

Science, Innovation and Technology Committee

Oral evidence: Science diplomacy, HC 838

Tuesday 27 January 2026

Ordered by the House of Commons to be published on 27 January 2026.

[Watch the meeting](#)

Members present: Dame Chi Onwurah (Chair); Emily Darlington; George Freeman; Kit Malthouse; Samantha Niblett; Dr Lauren Sullivan; Freddie van Mierlo; Daniel Zeichner.

Questions 207 - 275

Witnesses

[I](#): Dr Sania Nishtar, CEO, Gavi.

[II](#): Dr Alice Bunn, President UKspace; and Graham Turnock, Ex-CEO, UK Space Agency.

[III](#): Will Whitehorn, Chair, Seraphim Space Investment Trust.

Written evidence from witnesses:

- [Gavi](#)

Examination of witness

Witness: Dr Nishtar.

Chair: Welcome to the Committee's fourth session in our inquiry into science diplomacy. At this very interesting geopolitical time, the Committee wanted to look into the threats and opportunities facing the UK's international standing in science. We chose to do that through four lenses: health, life sciences, quantum and space. Today we will hear more about health from Gavi, before turning to space. For our first panel, we have Dr Sania Nishtar. I ask you to introduce yourself in responding to the first question, which comes from Lauren.

Q207 **Dr Sullivan:** Lovely, thank you, Chair. Thank you so much for joining us today. For people who may not be familiar with Gavi, 1.2 billion children have been vaccinated around the world. Could you tell us a little about Gavi as an organisation and its mission?

Dr Nishtar: Thank you very much. I am Dr Sania Nishtar, CEO of Gavi, the vaccine alliance. Thank you for that question. Gavi is basically a public-private partnership. It is an international organisation based in Switzerland. The UK should be very proud because you were one of its founding members. Since Gavi's creation, 1.2 billion children have been vaccinated, saving 20 million lives and accruing more than \$300 million-worth of economic benefits to society. As you know, immunisation is one of the best buys in global health. It has helped save more than 154 million lives to date, and Gavi has played a very important role in that.

The background of Gavi's creation is important to appreciate. There was a time when the expanded programme of immunisation had driven up vaccinations, saving lives. Then came a critical stumbling block, because the costs of vaccines were very high. That posed a serious challenge to access. Therefore, Gavi was established as a public-private partnership. We work with the pharmaceutical sector closely, including pharmaceutical entities from within the UK. We crowdsource demand from half the world's children, and that enables us to drive down costs dramatically, which allows more than 50 countries of the world to access vaccines.

We have a very innovative model. We do not operate like a charity. Gavi pays and countries co-pay for vaccines as well. Ultimately, countries graduate out of Gavi support, so it is not technically aid. It is like an investment. To date, more than 18 countries have graduated out of Gavi support. Countries as large as India and Indonesia have graduated out as well.

Q208 **Dr Sullivan:** Can I ask you a little bit about that? In the lifespan of how long Gavi has been around and these 18 countries that are now self-financing, what does that mean in reality? Does that mean that UK money or aid is no longer going there? How does it work?



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Dr Nishtar: The countries that have graduated are, totally, 100% self-financing their own vaccines from their own indigenous resources. UK money does not have to be channelled to those countries at all.

Q209 **Dr Sullivan:** We have a lot of amazing life sciences in the UK. Are some of the formulations and discoveries that have been made in the UK also helping the wider world?

Dr Nishtar: Absolutely. The UK is the crucible of innovation and science. What we do is to bring your science and innovations, with humility, to the world stage. You should be very proud that, during the covid-19 pandemic, the Oxford-AstraZeneca vaccine developed was pioneering work. The modelling work done at Imperial College resonated all over the world. I was then in the Cabinet in Pakistan and we used to have daily briefings on data from Imperial College. GSK is the pharmaceutical company we work with. We have produced more than \$3.9 billion-worth of vaccines since 2010.

Of course, there are many other critical science-based innovations. There are innovators working out of Cambridge on very innovative solutions to develop a biometric signature for children who do not yet have fingerprints. There is a long list of collaborations. GSK has developed two of the pioneering malaria vaccines. We ended last year by rolling out 30 million doses of malaria vaccine in 24 African countries, where they are hugely welcome and there is huge demand. So there is a huge interplay of UK science and innovation into Gavi operations. We are very proud of that partnership.

Q210 **Dr Sullivan:** Certainly with the malaria vaccine, given that malaria kills children under five, which is absolutely heartbreaking, it is fantastic that those vaccines are getting out to them. Do you feel, given the political and global climate we face at the moment, that cuts to aid in the UK have affected the global standing in which the world views the UK?

Dr Nishtar: We are very grateful that the UK has maintained its support for Gavi. That will bring value for millions of children on the ground. It will help us to continue our critical work. We are very grateful and honoured that, despite fiscal pressures and competing priorities internally, the UK continues to prioritise support for, for example, Gavi and the Global Fund, two organisations that operate at scale at the global level.

Q211 **Dr Sullivan:** I have one last question. There is, seemingly, misinformation and disinformation about vaccines and their amazing power in public health. In essence, good health is allowing people to have good jobs from a social justice point of view. Do you see in other countries this kind of suspicion or distrust of vaccines and vaccine technology? If so, what is the antidote to that?

Dr Nishtar: Misinformation is a real challenge for us. Unfortunately, in the day and age of social media, there is an incentive for lies, misinformation and controversial matters to get amplified. That is



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something we are battling with. But the reality is that there is no decline in the demand for vaccines. We just talked about the malaria vaccine. There was effectively a competition in Africa for who would introduce the malaria vaccine earliest. We are introducing the malaria vaccine into the 25th country in January. This has been the fastest deployment in the history of vaccines. There is a huge demand for all the childhood vaccines, such as the new HPV vaccine. The tuberculosis vaccine, thanks to British investment, science and engagement, appears to be on the anvil, and hopefully with us in the next five years. There is a huge demand for these vaccines. Of course, misinformation is a challenge. We are battling it by disseminating the right information and engaging Governments and communities proactively.

Dr Sullivan: Thank you.

Chair: Thank you very much, Lauren. Thank you for emphasising to us the appetite for vaccines in Africa and across the world. I think that that is particularly relevant on the day that the UK lost its measles elimination status because of declining rates of measles vaccine, though that decline is to 95%.

Q212 **Freddie van Mierlo:** I will follow on from some of the questions my colleague asked. What is the potential opportunity for the UK to lead on vaccines and global health in particular, given the political situation in the US? We have seen the US very recently leave the WHO and defund Gavi, and we have seen unease and unrest at the CDC. What opportunities are there for the UK to lead, given that the US is absenting itself?

Dr Nishtar: I think there is a huge opportunity for the UK to lead. The world is looking at you. You are a very important country. Through your Commonwealth footprint, you have direct engagement with so many countries of the world. You are clearly a world leader. This is a huge space in which to step because there is a massive need. Global health is not just relevant to our countries in the south; it is equally relevant to countries in the north, with reference to health security. I published a paper in the *Lancet* three days ago entitled "Global health leap: an urgent call to action", in which, respectfully and with a lot of humility, I recommended that the world needs an international panel co-convened by a head of state from the north and a head of state from the south. That is because there are a number of different imperatives with respect to the next steps, setting of objectives and principles, and getting alignment of the process of reform of the globalised architecture. I think there is a huge opportunity for the UK. It has the moral authority to do that because you have been such an important player in this space in the past.

Q213 **Freddie van Mierlo:** Conversely then, what would be the impact if we had a new Government come to power in the UK that was much more critical of investment in overseas aid and the benefits of vaccines? There are parties within the UK that take that position. What would be the impact for global health and for the UK?



Dr Nishtar: I think you need to understand what value investments in institutions like Gavi bring to your domestic audience, your electorate, the people in the United Kingdom. That is very important to understand. An investment in Gavi is not just an investment in the future of 500 million children over the next five years, which is what our strategy articulates. It is also an investment in the health security of people in the UK because Gavi maintains vaccine stockpiles for the world.

