I do not know the numbers, but I am sure they are not healthy. It is the same across most of NATO, apart from the US. It is notable that when a crisis happens, as we saw in Libya as well, it is not just you who screams for rapid resupply from the US; it is everybody. With what the US might be able to rush across in a crisis, if it is not worried about its own supplies, or what industry can quickly deliver, it is worth remembering that we fight as an alliance, so everybody will be screaming for the same narrow pool.

The biggest thing on control of the air is that if you just suppress but cannot hunt down and kill, effectively, mobile medium-range and short-range SAMs, you cannot have control of the air. Our Joint Force is far more dependent on control of the air than either Russia's or Ukraine's armed forces, which is partly because we plan to fight wars, and we are lucky enough to be rich enough to plan to fight wars, in much less bloody ways. They are artillery armies, first and foremost, so the impact on them of not having air superiority is less severe than it would be for us. The biggest thing that came unstuck with the Russians was not even their training; it was their logistics.

It is worth remembering that while you can do fantastic tactical training in quite complex environments, in a synthetic environment with aircrew, you do not train the maintainers or exercise the logistics chain when you do that. The emphasis would be not just on improving war stocks but on doing live-fire, large-scale exercises with our own logistics, as opposed to relying quite so heavily on American ones. To emphasise to ourselves how much we are dependent there, and what we could actually field if we had to do it ourselves for real, might be an unpleasant learning experience, but it is probably a necessary one.

The Chair: Thank you very much indeed. You have given us a great deal of sombre and very well-informed food for thought. Thank you very much for your contributions today, as we go forward with trying to navigate our understanding of how this country can translate what are clearly well-intentioned objectives into the reality of providing defence for this country and defence for our allies as well. Thank you very much.