HOUSE OF COMMONS

Defence Committee

Oral evidence: Future Aviation Capabilities, HC 51

Tuesday 9 January 2024

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Watch the meeting

Members present: John Spellar (in the Chair); Sarah Atherton; Martin Docherty-Hughes; Richard Drax; Mr Mark Francois; Mr Kevan Jones; Mrs Emma Lewell-Buck; Jesse Norman; Gavin Robinson; Derek Twigg.

Questions 1-44

Witnesses

I: Lucia Retter, Research Leader, RAND Europe, and Trevor Taylor, Director of the Defence, Industries & Society Programme, RUSI.

II: Brian Phillipson, former CEO/COO Eurofighter GmbH, and Tim Rowntree, former Director, OCCAR.

Examination of witnesses

Witnesses: Lucia Retter and Trevor Taylor.

Q1 **Chair:** Today we are undertaking our hearing on future aviation capabilities. We have Trevor Taylor and Lucia Retter before us. I would be grateful if you would say a couple of words to introduce yourselves.

Trevor Taylor: Good morning. I am Trevor Taylor. I head the Defence, Industries and Society Programme at the Royal United Services Institute. Before that I worked in the Defence Academy. I seem to have been doing defence acquisition issues in one form or another for quite a long time.

Lucia Retter: Good morning. I am Lucia Retter. I am a Research Leader at RAND Europe, which is the European arm of the RAND Corporation. I direct our Centre for Defence Economics and Acquisition.

Chair: Thank you very much. Our first question is from Derek Twigg.

Q2 **Derek Twigg:** Good morning. This is to both of you. Progress on the Global Combat Air Programme continues; an international treaty was signed last month between the UK, Italy and Japan, but no cost estimate for the programme has yet been produced. Is that a cause of concern, and at what stage of the programme would you expect projected costs to be confirmed and published? When will the next significant tranche of new funding be required, and how important is it to provide a multi-year funding commitment for the programme?

Trevor Taylor: There are a lot of questions in there.

Derek Twigg: The gist is, basically, how it has been set up, and the funding allocation, which has not been made. What would need to be done?

Trevor Taylor: Obviously, in private, there has been lots of work on cost estimates. Secretaries of State have made mention of the £2 billion that we have spent so far, and of the £600 million-plus that the companies have already invested, and a £10 billion figure to go for the next 10 years.

I think producing cost estimates and presenting them as firm at this stage would be simply a mistake. Although we spend a lot of money on cost estimation, if we think of the scale of the problem—the number of people working on the project, and the number of years it is going to take—it is quite unrealistic to expect a precise estimate to come in. I am tempted to remind Members about any work they have had done modifying their homes in the last decade. How many of the estimates that they got from their builders came in on time and budget? We tend to just accept—we know—that they won’t. I think it is too early to ask Governments to produce precise estimates, but it is important that, privately, they look at cost estimates and recognise that they are affordable. I think the Governments have done that.

Q3 **Derek Twigg:** I understand completely the point you are making. The second part of my question was about when the next significant tranche of new funding will be required, and how important a multi-year funding commitment for the programme is. There are two parts to this.

Trevor Taylor: There is a question about the nature of a funding commitment. The outline business case is due this year. That will lead to a formal development process beginning in 2025. That will require a firm commitment to what we expect the costs to be, and that will have to be spelled out and agreed.

The funding mechanism for the project is interesting. The treaty, which has been mentioned, signals that the project will be funded on an annual basis, as is traditional. There is an argument that a commercial company would never do a major project like that. A commercial company would not say, "Well, we've done very well this year, but we haven't got any more money, so we are going to stop and carry on next year." They would put aside multiple pots of money. That is how the Americans do it. They make money available—it is difficult to get Congress to approve money, but once they approve it, for a major project, they will make five or six years' money available in a kind of bank account, which can be used. The treaty signals that we do not really intend to do that.

I would much prefer to see a multi-year pot put aside, but that would perhaps meet some resistance from the Treasury because it would weaken Treasury's capacity to control money on an annual basis. But from a project point of view, it would make much more sense to have a multi-year pot that was set aside—to do something like the Americans do.

Lucia Retter: To elaborate on what Professor Taylor said on the first part of the question, as this Committee well knows, it is notoriously difficult to estimate the cost of such large acquisition programmes. Ultimately, the most useful way of estimating would be life-cycle costs, which again for a programme of this magnitude are very difficult; the uncertainty bounds around such an estimate would be very wide at this stage.

We also know that cost estimates evolve over time. The submission of the Royal Aeronautical Society to this inquiry showed that the initial Eurofighter estimates were around £7 billion in 1985, rising to £37 billion in 2011.

Also, it is clear that the different parties develop a greater understanding of the cost drivers as the programme develops. I would argue that we find ourselves at a bit of a critical juncture in this programme. A lot of the moving parts and key cost drivers are being finalised, or will be finalised in the coming year. One of those is, obviously, the delivery structure. We have the treaty to set up the GCAP International Governmental Organisation, and hopefully a corresponding business construct will be set up soon—in the coming year or so. That, again, will very much drive how much uncertainty and risk there is in the programme. In particular, the definition of "requirements" remains to be completely set, and in the public sources it is very clear that the intention is to try to set it as late as is feasible, so that there is greater flexibility in the programme as it develops.

I would also caution against making direct comparisons between the costs of previous international collaborative air programmes and GCAP, not least because it is very clear from the public announcements of the GCAP leadership that this programme should be run in a different way. It is intended to be delivered to a much speedier schedule than we saw, for example, with Eurofighter.

Finally, we also need to remember that acquisition programmes are often influenced by a kind of magical triangle: performance sits at one point, and cost and schedule sit at the others. Once you fix the schedule requirement, for example, it may well result in higher costs or compromised performance, so it is important to be cautious about what that triangle looks like for GCAP.

The second part of your question was around multi-annual funding. I agree with Professor Taylor that that is a really good thing. It would be a shame if it was not being put in place for GCAP. While we have long-term equipment plans in the MoD, there is still a lot of annualisation. A lot of programmes are subject to that, which means that the system can be in flux. On a routine basis; targets and milestones can be revisited just to ensure that in-year affordability is maintained. That is a bit dangerous for a large programme like GCAP, because it can prevent the programme managers from investing in the long term. For example, once we get to production, multi-annual contracts could really help to place orders for long-lead items, help with bulk buying and ultimately save costs. Multi-annual funding, where available, is a good thing and, for a large programme like GCAP, it would certainly be recommendable.

Q4 **Martin Docherty-Hughes:** I apologise to you both: I will need to leave Committee to attend Justice questions this morning. I think you probably answered part of my question already, but maybe we can say a wee bit more about how the GIGO and the equivalent industry contracts avoid the structural difficulties encountered, for example, by the Typhoon programme. Do you have anything specific to say on that at all? Are there any other countries in the GIGO that are doing things differently from the UK?

Trevor Taylor: The delivery structure is outwardly similar—you have an international organisation and one international company—but I think people are terribly aware that it will operate in a very different way. In particular, the powers of the governmental organisation will be greater, and the powers of the company organisation need to be greater.

I think others would confirm that one of elements of delay in the development of Typhoon was that whenever a company or a Government had an idea, it went into their machine; then, they said, "We will have to ask the others"—the other companies—and then when the companies had agreed, they sent it to the Governments, who asked the others. That slowed things down tremendously. I think they realise that these organisations have to be more empowered.

