



UK Engagement with Space Committee

Uncorrected oral evidence

Monday 31 March 2025

4.45 pm

Watch the meeting

Members present: Lord Clement Jones (in the Chair); Baroness Bonham-Carter of Yarnbury; Lord Booth-Smith; Baroness Donaghy; Lord Lansley; Baroness Mobarik; Lord Shamash; Lord St John of Bletso; Viscount Stansgate; Baroness Stowell of Beeston.

In the absence of Baroness Ashton of Upholland, Lord Clement-Jones was called to the Chair.

Evidence Session No. 9

Heard in Public

Questions 88 – 97

Witnesses

I: Richard Blain, Founder & Chairman, Earth-i Ltd; Geoff Buswell, Vice President of Business Growth, Telespazio UK; John Remedios, Director, the National Centre for Earth Observation.

USE OF THE TRANSCRIPT

1. This is an uncorrected transcript of evidence taken in public and webcast on www.parliamentlive.tv.
2. Any public use of, or reference to, the contents should make clear that neither Members nor witnesses have had the opportunity to correct the record. If in doubt as to the propriety of using the transcript, please contact the Clerk of the Committee.
3. Members and witnesses are asked to send corrections to the Clerk of the Committee within 14 days of receipt.

Examination of witnesses

Richard Blain, Geoff Buswell and John Remedios.

Q88 The Chair: Welcome to the second session of the UK Engagement with Space Committee. We are delighted to have Richard Blain who is the founder and chairman of Earth-i Limited; Geoff Buswell, who is the vice-president of business growth at Telespazio UK; and John Remedios, who is director of the National Centre for Earth Observation. Welcome to you all. We will start with a general question, and if you could each introduce yourself at the beginning that would be terrific.

Can you outline the high-level global trends in earth observation? How has EO technology changed in recent years and how would you expect it to do so in the future?

Richard Blain: There are certain questions on which I will be able to contribute a little more than others, but this may be a question that is best answered by my colleagues. I will just take the opportunity to introduce myself. I am founder and chairman of Earth-i, which is an earth observation company, and later perhaps I will tell you a little more about the relevance of our particular journey. As for myself, I have founded a number of companies in different sectors in the UK: healthcare, sport, aerospace, space and in the financial services and investment sectors as well. I am what one might call a serial entrepreneur with relatively broad experience across a number of different industries; that is what I have brought to Earth-i and my perspective of the earth observation industry.

The Chair: At the same time as answering the trends question, John, you might, if you can, provide an indication of the size of the global market for EO data and services; it is all part of the context.

John Remedios: I am director of the National Centre for Earth Observation, which is a research institute funded by NERC, the Natural Environment Research Council, which is part of UK Research and Innovation. I represent the space co-ordination group within UKRI and, for my sins, I am a professor at the University of Leicester, so I must have been a very good person. I have been doing earth observation for about 40 years, so hopefully I have some sense of where we are heading and where we have been.

First, I will say a couple of things about trends. There are two sets of technology; there is what we call the build—building sensors to do clever things such as looking at the earth—and digital technology. The growth of these two together is very important in our industry, and indeed in our science. They have always been important, but they are incredibly so at the current time.

I will split those two a little. In technology terms, as you will have heard it said before, there is a big push from the US to change the way it provides the science relating to small commercial satellites to enable more companies to participate, particularly in constellations. We are also

seeing some innovative tech, quite often derived from scientific advances: taking on the cleverer ideas, if you like.

Alongside that, I would not neglect public service changes. In the early 1990s, we looked to the United States, principally to NASA, to do our earth observation. At that time, Europe's capabilities were just emerging; in that decade, we probably had about three satellites.

In this current decade, if we look at the European Space Agency—it tends to launch all the public service satellites, though there are some in national agencies—its arms of operation, including Copernicus and EUMETSAT probably already have about 20 satellites in space, with many more to come in the second part of the decade. So, there has been a huge change in the public service provision and a much cleverer system, fuelled by demand, both from science and from impact, whether it be in government or industry.

Defence is the other part that has latterly emerged; it has always existed elsewhere. There is no doubt that people think defence demands will be much bigger, and I would broaden that to security as a whole. The question is how will security change the industry in future? It is not just about defence, it is about resilience, infrastructure, food, all those things.

Geoff might want to talk more about digital, but I just briefly say that, although we put a lot of focus on AI, that algorithm piece, that "cleverness" piece, is something that the UK is very good at. It is controlled by money: the more money you have, the more data you can process, the better job you can do and the better system you can have.

Overall, there are various estimates for the size of the market; one figure is around £3 billion at 2024 rates. I have done some translation from euros or dollars. That may double to £6 billion by 2033, and it could easily more than double. However, I think that hides a little below the surface; if you look at the revenues, the UK had around £800 million of commercial revenue in 2021-22, according to the size and health study. The GDP inflator on that is rather large; I do not know whether one should believe in it, I am not an economist, but the effect is that you end up with numbers more like £300 billion, which is because of the huge public impact of the data.

