HOUSE OF LORDS

UK Engagement with Space Committee

Corrected oral evidence

Monday 19 May 2025

4.40 pm

Watch the meeting

Members present: Baroness Ashton of Upholland (The Chair); Baroness Bonham-Carter of Yarnbury; Baroness Donaghy; Lord Lansley; Baroness Mobarik; Lord Shamash; Viscount Stansgate; Baroness Stowell of Beeston; Lord Tarassenko.

Evidence Session No. 14 Heard in Public Questions 127 – 134

Witnesses

I: James Black, Assistant Director, Defence and Security, RAND Europe; Dr Bleddyn Bowen, Associate Professor of Astropolitics, Durham University.

Examination of witnesses

James Black, Dr Bleddyn Bowen.

Q127 **The Chair:** Welcome back to this session of the UK engagement with space inquiry. I am delighted that we are able to welcome James Black, the assistant director of defence and security at RAND Europe; and Dr Bleddyn Bowen, an associate professor of astropolitics at Durham University. Thank you so much for joining us. As you know, this inquiry is focusing on the economic, regulation and partnership issues; those will be our primary recommendations. You will also know how difficult it is to draw the line between the civil commercial space and what we might call the defence space. So I am very keen that we spend at least some time looking at the dual-use nature of space technology and the whole question of geopolitics, which you will understand well, in the UK space alliances. I invite Viscount Stansgate to start us off with a space security overview.

Viscount Stansgate: Welcome, both of you. Can you provide an overview of the strategic context in which the UK operates in space? Where does space fit into what is, after all, a rapidly changing global environment?

Dr Bleddyn Bowen: Thanks very much for having me here today. We are living in a global space age. Space is an area that is used directly by well over 90 countries that have satellites of their own or companies registered to them that have satellites in space. To give you the numbers for some countries, per the last time I checked the figures, the United States has around 8,500 satellites; China has over 1,000; Russia has 300; Europe collectively has over 1,200; Japan has 110; India has 71; and there are many more countries further down with dozens of satellites. So we are in a very globalised environment. The UK has around 740 satellites, the bulk of which are the OneWeb constellation, which you can technically still call British even though the satellites are made in Florida; of course, it is Europeanising most of the shares now. Without OneWeb, the UK has around 40 to 45 satellites registered. The bulk of those are commercial. Compared to Russia, China and the United States, the UK does not have as much on-orbit presence as other countries.

In line with this, many anti-satellite weapons are proliferating as well. Direct-ascent kinetic energy weapons were mentioned earlier in the session. Four countries have successfully tested those capabilities, and another two have latent capabilities there. The US, China, Russia and India have demonstrated an ability to hit a satellite with a missile that launches from earth, and Israel and Japan have latent missile defence capabilities that can possibly be used in an anti-satellite role, so those weapons are proliferating. Less destructive methods of attacking satellites, such as electronic warfare, jamming, computer network operations, spoofing or falsifying the signals and data of satellites, are much more widely proliferated and harder to track and monitor. Space is becoming a critical infrastructure for every use in modern society in

security and defence—and so are the methods of threatening them or disrupting their use, should the political orders be given.

James Black: I agree with everything Bleddyn has just said. To add a strategic competition spin, it means that we have a domain that is moving incredibly quickly in terms of the technology, the use cases and the applications of that technology. Falling costs of launch are writing the business case for a lot of things that may previously have been pie in the sky: "Wouldn't it be nice if we could do X, Y, and Z? Oh, no, it is too expensive to get to space". It is translating those things into actual, viable business propositions. It is diversifying not just the number of actors in space but the variety of actors in space and the variety of uses to which we put space—the products, the services and so on. This means that it is an area we are tying up more and more equity in—be that economic, political, security or whatever other form of equity you like—but there has not been a commensurate ramp-up in our ability to protect and defend the domain, so equity is effectively becoming more and more at risk.

It is becoming so because the attack surface has increased, as Bleddyn said. The number of objects up there has grown exponentially and continues to do so. It is important to remember that it is not just the satellites themselves; it is the entire system of systems. There are the uplinks and downlinks. There are the ground stations, which often have high levels of security as a fence around them and things like that, as you can have very vulnerable ground stations. Obviously, there is the industrial supply chain, with the cyber risks there. There is a whole cascading range of threats.