Reading through the treaty, I was struck by the fact that such a document could be generated as quickly as it was, given that the Japanese have never been involved in anything like this before. We have done lots of collaborative projects involving these sorts of words, but the fact that the Japanese were able to sign up to this document so quickly is quite an achievement. It just struck me that that must have been quite difficult for them to take on board. Obviously the proof will be in the pudding when we see how they actually work, but the intention is very much that they should enable faster and more powerful decision making.

Q5 **Martin Docherty-Hughes:** Lucia, do you have anything to add to that? I am interested in the Japanese element. They usually do things a lot faster than most of us. Has Japan brought an element of "Get on with it"?

Lucia Retter: I am not sure whether it is Japan, or the sense that we know what we have done that did not quite work on past programmes, such as Eurofighter, and want to do it differently. There is clear evidence in academia that collaborative programmes tend to be plagued by partners overestimating the efficiencies they can achieve by collaborating, and underestimating the inefficiencies that often come because of, for instance, change management processes—the constant going back and forth between the different Governments or industrial partners.

There is a lot of evidence—RAND has done some of this work—on the challenges in collaborative programmes, whether it is on a governmental level, work share level or firm level. The question now is how these can be best overcome. One way, as Professor Taylor was saying, is that it is important to have an empowered delivery organisation, both on the Government side and industry side. Part of that is having a very frank conversation right at the beginning to identify what the nice-to-have bits of sovereignty are, versus those that are non-negotiable. Those components are agreed and stuck to from the very get-go. If during the course of the programme there is a dispute or disagreement, one can go back to those agreements on the fundamental principles.

That goes for the business construct as well, in which we agree how we want to balance the principle of juste retour, which is this idea that you give the industries in a contributing country involvement proportionate to the money being contributed by the country, and a stern focus on the "best athlete" approach, in which you just give money to the best firm or company involved. How you balance that really difficult trade-off should be subject to discussion right at the beginning, when the business constructs are being set up.

Q6 **Martin Docherty-Hughes:** Can I be very blunt? Have Ukraine and possibly issues in Taiwan made people make their mind up that we need to get on with this? There have been military issues.

Trevor Taylor: They don't make people feel more complacent.

Martin Docherty-Hughes: Focusing minds, I suppose is what I mean.

Trevor Taylor: The Japanese in particular are very keen, and the 2035 date for an aircraft is absolutely something they are keen on. They are going to be a constant pressure for that date to be met. That was not the case with Typhoon, because it was not the cold war when all the delays with Typhoon were ticking on. So definitely, that is a consideration. There is one interesting point for me about time, which goes to what Lucia said: the view in at least some companies, particularly in Japan, is that if you do this quickly, the costs will be controlled. I had someone Japanese say to me, "We are not too worried about cost. We are worried about time, because we know that if it is delivered on time, the cost will be bearable." That is something we should keep in mind throughout.

Lucia Retter: I mentioned the magical triangle of performance, cost and schedule. One could also argue that if you keep the schedule fixed, it could prevent the inflation of the requirements, which it would take longer to address, and it may encourage the parties involved to be satisfied with the capability that is delivered, because it is delivered on time. That would be a good thing..

Q7 **Martin Docherty-Hughes:** Finally, because I think we need to press the point, you mentioned the triangle and also the issue with Japan and time. What is pushing that is possibly the threat. We do not seem to talk about that more than enough when it comes to pushing forward procurement and contracts to make sure that we are dealing with the possible threat that we have.

Trevor Taylor: Japan has North Korea and China. The Committee should speak to some Japanese. There are also in Japan certain concerns that they are a bit more willing to air than we are here, about the reliability of the United States. Those things are definitely in play in that country.

Lucia Retter: There is also the commercial perspective: one could think that, if GCAP is to be competitive on the export market, then having it ready before the French-German SCAF is also a good thing, because it could provide greater opportunities for demonstrating its value and potential exports.

Chair: It will come as a big culture shock to the British civil service that time is a factor.

Q8 **Mrs Lewell-Buck:** Thanks, Chair; morning, both. As you are aware, debates around national workshare have been cited as a reason for the delay in cost escalation on Typhoon. I am curious about how the GCAP partners should handle workshare, while also recognising the need to balance the programme with efficiency and political and commercial realities.

Lucia Retter: Workshare in international collaborative programmes is always a highly political issue. There is always a trade-off in the balance between commercial and political interests—the need to bring back prosperity benefits to the countries that are contributing. It is one that cannot be avoided but, again, goes to having a very focused approach to managing it.

You will not be surprised to hear from a researcher that I think it would be really good to have a workshare agreement that is based on evidence and data, as much as it is politically palatable and militarily appropriate to have that sort of "best athlete" approach. As much as possible, it should be predicated on a good and robust understanding of what the industrial capabilities and capacities are in the different nations to then determine who should be manufacturing or designing the different parts of the system, to remove the duplication and inefficiencies that we have seen on Typhoon and other programmes in the past.

Again, it is naïve to think that we will do away with any political influence in that or any pressures that are being put from the different parties. Yet, to try to engender a culture of trust and transparency that is based on evidence and data about the different industrial capabilities would be beneficial to help this programme to control the cost and come on schedule, as it is intended to.

Trevor Taylor: There are some elements of encouragement. One is that in Tornado, it was Italy and, to a certain extent, Germany, that had to be brought up to speed. They were re-establishing a combat air industry. With Typhoon, it was very much Spain that was coming from a position that was further back. The three GCAP countries are all technologically capable. With Italy, this is the third combat aircraft that they have worked on. So, in terms of workshare there is decent evidence that all the countries have got significant capabilities that would be useful.

The UK has invested more than Italy has and there are some questions about Italy. Nevertheless, it has a competent set of companies and an experienced Government in collaborative projects. The other part that I think is significant is that, in the run up to the announcements that we had a year ago, there was an extensive amount of inter-company contact. All messages that I have received about that contact—British companies working with Japanese ones—has been encouraging. I will not give you a sensitive quote, but they found it very encouraging. So the evidence is that when it comes to sorting out who does what, that may not be as difficult a question as it has been with previous projects.

Q9 **Mrs Lewell-Buck:** So are you a bit more hopeful, then, about this one than about other programmes?

Trevor Taylor: I am a bit more hopeful. The most difficult cases in collaborative projects arise when you have got a country which, industrially and technologically, is trying to catch up and they are using that programme to catch up from a position that is further back than the other partners. Essentially, they say, "We're going to buy some of these, we're putting money into the development, we want the work—but we don't have the technology at the minute." That is less the case in this one. It is more, technologically, a partnership of something like equals, and it's one where the company relationships seem to be pretty close. They know they have to make this work. If this project develops a history that is similar to that of Typhoon, let alone the F-35, if I may say so, it's not going to succeed. So they know they have to make it work. And of course, in Britain there is company money in this already.

Lucia Retter: I will just add a couple of things. One is that perhaps workshare does not need to be seen as static and fixed in time, but can evolve over time, depending on how the different contributors are developing their capability throughout the programme. Perhaps having an assessment mechanism for their capabilities that is iterative and can evolve can help that workshare to develop over time as well. Obviously, we are going to see a programme that is at least 10 or 15 years in duration. So it's good to think of workshare as something that can evolve and is not necessarily static.

The other thing I will mention is that perhaps we are finding ourselves in a slightly different set-up now than we did with Eurofighter. With Eurofighter in particular, there may not always have been complete agreement between the partners as to what we were in it for, in terms of capability versus workshare versus industrial participation and so on, whereas here there is—at least this seems to be the case, from public sources—very much a focus on capability: "This is what we want to achieve." All the other things, like prosperity benefits, workshare and industrial participation, are important, but perhaps not as highly prioritised. If you have partners that pursue slightly different ambitions with the project and they are not completely aligned, that is when you can start having troubles.

