



UK Engagement with Space Committee

Corrected oral evidence

Monday 16 June 2025

4.30 pm

Watch the meeting

Members present: Lord Clement-Jones (The Chair); Baroness Bonham-Carter of Yarnbury; Baroness Donaghly; Lord Lansley; Baroness Mobarik; Lord Shamash; Lord St John of Bletso; Viscount Stansgate; Baroness Stowell of Beeston; Lord Tarassenko.

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

Evidence Session No. 18

Heard in Public

Questions 158 – 164

Witnesses

I: Professor Lucy Berthoud, Professor of Space Engineering, University of Bristol; Dr Heidi Thiemann, Director, Space Skills Alliance.

Examination of witnesses

Professor Lucy Berthoud and Dr Heidi Thiemann.

Q158 **The Chair:** Welcome to our second session of the UK Engagement with Space Committee this afternoon. A very warm welcome to Professor Lucy Berthoud, a professor of space engineering at the University of Bristol, and Dr Heidi Thiemann, who is the director at Space Skills Alliance. Our aim in this evidence session is to hear from our witnesses about skills in the space sector. A very warm welcome to you.

I am going to ask a very general first question, and we will proceed from there. Can you provide us with an overview of the space skills landscape in the UK? Is there a skills gap, and if so, how much of a challenge is this? Perhaps we will start with Dr Thiemann.

Dr Heidi Thiemann: Thank you so much. In terms of space skills in the UK, I will start off with the landscape of employment. If we look at the entire space sector, there are about 50,000-odd people working in it. About 31,000 of those are what I would call space workforce, and about 20,000 are in direct-to-home broadcasting, so people working at Sky, Sky Sports, broadband companies, that sort of thing. In the wider supply chain, we have maybe 75,000 people supporting the space sector. Most of the people working in space are clustered in London and the south-east.

The skills challenges in space have been growing over the last few years. In the most recent *Size and Health*, which reports every year or every two years on the economic health of the space sector, skills is now companies' number one issue for growth. When we looked at the space sector skills survey, which we conducted in 2023 with our colleagues at know.space, 95% of organisations surveyed—about 250 or so—said they had some sort of skills challenge that was either retention, recruitment or skills gaps in their current workforce. This has loads of impacts. It is harder to get your product off the ground. There is a lot more work for people in the industry as well. So there are a couple of gaps.

Just briefly on the range of jobs and vacancies available at the moment: in the space sector skills survey, we ask people or companies, "Who are you hiring? What types of roles you have been advertising?". Of all jobs advertised, there were about a quarter in software and data-related roles, a quarter in systems engineering, a quarter in other engineering—so aerospace, electronics, that sort of thing—and about a quarter in the business and commercial side of things. I have probably said enough, so I will pass over to my colleague.

Professor Lucy Berthoud: I teach space systems at the University of Bristol, but I would like to clarify that I am here as co-chair of the Space Universities Network, or SUN, as we like to call ourselves. I hope you enjoy the pun. We have quarterly meetings at the solstices and the equinoxes, you will be pleased to hear. This organisation has about 50 member universities. We work very closely with another organisation of

research universities which has about 60 members who all do space research. So there are a lot of universities working in the space sector. I hope that is useful to know.

What are we talking about in terms of the job sector? As Dr Hart mentioned, it consists of commercial, non-commercial—i.e. academia and research institutes—and then government and defence. It is always useful to follow the money. Where does the money come from? Some 83% of the sector is commercially funded, and then 17% is funded by either the UK Space Agency, the European Space Agency, or the Ministry of Defence. Where do these jobs sit? We have heard from Dr Thiemann that we need skills in electronics, software and business as well as aerospace engineers. Where are they working? They are working in, biggest of all, space applications, so that means earth observation, space data and so on; next is space manufacturing, which means satellites; then space operations, controlling the spacecraft from the ground; and then there are a few per cent of other roles.