To finish, while the dependency and the vulnerability of the attack surface has grown, the incentive for malicious acts has also potentially grown. There are broader geopolitics at the moment that are conducive to a deteriorating threat environment in space. Space is not immune to that and to everything that is happening down on earth. We see a number of actors who have recognised that, if you talk about the military advantage of the UK, the US and its NATO allies, that hinges on space as a crucial enabling domain and on cyber. That is how we do the techno-wizardry that links up all our forces in the military and enables them to fight in a way that is based on precision and qualitative advantage, rather than mass and quantitative advantage.

Countries such as China and Russia have looked at what we did in the First and Second Gulf Wars, picking apart old-school Soviet-armed militaries with ease. We did that because we had all these space-enabled targeting systems, et cetera; they have recognised that as both a key source of strength for us and, consequently, a key vulnerability. When you put all these things together, you have a situation where our dependency is growing but the resources and effort that we are devoting to protecting that equity have not grown at the same pace, which, obviously, potentially creates a destabilising situation.

Viscount Stansgate: Our dependency and vulnerability are growing.

Would you both agree that the definition of "critical natural infrastructure" in this case is not just satellites in space but, as you put it, the links between space and ground?

James Black: Absolutely. It is the ability to tell a satellite what to do; to make sure that it is doing the thing you have told it to do; to understand whatever it is doing; and to pick up the data that you are using for whatever service, whether that is earth observation, intelligence, surveillance, reconnaissance or satellite communications, or whatever that satellite is doing. I know that, in the previous session, we talked a lot about tracking satellites in orbit, tracking debris and things like that, but, crucially, we need to move beyond our ability to track what is happening to our ability to understand what is happening in the domain. That is a slightly jargonistic distinction between space situational awareness and space domain awareness in the business, but it is about the ability to understand why things are doing what they are doing on orbit—is it hostile or is it unintentional, accidental behaviour?—and to read into what is, in some senses, a transparent domain, in that we can all look up and see what is there with technical means.

It is also a very ambiguous domain in other senses—as with some other domains, such as cyber—where hostile actors can do things in a deniable way. Obviously, it is not the same as sending troops across a border. It is much more possible, including with the kind of reversible counter-space capabilities that Bleddyn alluded to, to do things that are concerning to the UK but without triggering a full-blown military response.

Q128 **The Chair:** Bearing in mind what you have both described, do you think that government policy—particularly if you look at the national space strategy, the defence space strategy and everything else we have done—is sufficiently attuned to space security in terms of both the threats and the resilience of our capabilities? If not, what would you do to improve it?

Dr Bleddyn Bowen: In terms of recognising it as an issue, UK policy is understanding the severity of the issue, but, in terms of some of the substance of the policy over many years, no. In the time I have been an academic, the attitude towards space policy, space security and defence policy in space has changed a lot for the better. I do not get as many funny looks when I say, "Oh yes, I do UK defence and space policy". It is now recognised as a thing. The 2014-15 national security space strategy and national space policies really helped put space policy and defence security on the map institutionally in Parliament and Whitehall, which has continued over successive Governments. That has been a good shift.

In terms of the substance of the policy, there is always a disconnect between the ambition of the rhetoric and language and the funds and actions that then do not follow. I would argue that that is true of defence and security on the whole, so space is no different or not particularly unique in that regard—especially when you compare it to other states and our peers in Europe, which have a more focused national effort that includes the private sector. In the UK, I never felt that there was a large national programme you could point to; there are a lot of small things all

over the place but there is no consolidated effort in any one particular direction.

The one key thing that I would recommend is to have a clear national focus with or without the private sector, depending on whether it is more commercial industry, science-orientated or defence and security. The UK has too many little things, whereas other countries have fewer, bigger things and more coherent capability development as a result.