There is also quite a lot of evidence that non-expert companies, rather than obviously using EO companies, or companies that call themselves space companies, are developing an in-house insurance and finance industry. I was asking colleagues about this, as it seems to be one of those examples of a market that is hard to capture.

I will stop there, but I hope that helps.

The Chair: Thank you. Geoff, do you have anything to add to that?

Geoff Busswell: John has briefly talked about the different parts of the value chain. I would summarise it as what we in the sector call the "space segment", which is concerned with the manufacturing and provision of

spacecraft. Over the past few years, we have seen a real wealth of sensor types now in orbit; the last 10 years have been truly transformative. A big reason that this has come about is because launch costs have dropped significantly. We have seen the Copernicus programme and the Sentinel satellites, and we have seen a lot of private investment go into private constellations.

On what I call the ground segment side—where the data is downlinked to the ground, managed, and ultimately has to be accessible by users—one big change over the past few years has been the idea of taking your machine to the data, rather than downloading it, so putting data on the cloud and making it accessible. That has been a big trend.

Finally, I will classify what I call the user segment. This is where you have your ground segment, your data, but you have added value applications which are provided to a customer or stakeholder. As a result of the increased amount of sensing capability in orbit, we are now seeing a much richer offering to the end-user community in terms of spatial resolution, revisit cadence and all the different types of parameters about the earth system that you can measure from space.

On the market size trends, I had a look around at different numbers. The UK numbers on earth observation are a lot more reliable. As John mentioned, we have the Size and Health of the UK Space Industry study. Indeed, I pulled out a similar number to John, just below £800 million in the last report, which covers 2021-2022. The global market is wildly variant depending on what source you look at. It is quite hard to know, for example, what the income of Chinese companies in earth observation might be. I have pulled out numbers as low as \$3 billion, but I have seen numbers as high as \$10 billion or more, so it is hard to know. What I would say about the UK EO market is that its growth has been extremely strong and resilient over the past 10 years. If we look at the size and health reports from the past 10 years, which are probably the most reliable source, we have had about 10% growth on average each year, which exceeds the value of about 5% for the space sector overall. Of course, the space sector does very well overall, compared with around 1.5% average growth for the economy as a whole.

The Chair: Thank you for that useful preliminary overview. Given that we will have votes, we will have to be fairly punchy on the rest of the questions in order to beat the clock. I pass over to Viscount Stansgate.

Q89 **Viscount Stansgate:** Good afternoon. The most cited use of earth observation technology is in climate science. Just how important is earth observation technology in helping the UK to reach its climate targets?

Secondly, are there any EO capabilities to which the UK does not currently have access and which, in your view, would be especially useful in tackling climate change?

John Remedios: The consensus is that I should go for this.

Viscount Stansgate: I agree.

John Remedios: First, I just give a clarification around that. There is an awful lot of UK expertise in climate science, and in earth observation in particular, as well as in the models that go alongside that. It is a really strong area for us with a lot of implications for understanding future trajectories. Weather forecasting—unless you regard it as a branch of climate science—is also very strong in that regard, so I put the two together.

In terms of UK climate targets, this is still an evolving picture. We have projects looking at how we can verify net zero for the UK. There is already a network of ground stations—flux towers, in fact—run by DESNZ, but when you look at any of these earth observation systems, you often find that they are not just earth observation. Like the Met Office weather forecast, there is usually a model involved, a set of in-situ stations. A project called GEMMA is looking at this and trying to improve it. So, that is one aspect.

Secondly, the growth in fine-scale terrestrial monitoring is beginning to yield some forward steps. We really want to know how much carbon we are using and how we are able to mitigate that across the UK, so it is important to be able to measure forests and look at agriculture to see how that is working. There is plenty to do on that, I would say. We are not anywhere near a polished solution. That is one of the difficulties we have in the UK: we are quite good at doing R&D but, at the National Centre, we are concerned about how we take those R&D discoveries and make them operational. How do we build them into a system that you can actually use? We are not so well set up for taking on those operational systems.

With regard to climate targets for the UK, we are beginning to see an increasing use of earth observation for renewables operations—if you know something about the variability of electricity grid networks, you can use weather forecast data, but you can also use direct observations of solar radiation, for example. One or two companies are trialling this to see whether they can use it to better understand that mix.

I would not want to leave out climate resilience. I do not think that you would class it as a climate target, but we will have to deal with the impact in the short term, whatever happens. I do not know whether you noticed it, but in 2024 there were arguably only four months when a major storm or a major flooding event did not occur in the UK. I was quite shocked when I realised this. In 2022, we had a large increase in wildfires. We have also seen a lot of urban stress in our city centres due to heating, which has a negative impact on health. This is what we are trying to deal with in the UK.