To give you an example, back in 2016 when the Ebola outbreak struck in western Africa, all hell broke loose. Ebola spread all over the world. Subsequently, mechanisms were put in place and the Ebola stockpile was created. Now, when there was another outbreak, nobody even heard about it.

I think that your population, the general public, need to understand that an investment in Gavi is an investment in health security which directly impacts them. First, we maintain the stockpile and have special financing instruments. Secondly, we directly engage with your commercial entities. The UK Government give us a contribution; we buy vaccines worth almost equal to that contribution from your pharmaceutical companies. That means an input into your economy, which means job creation, which means livelihoods. That is a very important consideration for the general public.

Then, of course, we help to present the UK's soft image internationally. You are the crucible of innovation and science. We give you market access. We bring that science to global platforms, which helps save lives. That is a very important foreign policy consideration for any Government. For all three reasons, investment in an institution like Gavi is not just aid; it is not charity. It is an investment.

In the same vein, we are currently executing what is called the Gavi Leap reform, which is very aligned with your line of thinking on where international development should lead. There are many points of convergence. As a former parliamentarian, I know that your first responsibility has to be to people in your own constituencies. That is how it ought to be. But I think we need to explain to people that it is to their benefit that the UK Government support institutions like Gavi.

Q214 **Freddie van Mierlo:** Thank you. You have answered my next question very eloquently; it was around what the benefits are to the UK. You did an excellent job of explaining that. A further question to that is: what role can we as politicians have in communicating those benefits and ensuring that there is widespread public support?

Dr Nishtar: I think there is an art to communicating evidence and science in layman's language. You have very sophisticated communication machines. It is important that there should be public support for investments in institutions like Gavi. People need to understand that it is for their own good, in addition to being for the good of children in the world. I think communicating difficult, complicated and



science-based evidence into messages that resonate with the public is entirely achievable.

- Q215 **Freddie van Mierlo:** If the benefits are so high—I think we broadly agree with that, especially if we get the money back through investment in our own pharmaceutical industry—why do you think the Government took the decision to reduce their funding to Gavi over the next funding period? What is the impact of that? One campaign, for example, says that that decision alone will cost 400,000 lives. I know earlier that you refrained from criticising the Government and I think you are in a difficult position given that the Government fund you, but perhaps you could speak a little bit to that.

Dr Nishtar: I think I have to be objective here, because I have also been on the Government Benches in my country. When you are in government, you have fiscal realities and there are competing priorities, as your Government have here. There are ongoing conflicts and some foreign policy decisions you have taken. There are the costs of settlement of refugees. Notwithstanding all that, the Government bent over backwards to take out an allocation for Gavi. Yes, there were cuts and we wish there had not been, but if I put myself in their shoes they really bent over backwards. While we engaged with them, we could see that they were proud of their investments in Gavi and were really making an effort to continue to maintain them. We were very touched and moved by the bipartisan support that we continue to see for Gavi. In very difficult circumstances, the UK Government and legislators on both sides of the aisle came forward and made this contribution. We are hugely grateful for that.

Freddie van Mierlo: One more question, Chair?

Chair: Very quickly.

- Q216 **Freddie van Mierlo:** I am interested in what you said about the malaria vaccine. Do you think that will also save money in developing countries—for example, the money spent on healthcare in treating those conditions? Do you think that would be a good investment in those countries?

Dr Nishtar: An investment in the health of children—an investment to treat a disease that kills children—always pays off, and there are economic mathematical models that speak in favour of that. I wonder whether you have ever seen a child die as a result of malaria convulsions. It is a horrific sight to see a child die because of cerebral malaria convulsions, and to know there is a vaccine that can prevent that is truly touching.

Kit Malthouse: Beyond measure, yes.

Dr Nishtar: It is beyond anything that can be quantified. I think you should be very proud that your science engine has delivered that vaccine. You should be very proud of supporting an institution that brings its



market-shaping machinery into play to make it accessible to all African countries that need it.

Chair: I had malaria and malarial convulsions as a baby and I remember my father describing to me just how terrifying that was as a parent. Obviously, I survived, but, as you say, ensuring that no child and no parent should go through that again is a wonderful mission.

Q217 **Emily Darlington:** You have already answered a lot of the questions I had. You have set out very well why the UK public should care about this, not least because malaria is moving north—maybe it is in Europe now—and we can use this vaccine effectively to make sure we are inoculating our own population. We saw your very crucial role during covid in ensuring that the pandemic that affected us all was as short as it possibly could be through the vaccination programme to stop the further mutations that we knew were extending its lifeline. You also explained quite eloquently the return to UK plc and why economically we should care.

The third pillar of this is how the UK can better use its science and innovation in life sciences through organisations like Gavi to have soft power around the world. Could you say a little more about how our contribution to Gavi and our science and innovation going through that is perceived in the global south, and how that benefits us in our foreign relations ambitions, particularly in Africa?

Dr Nishtar: It is perfectly justifiable for you to ask for greater visibility in our areas of operation. We try proactively to create opportunities for that. For instance, I was in the DRC a month ago. One of our hosts there was not just the Government but your ambassador. I think we should look at other such opportunities to showcase your investments. We have an increasingly deep footprint in Africa. To give an example, we work in 41 African countries. Gavi used to invest 57% of its resources in Africa. Going forward, under the Gavi Leap reform, we will be investing 80% of our resources in Africa. Of the 1.2 billion children that we have vaccinated, 500 million were in Africa in the past. Going forward, given that 80% of your investments will be going there, we will vaccinate even more.

Some of our programmes are exclusively for Africa—for instance, the malaria vaccine that we have just talked about. There is another initiative called the African vaccine manufacturing accelerator. That is a subsidy mechanism to promote commercial vaccine manufacturing on the continent.

There is a history to this initiative. During covid there was huge disenchantment because Africa was at the back of the line. That should never be the case again. With the support of the UK and our board members, Gavi put in place a subsidy mechanism of \$1.2 billion to promote commercial vaccine manufacturing on the continent. This is an opportunity for your commercial entities to broker relationships and for



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your private sector to deepen its footprint. Of course, you are investors in that subsidy mechanism. Clearly, there are huge opportunities through the Gavi machine—through the Gavi infrastructure—not only to create awareness about the excellent work you have done in promoting routine vaccinations, saving lives, making the world safe and responding to the global health security threats in Africa, but to be responsive to some of the political asks from the continent; and the African manufacturing accelerator in which you have a stake is an example of that. We need to do a better job of showcasing. As I sit at your table I can promise you one thing: whenever I am in a country I will and do reach out to your envoy there to make sure they provide every opportunity for your investment to be showcased.

Q218 Emily Darlington: Fantastic. Many Committees across this House have expressed increasing alarm at China's influence within Africa. Do you see our investment in Gavi and life sciences as a way of building a different kind of relationship with African nations from the more exploitative one presented by China?

Dr Nishtar: Your country has a deep footprint particularly in anglophone Africa, and your contributions are well recognised. I think we should do a better job of showcasing your investments through instruments like ours, and there are avenues to do that.

Q219 Kit Malthouse: I want to ask a quick question about what is coming next. Obviously, you have been part of the global campaign against measles that has had a huge impact. I think that, quietly, there are other diseases that you have almost eradicated, like neonatal tetanus. As the good news, which one on your list is next to be gone or nearly gone? You talked a lot about malaria, but there are lots of other smaller diseases such as leprosy or polio that we are closer to eradicating as we have smallpox. Which is next on the list of hope?

Dr Nishtar: You are absolutely right in saying that the only disease we have been able to eradicate from the face of the earth is smallpox. After that, we have not been able to do that. The second effort is around polio. This is a multi-stakeholder effort led by the World Health Organisation. All of us have joined hands. Gavi has a huge interplay in polio eradication, and we will continue those efforts. We are close to the finishing line. I think that would be the second disease potentially eradicated from the face of the earth.

Q220 Kit Malthouse: Which one did you say?