James Black: I agree and would build on that. I should probably declare that RAND has done a lot of research on helping to inform the development and implementation of both the National and Defence Space Strategies. The UK actually has some strengths in space strategy development relative to a number of countries. The UK is active in leading a lot of discussions at the United Nations level about things like responsible space behaviours and trying to de-risk some security challenges and governance challenges. The UK is very active in talking with allies and participating with allies in space operations, such as Olympic Defender and the Combined Space Operations Initiative, which is Anglo-Saxon countries plus major European countries and Japan. We are in all those sorts of fora but, again, it is the 'say-do gap': the strategy implementation and the resourcing gaps are the challenges on both the military and civil sides. As you alluded to earlier, a lot of this is inherently dual-use or dual-purpose, both of which matter.

To put that briefly in context, on the military side, we have historically not invested heavily in national military space capability in the way that the French, the Germans and even the Italians have. That is not necessarily a ranking position we would typically want on military issues; no offence to the Italians, but we obviously aspire to be number one or two in Europe. We have done that because we have had a close relationship with the US, which clearly brings huge benefits in the services we have been able to provide, with access via that and Five Eyes. With the standing up of a Space Command and so on, since 2019 or 2020, we have recognised that we need more of a sovereign capability, both for our own military purposes and as a contribution to our US allies because it needs to be a more equitable relationship. It is not going to be 50:50 but it could be 80:20, not 95:5 or that sort of thing. However, if you look at the investment in that, it is still predominantly overwhelmingly the budget for legacy major programmes, such as Skynet for military satellite communications. There are a tiny number of satellites going up for intelligence gathering purposes.

If you look at our investment on the civil side, we invest something like 0.02% of GDP in civil space, which is way behind not just France, Germany, India and so on but also Belgium and the Czech Republic. We invest about as much as a percentage of GDP as Romania. Again, no offence to Romania, but it is not necessarily the greatest space power in Europe. If you also look at where our investment goes, 75% of the UK Space Agency budget goes into the European Space Agency, so we do not have a large national programme in the way that the French,

Germans or Italians do. We invest far more in the European Space Agency and put our eggs in that basket.

Finally, building on what Bleddyn said, the money is often spread quite widely when we invest in national programmes such as the National Space Innovation Programme. Our historical industrial policy approach has been to let 1,000 flowers bloom rather than to back one or two key things in the way that the French, say, or others have done. This has left us in a position where we do not necessarily have the same clarity on priorities from government to enable industry to focus around one, two, three or four things. It is a bit more "spread and diffuse", which creates challenges when you are trying to compete on a global level—or even just a regional level within Europe.

Q129 **Lord Shamash:** The UK has developed an ambitious strategy for the development of space capability, with the *Space Industrial Plan* highlighting space domain awareness, PNT and satellite communications as key capabilities. There is an acronym, IOSAM, which is earth observation; that might mean more to you than it does to me at the moment. Government investment in launch would also indicate that this is a priority capability. Can you give us a sense of which capabilities you believe it is crucial for the UK to own; which we can collaborate on; and which we would ensure access to? Also, is the current level of government funding for space commensurate with its aims on capability development? That is quite a mouthful to put to you, but I wonder what you both think. Again, thank you for coming.

Dr Bleddyn Bowen: That is a good example. Part of the problem in the approach of space policy and strategy is that it is strategy by listicle. It lists all the capability areas and says that you want to be active in them all but it does not commit to any of them—with the exception of Skynet in satellite communications, which is the flagship of sovereign UK space capabilities. Second are Fylingdales in the North York Moors and, perhaps, the Cawdor Barracks in Pembrokeshire if they get approved. For either of these other capability areas to develop properly anything approaching a sovereign or operationally responsive capability that the Armed Forces would find useful for tactics and operations would be a huge undertaking for the skills, industrial and financial base of the UK.

Using an own-collaborate-access framework is useful to talk about these issues. It is right to continue to focus on the policy area of satellite communications. Areas that are obvious for UK investment to develop targeting capabilities for the long-range weapons our Armed Forces rely on are intelligence, surveillance, and reconnaissance; these include spy satellites taking optical imagery or radar imagery and other forms of intelligence-gathering, including signals intelligence from space. We build the Storm Shadow long-range missile but we are totally reliant on—usually foreign—intelligence services, militaries or companies, mostly the Americans, to give us the targeting data. If we want to have a sovereign conventional long-range missile strike capability, we do not have the backbone that you mentioned earlier to enable the targeting. When we give these things to Ukraine, we cannot give them much targeting data

even though we give them the missiles, so that would be an obvious area.