You need to know that we cannot just take an electronics engineer from another sector who can be immediately active and useful in space. We need maybe a little conversion course to help them understand the space sector, and we need one to two years to train them up until they can be really efficient and produce added value for their company. It is a small sector. You have just heard that from Dr Thiemann. Why should you care about this tiny little sector with only 128,000 jobs? It is really not that big compared to aircraft or to the car industry. The big reason is the sector is going to grow; it is really going to grow. Everyone is predicting it is going to be worth \$1.8 trillion by 2035. Even in the UK, the Government have said it is one of our fastest-growing sectors. Average growth in the UK space sector is two to three times that of the rest of the economy and other similar industries.

We have a productivity problem across Europe and the UK, but our productivity is double the UK average. I feel so proud of that. This is why we should care about space, not to mention that the sector is critical for us. Some 18% of our economy relies on space in terms of agriculture, finance, healthcare, not to mention its strategic importance in defence and the resilience of our critical national infrastructure. This is why we should care about space skills.

Q159 Baroness Mobarik: My question was about STEM skills and that being a general challenge in the UK. How much can space skills challenges be attributed to that wider STEM skills shortage? Is there anything unique about space that makes things particularly challenging? I would expect that the sector requires highly specialised skills, so how does that all impact? Dr Thiemann, do you want to go first?

Dr Heidi Thiemann: In terms of the general STEM skills challenge, that is significant and well known in the country. We can maybe get into STEAM a bit later but, when we look at the space employment figures, a lot of jobs are in engineering and physics for graduates who only go to university or do an apprenticeship course if they have had a good

engineering, physics or maths teacher at school. It is very well known that we have consistently missed targets for hiring physics and maths teachers over many years now. If we do not have that pipeline coming in to create the general STEM skills in the workforce, we can only hire with what we have. When we look at the specific skills challenges for space, yes, we need rocket scientists and astronomers, but our biggest gaps are in software, data, AI, electronics and systems engineering. These are not space-specific, and we are competing against most other sectors, especially those that can pay a lot better than space, such as tech, banking and finance. A lot of engineering graduates in the UK do not stay in engineering but go into finance and banking because you can command a much higher salary. It is only the really keen ones we get in space, which is not a bad thing in some ways, but space can only hire from what we have, and if we do not have the STEM skills in the UK, it is a challenge.

Professor Lucy Berthoud: Just as an example, a graduate aerospace engineer could expect a salary of between £25,000 and £35,000 with an average of £30,000. If they switch into banking, or they apply their skills in management consultancy, they can expect £80,000 to £90,000. There are three really important differences between the tech sectors and space. One is it is really highly skilled; 80% of the workforce have degrees. Secondly, we do long duration in space, where space missions sometimes take five years to design and build. They might take 10 years to operate, so we have to plan in advance.

The other thing is—this may be common as well—space is really multinational. If I have a call doing some university collaboration with a UK company, I am often talking to a French, Indian or Canadian person. That is typical for UK companies in the space sector. There is just one more thing: skills task forces are already being set up by the Government for nuclear, electronics and quantum. Now, quantum is a tiny sector, but it may become huge, just like space, and we do not have a task force for space. So I would encourage the committee to think about a skills task force for the sector.

Baroness Stowell of Beeston: That is quite an interesting point you just made about not having a skills task force for space. My question is somewhat tangential, but I will be interested in your response. When you said that a lot of engineers go into banking because it offers greater earning potential than perhaps in space, I wondered whether there is any relationship—or whether this is an area that has even been explored—between people who go into banking with engineering degrees perhaps having had some connection with the space industry through their education, to actually improving the investment back into the space sector. One of the things that we hear quite a lot is that investors, so the banking sector, are a bit risk-averse with new industries, whether it is AI or space or whatever. If engineers go into that field, is that an area that you have thought about trying to build up a pool of knowledge and talent to at least help with the investment angle back into the industry?

Professor Lucy Berthoud: There are space venture capitalists. There is a company called Seraphim, for example.

Baroness Stowell of Beeston: We have had evidence on that. I wonder whether that angle, that connection, is something that you even debate.

Professor Lucy Berthoud: That is a really great idea, and we ought to work on it. Certainly when I am teaching, I am trying to convince—

Baroness Stowell of Beeston: Into space.

Professor Stowell of Beeston: —aerospace graduates to go into the space sector, yes. I say at the beginning, "How many of you are interested in the space sector?" Some will say, "Well..." I say, "Well, my job in this unit is to try to convince you to get a job in the space sector at the end of this". We do not actually measure how many do then become banking investors in space. It is a great idea, though.