The other thing to point out is that we also make climate progress depending on what happens internationally, so what the UK does is extremely important. Being in Copernicus and those big operational systems, we can make a difference and things that we could not do as a single country. We could do more measurements for the UK. On UK-specific component emissions, we have the TRUTHS satellite, but there

are other things we can do with small sats that could help both our productivity and our climate targets.

I will stop there. I am not sure it was as punchy as you wanted.

Q90 **Lord Lansley:** I should declare an interest in that, only a few years back, the company I work with in Brussels had a contract with the European Commission to provide the Eyes on Earth roadshow for Copernicus Data. I went to one in Tallinn; it was an extremely good event.

I am in that territory because the object of that roadshow was to bring to SMEs across Europe an understanding of the availability and value of data and how they could use it. I therefore ask you about the extent to which that is true in the UK. Are we enabling a range of users to recognise the potential of that data, access it and turn it into usable products?

Let us look at commercial users to start with, then public services.

John Remedios: I will dive in, but these guys will have their specific comments. First, with regard to Copernicus and similar services, people want stability and to know that the satellites are going to be there. If you are going to build a market product, you need to know it is going to be provided at the base level. That has been really important and is why you see a lot of SMEs growing and picking up these ideas.

We lack a national intermediary service in the UK. For the last couple of years, we have therefore been building an earth observation data hub to work with the whole community. It has been really interesting to see the number of SMEs that have expressed an interest.

I just add one other thing. Although we find that public service data is readily available, it takes a lot of work with the commercial data providers to get that data. To try to put the UK ahead of the game, one thing that we are doing is to get that data from the commercial data providers to the people who want to use it much more quickly and in a more intelligible and trusted way.

Geoff Busswell: Just to comment on the use of EO data, there is a really wide set of use cases and, over the past 10 years, as I said before, the amount of data that is available on a continuous and reliable basis has really stimulated a huge variety of applications across agriculture, disaster risk modelling, crop insurance and so on. ESG is of course increasingly important and people can use EO data to verify offset claims, for example. One service that I have personally been involved in with Telespazio is around infrastructure monitoring; by bouncing radar data off of infrastructure on the ground and interfering with the signals over multiple orbits, you can detect subsidence levels to one centimetre or better for rail infrastructure, roads, bridges or nuclear power stations. That is a really powerful use case. Maritime security—illegal fishing—is another; by looking at the algae blooms in the oceans, you can infer the size of fish stocks.

John alluded to the EO data hub that is being built in the UK. That is a really important initiative to bring the national community together on the cloud, bringing public sector datasets and commercial datasets together, and putting in place the fundamental software building blocks. If you are a company that is looking to spin up a service quickly, you do not want to start from nothing. Ideally, you want to have basic software in place to enable you to search, to visualise and to allow users to download your data and services. Providing that foundation level in place of something like the data hub will really stimulate EO businesses in the UK, so that is quite an important initiative.

Lord Lansley: That is a very helpful listing of the sorts of applications that we are talking about. Given that the data hub has been around for a couple of years doing the work that you are doing, where do we stand in relation to a league table of the applications of earth observation data and remote sensing—not specifically with regard to the technology so much as the operational applications of that data? Are we leading the world or following others? How do the comparisons go?

Geoff Busswell: The development of the data hub started two years ago and the first drop, as John knows much better than me, is this month, so it is very much in the early stages. There will be further evolution, hopefully, and further funding over the next year and longer. This is very much the kick-off of the data hub, rather than it having yet operated in any sense, but we are very excited about the difference that it will make over the next few years.

Q91 **Lord St John of Bletso:** My question has partly been answered but, at a time of geopolitical tensions, to what degree can earth observation technology be redeployed for defence and national security? I am not just referring to surveillance and reconnaissance, but tracking maritime activities, disaster responses, border monitoring and preventing illegal activities such as smuggling, trafficking and unauthorised crossings. That is quite a broad question, but I am eager to know how it can be used in those other sectors.

Richard Blain: I am happy to take a first stab at that one, if I may. If we have an earth observation satellite in space, there is absolutely no reason at all why that satellite should not be dual use. Whatever it sees can have applications in the civil, governmental and commercial sectors, including the defence and security sectors of course. There is no doubt at all that earth observation carries very significant benefits for defence and security purposes, and the UK has had a number of opportunities to excel in this particular area.

One of the challenges is that a satellite can be in only one place at any one time. To be truly useful, we need to be talking about constellations or fleets of satellites so that we can monitor and revisit any point on earth regularly enough to be useful. In the security and defence application, we would need to revisit a particular point on earth potentially up to two, three or more times a day, which gets difficult down at the mid-latitudes. It is a lot easier the higher or lower you are, because earth observation

satellites go north to south, carving out a Terry's Chocolate Orange over the earth every day or so.

The point of your question, if I have that right, is about the dual-use aspect.

Lord St John of Bletso: Correct.

Richard Blain: These satellites are absolutely capable of dual use, but they are expensive, and there is time involved in getting them up in the air.