The ISTARI programme that the MoD is now pursuing is a research and development constellation, not an operational capability. It is deploying five or six satellites and testing out particular niche innovations in them. It is not doing what other countries such as Japan, India, South Korea and Taiwan are doing, which is deciding that they want a couple of dozen—maybe even three dozen—ISR satellites for their own target deck-building capabilities and conventional long-range or over-the-horizon targeting capabilities. I would suggest that we need to own more ISR capabilities than we currently do.

Position navigation and timing are far beyond our capacity to do in any sovereign capabilities; I gave evidence on this to the Brexit Select Committee in the House of Commons back in 2018. Sadly, we cannot muster the capability to do it as it would be an immensely long-term, costly project. It is important, though, that we negotiate access with the European Union's Galileo navigation system and its PRS—its high-grade, high-security, precision, military-grade navigation service—as a back-up to GPS as well. Launch is another area. The UK has not invested in the capability to launch the big satellites that we would want to launch for defence purposes. It would be extremely costly to do, and we do not have the ideal facilities or territory to launch those kinds of satellites in those orbits. Space situational awareness is an area where we can do more. It is maybe an area for more owning as well; that is where DARC in Pembrokeshire comes in.

James Black: I agree. We did a report for the Ministry of Defence; it is on GOV.UK but I can share it with you. It tried to develop a decision support tool so that the MoD can make its own collaborative access choices. I wish I had a flip chart with me but, in effect, it is a logic flow: "What is your requirement? Is it something that already exists? If yes, great, go do that. If no, do you need it immediately or is it a slower burn?" It works you through all these sorts of questions and a lot of the outcomes get quite messy. It is not as straightforward as whether something is really essential, therefore we have to own it and have sovereign miniature capability, because there is also a question about when we need to own it. If the answer is that we need to own it right now but it is going to take five or 10 years for UK industry to produce it, we are just going to have to suck it up and tolerate that we are dependent on an off-the-shelf solution from an ally, a foreign company or whatever. It walks you through those sorts of situations: things that you must own, things that you probably should own and things that you are forced to collaborate on, versus those things that you proactively try to access from the market or collaborate on where you can.

Because it gets quite messy when you start talking about dual-use capability, it is really important to distinguish between the military versus the civil or commercial requirements here, because there is a very different definition of "must be sovereign" in that debate. If we are

talking about civil and commercial, there are a bunch of strengths that the UK has, such as space weather, instrumentation and active debris removal, which there is potentially a market for and which the market will drive. The Government and the military in particular will be minor players and are not going to spend enough money to move the dial on that market in most cases; there are some niches, but mostly not. In the military applications, there are going to be certain things where there is much more purchasing power for the Government and, therefore, they can actually make more of an impact. Bleddyn has done a good job of emphasising a number of the priorities.

One of the final things I would say is that it is about recognising the increasing threat environment that all that capability is going into, which means that the way we design the capability needs to look different. It is not about one or two satellites that are highly exquisite, vulnerable, unguarded targets; it is about having more proliferated constellations of a larger number of satellites that give you resilience, as well as having non-space-based alternatives to things so that you have redundancies and reversionary modes if you do not have access to the space service in question. It is also about working with the commercial sector so that you can draw on its data and stuff wherever you can and entangle the two. Crucially, it is about having some sort of deterrence there to protect it. If you look at the value of the Skynet constellation or our aircraft carrier groups, there is not an entirely dissimilar amount of money that has gone into them for a very different level of protection.

The Chair: Thank you very much. I am going to ask Baroness Donaghy to ask her question but we may be voting in a minute, so you can at least think about the question even if you do not have a chance to answer.

Q130 **Baroness Donaghy:** To some extent, you have already moved into the dual-use area. As there is evidence of higher military spending by the UK Government, can you suggest any other areas where our vibrant space sector could be useful and which it could move into?

James Black: I will go first on this one. It is important to recognise that, although more money for defence is a good thing in the current environment—

The Chair: We are going to suspend the session for voting.

The committee suspended for a Division in the House of Lords.

The Chair: Welcome back to this session where we are looking at some security issues. Baroness Donaghy had just asked a question, which she will reprise briefly.