Q10 **Mr Jones:** So is it best not having the French and Germans in on them?

Lucia Retter: Well, they have their own programme at the moment.

Q11 **Mr Jones:** They have their own programme, but you are arguing that with Eurofighter, the French and Germans were a problem, so it's best not having them in. Could you just comment about the Swedes, in terms of what Sweden—

Lucia Retter: The French were not involved in the Eurofighter; they stepped out.

Q12 **Mr Jones:** They were originally and then they stepped out.

Lucia Retter: And then Germany was involved, Spain was involved and Italy was involved. It's all hypothetical to explore whether the Germans would join GCAP. There is a lot of speculation in the public domain. What I'm trying to say is that what does help programmes is a unified focus from the different partners. Also, having three—versus four—may make it easier because it's just fewer that you have to consult. But having quite a clear agreed vision of what we want that programme to deliver should really help with controlling the costs and delivering on the schedule.

Trevor Taylor: I think it's—well, let's say that Dassault have never done a collaborative aircraft programme and maybe that is not a coincidence. They do have a reputation, I think, in the industry for being difficult to collaborate with because they don't recognise anybody as anything like an equal. I remember back when—this is dreadful. I remember back in '83, I think, when the French dropped out, there was a sigh of relief around the UK because all the experience of Tornado and working together was going to be ripped up. I think, to a certain extent, you are absolutely right.

The Germans are a different case. The Germans could have come in, but I think the situation with Germany is that, at least for the moment, this ship has sailed. At some stage it may be that other countries want to get access to the aircraft and would like to make a contribution to, if not its development, perhaps its production, and that includes Sweden. That will be an issue that the members will have the opportunity to deal with. It relates to the exports question and it relates to, of course, the known Saudi interest in being involved. But for now, the focus is absolutely on the three members making this work and proceed quickly. They know that in the end, that as time goes on, other issues are going to come on to the agenda. However, they are not going to be addressed now.

Q13 **Jesse Norman:** I want to ask about the Defence and Security Industrial Strategy. There is a lot of talk in it about Team UK and what that might mean in terms of a more integrated approach to exports. Can you give us some sense, Mr Taylor, as to whether you think that is a real thing and what you make of it?

Trevor Taylor: Companies certainly recognise the place of exports in helping their position. Government and companies realise that it also contributes to maintaining industrial capability, in that you do not have the intervals between orders that you have if you are entirely reliant on one national customer. The Air Force is not necessarily a unified entity, but at least part of it recognises that if it is to get an affordable aircraft, having an export dimension to it—

Q14 **Jesse Norman:** There has to be a weight of orders, if you like.

Trevor Taylor: Yes, a weight to orders. That ties into how we think of the requirement, and a stable requirement, which is that the focus now is on having a product that has two generic attributes. One is that it has to be good enough to deal with the challenges presented by China in particular in 2035. It has to be good enough for that job. That is a key driver of the specification.

The other thing is that we also want it to be an open system that can be upgraded. We live in a time of electronics and software, but also of weaponry, so we want it to be an open system and that will help exports. It will give us a product that we may be able to export, but we will ourselves have a more advanced version certainly lined up and would not necessarily export the most advanced piece of kit.

On the export piece, people are conscious of it and they have bought into it in a way that they have not done before. The services now recognise, in having to run their own money, that simply specifying what they want and not taking any notice of what anybody else might want will not be productive for them.

Jesse Norman: I do not know whether you want to come in on that, Ms Retter.

Lucia Retter: I can come in later, if you want to follow up.

Q15 **Jesse Norman:** Can you give an example, Mr Taylor, of where you think this has been really well done in the past and where you think this has been really badly done in the past? That is, building exportability into the framework of the defence procurement programme early on enough to give it genuine scope, improve affordability, enable cost sharing, open standards—that kind of thing. Where do you go if you are thinking of a good experience—not necessarily in this country, of course?

Trevor Taylor: The classic British experience is, of course, Hawk. It was a nominally a trainer aircraft, but it was designed from the beginning to be strong enough to take a lot of weapons on board so it could have a combat role. That was terribly helpful, and it has proved to be a system that can develop constantly. Although for different reasons, people could also think of the F-35. As we can see sometimes from the comment, not every bit of the US armed forces is that keen on the F-35, but it has, in one way or another, achieved major export successes.

It used to be that the French had a good reputation for making things that were exportable. I am going back now but things like the French tank, the AMX-30. It looked like a tank—I do not think that any British soldier would have been happy going to war in it, but it sold very well in the wider world. In a way, that fitted French defence policy, because French defence policy was very emphatic that, as far as Europe was concerned, nuclear weapons were what mattered. The first requirement for GCAP is that it is good enough to take on our peer adversaries, and then to think about ensuring that it is an open system. Manufacturers are now more sophisticated about how they think about that.

Q16 **Jesse Norman:** Thanks. I want to let colleagues in, but do you think that there is a tension between the Team UK aspiration and the exportability aspiration, or do you think that those things fit together?

Trevor Taylor: I think they fit together, because of one of the barriers in the past—different Governments have said, as I think members of the Committee will know, that we must ensure that exportability is part of a requirement. It is very difficult to find any case where any requirement was compromised in any way for exportability of the services. They said, "No, no—it has got to be like this," and it was often very expensive. Now the world is slightly different, and the users, developers and Government, with their prosperity and other agendas, are all signed up to recognising that exports for this will be valued. It will be complicated, because people will want shares—export customers—but that is why we keep the current focus.

Q17 **Jesse Norman:** That is why I think that there could potentially be a tension with Team UK.

Trevor Taylor: Make it work, and then we can share out the work. This has been done many times by the Americans, by the way, with lots of systems. I remember that they developed the MLRS and then went round Europe finding people who could make bits of it. That was a long time ago, so it is not a new practice.

Lucia Retter: On Team UK, there is quite a lot of evidence to show that when countries have historical relations with other countries, exporting defence products can be easier, not least because the companies will know the business environment, defence environment and so on. Arguably, Britain has that and those kinds of relationships, particularly in the Middle East -in the aerospace sector.

I welcome the focus on defence exports being part and parcel of a wider package of the UK value proposition, which is how it is being presented in the DSIS, the IR refresh and the Defence Command Paper, articulating defence exports as being one of the ways in which the UK can build strategic partnerships around the globe. This is strategic defence exports, rather than any small pieces of kit. It is a good thing, and often countries will seek assurances from the UK—from the operators and the users, really—on how to maintain, train on and upgrade the equipment that they are purchasing, and those assurances can carry quite a lot of weight. That kind of collaboration between Government—MoD in particular—and the Armed Forces with the industry to pursue export campaigns can be quite helpful.

On exportability being weaved into capability development, I have two points. One is that exportability is really hard to assess, particularly when we look at 10 to 15 years from now. Exports are notoriously quite volatile. There is a lot of fluctuation year on year, or even decade by decade, in terms of the value and volume of exports, and sometimes we are quite surprised by what exports well and what does not—the Type 26 perhaps was not necessarily designed to be a super-exportable ship, but it is. It is sometimes really quite hard to predict what export markets will look like, how they will behave and what will truly sell in those markets. There are also a lot of external factors that are beyond UK control—a lot of political factors and various industrial requirements that the countries might have for exports where they might want industrial participation, technology transfer and so on. Exports are good for all the reasons that Professor Taylor outlined, in that they prolong production lines and bring benefit and revenue, but they are not a silver bullet that will solve all problems of the UK industrial base.