Dr Nishtar: Polio. Of course, there are also cervical cancer elimination aspirations. You will know we have a very effective vaccine against the human papillomavirus, which causes cervical cancer. It is able to prevent 90% of cases and is a huge instrument of equity. Gavi was able to vaccinate 86 million children. We were ahead of our target as we closed the five-year period last year. We hope that cervical cancer elimination will be another opportunity. We recently launched the RSV vaccine—the



respiratory syncytial virus vaccine. There are new vaccines in the portfolio; there are older ones that have the prospect of eliminating a disease. We are very thankful for your support, which enables us to continue our mission.

Q221 Chair: Thank you very much. Dr Nishtar, you have given us hope for the elimination of polio and cervical cancer. You have also set out strongly how the work that you do is without price, the return the UK gets on its investment and how it impacts this country. The figures I have seen say that Gavi has delivered \$280 billion of economic benefit in the countries in which it has worked. Do you have an idea of what the cost of that has been and what level of donations it is taking to deliver that level of benefit?

Dr Nishtar: We work in five-year strategy cycles. We concluded our fifth strategy cycle on 31 December 2025. We have just commenced our sixth strategy cycle. To give you a sense of the costs, our sixth strategy was costed at \$12 billion—\$11.9 billion, to be exact—and we were almost able to secure \$10 billion. Of course, we have had to recalibrate our programmes downwards to be able to fit into the envelope we have, so this is what a strategy cycle costs.

Q222 Chair: For the \$280 billion of benefits you have delivered, how much investment overall has that required?

Dr Nishtar: I will have to add all the costs of the strategy cycle. I can come back to you offline. I do not want to quote a wrong figure.

Q223 Chair: I am sure that the return on investment outpaces anything that the private sector can expect.

Dr Nishtar: Absolutely, by leaps and bounds. For every dollar invested you get \$54 in economic return.

Q224 Chair: I wanted to understand the level of return.

Dr Nishtar: That is the magnitude of it. You invest a dollar in Gavi and get \$54 in economic returns.

Chair: Thank you very much for your evidence this morning and for all the work you are doing, Dr Nishtar.

Examination of witnesses

Witnesses: Dr Bunn and Graham Turnock.

Chair: Welcome to the second panel of witnesses in today's Select Committee session on science diplomacy. We are very pleased to be joined by our two panellists. I start off by asking George to put the first question and the panellists to introduce themselves.

Q225 George Freeman: Good morning to you both, and welcome. We could be at a really exciting moment for the UK space sector. As former



Minister, I look at what is going on around the world and I see the Government, correctly in my view, announcing that the science and technology R&D budget has three big buckets: first, blue sky and Nobel prize-winning science; secondly, growth; and, thirdly, defence, sovereignty and security.

In my view, traditionally, space has always had a very academic deep science astrology legacy in the UK, but it feels to me that this is a moment for the space sector to be recognised as completely central to the other two buckets as well. I want to start by asking whether, at the moment, the space sector feels plugged into these three big buckets, the new Government strategic vision and the industrial strategy. What is the mood in the sector at the moment, because at times it has worried about being not properly understood across Whitehall in what it can do. Is that changing? I would like to ask you both whether it feels like a sector that is at the heart of the Government's sovereign strategic growth and security missions.

Dr Bunn: No, is the short answer. I am delighted to give evidence this morning. I think space as a sector is a fantastic exemplar of the way in which you can deliver science diplomacy, be that in the provision of science to support our diplomatic efforts, using Earth Observation to support climate change discussions at COP, for instance, and also being a vehicle to enable those multilateral frameworks to come together. We remain part of the European Space Agency. I think we had a sobering result at the end of last year, to which I may return, in terms of UK investment with respect to our peers in Europe.

Space is a sector that is inherently international. We have some very strong evidence of where space as a sector has endured in our international diplomatic efforts. I am thinking of things like the development of the meteorological system during the cold war. The UK itself has in the past led some brilliant programmes, working particularly with developing countries. There was a programme launched eight years ago with £150 million of public money, leveraging £650 million of private money. That was a fantastic success, and we have stopped it at a time when I think most of us in the room would argue that we should be upping our efforts on the international stage, not retreating.

Q226 **George Freeman:** There are several things to which I would like to return. You were the distinguished chair of the UK Space Agency, so it would be interesting to return to that as well. Graham, what is your headline view in answer to my question?

Graham Turnock: Thank you for giving me the chance to give evidence today. I am Graham Turnock. I was chief executive of the UK Space Agency between 2017 and 2021, working with Alice during that period. I have since been at the European Space Agency. I am now a visiting fellow to All Souls Oxford looking at space governance.



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My answer to your question would be that space generally has an incredibly powerful role in those two other domains—the economy and security. We are seeing that globally with massive investments, recognising in particular the military and security potential of space. The Americans have always heavily invested in it, but we are now seeing huge investment by the Chinese and substantial investment by the Indians and Europeans.

The UK has upped its investment in military space. A few years ago it committed to a £1.4 billion spend over 10 years in addition to what it puts into Skynet, the communications satellite, on which it expends roughly £1 billion annually. We are now seeing that being dwarfed by other countries. In the autumn, the Germans themselves committed €35 billion to defence space spending over 10 years. That is almost three times what we would be spending annually. As for growth potential, one of the big new areas that is coming through is satellite constellations, especially communications constellations. We have an interest in the Eutelsat OneWeb system, but the biggest game in town at the moment is Elon Musk's Starlink. There are other constellations coming on board from Amazon and the Chinese. I think the UK risks being squeezed out on all of this at the moment because our investment is not at the level of our competitors, nor are we as central to European efforts as we were before.

Q227 George Freeman: Perhaps I can ask a couple of supplementaries, one on the UK Space Agency and one on the European Space Agency and European defence. Graham, perhaps I can ask you about the UK Space Agency. We heard the news in the summer that it was being brought inside DSIT. I think the argument for it is that, given the geopolitics of space, technology, satcoms and some quite sovereign decisions that have to be made, this is part of the militarisation bucket, and that needs to be done in-house, not by a sort of arm's length, quasi-academic body. Do you understand that logic? Do you think that is what is happening, and is the sector through that internalisation being plugged into new sources of defence and security funding? Alice, I want to ask about ESA and whether we are getting our value for money there, but Graham, please deal with the internals first.

Graham Turnock: I certainly understand that that is the logic. Arguably, it did not help when the responsibility for strategy moved from the UK Space Agency to DSIT four years ago. There was then a separation and quite a bit of duplication of effort on the part of the UK Space Agency and DSIT. I can see the logic of trying to bring that back together within the Department. That will, I think, facilitate working relationships with the Ministry of Defence, which to my mind are absolutely critical, because, if you look at all of the main spacefaring nations in the world, defence is the biggest driver of capability and investment. If we want space to keep pace in the UK, it has to be linked very closely to the MOD.

Q228 George Freeman: Alice, that links into the ESA piece and defence. In the great European post-Ukraine defence surge—spending has not really



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happened yet—in the pledge to raise and spend more and the UK's part in that common shared defence as part of NATO and satcoms, you would think that would be a big moment for the UK space satcom sector. Can I ask you to follow up your comment on ESA? We are obviously part of ESA, but are we part of that European defence satcoms technology piece so that our sector will benefit?

Dr Bunn: I think it comes back very much to the question you have just posed to Graham about whether or not our decision-making structures are sufficient in the UK to take advantage of those opportunities. The short answer is that they are not. We need to stop considering space as a purely scientific endeavour. iTELLS, of course, delivers scientific benefits, but with the economic growth potential and increasingly the security, defence and foreign policy, a lot of soft power can be realised through our international space efforts. Historically, we have done very well on that.

To come to your question about Europe, we need to be humble. At the latest round of subscriptions to the European Space Agency at the end of last year, the UK put €1.7 billion on the table. That is to be compared with countries like Germany that put over €5 billion on the table. Recognising what is going on geopolitically, Germany increased its subscription levels by 46%; Spain by 102%; and France and Italy also increased theirs. The UK was one of only two countries to decrease its contribution to the European effort. We have to be very clear about that. I am well convinced of the societal benefits of investment in space, and I would argue that those levels need to be higher. None the less, we also have to be more strategic in our choices. For many years we have sown a thousand seeds and that has not been in our best interests. We need to sweat the money better and I suggest we do that by making some very strategic intentional choices about the national capability we want to deliver in order to be a meaningful international partner.