Baroness Donaghy: It is just the final sentence, which I do not think I got out before: does the Government's commitment to higher military spending present opportunities to provide greater support to UK-based space firms?

James Black: The short answer is yes, but not as much as one might think. We are increasing defence spending, which is absolutely essential in the geopolitical environment in which we find ourselves, given the state of the UK military more broadly and the role that the UK wants to play in European security, NATO, supporting Ukraine and the long list of things it wants to do. Although they are disruptive to our government budgets, we must recognise that the increases are not enormous in the grand scheme of things. They are certainly very small compared to what other countries are doing as a percentage of GDP. Moving up to 2.6%, 2.7% or even 3% of GDP largely addresses an existing hole in the finances for the equipment plan that defence already has; it does not really give you lots of new money to spend on new things.

I know that we are waiting for the Strategic Defence Review to drop and all these sorts of things but, if you look at the Defence Equipment Plan as it exists, short of massive disinvestment in certain areas, there is not an enormous space in that for space. Most of that money is tied up in things like Skynet, which is a military satellite communication system, as has been alluded to. Yes, it is some money, but it does not transform the picture.

If we want to go a lot further, bluntly, more resource is needed. We were just discussing this in the break. There is a recurring danger in UK defence policy-making, specifically around things like space, that we can always look for a smarter policy or set of priorities that, through the dint of their sheer cunning, will get us around physics or finances. The reality is that you just need to spend money on capability and give the end-users the ability to go out and do the things that they need to do as operators.

If we cannot do that, we need to recognise that we are carrying some risk and try to mitigate that in other ways—for example, by investing in non-space-based alternatives and saying, "We're probably not going to have access to certain services in a major war, so we need to train people and have alternative systems that they can fall back on". Or we need to double down on certain partnerships with key allies and say, "We're going to work more closely with country X, Y and Z. They will provide us with a capability but we will not have the sovereignty, full security of supply and so on that we might be comfortable with".

Dr Bleddyn Bowen: The global space industry is more often than not tied to military industrial complexes. The big space industry primes are also usually the arms companies; that has been true since the start of the space age. In terms of the UK's position, it would be very difficult to have a truly sovereign British industrial capacity feeding into what may be operationally sovereign for the British, because the big companies are going to be either American, British-American or European prime contractors. Other British companies are going to be much smaller. So, it very much depends on where the investment comes from.

If we are looking at a very large defence project, we are looking at a very large prime. There could be some more British opportunities with niche

research and development, smaller-scale and perhaps civil programmes, or more economically and commercially-orientated programmes. Britain is very successful in smaller satellite manufacturing and design; Clyde Space and Surrey Satellites are examples of that. It very much depends on what kind of programme you want and whether more of that is located in Britain. A company such as Inmarsat is registered here in London but its manufacturing is all across Europe and the United States, I believe. There are a lot of transnational companies involved.

In general, more defence spending is needed. We will see what happens with our partnership with the European Union and whatever agreements come forward. There should be more opportunities for British companies in the space sector as there is more spending on space, as part of the European Union's own increasing interest in defence spending on space, because the EU recognises that European autonomy in space is really important and that there are natural security and defence derivatives from that.

Q131 **Baroness Mobarik:** Historically, the UK-US relationship in space has been strong—for example, with intelligence co-operation such as Five Eyes, defence collaboration and so on—but how do you envisage the UK's relationship with the US on space-related matters evolving? Where are the strategic risks and opportunities when it comes to the US?

Dr Bleddyn Bowen: In many news pieces I have read in the past five or six months, journalists have wanted to dispel the notion that there ever was a special relationship between America and Britain. However, if you look at space, missile, nuclear, intelligence and cryptography, those areas are where there really is a special relationship between Britain and the United States and where Britain is, in many ways, dependent on the United States.

Back in the early Cold War, Britain decided to abandon its own efforts at being a satellite-launching and nuclear-weapon state in terms of a full sovereign nuclear weapons capability—more or less the missiles—because the Americans provided everything we wanted in the end after enough negotiation. That has continued to be the situation. Unlike the French and other western European states, we have never felt the pressure to develop those kinds of sovereign space capabilities, so we are extremely dependent on the Americans; maintaining that relationship is of supreme importance.