The second point of caution, perhaps, is that exportability in capability development should not come at the cost of developing capability that meets the requirements of the UK and its partners. That is something, as Professor Taylor said, where you need to focus first on how to meet the needs of the UK and the partners involved in the programme. If it is the case that that solution is quite easily exportable, great. The risk would be if you were to compromise that capability just to ensure you could export it. In fact, there might be some examples. The A400M has a really large payload, precisely because it was envisaged to be exportable, but now may not give the UK as many options, as perhaps something that had a shorter take-off and landing would give. There are trade-offs and one needs to be aware of them. I would caution against exportability as a silver bullet, or the one thing to pursue at any cost.

Q18 **Mr Francois:** On your points about annularity, when the Committee looked at procurement we focused on the Treasury's obsession with annularity and that of DE&S, which is unfortunate. We very much have sympathy with what you say about having multi-year funding, so a hat tip to you on that.

This aircraft is going to be very sophisticated, so making it affordable is going to be a real challenge. The history of Eurofighter and F-35 shows how difficult that is going to be. In order to make it affordable, we need to export it. If we export it to Saudi, and MBS performs to type, he will want a major share of the programme and will want to build the aircraft in-country. How are we going to square that circle, Mr Taylor?

Trevor Taylor: The Saudi case is a good one, if you like a challenge. My perspective on this programme is that we are aware of many of the difficulties, although there may also be difficulties we are not aware of. It is really a challenge, but if it were not a challenge, everybody would be doing it. If it were not a challenge, the kudos that will come from achieving this programme, which will be huge, would not be there. There is not going to be a risk-free context for this programme.

The Saudi case is interesting. The Saudis want to develop their industrial sector, and my view is that we should be ready to help them do it, but we should do so in the context of some restrictions that come with that kind of help. I will leave it to the Foreign Office to articulate the language, because I would probably be too blunt.

There is plenty of evidence. Collaborative projects are done between countries that have similar values and stable political relationships over time, and that are not disrupted by major political upheaval. Working with the Saudis would involve investment and some degree of reliance on them, perhaps for some components in the longer term. I do not think assembling the aircraft is that sensitive, because it is about 10% of manufacturing costs.

Q19 **Mr Francois:** To be fair, if you had said 10 years ago that we would be building a sixth-generation fighter in an Anglo-Italian-Japanese programme, probably no one would have believed you. I think the Committee is aware of the scale of achievement already, and the treaty and all that goes with it. This is all very impressive stuff, but the history of Typhoon exports in recent years is that if you are going to sell in any numbers, you have to sell into the Middle East. Saudi Arabia is keen, as you say, to develop its own aviation industry. If it is going to be part of this programme, is that not fundamentally going to change its nature? You appreciate the question.

Trevor Taylor: Yes. You could put it in a slightly different way: any export customer these days, whether that is Colombia or wherever, demands an offset. If anybody is going to buy this aircraft, including the Saudis, there are going to be offset demands. There would have to be a deal with the Saudi Arabian Government about what they contributed to the programme, the benefit, and access to the aircraft. Access to the IP is probably more important than what work they are doing in-country, because they will make significant use of imported labour anyway. That is a hurdle that has to be passed.

Q20 **Mr Francois:** I suspect that that is exactly what they are going to want, in return for a very, very large amount of money. But we will see, I suppose.

Trevor Taylor: I will duck the question, because we know that Saudi Arabia is likely to need to be accommodated. We know that it is going to be a very sensitive negotiation. We know the variables that are involved. It is not my place, or that of anybody in a public forum, at this stage to be able to offer a magic solution that would fix it.

I would say, because this is going to be a very sensitive programme, that the security wrap around it will be higher than for anything we have done before. That is an issue for dealing with Japan. Japan is having to work on developing the kind of capacity for a security wrap that it has not had before. That is something that would have to be taken up as part of the agreement with any export customer, and certainly anybody who was contributing to the programme, but I think it is too early to say. We know that Saudi Arabia is there, but the focus is, "Let's get this thing moving on the timetable and keep it moving on the timetable." People will deal in private with the Saudis constantly, I am pretty sure.

Mr Francois: Ms Retter, have you anything to add on that?

Lucia Retter: No, I have nothing to add.

Chair: Time is moving on, but Jesse Norman wanted to come back in quickly.

Q21 **Jesse Norman:** That is very kind, Chair. I fully agree with the point about annularity that Mr Francois has just made. If one thinks about the Treasury standpoint, you have a long-term investment in roads through road infrastructure strategies and the same in rail. Why not in these programmes, and why not more continuity?

The other question I want to raise goes back to the mention you made of China. As a former Transport Minister, I can tell you that three years ago the idea that China would be the globally dominant electric car manufacturer was known within automotive circles, but not more widely. Now that is what it looks like it is going to be. Do you think there is potential for technology dominance or breakout in similar areas of defence technology from China that we are not remotely aware of here at the moment, and that we are not really engaging with through the kinds of programme that we are describing?

Trevor Taylor: The Committee is offering a broad agenda this morning! My take would be that China has obtained and developed technology by a range of means, as we are all aware. Its achievements are really striking, particularly in electric vehicles, as we have seen recently. It is still significantly dependent on Russia for engine technology. In terms of aircraft, we are very fortunate in that we have an excellent engine company and engine companies in the West that really push at the limits and do extraordinary things. That is something that Russia has never been able to match, and the Chinese are still in a catch-up position.

You might imagine that the Chinese are very good on electronics, but even then they have issues around access to components that are not going to diminish. They might be very good at the electronic part of an aircraft, which is what we worry about or think about in terms of a lot of opportunities, but less good at making it go forward and stay in the air in a reliable way.

The engine aspect of GCAP is now clearly established. It is referred to as the power and propulsion system, because the volume of electricity that is required—and will be required as the aircraft goes forward—to power the weaponry and the range of sensors means that that is the next step, if you like, for engine technology. That is a moving target for the Chinese to get after.

I think they may do—you may well be absolutely right that they may have lots of wonderful work going on, but I can't see—

Jesse Norman: It was just a question about your overall assessment. You have been very kind in answering. Thank you very much.

Lucia Retter: I am not an expert on China, so I will not comment on that specifically, but what I would say is that every capability development programme in the MoD involves that sort of threat analysis and an analysis of what potential competitors might do, might have and might develop. The GCAP team that is sitting in London combines those perspectives very much in the discussions about the programme, so I would expect that those perspectives are also brought into whatever decisions get made on the design and the specific technological concepts that get pursued.

Q22 **Sarah Atherton:** Can I go back to exportability and the defence technology and equipment transfer that you mentioned, Ms Retter? Japan is far more restrictive in its approach to that than the UK and Italy. Do you foresee that as problematic, and to what extent? And to what extent do you think that the UK acknowledged that when negotiating GCAP?

Lucia Retter: A lot of these programmes, as we have seen with Eurofighter, evolve over time and involve a lot of iterative discussions, precisely about these sorts of things—who do we export to, can we transfer technology, how much do we build indigenous capability if we export—so I would expect that those subjects will be coming up as we collaborate with Japan in an ongoing way.