I have some further comments, but they might be better aired in one of the later questions.

John Remedios: From the civil side, the physics of sensors means that when you do go from civil to defence, you often need higher spatial resolutions and you might have different performance requirements, so it is not a straight translation. That is one reason why it can be expensive, but the engineering capability allows you to do that. I would suggest that if the UK wants to do this really well, it should be prioritising. We need to think and focus; we cannot do everything. We have to decide which sensors to use. The barrier is also about how we have that discussion and how we share that data. If we have security data, we of course have to think carefully about who accesses it and how they access it.

I see some signs of movement now, but the barriers to dual use are mostly about how we share expertise and access, which systems we prioritise and how. Going forward, I would really strongly encourage giving thought to that.

Lord St John of Bletso: I suppose my question is broader than defence; it is also about protecting critical national infrastructure from cyber threats and utilising existing technologies for heightened security measures. Many years ago, I made my maiden speech on this—it is an area that I have a lot of interest in.

Geoff Busswell: There are services in play in government right now using commercial satellite data streams. Under the Home Office, there is a vessel detection service that is using satellite data to support observations of vessels in UK territorial waters. That was in the press over Christmas, for example, so you can go back and look at that. The UK MoD also routinely uses commercial satellite imagery, and again this is in the public domain.

I just talked about using commercial data for defence and security purposes, but one of the most interesting aspects is that some countries are using their data the other way around. Italy, for example, invested in the COSMO-SkyMed constellation for military purposes, but it is in fact taskable by commercial users as well, so it is a dual-use system primarily designed for the military. That is quite a powerful use case, and perhaps one that the UK could look at.

In the current geopolitical world, we are seeing more and more initiatives around dual-use constellations. Literally two weeks ago, Leonardo announced that it is investing in an EO constellation which will serve both military and civil use cases, so this is a trend that will become increasingly important over the coming years.

Q92 Baroness Bonham-Carter of Yarnbury: On the dual-use point, and to pick up on what Lord Stansgate asked you about earlier, I note that one of the issues is disaster response. EO provides vital data that enables an effective response to natural disasters and crises. Considering what we have experienced in the past two days, how do we go about anticipating those disasters? That would be wonderful. This question is probably for John.

John Remedios: Yes, absolutely, and there is a global agenda behind it, even in the more restricted sense of the term climate; early warnings for all is a big theme. I like to remind everyone that it is for everybody, including ourselves. The International Charter Space and Major Disasters is an international agreement allowing satellite data to be obtained and used in times of disaster, and the UK is one of the countries that has called on it.

For prediction, you need two things: enough good satellites and an understanding of how the signal might first appear. To take wildfires as an example, it is quite easy to see how we could do that; we know that we do not model very well, but we can observe temperature, soil moisture or water availability, which might set the conditions for things to occur.

There is a lot of stuff that we can do, but the consideration is how we build the alliances to do it. Some commercial companies support emergency services, but not necessarily predictive services.

Baroness Bonham-Carter of Yarnbury: I am saying something slightly different; should it not be possible to know, or anticipate, that the plates are moving or that the ocean is boiling?

John Remedios: Different problems require different sensors. It depends on the field. With disasters such as fire, drought, high temperatures, those sorts of things, you can do quite a lot, but when you are talking about land, tectonic—

Baroness Bonham-Carter of Yarnbury: They are things that are underneath.

John Remedios: Volcanoes and earthquakes are notoriously unpredictable.

Baroness Bonham-Carter of Yarnbury: It is very weird.

John Remedios: You can make measurements and understand the increasing stress. It is a bit more successful with volcanoes, particularly with ground measurements as well—with GPS GNSS signals—but apart

from that they are horribly randomised. Or if they are not randomised, the science community still do not have enough knowledge to interpret them.

Baroness Bonham-Carter of Yarnbury: It is a potential feature.

John Remedios: It is something that people are looking at all the time, yes. If you can see the build-up of stress, which you can at the time of the earthquake, can you see it early enough?

Baroness Bonham-Carter of Yarnbury: Shall I ask my actual question? It is, to be honest, very straightforward. How do you regard the prowess of EO? The good and the bad—that is what my question was meant to be.

Richard Blain: Can I get some clarification on the context of your question, please?

Baroness Bonham-Carter of Yarnbury: I am always surprised that we cannot anticipate these terrible things like earthquakes, tsunamis, and so on. I was hoping that, with your technology, we might be better able to anticipate them in the future.

Richard Blain: In terms of an interpretation of the technology, I would definitely defer to John.

Baroness Bonham-Carter of Yarnbury: The Chair might be cross because that was not my actual question.

The Chair: The question that Baroness Bonham-Carter asked after that was how you would characterise the UK's prowess when it comes to earth observation. What do we do well and what do we not do well? We are beginning to unpack that during the course of the proceedings but let us know whatever comes to mind.