Q229 Chair: That leads perfectly into my question with regard to where our capabilities and strengths lie. Last year's modern industrial strategy from the Government identified some space capabilities as priorities. I am sure you are familiar with them, but I will read them out: space domain awareness; in-orbit servicing assembly and manufacturing; Earth Observation; position, navigation and timing; satellite communication technology; and launch. Those are our six specific space capabilities. Are they the right ones? Are there others that we should be thinking about? As you respond to that question, could you identify leading UK companies in one or other of those sectors? I will start with you, Dr Alice Bunn.

Dr Bunn: The short answer is that I think it is still too high level. We have not been as specific enough in the choices we should make. For instance, space domain awareness is a very large field in itself. There is a lot of scientific interest, economic growth potential and defence interests. One could do anything from increased effort towards space surveillance and tracking, for instance. One could develop more efforts to the capability to interact with satellites; that could be debris removal; it could be in-orbit servicing.



The one I would probably highlight as a “no regrets” choice is space weather. Space weather is a risk, not a threat, but we know that we are due for a large event. If we do see a big solar storm emerging—the sun has weather, just like we have—that would represent a huge risk to our critical national infrastructure. The UK can be very proud of both our academic excellence and the fact we have the Met Office giving 10 years of operational weather forecasts, and that we have a programme that we lead through Europe, but that also relies critically on a partnership with the US. I believe that is an example where we should be doubling down and making sure we secure global leadership all the way through—not just the scientific investment or the build, but the operational lead, well into the future. It is worth saying that these things need decadal consideration, not just funding cycles.

Q230 **Chair:** Space weather is an example of a part of the Earth Observation which is identified as an industrial strategy. You are arguing that we should be more specific in where we focus our efforts.

Dr Bunn: That is right. To be clear, it is looking out towards the sun, not Earth Observation looking down at the Earth.

Q231 **Chair:** Where does space weather come in the six categories?

Dr Bunn: It is space domain awareness, recognising the fact that those orbits are getting increasingly congested. We have more and more infrastructure up there. We need to do more to ensure the safe operations of that infrastructure. That is space domain awareness in the round, of which space weather is a key natural risk that we need to manage.

Q232 **Chair:** Do we have leading companies in that area on which we should be building?

Dr Bunn: Yes, and in the academic community as well.

Q233 **Chair:** To make it more specific, can you name some leading companies that we have?

Dr Bunn: There are many that would be involved in the production of the instruments. Airbus leads the build, but smaller companies would be involved as well in some of the instruments. As I say, we are already leading that effort through the European Space Agency programme.

Q234 **Chair:** Graham Turnock, do you have anything to add in terms of where we should be specialising our capability?

Graham Turnock: I just observe that, if you take space domain awareness and in-orbit service manufacturing out of those six, the four you are left with represent more than 95% of the commercial space sector, so there is not a lot of choice making going on with that list.

Q235 **Chair:** So there aren't other big areas.



Graham Turnock: No, there aren't really other big areas after that. Reading between the lines, it is clear that the strategy does not intend that we should do everything in each of those chunks, but it is silent on what we should do. As to where within those big chunks we would focus is a good question. We certainly have strengths in all of them. Mentioning some other companies, Astroscale is a very strong company in the in-orbit service and manufacturing area, but there are many other smaller companies in addition to Airbus.

Going back to defence, what is the defence interest in these areas? There is strong interest in satellite communications with Skynet; there is also potentially a strong interest in space domain awareness and in-orbit servicing and manufacturing, because that also links to rendezvous and proximity operations, which is shorthand for making sure that others do not spy on you in space and having the capability of knowing what others are doing.

Q236 **Chair:** I am very keen for us to understand what the benefits and implications are of our strengths in space technologies for industry, our communities and our prosperity. Do you think there is a mismatch, if you like, between our ambitions for the sectors as set out at a high level in the industrial strategy and the investment and support that we are offering those sectors?

Dr Bunn: Unsurprisingly, I think there is a mismatch, but I would reiterate that it reinforces the need to make choices. I would like to give the Committee an example of where we made a very good choice. I have been working in the sector for over 25 years. Back in the late '90s, the British National Space Centre, as it was, invested in a programme for small satellite technology. We funded three satellites end to end. It was quite innovative at the time. People were not building small satellites; they were building satellites that in some cases were the size of a double-decker bus, but that led to the fantastic success of organisations like Surrey Satellite Technology. We have seen their success repeated again with organisations like Clyde Space. For a good while, Glasgow was the No. 1 producer of small satellites globally. We need to make these long-term bets. As well as getting our level of ambition and investment aligned with our level of ambition, we now need to make some choices. As Graham said, so far we have not really done that.

Chair: That is a strong message for us to take away.

Q237 **Daniel Zeichner:** Good morning. I want to return to the European Space Agency. In your introductory comments you described the contributions that we are making as a "sobering result". Can you tell us a little more about what you think the main risks to our space capability will be from that reduced investment? What will be the impact of it?

Dr Bunn: In short, we risk falling behind our peers—our competitors—in Europe. As an example, the level of investment in the Earth Observation programme was relatively low. That decision was made not least because



the level of investment in 2022 was relatively high, but we then have to reflect on what that means for the sector and what we might need to do to support it in other ways.

Earth Observation as an example is a very powerful subject of this inquiry in science diplomacy, supporting our approaches to COP, for instance, and supporting our work with other developing countries, but it is also an area that is becoming increasingly commercial. We have seen some fantastic successes in the UK through companies like Open Cosmos, which is now making a real success of these Earth Observation programmes.

As to what more we could do, that is a point of reflection for the UK. I suspect we could do more in regulation, which is something that has not come up yet. That is increasingly important when we consider that most of these technologies are dual use in nature. We need to provide those frameworks to enable the industry to make a commercial success where those capabilities are quite mature.

Q238 **Daniel Zeichner:** Graham, what do you think the implications will be?

Graham Turnock: Building on what Alice said about the Earth Observation investment, which is the stand-out reduction—although she also mentioned that others massively increased as well—the other problem with not investing so much in Earth Observation is that it puts us in a weaker position to get our share of the Copernicus contracts. We have participated in Copernicus over the current seven-year period, but we are at risk of not getting the better roles, or even substantial ones, in those openly competed-for contracts if we are not investing in the ESA technology development stage which comes before Copernicus.

Dr Bunn: It is very relevant that the Copernicus system has been around for more than 20 years. When we were part of the EU it was natural that we paid into that system. I do think we have a level of strategic choice to be made. Sometimes we are part of those big multilateral frameworks, and within the European Space Agency, it is very logical to remain part of those big science programmes, or the exploration programmes, where the scale of funding is such that you would never wish to do that as an individual country. In other areas we might want to develop our own national capability and play that into a bigger system. Other countries have done that for Copernicus; for instance, it is the model that Canada uses. There will be other areas where we can think about different models and perhaps be more realistic about our position and influence in Europe.

Q239 **Daniel Zeichner:** Given that that decision has been made, what can we best do in mitigating and reducing the damage you are describing?

Dr Bunn: In terms of the investment in the programme overall, I think we need to think about where we want to develop our national capability and priorities. It is not one size fits all. It is important to be very



intentional about how we deliver on our space priorities, because it depends on the objective and whether we will want to develop something nationally, develop something through Europe, develop something through the Five Eyes partnership, etc.

Q240 Daniel Zeichner: As the European Space Agency itself changes its priorities in terms of what is happening geopolitically and looks more at defence and resilience, does that open up opportunities for us here? What can we do to take advantage of that?

Graham Turnock: One of the big new initiatives announced and partly funded at the ministerial council in November was the new European Earth Observation Security Service. The UK has put in a very small holding investment at this stage, but the programme is open for subscriptions for some time to come. That is an area where the UK could decide to put in a more substantial investment. It is highly likely that that initial ESA investment will eventually flow into a European-wide system. Depending on the UK's political comfort with Europe, we could be part of that system, but, almost certainly, if we do not invest at the ground stage, we will not get into the full system later. That is something I suggest we should be actively considering at the moment.