Arguably, on Eurofighter Typhoon, collaborating with Germany has not always been particularly easy. The news just yesterday showed us that there was a U-turn on Saudi exports. It is not unusual to have different countries with slightly different perspectives on exportability, for example, or industry workshare. So I would expect that in a relationship of trust and transparency, which hopefully will be established within the GCAP governmental organisations, you would have those frank conversations as the programme evolves, and as perhaps quite concrete opportunities arise. It is all well and good to discuss something in the abstract, but there might be concrete export opportunities where that will have to be discussed in a much more specific way.

Trevor Taylor: I was looking to find the precise bit of the treaty in this pile of paper in front of me. My initial impression on reading the treaty—I would need to check it—is that the parties to this treaty have said that they are going to develop a collaborative or collective approach to exports, which was interesting. Previously, my understanding has been that although the memoranda of understanding are secret, what these things say is that any party can veto an export. That is what we have seen. I think I have seen in this treaty a signal that indicates that that is not a very satisfactory formula and that they are going to try to develop a common form of words to shape that, which presumably, like the treaty, will be in English.

Japanese policy on exports is changing all the time, significantly. They recognise that their previous stance is out of date and they want to do things differently. We may see that with this; it may not be in public, but I think they are looking for a different approach. I will look through the words of the treaty and send a note.

Chair: That would be very helpful.

Q23 **Mr Jones:** Changing the subject, I will turn to the medium-lift helicopter programme. Could you tell us just how important that programme is in terms of capability and the industrial perspective? The MoD set out its commitment to the programme in 2021. Has that changed?

Trevor Taylor: I can only presume that the different stances on this helicopter have been taken on account of a shortage of money. I can only presume that.

In my written evidence, I raised two questions: why did they go for a competition when it says in DSIS that they have a strategic partner, and why the delays? Both of those things may be linked to an effort to drive down cost. There is heavy reliance on the ability of the Puma to keep flying, which may be validated. My concern is simply about what happens if there is a serious accident. These airframes are now very old—I think the first ones came into service in '71—so there is a vulnerability there.

Industrially, clearly the Leonardo proposal involves developing and advancing on an established aircraft. So would the other two partners, but in Leonardo's case the work would be done in the UK. It is a question to present to Leonardo about what development work it would have, in terms of its ability to generate new helicopters, if the thing is postponed further. There is a gap.

I think it is unfortunate when a Government says it is going to do something, changes its mind and then looks to industry or even the public to have trust in it. This is the nature of policy documents. If people look at policy documents and say, "Well, that's not going to happen—it doesn't matter," that is not a good thing for Governments.

Q24 **Mr Jones:** I agree with you. I think it is Treasury—it is money—that is driving the change. At the same time, we have had a commitment on the Chinook programme, which seems rather expensive for quite a small number of aircraft.

Trevor Taylor: The number that I have seen is £1.5 billion for 16 aircraft, which is about £100 million a go, basically. That is expensive. Maybe there is a cultural thing here. The special forces have a tremendous reputation, but they also have a reputation for getting what they want—"We need this, get it for us"—and maybe that price has gone too high in this instance. In terms of money for the two programmes, the medium-lift helicopter is £1 billion and the Chinook is £1.5 billion.

Q25 **Mr Jones:** I think I have heard that it has gone a little bit higher than £1.6 billion. I understand that it is quite a lot higher than that. This is going to give us a real problem, because it means that we will have nearly 60 Chinooks. As you have just described, there will be very ageing airframes in terms of medium lift if we do not actually do some procurement. Does that not put the helicopter fleet that we have completely out of balance?

Trevor Taylor: I feel less confident talking about the military capability involved than about the procurement choices and procurement strategies. The age of the Chinooks that we have varies quite a lot. We had the issue where we went to a standard version and then bought some more, so it goes back. It is a very capable aeroplane, and there is no doubt that the services like it, but it has got to the point of being extremely expensive. In MoD priorities, the cost of the SF Chinook—let's call it that—fleet is looking almost unaffordable. Well, not good value, let's put it that way.

Q26 **Mr Francois:** On that point—sorry to just contradict something: if the special forces always got what they wanted, the Hercules would not have been withdrawn. I think that is an absolute open secret, as my colleague Mr Drax has made very plain in this Committee on multiple occasions, but we are where we are.

The context, as my colleague Mr Jones is alluding to, is that the National Audit Office in its latest examination of the 10-year equipment plan highlighted that the difference between what the MoD has likely got the money for and what it wants to buy is now £17 billion. There is a black hole there, and experience shows that if you buy anything from Boeing, boy, do you pay through the nose for it. Your description of "almost unavailable" for the CH-47G is on the money.

Can we actually afford both these new helicopters at the same time, or, for the reason I have just given of that £17 billion black hole, is it going to turn out in reality to be one or the other?

Trevor Taylor: The £17 billion black hole is, I think, roughly about 10% of the total spend over the period. All I would say is—

Mr Francois: Less than that.

Trevor Taylor: The other thing I would say is that, as long as I have been doing things to do with defence acquisition—and you can see the colour of my hair—there has been a black hole. It is just a fact of life.

Q27 **Mr Francois:** Sorry, last year the NAO assessed that there was a surplus of £2.5 billion, so that is not quite correct. In the 11 years they have been publishing the equipment plan, the deficit has never been this high, so actually this is an exceptional figure.

Trevor Taylor: I think at one point it was £32 billion.

Mr Francois: No, that was a different argument. That wasn't for the equipment plan.

Trevor Taylor: I stand corrected on SF getting—

Mr Francois: Don't set Kevan off on that one.

Mr Jones: Made up by Tory party central office.

Q28 **Mr Francois:** Don't set Kevan off on that one; let's just stick to the equipment plan. The question is: can we afford both at the same time?

Trevor Taylor: "Afford" is a matter of prioritising. The question would be, in capability terms, should we prioritise both these things over other possible ways of using the money? It is not my field of comfort, looking at capability, but it would seem to me that from an industrial point of view, from a prosperity point of view, from a levelling up point of view—those sorts of arguments, certainly—the medium helicopter would have more weight. It may also be that, militarily, it would have more weight, given the size of the Chinook fleet—as you say, we already have 60 Chinooks. It may have more value in the longer term.

Mr Jones: The Chinook programme is actually doing a lot to boost the economy in the United States, rather than here.

Mr Francois: Yes, it is.

Q29 **Sarah Atherton:** Assuming that the new medium-lift helicopter procurement process goes ahead, and differentiating from exports per se, how much weighting do you think is given to awarding a contract to an organisation that has an existing pipeline of exports and commitment, rather than just saying carte balance, "Well, this is the export ability potential of this"? How much do you think the Government look into what their track record is? Have they got a track record, a good existing SME pipeline and commitment?

Trevor Taylor: SMEs, or—?

Sarah Atherton: Exportability, SMEs—they have the structure in place to support what they are saying their exportability is for that procurement project.

Trevor Taylor: There is significant concern in the wider industrial community that cost considerations and risk considerations are overriding many of the commitments in the DSIS. That applies to the solid support ships, which this Committee drew quite a lot of attention to. Of course, we have not yet seen the revision of public procurement regulations, which press commercial people to use competitive tendering when possible, and when you use competitive tendering when possible, we all know that it is a lot easier to get approval for choosing the cheapest case.

I doubt that the export record of the company and their involvement with SMEs has had a major impact on many of the big decisions that we have taken. It would be something of a change, although companies do now go to great lengths to point out the details of their supply chains.

Chair: Thank you very much for your evidence today—we have slightly overrun, although we started later. It will all be very helpful in formulating our report.

Examination of witnesses

Witnesses: Tim Rowntree and Brian Phillipson.