Dr Heidi Thiemann: This is where it shows that we could do a lot of work at the mid-career stage. You have had a career in banking. Maybe you think, "I want to change". We could pull people back in again. When I was an astronomer, we actually had two ex-lawyers in my office who thought, "I'm done with law; I want to do space".

Baroness Stowell of Beeston: It is more about educating our banking and investment community.

The Chair: It would have been nice to have had the opportunity.

Dr Heidi Thiemann: We can investigate it.

Lord Shamash: A couple of us here would happily join it.

The Chair: Absolutely. A late career change. Thank you, and now over to Lord Tarassenko.

Q160 **Lord Tarassenko:** Previously having been head of engineering at a university not far from Harwell, I can comment that this is an issue. All of us in engineering higher education try to get our graduates to stay in engineering. It is better than it used to be 30 years ago, I can tell you that. It is about 50:50 now, those who stay in engineering and those who go into different sectors such as management consultancy, the City, et cetera. But it will always be the case because of the salary differential.

My question follows on from what you said about the skills task force for space. Maybe the problem is because there are already schemes that the Government set up. We have heard about some from DSIT, from the UK Space Agency, even the Ministry of Defence. There is a cross-government space workforce action plan, not published yet as far as we know. There is the physical build of the new space academy, and MoD even has its space professional training pathway for military service personnel, so there are lots of initiatives. Perhaps they would argue you do not need a skills task force for space, because if you have all these various schemes, why have another one? Quantum did not have any; it is doing it ab initio.

Is that a fair point or not? Or do you think these initiatives are not really doing what they should be yet?

Dr Heidi Thiemann: Government have done a huge amount in space skills in the last few years. At Space Skills Alliance, we went back to the 2016 skills strategy and asked, "Have they done everything, ticked it off?" The answer was, "Yes, fantastic", almost everything had been accomplished, which is great. A lot of work was done towards a space workforce action plan, which has not quite materialised, and I do not believe it will, but there are other things in the pipeline that I can probably touch on later.

In terms of why there should be a task force or what success has been, actually, one of the challenges is making everything fit and work together. It is that piece we commented on in the last section; it is collaboration and co-ordination. In the last three years, there has been a very successful funding cycle in Space to Inspire, Space to Learn and Skills for Space. That tied together a lot of different initiatives, which all linked into the National Space Strategy, funded UKSEDS, the National Space Academy, ESERO, the Jon Egging Trust, all these sorts of things on a pipeline of skills development, and it was really successful. But now that does not exist. There is no leadership; there is no independent group saying, "This is the direction that we want to be going in". Actually, the task forces that other sectors such as the nuclear have are very good at having an independent body look at all the evidence and say, "This is where we should be going". In space, we are doing lots of bits but we need someone to bring us together.

Professor Lucy Berthoud: I would argue that we have a fairly good pipeline set up from primary school right through to HND, apprenticeships and bachelor's degrees. I would say then it goes slightly wrong, and that is partly because we need more initiatives later on. So we need this cross-training and training of people who are not in the space sector to come in later on, so the mid-career piece. We also need some nuancing with the apprenticeships funding, because there has been a recent change to the scheme, which means that you can only do the level 7s, which is a master's degree, when you are 16 to 21. Now, I do not know many 16 year-olds who could do a master's degree. There is also an issue in that a lot of companies have been saying to us that they cannot spend any money on training courses for career-switching, because all their money is taken up by the apprenticeship levy. As you may know, if they are a large-ish company, they have to put a certain amount into the apprenticeship levy, and that money then is being taken away from training. That is what I would contribute.

Lord Shamash: How does the UK compare internationally when it comes to space skills? Given that we perceive ourselves having world-leading institutions, do we not have an advantage over other countries? If not, why not?

Professor Lucy Berthoud: Shall I start with this one? I would like to address that world-leading institution piece with some of the challenges

that creates. We do have world-class space research, as I am sure you have heard many times. We are, for example, second in the world after the US in terms of space publications, which is pretty good. We have world-ranking universities. We teach in English; that is a massive advantage. This means we can recruit thousands upon thousands of international students, and in fact the Government stated that they want to increase their number.