Dr Bunn: As well as that, one of the benefits of our membership of ESA is the fact that we have access to the scale of technology, facilities and expertise that we can use on a bilateral basis. Other countries do this a lot. It is something that the UK has not chosen to do in the past. We have instead taken decisions about participation in a wider European programme, but as a member of the European Space Agency we also have the right to use them to deliver against our national priorities, so there is a further option there.

Q241 Daniel Zeichner: In this changing situation, are you confident that we will retain our competitive position, or is it at risk now?

Dr Bunn: Directly, there are areas where it will be at risk and where we will fall behind our competitors.

Graham Turnock: The financing is the biggest risk, frankly. If others invest at the level that, for example, the Germans do and we do not, it is almost inevitable that we will fall behind.

Q242 Samantha Niblett: Emily and I were really fortunate to do the armed forces parliamentary scheme last year with the RAF, which included probably one of my favourite visits, which was to RAF Fylingdales. Having the unique opportunity to see our capability and unique positioning in the coverage that we have in our defence and to touch on the relationship that we have with the States and sharing data and insight was quite incredible. I have a question prepared on how reliant the UK is on US capabilities for civil and defence space operations. I would love the answer to that from your perspective, but I would also really appreciate it on the flip side. How much are they reliant on us?



Dr Bunn: It is such a good question. We have to approach it with absolute humility, because the truth is we are heavily dependent on the US. I have mentioned it already. One area where we quite rightly have our heads above the crowd is in space weather. Broadly, to look at that activity on the sun, you need to understand speed and direction. We lead on the production of one satellite and the US leads on the production of the other, and we both need each other, so it is a strong area of co-operation.

The second part of the answer is that, despite the fact that the US has vastly more resources on the defence side in space than we do in the UK, we have geography. Fylingdales is very useful to the US because we have that geography. We have not mentioned launch yet. The interest for launch is also around geography because of the safety considerations. We can launch from the north of Scotland into a sun-synchronous orbit over open water, which is something that the US finds much harder because it finds itself either flying over North America or South America, and that is a tougher safety case. Launch is interesting. It is a very good example, I believe, of why we need to think about our investment in space across all our interests. Yes, there will be commercial opportunity and economic growth opportunity from launch, but my opinion is that it will only really thrive if we have interest from the defence community as well, because you have to look across the piece at the range of interests for us developing that capability for it to make sense.

Graham Turnock: If I can build on that, the US invests multiple tens of billions in military space annually. It is an order of multiple magnitudes more than us. Primarily, we are dependent on it for intelligence, satellite information and early warning—Fylingdales is part of that system—but also for space domain awareness and what they call conjunction warnings, which is basically warning satellite operators of the risk of being hit by debris. We are not alone. The whole of the world is very much dependent on the US there, although a lot of people are looking to develop their own space domain awareness.

In terms of its interest in us, in addition to what Alice has mentioned, it is also quite interested in our small sat capability. It has tended to operate quite large, intelligent satellites. It has seen what Surrey Satellite Technology has done with small satellites. It is quite interested in some of the video surveillance that we have demonstrated and that we are able to do. Some of the work that the MOD is pursuing in Earth Observation satellites is definitely leaning towards US interests. But, yes, we are a relatively small player compared to its spend.

Q243 **Samantha Niblett:** We have seen quite a bit of this in the last year or so, but how would a sudden shift in US space policy such as President Trump's proposed cuts last year affect the UK's access to crucial capabilities?



Dr Bunn: I am beyond my brief at this point. It is a question for the defence community. I could give a view, but I do not think I am the expert to answer that question.

Graham Turnock: A lot of those cuts were to the Earth Observation programme related to climate monitoring, and on that we have a strong stake, as we discussed earlier, in the Copernicus system, the European system, which does quite similar things to what the US system does. It is not completely the same, but there is some complementarity. I would say probably. We are not directly exposed to that reduction in Earth Observation investment, but it is a loss to the world as a whole, potentially, over time.

Q244 **Samantha Niblett:** Just to expand on that, are there any specific capabilities that the UK should prioritise to reduce our dependence on US science and equipment?

Dr Bunn: On the science side, there are some green shoots. We have not talked very much about exploration or science, but it is worth noting that the UK scientist is one of only two international members of the US Artemis scientific advisory group. We still have enduring co-operation in those areas. It is the defence areas that would be much more difficult. We do not have PNT capability. We rely completely on the US. It is a good example of where scientific co-operation can often rise above geopolitical tensions. We have some good precedent for that. On the defence and security side, we have more cause to be concerned.

Q245 **George Freeman:** Thank you, both. I am drawing quite a depressing but honest view of the UK space sector. I used to describe it as a Formula 1 pit lane and we did not have a sovereign car, but there are plenty of cars in the space economy globally. We are a pit lane of amazing technologies, but I am not getting a great sense that a demand signal is coming through in this new geopolitics where they are going to get pick-up from.

I wanted to ask about OneWeb in particular. I inherited the deal done in a way that I know infuriated the Treasury and the Foreign Office. Former Prime Minister Johnson and Dominic Cummings in a room acquired a controlling stake for £500-odd million. I inherited that deal and thought, "Well, I wouldn't have done it that way but that's quite an interesting asset." It seemed to me that, as Europe had an ambition to build a constellation, we had an opportunity to play that in and secure some supply chain rights. We had a golden share. Even if one is sceptical that Europe could ever afford to build a Musk-style constellation, OneWeb owned spectrum rights, which were really valuable. In the end, the deal was rushed through after I had resigned, given my opposition to it. Where do you see OneWeb sitting now? Have my worst fears come true—that it has been swallowed up by Eutelsat and our golden rights have gone—or is it still at the heart of an interesting opportunity for the UK?

Dr Bunn: I do not see the UK Government taking advantage of it as a strategic asset for their own needs. I do not see a procurement strategy



around OneWeb. I know this can make people feel very nervous. We are very British, aren't we, and we do not like to interfere in the markets?

Q246 George Freeman: For example, telephone services in the Shetlands and rural areas.

Dr Bunn: Exactly. That is a decision. Contrast that, though, with the approach taken in the US recently where NASA decided that it wanted reusable launch technology. It was not going to build it itself, but it put down the cheque to say, "I will be your first customer for a technology capability that has not yet been invented." These are the extremes of the approach to supporting space. We are at the other end of the extreme. We hear time and time again from the industry—and this applies to capability like OneWeb communications and equally for Earth Observation, debris removal, you name it—that a relatively low level of procurement from Government can have a massive multiplier effect in attracting private investment. We have not had a procurement strategy for space capability.

Q247 George Freeman: Graham, are OneWeb's rights valuable in the geopolitics of this?

Graham Turnock: My impression, as Alice says, is that it is being managed as a financial investment primarily. On the face of it, it does not seem to be doing terribly well. Eutelsat's share price has declined progressively over the recent period, and it faces major challenges in competing with Starlink. It has potential, but I am not seeing it at the moment, and nor is the manufacturing of the next generation likely to be in the UK.

Chair: Okay. We need to move on now, so we will go to Freddie briefly and then Kit, and then we will let you go.

Q248 Freddie van Mierlo: Thank you, Chair. I am wondering about the UK's exit from the European Union—Brexit—and the impact that it had on our space sector in terms of leaving Galileo, the EU's satellite navigation programme. What has been the lasting legacy of that?

Graham Turnock: The immediate legacy is that we left the programme in terms of our industrial contribution. We investigated the possibility of doing a UK positioning, navigation and timing system. The upshot of that, which I think was quite positive, was that we realised that the UK's own understanding of its positioning, navigation and timing needs was not very well developed. A lot of work has been done subsequently to try to understand better what our own requirements are, which could in time lead to some demand signal toward the satellite industry again to provide a component of those PNT requirements; but I think it will be a slow process. The other impact is that it probably has slowed down the Galileo system a bit, but ultimately it is now reaching full operating capability. It leaves us, though, in the position of being very dependent on the US system as the only assured system that we can rely on for military purposes.