Given the events and the discourse of the past five or six months, my faith in the United States has been shaken. It is a real conundrum for the British, not just in space. If things get to the point where UK-US relations deteriorate, we will have a string of structural problems to deal with in terms of defence capabilities, given that so many of our defence companies are Anglo-American these days; there are real issues to sort out there. In terms of real co-operation, I have not heard of a scaling back of the day-to-day, military-to-military co-operation on activities. UK Space Command is still highly integrated with the activities of the US

Space Force, and exchanges are happening. The rhetoric is alarming and concerns me.

On industrial partnership, I mentioned the DARC radar proposed for Pembrokeshire; that is seemingly going ahead. Lockheed Martin will be building the radar equipment for that, so, in terms of actual co-operation and industrial partnership, I am not too concerned about material changes in the relationship, although the rhetoric has been alarming in the last five months.

James Black: I agree that there is huge integration between the two countries at the day-to-day operational level. It is worth stressing that, although the US is certainly not as dependent on us as we are on it, we equally make some important, niche contributions, particularly around things such as geography. We provide basing territory for key nodes in its space surveillance network. We have RAF Fylingdales, which, although it is a ballistic missile-orientated facility first and foremost, also has an important space role. There are also other overseas territories and so on that play an important role in the US system. The UK then brings its own capabilities, which, while not always of the same magnitude as the American ones, help it by providing resilience and duplication when it faces threats from the Chinese, the Russians or whoever. It is obviously useful for it to have a UK service that it can fall back on.

I remember that, back in the Biden Administration, there was still a strong emphasis from the MoD Space Directorate and UK Space Command on trying to rebalance that relationship, though we are clearly the junior partner in terms of our resources, population, scale and so on. We absolutely can make the relationship somewhat more equitable, which is useful to the Americans in terms of providing them with the resilience redundancy I mentioned and taking some pressure off them. It is also useful to us in terms of hedging by having a level of sovereign capability that we can fall back on. Linking back to our discussion on priorities, there is a question around whether you try to do a sliver of everything—we are doing a little of everything the US is doing—or try to prioritise and say, "We're going to be really good and perhaps even take the lead on certain niches; that will provide an overall value proposition".

I will just end on that phrase: "value proposition". We talk a lot in our strategy documents about collaborating and our capability development plans. We do not always think about what is in it for the people we are collaborating with. Sometimes, it is a hunk of money, but it is often much more interesting if you offer some interesting technology, intellectual property and those sorts of things, which rely on having sovereign R&D programmes, industry programmes, et cetera. If you have some interesting kit, you can go to the Americans or whoever else and say, "We can do this; you cannot do it. We can do it a bit better".

Lord Lansley: I want to sneak a couple of supplementary questions in. Dr Bowen, you talked earlier about how we are never going to develop our own PNT capability. We rely on GPS, but you implied that we want to be in Galileo. Is that because there are complementary benefits

associated with those two or because this is simply about reducing reliance on the US GPS?

Dr Bleddyn Bowen: It is important to clarify the acronyms here. PNT refers to any kind of position, navigation and timing technology, including those based on earth, in the air, at sea, underground and in space. My earlier comments focused on global navigation satellite systems: the American GPS, the European Galileo, the Chinese BeiDou and the Russian GLONASS. Those GNSS systems are far beyond the pale for UK finances and capabilities right now. There are other areas, perhaps terrestrial back-up systems that the UK could redevelop, such as eLoran. We used to have radio beacon navigation systems on the ground but they were decommissioned once GPS started doing everything for us. So there is other non-space PNT that we could do as a back-up.

During the Biden and Trump Administrations, they were already moving towards negotiating with the European Union and Norway on having military access to Galileo as a back-up to GPS. From a NATO perspective, you want NATO members to be able to use GPS and Galileo because, if something bad happens to GPS—for example, in the James Bond film "Tomorrow Never Dies", somebody puts false data into GPS, spoofs the signal and sends a warship off course—then you have Galileo to give you another option, or you would have to do something to both independent systems. That is an example of the need for two systems. We will no longer have participation as a contractor for Galileo unless an amazing deal is struck in the next few weeks.

Lord Lansley: That is not impossible.

Dr Bleddyn Bowen: Access as a user for the military-grade service of Galileo is so important for resilience and redundancy.