Q30 **Chair:** We now have the second panel for our investigation into aviation. I would ask our two interviewees—one here in person and one over a video link—to introduce themselves, starting with Tim Rowntree.

Tim Rowntree: Good morning. I am Tim Rowntree, a senior associate fellow at RUSI. I have 45 years in defence acquisition in the Ministry of Defence, mostly in the air sector, and I am the former director of OCCAR, the international armament organisation. I also should declare that I am giving some advice into the GCAP project.

Brian Phillipson: Good morning, everybody. I have had more than 50 years in the aircraft industry and more than 20 years at the centre of the Eurofighter programme, initially as the BAE Systems Programme Director as we went through agreement of development contracts and the launch of development, then as the CEO of Eurofighter in Germany as we went into the production phase. Then finally, I left as the COO in 2009 as we were starting with export deliveries. I have also worked in a lot of other collaborative programmes, with the Americans and Swedes, for example, as well as on the Eurofighter and Tornado programmes.

Chair: Thank you very much. Our first question comes from Richard Drax.

Q31 **Richard Drax:** Good afternoon, gentlemen. It is nice to see you. My first question is to you, Mr Phillipson, and the second is to you, Mr Rowntree. During these sessions, acronyms fall from our lips with great ease, and I often wonder whether those viewing understand what on earth we are talking about. I shall refer to two acronyms: OCCAR—I will not bother with the French interpretation, but the English is the organisation for joint armament co-operation—which is an international organisation that manages complex defence equipment programmes, and GCAP, which we heard mentioned several times in the previous hour and is the global combat air programme. I hope that brings a bit of clarity for those watching.

It is generally accepted that the overall delivery mechanism established for Typhoon was flawed. Looking at our report, I see that the costs went from an estimated £7 billion for 250 aircraft in 1985 to £22.9 billion in the NAO estimate of 2011 and total programme costs in excess of £37 billion. By the Bank of England's calculations, that was an increase of 250%. Going back to Typhoon, Mr Phillipson, what were the key structural problems with the Government and industry organisations, and what specific impacts did that have on the ability to deliver the programme?

Brian Phillipson: I think the biggest single issue was the lack of real control from the shared organisations. I listened to the previous session, and people talked a lot about empowerment for the joint agencies. The empowerment on the Eurofighter programme was weak. That resulted in lots of individual changes and delays. That is to say that the two biggest problems that the programme encountered were change and delay—delay specifically associated with indecision.

For example, in the Eurofighter programme there were areas in which industry had responsibility for doing things and taking decisions, but those decisions had to be ratified by all four nations—not by the international agency but by the individual nations. This provided an ideal opportunity for individuals in nations to leverage the programme, often for quite unrelated issues. That caused all sorts of delay during the programme, and the fact that people in the international agencies were often under pressure from their national partners to pursue their national line rather than the international line further reduced the ability of the central agencies to manage the programme effectively. The big problem areas were these changes, delays and indecisions. All of that resulted in disruption to the programme.

There were some very well-known major examples of this. Perhaps the biggest one I should point to was the discontinuity in production associated with tranche 2. The development programme led into production, and production was supposed to be a continuous process, with one batch of aeroplanes leading to the next. There came a point when the nations could not agree to proceed with the second production tranche—the second batch of aeroplanes. That led to industry effectively facing a gap, having to slow down and subsequently build back up again. There was a huge bill associated with that single indecision and delay.

Q32 **Richard Drax:** Would you say that the smaller the number of nations involved in building an aircraft, the more likely you are to get something built quickly and more efficiently, rather than having a massive conglomerate?

Brian Phillipson: I do not think that is the biggest issue. The issue was that the partners, whether the industrial or the nations' ones, were able to leverage narrow interests, and the central agencies did not have the power to prevent that. On the contrary, there were mechanisms built in that facilitated it.

No matter how many partners you have, if you have a management agency on both the Government side and the industrial side that is free to manage the programme and resist some of the narrow interests that come in from outside, that will work just as effectively. If three nations are all pulling in separate directions, that is not good. If four nations were pulling in one direction, that would be much better.

Q33 **Richard Drax:** Thank you, Mr Phillipson. Mr Rowntree, a question for you: what model does OCCAR use to manage programmes across the participating nations, and could a similar approach work for GCAP?

Tim Rowntree: Yes, absolutely. As you may know, OCCAR was created back in the late 1990s because the national armaments directors and the Ministers in the participating nations were quite frustrated by what had happened with some of the earlier programmes, like Tornado and Eurofighter. They wanted to learn from that and do something better, so they tackled things head-on, like the juste retour—the cost share-work share—and they created a thing called global balance, whereby, instead of trying to divvy up every single piece of equipment into 30% German and 30% British, we said, "Go for the best, most competitive provider and look at this work share-cost share thing over many years and all programmes. Look at it at a national level, not at an individual detailed equipment or even programme level."

I used to do a global balance report to the nations. In my time, the portfolio grew from 13 to 16[1] programmes, so there was quite a lot going on there. It used to amaze me when I used to do the global balance report that, when you averaged across all programmes and all time, the nations were remarkably in balance with doing absolutely nothing apart from going for the most competitive piece of equipment that you can get your hands on. That part really worked well. They really wanted to make the organisation itself much more efficient, so we bring people into the organisation—again, by competition, not by national flag. People do not get selected because they are from a particular nation; they get selected because they are the best person. Again, the OCCAR director has a responsibility to look across the organisation and say, "Come on, we're a little bit light on Germany now." Then I would go and encourage the nation concerned to say, "Send me better candidates, please. This is what we are looking for in OCCAR." I would have the responsibility to rebalance that through the way that I selected people to try to redress the balance.

[1] Note from witness: I provided more recent figures in error. During my tenure, the number of programmes in fact increased from 8 to 13.

It also has lots of mechanisms in its rule set, so that other nations can join a programme, even if they are not part of OCCAR. Turkey, as you may know, is a very key partner in the A400M programme, even though they are nothing to do with OCCAR. But under the OCCAR mechanism—if you look at occar.int, you can find all the contracting rules, procedures and everything on the internet in open source—they were able to join the programme on equal terms to the other ones. Again, that is a really interesting lesson for GCAP in terms of exportability.

OCCAR also has a thing called observer status. If you are thinking that a nation could be an export customer, you can offer them observer status. They do not get access to all meetings at all times, but they get a sufficient look-in to the programme, subject to some security checks and things. It warms them up, and they can ask questions. Sometimes, if a nation is looking in at a programme—I have experienced this—they say, "We've got a requirement for this, this and this." When you examine it, you think, "Gosh, so do we," so it is actually quite a win-win situation. For lots of reasons, the OCCAR model has learned from the past. It is an excellent way of running international programmes, and I certainly think that a lot of the lessons from it can really make GCAP work much more efficiently than some of the previous ones. May I just add one other point?

Richard Drax: Yes, please do.

Tim Rowntree: You asked Brian whether having more nations is more difficult, and I agree with his take on this: A400M had six nations in it, and you kind of go over a hump at around two or three. If I was in a long session and one nation had a difficulty, that nation felt real pressure to not block the programme. When I looked across the programmes in OCCAR, I could see different levels of a co-operative culture going on in the different programmes, so what I think we need to do with GCAP is absolutely promote the concept of a responsibility to agree. The governing nations really need to think of the challenge and give us a mandate that takes it on. That will help us to move the programme forward.

Richard Drax: Thank you.