Q249 **Freddie van Mierlo:** You have spoken at length about what space is in terms of looking at Earth and a focus on the UK specifically. Those are the questions that we have asked. If I were to go to the public and ask, "What do you think space is?", they would talk about exploring Mars, going to the moon, and maybe the International Space Station. How do we communicate that to the public? Is there a gap in the understanding of what modern space is and what Britain's role is?

Dr Bunn: There is absolutely a gap in public understanding, and that is what has held us back. It is the curse of space, in many ways. In many ways, it is very emblematic and very visible. On the other hand, people think it is about missions to Mars, rockets and astronauts. You go back to the original space race and indeed it was very much about national prestige, was it not? It is no longer about national prestige. It is fundamentally the capability that enables us all to live our modern lives. It is very much the invisible infrastructure in space. People have no idea that 99.9% of the data in a weather forecast comes from space. People have no idea that they use navigation capability all the time in their day-to-day lives. It is a challenge because we are competing against the Buzz Lightyear impression, not to be facetious.

Chair: Let's not compete with Buzz Lightyear. Thank you very much. Kit, you wanted to come in briefly.

Q250 **Kit Malthouse:** Before that, it is very clear to me that Starlink in particular is mucking about with its pricing on the basis that it is trying to choke off investment in the competition by making itself cheaper so that nobody bothers. It is quite an interesting economic strategy by Mr Musk at the moment to maintain his domination.

You talked about opportunities in space and our participation in those plus or minus, but obviously space also presents some threats. Do we as a country do enough, on the basis that we are talking about diplomacy, to galvanise global effort around threats? You talked about emissions from the sun and storms that will have an impact. I have been to the Met Office wherever it is and seen the big, glowing picture that it has of the sun constantly. We heard that we have downgraded our effort on planetary defence, while the Americans have their DART programme and entire unit. What other threats are there? Do we participate? Should we? Is there more we could do to galvanise the sense that there may be, while not little green men coming to shoot us, threats from space?

Dr Bunn: The European Space Agency has a planetary defence programme. There are missions going out to intercept near asteroids coming our way towards the end of this decade. We have a foot in that camp. My opinion is that the biggest threat comes from the space infrastructure itself. Those operating orbits are getting increasingly contested and increasingly busy. It is increasingly likely that there will be collisions in space that, if we are not careful, will lead to an exponential build-up of debris that renders the whole operating environment unusable. There, we can do much more. We have some real optimism in



the UK in terms of the capability that we are developing. For all these things, you need the capability to approach things—rendezvous and proximity operations—and for debris removal to take it out of those critically busy orbits.

Q251 **Kit Malthouse:** Is there an emerging governance framework around that—a global UN, WTO-type of thing?

Dr Bunn: Formally, that would sit under the UN framework. In reality, it is very difficult to agree meaningful targets. The thresholds are so low. That is why you see efforts coming from a number of different directions. People in this room know this very well. Even our King is taking initiatives to encourage more sustainable use of the operating environment.

Q252 **Kit Malthouse:** Are we in the lead in that diplomatically or not?

Dr Bunn: We could be.

Q253 **Kit Malthouse:** So we are not. In the same way, for example, that, because of history, maritime law is broadly decided across the world in the UK, and in the same way with aviation law—every pilot speaks English for a reason—and all those kinds of things, the rules of the road, is there no way we can establish UK-governed rules of space?

Graham Turnock: If we get to the point of having frequent court cases, we have the potential of those being heard in the UK because we have a very reliable legal system. It could be that jurisprudence develops on these matters in the UK. It is harder for us to set the overall rules just because we are one voice and others are either large like the US or banding together like Europe.

George Freeman: Interestingly, the Earth Space Sustainability Initiative, headquartered in London at Lloyd's, is setting protocols. It has just set its 12th protocol and has 20 countries.

Q254 **Kit Malthouse:** How does that parlay into us being dominant in the same way we are in maritime? If we cannot own the teams or the players, we might as well try to control the pitch.

George Freeman: That is exactly what that is about. It is trying to do in space what we did in maritime.

Dr Bunn: We need to then back that up with the investment in the sustainable technologies that we need to sustain the environment, such as debris removal and in-orbit servicing and manufacturing.

Q255 **Chair:** Thanks very much. I am getting a strong message from you that there is huge potential in space but that we are not making the detailed decisions about our capabilities necessary to help us realise that. Do we have a strategy for space post Brexit and in the era of US isolationism? Do you think so?



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Dr Bunn: I think not. The key is to get those decisions taken across a range of different governmental Department interests. Don't get me wrong, this is fiendishly difficult.

Q256 **Chair:** Okay, that is great. Do you agree?

Graham Turnock: Yes, I would say we are not there yet.

Q257 **Chair:** On sovereignty, which is a key issue for this committee, can we say we have UK sovereignty if we are dependent on US technology to the extent that you have already defined? You both look puzzled.

Graham Turnock: We have relative sovereignty in that there are things the US needs from us, clearly. We are not in a one-direction relationship, but we are very dependent on the US for many space-related capabilities.

Dr Bunn: I was trying to work through what sovereignty really means. If it really means that we have an independent capability to build and operate a satellite end to end across all those capabilities, then absolutely not. In the same way that we rely on the US, equally, there are some bits of the system that we will still rely on from Europe.

Chair: Thank you very much. We have overrun a little bit, but that shows the level of interest and the appreciation of your responses. Thank you for joining us this morning, Dr Alice Bunn and Graham Turnock.

Examination of witness

Witness: Will Whitehorn.

Chair: Welcome to our final panel in today's Select Committee session on science diplomacy where we are looking at space. We are joined by Will Whitehorn. Thank you very much for joining us. I will ask you to introduce yourself when you respond to our first question, which comes from Kit.

Q258 **Kit Malthouse:** Thank you. Good morning. I want to put a question to you that was put to the previous panel. Are the Government getting themselves in shape to take full advantage of space? We are seeing the merger of the UK Space Agency into the Department. The machinery of government changes. Do we look to be match fit for the opportunities coming our way or not?

Will Whitehorn: No, we are not match fit at all at the moment. My name is Will Whitehorn. I chair Seraphim Space Investment Trust, which is the largest publicly quoted space investment fund in the world and is in London. I have worked in this industry for a long time. I have never seen the state of Government involvement in space to be so much in stasis and frozen as it is at the moment. To use a cliché, we have a moment of clear and present danger to the United Kingdom, and we are not seeing government engaging in that. I was at an industry meeting yesterday where there was a sense of depression about the current situation. We



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have the feeling that Nero is fiddling while Rome burns. We have a defence threat to the United Kingdom, much of which will come from space-activated activities, be it drones managed from space, rocketry or the management of other assets from space, and we are not at the party at the moment to the extent that we should be.

We read every day in the *FT* about new contracts. The German Government have been in place for less than a year. Overnight, they have created a space budget that is 10 times the size of the UK's within four months of deciding they needed a capability to be able to see through clouds at night and see what is going on in the north above Germany and Sweden. They have let those contracts to a company called ICEYE. We would have had an opportunity to be at that party, and we are not taking it because nothing is happening.

Our institutions for space, like UKspace itself, are well-managed institutions. Paul Bate, who runs the UK Space Agency, is very capable. In the chaos that is going on we could lose him, and that would be a great shame for that institution. We have good investment bodies created by government in the past like NSSIF—a very good investment organisation. Seraphim works closely with it. In other businesses in which I am involved at the moment and in academia, NSSIF is doing great stuff. The BBB is doing great stuff. But they are not supported by the framework of knowing where they are going to be getting funds from because nobody is moving.

The MOD is in stasis. Paul Tedman runs Space Command, an organisation that I was involved in setting up. I was on the board of the RAF for four years. I was invited by the Government to join that board to help set up that Space Command. He does not know where his budget is coming from. He does not know when he is going to get it, and they are having problems spending it.