The Chair: I am conscious of time because we have to stop this session in 20 minutes, so let us just keep moving along; if there is time at the end, I am very happy for you to come back to this.

Q132 **Baroness Bonham-Carter of Yarnbury:** I am returning to domestic policy; the questions have shifted around. Does the separation of space between several government departments affect in a negative way the UK's ability to develop capabilities that can be deployed for military, civil and commercial purposes? You probably know about the House of Commons Defence Committee report, which suggested that "a Minister for Space should be appointed within the Cabinet Office to provide clear centralised direction". I do not know what your views are on that.

Dr Bleddyn Bowen: For me, this question comes down more to the people you put in those positions and what sort of authority, political cover, budget or finance they have discretion over. Boris Johnson's Government set up the National Space Council on paper; I have not been able to read or hear anything much about what it did. It was supposed to be at the Cabinet level but, at least in public, as far as I could find in my internet trawling, I could not really see what, if anything, it actually did.

These things have been tried to be done before. I do not understand the system well enough to know whether a Minister is better than a Cabinet-level council, but you need the right people who are able to make the right decisions with the correct political support—and, importantly, who are able to make the net assessments needed. You need people who understand a lot of different kinds of space and terrestrial technologies, as well as the different sectors of activities that they relate to: civil, military, commercial, industrial, research, et cetera. It is a real challenge for one person to be able to make all the right decisions all the time on those issues.

Baroness Bonham-Carter of Yarnbury: I am sorry to interrupt before you, Mr Black, answer. Perhaps I put the question badly. I suppose what I am asking is: do you think that there should be one administrative body that brings together defence and civil affairs where space is concerned?

Dr Bleddyn Bowen: It depends on what you mean by "bringing together" because different sectors will need to make specific and unique decisions that other sectors may not understand.

Baroness Bonham-Carter of Yarnbury: That sounds like a no to me.

Dr Bleddyn Bowen: It depends because, even when you have siloing, you need to have some co-ordination as well, because we do not have many resources and we need to make sure that the pound goes the furthest it can. So there needs to be some co-ordination role but, in my experience of talking to many people across many different space communities, you will often have space scientists never talking to military people and vice versa because they are in different universes. Getting one person who understands all of that would be a challenge, but you still need co-ordination, accountability and leadership at the top; they are so important. In the past, there has not been strong cross-sectoral leadership from government independent of industry and party-political influence.

James Black: It is important to note that there is a tendency to look for structural solutions to either political or cultural problems. There is a whole variety of models you can have for what the organogram of government looks like; any of them will have pros and cons. If all the defence space policy stuff is moved out of the MoD to integrate it more with civil, you have just created a divide between space and the other operational domains for the military; they will see that as something civil servants worry about and not something that the military has to think about. Conversely, if you put the civil and commercial stuff in with defence, you have suddenly securitised space, so even going and having conversations with certain countries about partnerships becomes quite difficult. Those countries will say, "This is a military effort. Why are you talking to us?"

I am actually fairly ambivalent about what the structure looks like. I am loath to create lots of churn and change by having 18 months of change

programmes that take time to bed in, where everyone has to reprint all their business cards and that sort of stuff. Strong political leadership is much more important to me: it unlocks the clarity of direction and is the cauldron of cultural and process-level stuff. I have worked a lot for and with people across all sorts of departments, including the MoD, DSIT and the Space Agency. There is a willingness and desire to collaborate but, often, the incentive structures do not really enable that as much as they should: the internal planning and budgetary cycles do not line up; the ministerial changes get in the way of decision-making in one department; and all those sorts of things. Addressing the high-level political bit, a Minister for Space may catalyse that clarity. Otherwise, it is about enabling the cultural change of collaboration—not, "We need a new logo and a new building". I do not think that that is the solution.

Q133 **Baroness Stowell of Beeston:** I would like to talk about the UK's relationship with Europe in the context of defence and security. Where do you think space fits into that? Do you think that we should seek greater participation? I do not know whether you are aware but, in the statement that was issued following the talks this morning, there is apparently an agreement that the UK is going to have deeper co-operation and greater information exchanges with the EU on defence. It would be helpful to get your take on this and where you think there might be a priority for focus.