Richard Blain: I can certainly have a go at that. My company, Earth-i, has been involved in earth observation since 2015, working predominantly with small satellites, some of which are built in the UK. The UK is a global leader in the manufacture of small satellites; it is something we do very well, and we need to maintain that lead, because the technology is rapidly evolving. Companies such as Planet Labs in the United States are building satellites at a rate and pace that outstrips our own small satellite production capability in the UK.

We also do well at the interpretation of data. We interpret data from the Copernicus satellites as well as from a wealth of commercial satellites. We are also good at finding innovative ways of applying that data. Getting the satellites up in space is just step one. They are useless unless they provide information and data that help us to make better decisions here on earth. That is the exam question that we need to think about when we look at earth observation: how do we use earth observation to make better decisions on earth?

To answer your question succinctly, we do the satellite build well and we are moving towards launch. There were some comments on that previously, of course. We also innovate. As a company, we work closely with the American company that I just mentioned to help it interpret the data and find uses for it. We absolutely have prowess in that field as well.

Q93 Lord St John of Bletso: We are interested in the key challenges that you face. I am not just referring to skills and financing, but also to market competition, infrastructure and scalability. I would imagine that obtaining access to high-quality satellite data can be expensive and complicated. That is my first question.

My second question will be about regulation but let us touch on the first.

Richard Blain: I am happy to take that bit. Your question talks about the challenges that we face, and what I want to air here is a fundamental difference in approach in terms of how we do things in the UK and, to an extent, through the European Space Agency, versus what happens in the US. I heard a good example of that at a meeting where we had people from many members of the European Space Agency and some American companies. The observation from the States was that we have an excellent system of grants, which works very well and helps us to get a foot on the ladder and step up.

There is a big difference, however, which is very important. I have a specific example that I would like to explain to you around the question of anchor tenants. Even now, the UK could be in a very different position had we looked at this differently. For instance, a company in the United States might say, "I have a great idea about being able to build a rocket or build a satellite and go and launch things", and the US Government—or some other Government, for that matter—may say, "Well, that's great, if you can go and do it, we will take that service from you and here is a contract". By doing that, that Government have supported the company by removing the market risk. The market risk is one of the risks that any investor will look at when they consider whether they are going to fund a particular technology. The technical risk, scaling risk and other aspects of risk remain, but removing the market risk makes a very significant difference.

What might happen in the UK—this is a flippant example, so forgive me—is that we might say, "We want to build a rocket and we want to launch in the UK or Europe", and the answer might be, "Well that's great, we're not going to give you an anchor tenancy but, if you have a problem with a fuel control unit, we can give you a grant that will help you understand how you can make a better fuel control unit". That is a slightly flippant example, but it characterises and illustrates, I hope, the importance of the difference there.

If you can indulge me for a moment, we have a very specific example of this. Back in 2018, Earth-i launched the world's first commercial high-definition colour video satellite, built here in the UK. We took the lead on that satellite, with a 75% stake, and the UK MoD came in as a partner.

The RAF used it to launch Space Command. It was called Carbonite on the RAF side and Vivid-i or VividX2 on the civil side.

We also had private equity funding that, starting back in 2018, would allow us, as a UK sovereign capability, to deploy a constellation of 15 of these satellites that will give us incredible global coverage, with the capability not only of taking still images, but of going into that fourth dimension of temporal information on video images, which allows us to get angles when we pass over a site and to build 3D models. We could have had an incredible lead, and in fact I had a meeting at 10 Downing Street with Boris Johnson's chief business adviser. In that meeting, I must say that I felt like I was a contestant on "The Apprentice". I did not really feel that our proposal was taken very well, despite the fact that we had very significant private equity funding if only the UK Government would become an anchor tenant in the way that I have just described for a nominal amount: £6.5 million a year to take data from the satellite constellation for five years. Thus, a commitment of £32.5 million from the UK Government would have unlocked a significant nine-figure sum of investment, but unfortunately that did not happen. Here we are, seven years later, and the UK does not have its own sovereign capability.

My very strong message, if I can get this across, is that anchor tenancies are absolutely vital; if the Government can support those, the commercial world and private investment funding will step in, accelerate and power through all those technical problems with the fuel control unit and so on.

John Remedios: I just want to add a couple of things; to pull that into context, why would that be? It might be interesting to explore the reasons on another occasion. One issue is that we do not have a clear idea of the sovereign capability in the key assets that we want. For instance, Richard will come along with a proposal and somebody else will come along with another proposal. We do not really have a framework.

The other bit we do not have—you will have heard this before if you have been listening to any of the science debates—is a long-term commitment to that asset. We maybe do better on the defence side, but not on the civil side. We really need that clear idea. We could do marvellous things, but we need to know that we will doing them for the next five years at least, maybe ten years—five years would certainly be a start. Then we could say, "These are the assets we want to have, the assets that we need, can we go for it?" And we could do it. But first you need that sense of purpose.

Geoff Buswell: I would definitely support the anchor tenancy and the multiyear approach.