You are seeing in the Defence Committee today debate about not moving forward yet with the Skynet 6 project. As somebody who is involved in the industry and passionate about it, I do not mind who gets that contract, but this has to be let now. We cannot be moving forward to another iteration of deciding whether we are too reliant on one organisation or company or another. That was a contract that was let, and it needs to move forward. We are in a truly dire situation. Space is so important to us. It is important in all the ways that Alice mentioned.

I will give you an example of why space is so important beyond the defence that I am talking about at the moment. She talked about space weather as an event. We are overdue a thing called a Carrington event. We will have another one. In the cycle that we know scientifically, it is overdue. If it happened on the scale that Carrington witnessed in 1859, it would wipe out a lot of our infrastructure. Britain is better prepared for that than others. We have had a project with the UK Space Agency called



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Vigil that I lobbied for, and it has been a good project to do with ESA, but it is stalling at the moment. We must not allow these things to happen.

Q259 **Kit Malthouse:** You think the merger of the UK Space Agency with DSIT is a backward step.

Will Whitehorn: Can I come straight on to that? There has been a problem between policy and execution. They are looking at the right problem. I do not know if it is the right solution. Even if it is not the best solution—everybody else seems to be starting independent space agencies just as we are merging one in—it is better to get on with it and get it done than be in the situation that we are in at the moment. It was announced last August. The UK Space Agency has done its best, in the meantime, to carry on getting involved in the projects that it needs to be involved in, and I laud that. I am not criticising the Space Agency here. It is in a situation whereby it has continuing uncertainty. They are talking about April before the merger now happens. This was last August. In that space of time, Germany has spent €10 billion on space defence from a situation of being elected as a Government. I would say we are close to an emergency situation, to be honest.

Q260 **Emily Darlington:** That was very blunt. I appreciate that. You are reflecting some of the conversations that we have had. I want to focus specifically on near space, particularly MOD and defence. As Samantha said earlier, she and I were on the AFPS programme focusing on the RAF, and we had many opportunities to speak to both those involved currently in UK Space Command and those who on other bases understand the value of Space Command. It formed one page of the Defence review, which I found quite disappointing. Do you think the Government properly understand at the moment the interplay between space and defence and how our lack of leadership in this area is causing our country to be less secure?

Will Whitehorn: No, they do not. It is as simple as that. It is quite clear at the moment that the priority is not being put on getting the things moving. The budget for the MOD for space seems to be in stasis now. I ask everybody in the industry who is working on contracts, and it has slowed down. There are projects that are interrelated to space, such as Tempest, which is the successor to the F-35B. Let us call it that for the purposes of today. We have a great deal of leadership and leverage. Thirty-five per cent of F-35A, F-35B and F-35C aircraft come from the UK. It is a huge money-earner for Britain and it is a very successful aircraft. We could be at the heart of its successor, the next generation, using autonomy and management from space of assets.

I just took over chairing a company called Sofant Technologies in Edinburgh that has developed a K-band microwave receiver/transmitter system that would be perfect for that and perfect for drones so that they could be communicated with directly from space and communicate back. Almost all the interest in that company at the moment is coming from Germany and the United States. NSSIF has invested in the company. It



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has been great. But when it comes to our MOD, its hands are largely tied. It cannot move forward quickly enough at the moment because it is mired in a bureaucracy that others seem to be throwing in the dustbin around us in Europe and in the United States, because there is a threat from China and Russia in space and with related technologies of offence that we can only counter if we do much more in this area much more quickly.

Q261 Emily Darlington: Picking up on Fylingdales and MOD capability, it is the radar that covers all of Europe and a lot of north Africa. It is extremely important in today's geopolitical world, but it is just the radar. The analysis and everything else that comes off the data collected is not done within the UK. Do you see that as a strategic weakness in our defence?

Will Whitehorn: I actually think that is one of the lesser worries at the moment. We still have a strong relationship into that kind of data with NATO and as a member of Five Eyes, and in partnership with the United States, that I do not think is under threat at this stage. Fylingdales is so important to that defence itself that if we were denied the data I would imagine we would be denying Fylingdales. It is rather like somebody saying in the newspapers, "Well, our F-35s are under threat from the United States." The same goes the other way. A lot of these threats are meaningless threats one way or the other to our national security. Our national security is most under threat at the moment because we are not doing anything and not spending the money that we need to be spending on the methodologies of defence. We need to be a leading spacefaring industrial nation. Traditionally, for quite a number of years, we have been No. 3 in terms of the number of space companies worldwide. We are third in terms of our size. In the last year and a bit, we have slipped to No. 5 that quickly.

Q262 Chair: That is two places.

Will Whitehorn: We have gone down from being the 10th most invested company by volume—if you imagine all the volume that SpaceX took up, it is still quite a lot—down to No. 17.

Q263 Chair: By volume of—

Will Whitehorn: Of money coming in to be invested. These are real changes that have happened very quickly, and, I have to confess, over a period of two years. We need to show that we have an industry that has the support of Government to lead, and the private sector will have the confidence to invest here. There is a company in which Seraphim has invested in the UK called ALL.SPACE. It has just failed to raise money from the UK's National Wealth Fund and has taken it from the United States.

Chair: That is a very interesting case study. In fact, we would like some more details on that.

Q264 Emily Darlington: I want to ask about satellites. Satellites are



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increasingly important both to domestic consumers and militarily. We know the development in China of satellites. It very much foresees warfare using satellites and is developing satellites that can conduct that, as we know. We are reliant, and potentially becoming increasingly reliant, on Starlink for both telecommunications and military capability. Do you think this is a strategic vulnerability to the UK?

Will Whitehorn: That is a very good question. I do not think anybody could give you a distinct answer to that at the moment. No. 1, Starlink needs competition, and it is going to be getting that from the US and China. It could potentially be getting it from OneWeb. The British Government need to urgently review the purpose of their strategic stake in OneWeb and how they work with Eutelsat to make sure that OneWeb is at the party in any German contract for the kind of product that was announced only this week that they are looking to develop with a small satellite constellation in Germany. OneWeb is the possessor of the best spectrum in the world for operating this kind of system and it has some of the best technology. In this country we still have a strategic stake in it owned by the British Government, but if I try to find out what on earth is going on with it, I am probably going to have as much luck as George would have, who is in Parliament and has been in Government. I just do not know why we are not looking much more urgently and closely at that.

Meanwhile, my colleagues in a number of large prime manufacturers—I work mainly with the smaller, new space companies—who we were on a call with yesterday and the current chair of the UKspace trade body said, “The problem we’ve got is they are literally rearranging the deck chairs at DSIT while this is going on.”

Chair: Okay, thanks very much. George wants to come in now.

Q265 **George Freeman:** Thank you; you have been very clear. The dilemma for the UK space sector, it seemed to me, in a global race with China and America is working out a niche. What does the UK do? It seemed to me that Europe was going to build a constellation. We could be a provider through OneWeb of some of the bits of technology. It also seemed to me that our leadership in the City in finance, regulation and law was a major USP. The global commercial space economy ain’t going to want to be headquartered in Beijing, Moscow or probably Washington. It needs a safe home, which is why I set up the Earth Space Sustainability Initiative. Seraphim has been a great success. Lloyd’s of London insured the first satellites. It is the biggest insurer of satellites. London is still a major financier of space. How quickly do you see this dilemma that you have described in terms of the industrial supply chain? Does it risk our role and leadership in finance and insurance as well in those other London-based sovereign soft services?

Will Whitehorn: Yes. All of that is at risk at the moment. One of the things that puts it at risk is the sheer scale of what is happening in other places. Let us look at SpaceX and its rumoured flotation. That has set alight the valuations of a lot of the new space companies that are already



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in profit in Europe because people realise how valuable these space businesses are. SpaceX's valuation is greater than the size of the UK economy for its flotation, potentially.¹ It is larger as a valuation than putting on it, potentially, for a flotation than all the US defence companies combined that exist today. So we are looking at a huge company that has been created because it has captured 80% of the entire launch market globally, and the launch market is exploding because satellites are doing more and more of the things for us above us than they have ever done before.