Q34 **Gavin Robinson:** Good morning to you both, gentlemen. Mr Rowntree, because of your European experience through OCCAR I will pitch this to you first. You have talked about the intricacies between different countries. Sometimes there is a political dynamic to how those countries engage with one another. Italy, one of our partners in GCAP, is well known for political stability, or lack thereof. How have you navigated different political machinations that infect what have been, until that point, political consensus or agreements between nations? More importantly, should they arise in this scenario, how would you seek to mitigate them?

Tim Rowntree: As you may know, OCCAR has its own legal identity, so it is able to place and negotiate its own contracts, so we can have a lot of delegated authority. If that sits underneath something of international treaty status, a nation finds it very difficult on a change of Government at a general election or a change of policy to back away from an international treaty obligation. I found this with A400M. We went through a re-baseline in 2010 which, as you remember, was quite an important election year. At that time, we needed to put some more support into the programme because of difficulties that had arisen. Because the international treaty had the mechanism that we need to support this programme, then not supporting the programme would have been the decision. Supporting the programme is the non-decision. We were able to carry on with business as usual through that whole political cycle of a new Government because the UK did not want to back away from an international treaty-level obligation to the long-term security of the programme.

The same happens, of course, with all the other nations in Europe. It is very different from what we had with Eurofighter, where every time one of the four nations had a new Government—that means more than one a year if you think about an average Government tenure of three years—we were always blocked to some extent by a change of Government or political turmoil. That international treaty status which, thankfully, the GCAP is en route to doing, will insulate us against those political cycles and get that delegation and level of authority running.

Q35 **Gavin Robinson:** Thank you. Mr Phillipson, Eurofighter was referenced there. You might have fond memories of some of these machinations politically. Have you got any advice or suggestions that you would like to make to the Committee about the dangers of political volatility and the steps you can take to mitigate their impacting on the delivery of a procurement programme?

Brian Phillipson: First of all, I agree with Tim's comments that when the international agreements are in place it is very difficult for nations to move away from them. To be honest, from a Eurofighter point of view, in terms of big politics—the politics associated with national elections and the like—we saw remarkably few interruptions. We saw lots of minor stuff. Local industrial policy was a major problem area, but once we had agreed, say, a development contract or a production contract, it sailed forward largely untouched by what went on externally. Maybe that is a credit to the ability of those representing the Nations to resist some of the political debate outside, but the programme was not often affected. I have mentioned that the Tranche 2 production was the exception to that. Towards the back end of the programme there were issues over later production batches as well, but the development contract and the early phases of production were not affected by big, national political issues.

One other thing I would say is that there were cash-flow issues and nations did have specific issues associated with continuity of funding. Again, these were handled remarkably well. By and large in the Eurofighter programme, funds did not cross international boundaries, so if there was a funding issue in a nation, the companies of that nation were the people who suffered most. To a large extent, there were side agreements established nationally to work out how to accommodate them. I think that the programme did very well at not being affected by those big political issues, but the reasons it did cope were the same ones that

Tim has made reference to—it was very difficult to step out. On Tranche 2, when it did not progress, the ultimate bill to the nations for the disruption caused was massive—maybe that was a lesson for everybody later on. Indecision and change drives cost. Continuing with the plan that is in place is actually the cheapest way forward.

Q36 **Gavin Robinson:** Thank you, sir. Do you envisage or could you foresee any issues arising with GCAP from political interference or political issues?

Brian Phillipson: Inevitably, you might. At the moment the treaties being put in place look very encouraging. Certainly, from all that I have seen and heard from both the treaties—for example from the UK MoD evidence—and some contact I have had with Japanese officials, people seem to be facing up to this very well. There is a clear requirement for an aeroplane of this type. All the nations share that requirement. They want it in the same timescales, they want it quickly, and they seem to have a strong commitment to it. Perhaps we can talk separately about some of the issues in Japan on export; we have coalition Governments in Japan that could be subject to change—you cannot guarantee these things. I think that the way in which it is being set up so far seems to be putting in place the right sort of political framework that would make stepping out of the plan much more difficult than continuing with it. That is what we need.

Q37 **Chair:** Brian, could I just explore a little bit further the answers you gave to Richard Drax, particularly regarding the introduction of additional partners after the programme is already under way. You will be aware that there have been reports of the possible introductions of Saudi Arabia, Germany and indeed Sweden as well. What are the particular issues that then come about through introducing new partners once the programme is already under way?

Brian Phillipson: Well, I can really pick up some of the things that Trevor talked about in the last session. Let us separate out development from production and downstream phases. To bring in new partners in development once work has been launched is extremely disruptive. I think that an export nation might well have development capability as well as manufacturing capability, and to find room for that development capability in a work-shared development programme is very disruptive. If it is to be done at all, I think it needs to be done around something bounded or extra. You might consider ground aids such as simulators and training aids, or you might bring in integration of new weapons, but to disrupt the basic development programme would be extremely difficult. By comparison, moving production work around is relatively easy, and industry has been doing it for years. I do not know an export programme that did not have some element of offset. Moving work into other nations and setting up nations to be able to do it is something that the industry has been well used to. I think bringing in extra partners to the production phases or the downstream support phases is manageable, but to try and do it in development is extremely difficult.

The other thing I would say is that this programme probably has some unique requirements, because the level of integration of the development partners, and things like the security issues around it, will be quite challenging. Again, to bring a fourth nation into that during the development phase would be really difficult. It would be much easier in the manufacturing phase, and I think that the industrial partners would be quite prepared to look at how they could transfer work out in return for the higher volumes they get from the export sale.

Tim Rowntree: To add to everything that Brian has quite rightly said, I think there is some middle ground, and I give the example of the Boxer vehicle. You are familiar with the fact that the UK was a founding member of that and now is rejoining.

Mr Jones: Don't we know it.

Tim Rowntree: I led the negotiation with Lithuania when they wanted to join Boxer. Fortunately, Boxer was designed on a modular basis—it has a drive unit and then mission modules that you add. In the case of Lithuania, they needed particular capabilities in the add-on mission module—a 30mm gun and various other ideas. They were able to develop those as part of joining the programme, so they did a bit of add-on development. That satisfied them, in the sense of getting some really noble work into the country while at the same time not disrupting the ongoing OCCAR programme.

One thing that is relevant to mention about OCCAR at this point is the "hold harmless" principle, which is built into the treaty. That means that if a nation is already a partner in the programme and, because of some national issue, it needs to change the offtake and reduce the number of systems it is buying—this caused a lot of friction with Tornado—under the OCCAR rules, it compensates the other nations for that. Any nation in an OCCAR programme effectively has a guarantee that its commitment will stay the same unless the industry itself runs into problems, but not because of the behaviour of other partners. That has a stabilising effect. Some nations trail the idea of changing numbers or configurations because of national issues, but when they realise the full cost of compensating everybody, they have a second thought and carry on as they were.

There is a middle ground between the development that Brian mentioned and production if you make the thing modular and upgradable. As we have said, that is a key part of the GCAP concept.

Q38 **Jesse Norman:** To follow up on that very interesting point, if I understand the evidence you have both given, the key to success in one of these projects lies in absolute clarity up front about what you are trying to do and specification in the first instance. Change of mind, change of client and variability are major sources of failure in any procurement.

Tim Rowntree: Yes.