Dr Bleddyn Bowen: Although we have been dependent on the United States on security and defence in many ways, we have also integrated fully in the European commercial, industrial, space science and research and development system. We were founding members of the European Space Agency back in 1973 and, during the Theresa May Government, our funding for ESA went up quite significantly; that was the right direction to take. ESA is not an agency of the European Union—it is separate from the EU—but the EU remains the single biggest contributor to its budget. Britain is, I think, fifth on the list of contributions behind the EU, France, Germany and Italy.

We heard that 75% of the civil UK budget goes to ESA. That then comes back to us in shared co-operative projects that we just cannot do ourselves because all of Europe is co-ordinating. The EU investing more in defence is really important and we should be aligning more closely with it, especially in terms of resilience and redundancy but also as a natural partner for us in the further continued development of our space industry. Airbus is still such a huge part of the British space industry; it is a dominant force in the European space sector and does a lot of the building work for ESA.

I want to see more engagement and activity with the European Space Agency as a means to support any greater national effort because the other big European states—France, Germany, Italy and Spain—have large national programmes as well as strong ESA contributions and engagement. The European Union will invest more in defence security, a lot of which will be done through the European Space Agency, so it is important that we play a constructive and active role through the European Space Agency.

James Black: I agree completely. We need more collaboration with the EU to avoid that influence we talked about—the influence that the EU and its major member states have within ESA. If ESA remains our primary vehicle for our civil space investments, clearly, we want to maximise our influence over the direction in which those programmes and missions go. There has been a lot of effort in recent years to improve our geo-return from those contracts. They used to be not as good as they should be, but they have improved, so we are getting more money back in line with the money we are spending. Some initiatives to support that will be wrapping up now that we have kind of evened up. We want to continue with those sorts of things. We just did a big report for the UK Space Agency evaluating the ESA strategy and what the UK gets from it; there is lots of positive news from that, which we want to continue. A lot of it is ultimately about engaging with the EU as one of the other major customers and participants.

Given the pace of change in the space sector, not just technologically but commercially, and given the challenges because the American space industry is moving ahead—including the challenges that that poses to some legacy companies in Europe—we will potentially see things like industrial consolidation or change in the European space sector, which has security implications economically and nationally. So, clearly, we want to have a conscious approach to what the UK's participation is in that and to understand what the implications might mean for us, because having a healthier and more vibrant European regional space sector is good for the UK not just economically but in security terms. It provides an alternative to having to buy stuff from SpaceX every time, for example.

Q134 **The Chair:** I have a quick last question for you, though I suspect that there may be more conversation when we close this session down. Very quickly—if you do not mind—are there any other states that we should be engaging with or increasing our engagement with? Just give me a quick list.

Dr Bleddyn Bowen: Japan, South Korea, Taiwan and India. They are all making very large investments, which I referred to earlier, in security and defence specifically as well as in their wider space industries. British companies are already paying India to launch their satellites into space. India is a really serious space power. The most interesting things happening in space right now are happening with the Asian space powers.

James Black: I agree. Picking up on the Japan example, we have a number of companies that straddle the two, such as Astroscale. There are lessons that we can learn from it as a country with broadly similar scale and resources, including in terms of some of the operational and military problems that it faces with regards to China; those are not so dissimilar to what we face in the Euro-Atlantic region with Russia or what we face in space with China. The Japanese MoD has just, I think, signed a contract with Astroscale to try a kind of bodyguard satellite out with its military. We could think about and learn lessons from those sorts of things.

I would add to the list Norway, which is also interesting. They are a country playing a niche geographic role in looking at the role that space services can provide in Arctic security. The UK regards itself as the Arctic's closest neighbour, obviously, and we have an aspiration for greater military contribution in the High North. Those Nordic countries are interesting.

To finish up—this is more on the civil side than the military side—it is interesting that we now have a bilateral programme for engaging in space missions. The reliance on ESA has positives but the bilateral programme builds relationships in the civil space area that we can then perhaps pull across either to more dual-use, dual-purpose capabilities or to overtly military-to-military co-operation.

The Chair: You have both been incredibly generous with your time and given us a huge amount of information in a short period. Thank you so much for joining us. I formally bring this public evidence session to a close.