We are in the process of fully industrialising in space. There is an industrial revolution going on up there. We are putting data centres up. The first one is about to go up. If we can move data centres outside the planet, that is a huge environmental leap forward. Space Solar, a British company, is currently, again, struggling with the Government to get anywhere but trying its best to raise the money for its unique and brilliant space solar technology to produce solar power for the planet Earth.

Q266 George Freeman: I think I am hearing you say that we cannot rely on the fact that we have been, historically, an insurer and regulator if we are not investing in the technologies and the supply chain.

Will Whitehorn: If we do not have an industry here, what will happen to those functions that exist in the UK at the moment? Seraphim finds it pretty hard in the current circumstances to raise money. Although the UK stock market looks like it is on an all-time high, our pensioners are redeeming—what was it last year?—£50 billion out of the stock market, and therefore smaller companies are not able to raise finance on the smaller new stock markets like AIM. All this is a holistic problem. When you look at the UK as an investment centre for space, we have the best investment company in space here, but we are very small now.

Q267 Chair: Just to clarify—it is a really interesting point that you are making—are you saying there is a risk to the City's status as a financial leader if it is not a part of the industrialisation of space and not helping to finance it?

Will Whitehorn: Most definitely.

Q268 Chair: Thank you very much. That is an important point that has not been previously raised. I want to bring you back now to a point that we have discussed in previous panels and, indeed, throughout the inquiry, which is about UK sovereignty, particularly as it relates to space. The previous panels have very much given us a message that there is not a clear strategy for space, and that is impacting the decision making on which sectors to support, etc. With Brexit and then US Administration

¹ Clarification added by witness: "SpaceX is being valued at over \$1.5 trillion for its expected June float and the entire U.K. annual government budget is slightly less at £1.1- £1.2 trillion."



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isolationism, do we have a clear UK space strategy? Can we have a clear UK space strategy? What would it be, in your view?

Will Whitehorn: It is a very good and complex question, so I will try to keep the answer—

Chair: Short and simple.

Will Whitehorn: Short and simple. Yes, we definitely need a UK space strategy, and none of the documents that we have produced from a governmental point of view have managed to encapsulate one. The reason we need one is because of all the things that we have been talking about today. Space matters to us because it will be the leading industrial sector of the future. If we are going to survive with 10 billion people on this planet, we will have to industrialise in space, because we will never reach net zero without space. It is as simple as that. People in the general public do not see it that way, as you said earlier, Chair. You and Freddie mentioned the fact that we as the public see space as NASA, rockets, ESA, exploration and all those other things. We do not see it as the biggest industrial sector of the future already employing 65,000 people in the UK before we even get started.

Q269 **Chair:** You have done an excellent job in setting out the importance of space, but I asked you about the key decisions that you like about our strategy. Do we align more with Europe or with the US? Is that a decision that we need to make? Do you have thoughts on what our space strategy should be or how we could come to those conclusions?

Will Whitehorn: We need to have a very close relationship with ESA and we need to up our spending for ESA.

Chair: Right, okay.

Will Whitehorn: I do not think in the case of the EU it is quite so crucial, but it is crucial that we work with countries in Europe. It is not a European Union initiative by Germany. It is not a European Union initiative by Sweden to launch these very large contracts they have just signed up. These are initiatives that are more related to NATO. Having a European defence based around the NATO that exists as it pertains to Europe is a crucial strategic aim for Britain.

Q270 **Chair:** Okay, that is very interesting. We have talked about Brexit and US developments. Obviously, we also have growing military competition in space from China and Russia, and we talked about this a little bit earlier. What sovereign capabilities do you think the UK needs to prioritise as part of the strategy to ensure as far as possible our national security?

Will Whitehorn: It is clear that China is probably developing right now the capability to neutralise other nations' satellites in space. That does not mean destroy them with kinetic weapons, as in destroy them with missiles or some sort of bullet in space. One of the reasons there is not



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that kind of threat is what is called the Kessler effect. Kessler was a scientist at NASA in the '70s. You know about Kessler. He developed the theory using a computer model of what would happen if you started destroying satellites in some kind of Star Wars way. China is developing the capability to neutralise them using electromagnetic weapons—let us call it that: a microwave. The UK could well be a leader in countering those kinds of things because we have capabilities at the deep research level to do so. It is important that this is given urgent priority—not another inquiry, not another this. There needs to be budget unlocked for the MOD now.

Q271 **Chair:** Are you saying that needs to be a sovereign capability—a UK capability or a NATO capability, or an open-source capability?

Will Whitehorn: Ideally, it would be a NATO capability.

Q272 **Chair:** A NATO capability.

Will Whitehorn: The UK happens to have industrially and scientifically quite a lot of the tech. I have two chips in my pocket. They could do the job very well.

Chair: We love witnesses who bring chips in their pocket that can do the job.

Will Whitehorn: And they can certainly be useful for knocking out drones using electromagnetic effects.

Chair: Excellent.

Will Whitehorn: I am a believer in having a strategic policy for the UK in space that links holistically to defence and industrial strategy and does not see space in isolation. We could not feed ourselves without the GPS system now. This is so important.

Q273 **Chair:** Absolutely. As part of our global food security inquiry, we are seeing that, and as part of our daily lives we recognise the importance of GPS. Can I bring you back to the overarching strategy? You have talked about NATO capability. Are there any UK sovereign capabilities that we should focus on outside of our alliances? Are there any dual-use capabilities that we need to focus on?

Will Whitehorn: I believe the UK—and it might now be necessary to co-operate with another couple of countries in northern Europe—should have a synthetic aperture radar capability to be able to observe the northern North sea in the months of darkness and when it is covered in fog and cloud. The only way to do that currently is a commercial technology that the Germans and the Swedes are buying so that they can keep an eye on what is happening above us, over Iceland and beyond the Shetland Islands, which we do not have at the moment. With a commercial contract, we could develop our own satellite capability to give us that



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capability for the Royal Navy and the RAF to be able to observe what is going on in the seas north of this country of ours.

Q274 **Chair:** Right. I will come to George in a moment to ask our final question. I know we are keeping you a little longer than we said. I am getting the strong message from you that we need a strategy; we already have a number of documents, but they do not form the strategy that we need. We need to reflect the realities of Brexit and of the US, China and Russia. This probably goes back to the machinery of government. Who, in your view, is the Minister responsible for space and for delivering that strategy?

Will Whitehorn: I do not know in reality. There are some very capable Ministers in government at the moment, such as Peter Kyle, who is now the Business Secretary, who was engaged and beginning to think about a strategy, but it is one that engages more than one Department. This is not a DSIT issue or a Treasury issue. It is an issue for all those Departments, none of which is thinking in any joined-up way about it. From our point of view in the industry, we want some action on the things that are supposed to be being actioned. Unlock the moneys that I am talking about. Even if they are not the perfect decisions like the DSIT-Space Agency merger, let us just get it done so we can get on, and then we can develop a strategy. While we are in this stasis that all my colleagues in the industry are talking about, Nero is fiddling while Rome burns.

Chair: Let me bring in our previous Space Minister, George.

Q275 **George Freeman:** Our purpose is to help, support and challenge Ministers and Departments. You have been very clear strategically. What would be your list of tangible things if the Space Minister or the Prime Minister were here that you would like us, having heard you, to push for to be done in the next six, nine or 12 months?

Will Whitehorn: Unlock the resources that we have immediately, such as the National Wealth Fund, and allow it to invest in this kind of activity in space and defence; up the money that you commit to the British Business Bank, and let it commit more money to NSSIF, both of which I consider to be well-run organisations; and, for goodness' sake, bring forward some kind of legislative approach to unlock the capability of the City of London to attract IPOs. There is a space company that may well float called ICEYE based in Finland. It should be coming here to float. It should not be going to the United States to float. That is something that we are not doing. That holistic approach to strategy that involves space also involves finance, industry and commerce in the most general sense.

Chair: Thank you very much, Will Whitehorn. You have been very clear in your messages to this Committee, which we like. You have also been very clear on the importance of space to our economy and our security, and, moreover, on the way in which we need to come together across this Government and across the UK to use our international influence and



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international relationships in order to build the space sector here and globally. Thank you very much for your evidence this morning.