I would like to raise a third point if I may, because it is a fairly important challenge that Telespazio UK has faced. The UK as a whole, and the EO sector, are on the Copernicus programme. I must emphasise how incredible it is; a world leading EO programme that is the envy of other continents. Of course, we left the EU and so we were out of Copernicus for a period. We came back in as of 1 January 2024 but I guess,

unsurprisingly, there is a bit of a lag to get back to where we were because the Copernicus programmes are multiyear contracts and are not owned by UK companies or organisations right now and foreign entities are involved. It has therefore taken us some time to get back to the level we were at before. There is no geo-return rule in Copernicus as there is in ESA. In ESA, whatever the member state pledges, ESA guarantees that it will get that back in contracts to its country. In Copernicus, there is no such rule. Basically, you are putting the money straight into the EU budget, so that is a bit of an anomaly; we are not an EU country, but we have gone in.

We need some urgent attention by the Government to lobby the EU so that UK organisations can get back to the level that we were in these supply chains.

The Chair: We are not getting the return from our investment.

Baroness Bonham-Carter of Yarnbury: We are back in, but we are not really back in.

Geoff Busswell: We are back into an incredible programme, but we need to make sure via the right lobbying that we are getting the most out of that.

The Chair: We need to get the benefit out of it.

John Remedios: You have to have clear priorities, and you have to be able to say to the EU, "These are the things we want". That is what other countries do. It is inevitable that you will end up behind, because you had a period out: that is not politics, it is just real life.

Q94 **Lord St John of Bletso:** I know we have a vote coming, but could I probe on the regulatory hurdles that you face? I only want one answer. We are aware of the complex regulations relating to satellite launches and data privacy as well as spectrum management, both nationally and internationally, but what scope is there for streamlining this process?

Geoff Busswell: We are more on the downstream side, so it is not a hurdle that we typically face. I will leave it to my colleagues.

The Chair: It is really about the regulatory aspects. Could things be pruned at all?

Richard Blain: When we launched our satellites, we worked with SSTL on the space licence, and we had lawyers dealing with it for us. We did not face any particular hurdles ourselves, but I would say that our experience is in a very, very narrow field, so I cannot speak for the experience of the rest of the space industry.

The Chair: Do you have any other reflections?

John Remedios: You mentioned data privacy, so maybe the one bit we could comment on is data. I am not sure though, that we see data privacy regulations as being the problem. Companies are quite guarded

about their data, and they are not streamlined in processing that data to enable lots of people to use it. That is one thing that we are looking at. Licensing, rather than regulation, is the challenge that everyone is trying to overcome to enable people to make faster and better use of data.

The Chair: Thank you very much. Now we go over to Lord Booth-Smith. You might want to do a bit of telescoping, but we may be interrupted by a vote. We keep open the possibility of being interrupted, though we have been very lucky so far.

Q95 **Lord Booth-Smith:** I will keep it brief; it is a very narrow question, actually. We have heard a lot over many sessions about the symbiotic relationship between the academic or public sector research institutes and the private sector. I wonder if you could just unpack how that relationship works in your field?

John Remedios: I would say that, where there is public funding of projects, it is excellent. If we are building a public service satellite, working between researchers and industry is part and parcel of the game. In the National Centre, we are doing not just the bright ideas bit of it, but all the legwork behind requirements and trying to chisel out whether this instrument going to do what we need it to do.

We find that, within commercial considerations, industry is very responsive. If you look at the innovation strategy, I know it is probably not the strategy of the current Government in the same way but, when it was published a few years ago, we were in Space Park Leicester, which is part of the University of Leicester and is where our headquarters sit, because the research funding had enabled us to work with 130 companies over a decade. So, as you can see, that is a good starting point for the EO data hub. It is actually joint researchers and companies, and we are funding six primary companies to deliver the software into the hub. We also run a business club, Space for Climate, where businesses can come and sign on to learn about climate data from earth observation, how we use it to share practice or to develop bids. There are lots of successes.

What I find interesting is that where the objectives of the company are much more commercial, they are not necessarily looking for Government or public service funding so much, and then I find a slightly surprising picture. I do not see as much pickup on skills or making alliances with the people who produce those skilled individuals. I do not see very much investment in R&D. I did some reviewing for Finland, which was really interesting. Some companies had joint academic industrial projects across a range of non-science fields. The companies involved had a very clear sense that they wanted to be where the expertise was, and had very clear arrangements for working with academics. I do not spot that in the space industry in the same way. I am not sure why that is, but I find that surprising.

Lord Booth-Smith: Do you mean private sector R&D?

John Remedios: Yes. I am just saying that we can make a direct arrangement or we can benefit generally. You get good examples, but you have to work really hard to make them work and we have the talent to make a lot more of that.

The Chair: Is the issue that there is not a very clear network?

John Remedios: No, it is a cultural thing, and part of it is transnational for the bigger companies.