Q39 **Jesse Norman:** The second thing is that there has to be an important cultural fit. We can learn about what are effective and ineffective cultures between the partners—ideally, not too many, but focusing on the right way and prepped and primed in the right way. You have also talked about the institutional factors. The point about stopping nations defecting by building in incentives either through treaties or cost penalties is very interesting. Can you talk a little about how the cost penalty system works? Are you saying to people, "You will bear the marginal cost of your reduction"? Are you saying, "You will bear the average cost of the production loss"? Or are you saying, "We will reach back into the cost structure of the whole thing and bill you a much larger share of the amount of production we have lost," which would be much more punitive? How is that thought of?

Tim Rowntree: It is much simpler than you might think in some cases. I will give the example of France moving some A400M deliveries downstream to a later timescale. The nations agreed that if France needed to do that, fine. Then my people went into negotiation with Airbus and said, "Well, what does that mean for you, in terms of your production line costs, etc.?" We did a deal with Airbus, and we asked it to keep the contract conditions for the five nations the same, and then France would pay the delta. The cost of the end-line disruption was borne by France, as well as the actual delivery cost of the aircraft. In that case, with a single contract through Airbus, it was quite simple. It might be more complicated if you have a programme comprising multiple contracts, but generally we don't have many prime contractors or main contractors in our programmes.

Q40 **Jesse Norman:** Right, so there isn't what you might call a specific protocol for assessing cost and attributing it; there is more of a programme-by-programme, work-it-out, workaround type of approach.

Tim Rowntree: Yes, it is bounded by the specific programme, absolutely. It is only that programme. If you think about Turkey in A400M, they wouldn't want to be impacted by what is happening in other OCCAR programmes, so the financial impact is purely within the programme. Generally, it is the fallout from the commercial negotiation that OCCAR makes with the prime contractor.

Q41 **Jesse Norman:** There isn't a stable methodology that says, "We are going to assess this on an average cost basis, or a marginal cost basis." You essentially look at what the delta is within the programme and try to work it out through administrative means.

Tim Rowntree: It comes from the actual contract amendment. The contract amendment will tell you what economic conditions the contract has been placed in or the amendment is priced in. It will tell you whether it is outturn prices, 2017 prices or whatever, and in that case France will just pay the contract as written with Airbus.

Jesse Norman: Thank you. Brian, did you want to come in on that?

Brian Phillipson: Not really. I agree with what Tim is saying. The contracts usually provide provision for these sorts of things. If there were a major disruption, you would negotiate a contract change and the funds would be allocated accordingly. One other thing I would say is that when there is a really big issue, sometimes nations just have to sit down and reach a compromise, no matter what it might say in the contracts. Realpolitik occasionally says you have to actually agree with your partners on something that was unexpected. An element of give and take is necessary when there is a major difficulty. Certainly what we had on the Eurofighter programme was some very nasty poison pill-associated with full withdrawal but, if there were changes inside the programme, it wasn't quite as clear-cut as the OCCAR arrangements in terms of, if you like, guilt for the costs, and there would be more of a negotiation between the nations on how they would share it.

Q42 **Sarah Atherton:** I am going to chat about GCAP and exports—I will start with Tim, but it's a question to you both. How important is it for defence exports to be built into the programme from the start, or can it be built in at a later date, while in transit, and still be as successful? How reliant is the success of GCAP on potential for exports?

Tim Rowntree: I think, as has been said, the key is to make a really good product, and it is very hard to predict what is exportable because things change. Having said that, it is never too early in my experience to talk to potential export customers and ask, "What would you want if you were a future customer?". As I said, sometimes they come up with some really good ideas on capabilities that we haven't thought of, so that's really good. If you are in a dialogue, you keep your finger on the pulse as to how the politics and the thinking are changing in that country. It may be that that country then asks for observer status and maybe informally starts thinking, "What would be the cost if I had this maritime capability built in for me?"—that kind of thing. There could be some informal discussions to bring that along. I do not think we should design it to export, because it primarily has to do a job for the UK, and it's a hugely important job both militarily and industrially, but we should keep an eye on the export market and make sure we warm up anybody who may be interested for a future date and keep that option open.

Q43 **Sarah Atherton:** Are there any countries that we haven't mentioned so far that you think would be interested, for warming up?

Tim Rowntree: I think we should keep a dialogue with Germany and perhaps Spain, and Sweden may come back in. We talked about the cost of the programme earlier, and we don't know how much this is going to cost. I'm concerned that with the three nations, it's a very big ask financially, so until we have a robust cost model, it is very hard to know whether it is even affordable. That is the truth. It would be a push, even if we had wide European co-operation on this project—affordability would still be a worry. Getting in a big country that can contribute to the financial burden would be good, although I note Brian's point that the later that is, the less opportunity there is to influence both the international construct and the development of the product. But I would never say no or never on new partners.

Sarah Atherton: The same question to you, Brian.

Brian Phillipson: Again, I would agree with Tim's point. The first measure of success is that we develop an aeroplane that meets the requirements of the nations within the timescale and budgets that are required. That is the first success criterion. Beyond that, export is a different measure of success, but clearly, if we can bring in export success, whether it is partnership or direct sales, the financial benefits, continuity benefits and learning curve benefits are massive. The contribution that can be made to offsetting the original acquisition cost is huge. If we look back over things like Harrier and Hawk, the UK effectively acquired its aeroplanes for nothing, because the total export revenues to the exchequer were greater than the original development and acquisition costs. So it can be hugely important, but we have to keep our eye on the first requirement, which is the national defence requirement of developing an aeroplane against the requirements that the nation has assessed.

The other thing I would say about export is that I have been mightily encouraged by the changes that Japan has been making recently. The UK and Italy are well used to export sales. I do not know whether many people have yet caught up with the changes that the Japanese announced just before Christmas, but the commitments that they have made to supporting export in partnership programmes are remarkable. I have never seen a European nation, for example, say that it will guarantee supplies if its partner has decided to export, including direct supplies to the export customer. That is a level of commitment I have not seen from anybody else. It is very encouraging that Japan has moved an awfully long way in helping to support exports. Even though it does not necessarily have the experience that UK and Italy have, I think it is now ahead of us in terms of its commitments to provide support.

Tim Rowntree: May I add another point?

Chair: Of course.

Tim Rowntree: I think unit production cost is a massive thing for the export market. We are putting a lot of energy into digitisation and advanced manufacturing to get the product developed and into the air, but we need to really harness advanced manufacturing to take a massive chunk out of the unit production cost once it is developed. Having been very close with Tornado and Eurofighter particularly, my feeling is that we developed these aircraft and effectively hand-built them with specialist jigs and tools, and then, when we got to what we call production, we just did that a little bit better and as quickly as we could. Certainly, I recall that the production facilities were very quiet, peaceful places.

You think about lessons from Ukraine, where mass—the sheer quantity of equipment that you can get—and the ability to regenerate equipment are absolutely key. With this aircraft, I think we need to have a phase in the middle, when we have developed it and we then get into something we might call a production design phase, where we say, "Right, let's give ourselves a target to take 50% out of the UPC." That will be a massive door opener, both to the export market but also for our own ability to sustain anything like a sizeable conflict in the future. That would be my ask: that we really invest in that.

Q44 **Sarah Atherton:** Tim, for my own interest, can I ask whether the Tempest is being developed so that it can be adapted at a later date to a maritime environment?

Tim Rowntree: I really don't know.

Chair: And possibly also looking at features such as additive manufacturing for spares replacement and the whole logistics side, which therefore makes through-life costs much more—

Tim Rowntree: Absolutely. I should have mentioned that.

Chair: That is a very good and encouraging note on which to end, unless colleagues have any other questions. Thank you very much for your contribution to our deliberations.