The Chair: I will suspend the sitting. Some of us are not going to be voting, so when our two Conservative colleagues come back—no pressure—we will resume.

Sitting suspended.

The Chair: Welcome back to the final segment, I suspect, of our second session this afternoon. We go back to Lord Booth-Smith.

Lord Booth-Smith: Thank you for your previous answer, John. Just to reiterate, the question was about how over many sessions we have heard about the symbiotic relationship between academic and public sector research institutions, along with private sector partners. I asked whether you could unpack how that relationship is working within your field.

John Remedios: I have given you an answer. Perhaps Geoff would like to respond.

Geoff Busswell: John has mentioned two of the examples I would have given: the data hub, industry, and academia together. Space for Climate has been a real success. It is a stakeholder group that has been around for more than 10 years, which consists of industry and academic members and is chaired by the UK Space Agency. It is all about trying to bring to bear that academic, research and innovation capability that we have in the UK in terms of excellent science as well as commercial services involving climate information derived from satellites that can then be used in wider sectors. Space for Climate has been a really good partnership between public sector academia and industry.

ESA is a really good vehicle. At Telespazio UK, we prime a contract where we quality assure all the European Space Agency's satellite data before it goes out to the community. To do that, we work with a number of academic specialists on the different datasets. That is a long-term contract that we have had for more than 15 years, but it is tremendously important in terms of the UK's ecosystem and making sure that ESA is offering the highest-quality data to the global community. Those are the three I would mention, and I will stop there.

Richard Blain: Just very briefly, from a space SME perspective, we have found the relationship between academia and the private sector to be very good indeed. It has worked extremely well for us. Our ability to develop new ways or enhance ways of interpreting satellite data for new

applications has been supported by the partnerships that we have had, so it is something that, for us, works extremely well.

John Remedios: I just add two points very quickly. One company that has been an interesting innovator is GHGSat, which is a greenhouse gas measuring satellite based on technology in Canada; it is very clever technology. One interesting thing that it has been doing in order to get acceptance of their product is to work with the best groups in the world. I can happily testify that it has worked with Harvard, SRON in Holland, and with ourselves on UK detections in the National Centre, University of Leeds. That has worked really well; it has been a profitable and helpful development, so that is very good.

One side of that coin is the way that we fund it. We were talking about grants and contracts; you have had some discussion about that elsewhere. We do quite a lot of innovation funding, but in small bits and with many different players. If we could find a way of aligning that in the earth observation sector, I suspect that we would probably do a lot better.

The other part is that I tend to find that, unless we go to ESA, the innovation part in the UK is company led—which is great; I think it should be mostly company led—but not exclusively. It is interesting that we have run a few projects recently where it has been researcher led and we have said “We can do this stuff, if you want to take advantage of that, come and do a project with us and then we are happy for you to take it away and get on with it”. That has been a bit more successful, to our mind, and the products have been a bit more credible. That is just a bit of how we fund innovation that could really improve things.

The Chair: Thank you, and thanks for weaving those two questions together in your answers so well. Over to Lord Shamash.

Q96 **Lord Shamash:** One criticism that we have heard of UK space policy is that it is not sufficiently focused on the strengths of the nation. Do you believe this to be the case? If so, where could we focus our resources, and what, if anything, should we be cutting back? By our nation’s strengths, I suspect we mean our private sector, academia, and the ingenuity or innovative skills that we possess. I just wondered what your take was on that.

The Chair: That is really a continuation; do you want to highlight some points there?

Geoff Busswell: It has been well said before that we have a lot of grants, which is great for pure innovation and low TRL level technology, but we need to develop our own national civil multi-year programmes, supported by real contracts. The *National Space Strategy* in 2021 was a really important milestone, the first time we have ever had a space strategy that has had buy-in from both the civil and defence side of Government. The key is to make sure that we understand what our national priorities are and then to utilise the different funding streams out

there to realise those priorities. When I say the other funding streams, I mean of course sustained national funding, along with the ESA funding that is out there, Horizon funding, Copernicus and bilateral agreements we might have with other countries.

If we understand what our priorities are, then we can leverage all this other funding in the right way to serve our own needs, rather than being a slave to ESA, maybe, where we are not driving ESA funding through in the right way from our own national priorities. That is the key. The *National Space Strategy* was a really important start, and we need to keep the momentum up and follow that through.

John Remedios: That is a challenge. Space is a very broad term, and there are lots of bits of space work that we could happily fund. We do quite a good job of aligning with priorities, but the question is: "When are you reinforcing the strengths that we can really take advantage of?" We can ask ourselves, "What can we remove safely?" I do not think we are going to stop doing earth observation. I hope I am not being parochial; there is a demand and a need for it at every level, so we should be building on that. What we do not want to do is sit in the middle and be partially funded.

We also need to take a realistic look at what we want to achieve. It is much better for us to align our priorities and the areas where we think we can take a market lead. Those are two different things, but we can align both. I do see defence as an increasing pool for our area, and I listened with interest to the previous session. There are some challenges around what will get us our satellites into space; in the end, we should be driven in space by the use that we are going to put it to and work backwards, not just forwards. We are not big enough as a country to just work forwards; there is a real danger of that, whereas we have pools that we can do real, serious work with.

Richard Blain: I think that we focus relatively well on the nation's strengths, but probably not in the right way. There is an opportunity for a fundamental rethink of how some aspects and some lines of funding are applied. We always hear that space is hard and difficult. In order to engage with space, one has to have an appetite for risk. That means that, in order to drive growth, UK funding needs to have a greater appetite for risk as well.

Earth observation is my area of involvement, not comms, and it is by definition a global market. There is no reason why the UK, even though we are a relatively small island, cannot be a global leader in earth observation. There is a huge opportunity out there. Our ability to see into every corner of the planet, every backyard of every industrial facility, every field, everywhere in the world, and look at every crop on a daily basis is an astonishing capability. Our ability to interpret that into meaningful information helps us make better decisions here on earth, whether for climate change, philanthropy, financial gain or, of course, security and defence.

We are still a long way from being able to interpret such vast amounts of data and to find new ways of interpreting it as well, so that is an opportunity for the UK. I believe that we are losing a little of our lead in earth observation capability in the small satellite space. We see overseas companies that have accelerated past what the UK was doing when the UK had the lead, which is a great shame.

Q97 The Chair: This leads very well on to the final question, for which I would like bite-sized responses. When it comes to earth observation, do we have the right balance between sovereign, bilateral and multilateral projects? Richard, you have almost begun to answer that, so I will start at the other end with Geoff.

With the ESA ministerial council meeting upcoming, what investment should the UK specifically be making in ESA's EO programmes? Can you provide an overview of the benefits the UK derives from Copernicus participation?

We have actually touched on that rather well, so I do not think that we need to run over it, but Ministers might find it useful to get some guidance for ESA's ministerial council meeting.

Geoff Buswell: We need both. We need the national and we need ESA. We have utilised ESA funding very well over the years in the UK. The statistics say that for every pound pledged into ESA, we get close to £10 back in wider impact in the UK economy, so it is a very good investment.

ESA is also sometimes very useful in smoothing out the turbulence in the world. When I look back over the past 15 years, the two most difficult periods in the UK financially and economically were the financial crisis in the late 2000s and Covid. Through those, the space industry continued to grow. Because the ESA ministerial council happens every three years, it smooths out the pain a bit when a country hits difficult times. Not only that, ESA provides really important skills and R&D benefit back into the UK. ESA does incredibly exciting, world-leading mega programmes that no one nation could do alone, so being part of ESA enables our access to those.

On the balance side, we need enough of a national delta on the top to enable us to use ESA for our own means, like I said before, so that we know what programmes to subscribe to in ESA to serve our own national interest. Funding on both should be increased. If you look at our GDP versus that of Germany and France, for example, they put more than double into ESA and into their national programmes than the UK does on both.

John Remedios: We should be focused, but deep. Let me explain: basically, there are two truisms that people do not really appreciate. One is that, in earth observation, you need to have satellites in space; those are your assets. If you do not have any satellites in space, you do not have any assets.

The second is that data is your value for money. You can build that satellite and it can flow, and you can do a bit of data and get a bit out. The more you plough into that—it is a logarithmic scale—the more factors you get. We need to learn to create the right playing field for commercial companies, either from the public purse or from encouraging investment. Richard gave us a good illustration. Maybe the defence side is beginning to lead, but we need to have some sovereign missions. That plays well in Europe or elsewhere because you have shown you have the capability to do it.

At the ministerial level, I would say that we need to pick our winners in the earth observation area. If we are going to stay in Copernicus, we need to be really thinking forward, looking at the technologies that we could do from the UK. There is always a tendency in the deliberations to think about shiny toys and not think about data as value for money. So, we would really encourage UKSA and DSIT to think about the downstream sector in the ESA picture, because there are a lot of companies and a lot of scientists who will be the brains of the future and benefit from that bit of funding. That is not really a factor in the calculations—that is just the big bits of kit and whether we can get a big bit. The same funding can actually liberate a lot more. So that is what I am really keen on: a national bit of programme with some infrastructure in the UK, and to pick our winners in Europe to have UK-led European satellites with some data and infrastructure behind that.

Richard Blain: We have benefited from ESA funding through UK Space Agency contributions, which has been exceptionally good. It has worked very well indeed for us; over a period of years, we have been able to develop some capability which we are now selling on a global basis and bringing in commercial revenue to the UK. On that aspect of the interpretation of the data and how we use that data to make better decisions—or different decisions that we could not even make before—we have found some great ways of doing that through this particular funding route. It has really been a superb programme for us.

The Chair: Thank you very much indeed for a very useful session on earth observation. Many of us were only putting our toes into this but now we know a great deal more, thanks to your evidence. This session is now concluded.