In terms of the rising proportion of international STEM students, almost all the universities in my network have been standing up new space engineering, in particular taught master's programmes. These have typically 80% international students. That gives us two problems: how do we ensure our domestic pipeline? How do we make sure our home students are getting robust access to these educational opportunities? How can we address that? Maybe we could put in some bursaries for courses where they have shortages, such as electronics, AI and software. That is a possibility. The second challenge it gives us is, how do we retain those international students who we have invested so much in? Because otherwise, let us face it, they are going to go home to their countries. They are going to work for and develop competitive programmes to our space industry, not to mention they are going to get my 35 years of experience in space research and industry and take it home.

Do we want to do that? No. I want to give you an example of a student I teach at the moment. Let us call her Jaya. She is a data science master's student who comes from India. We are working together on how to detect nuclear radiation leaks using space data, which is so important with what is going on internationally at the moment. I have said to her, "Do you want to go into the space business?" She said, "Well, perhaps, but what I really want to do is make the world a better place". We want to keep people like Jaya in the country. That is what I would like to focus on in a minute when we talk about visas.

Dr Heidi Thiemann: I will add a few points of comparison for skills challenges. We have spoken to our counterparts and other space agencies for most of Europe, and we have found their skills challenges are very similar to ours. We are not alone. Things like Brexit have made it slightly harder to access a European talent pool, which obviously our European counterparts do not face, but largely the challenges are the same. We are working on an EU/Horizon-funded programme called ASTRAIOS at the moment, looking at those skills challenges. A lot of European countries are facing a bit of a brain drain, especially from central and eastern Europe towards the Benelux region. Some of our people may be going that way as well. But we are not alone in our skills challenges.

Q161 **Lord Lansley:** Again, thinking about your skills task force, let us imagine they exist and are sitting around the table saying, "Well, what are the things we should bring to the table that we are not presently doing?" I wondered if you might give us any suggestions. That might be both public and private sector, of course. Do you have a sense of who might

bring what to the table that is not presently there?

Dr Heidi Thiemann: There are a whole host of things that a skills task force could focus on. We have put quite a lot of thought into this. Last year, we published a *Space Skills Roadmap 2030*, which laid out 26 recommendations that we think should help tackle the skills challenges in the space industry. They range from everything from how you could persuade the public through social media or advertising campaigns, work with royal societies, those sorts of things, and improve the National Careers Service and provide a better understanding of the space industry. As a brief example, if you put "space" in the National Careers Service, you get astronaut as the first result; the next one is gardener; the third one is horticultural manager. You have to go quite a long way down the list before you get to actual space jobs. There are a few small silly things that could be done quite quickly.

Lord Lansley: You might find we could do a separate report on the National Careers Service.

Dr Heidi Thiemann: Yes, I know. But there is also the focus that could happen on lifelong learning and that mid-careers point. That is where I would like a skills task force to focus. How we can attract from other sectors, or get people back in with their skills when they left for career break, for maternity or paternity leave or caring? But, as Dr Hart said in the previous session, a task force could focus and help create those early career opportunities. At the moment we have a bottleneck where we have a lot of very keen students. They come out of university and they have nowhere to go. They leave to go to other sectors; they get disillusioned and do not come back to space. There are all these amazing skills that we could have. I would love to see a task force focusing on helping build that early career pipeline up to the mid-career.

Professor Lucy Berthoud: I can only agree with that, and I would summarise it and say that we have three key asks for a task force: one, strengthen our domestic pipeline; two, re-skilling and up-skilling; and three, international talent retention via a more nuanced visa system.

Lord Lansley: We will come on to the latter point in a moment. Somebody else wants to ask about that, but can I just jog back to one point I wonder about? We visited Harwell and met a number of really exciting companies, but the difficulty is that Harwell is in the middle of a place where there is a great deal of competition for the people who are living there. So you have to bring people there, and it is an expensive place to live and so on. Is there a geographical issue here where we need to maybe ensure that space companies are able to reach out to other places, or indeed relocate to other places, and develop the 14 clusters you are talking about a bit, with an objective of reaching to where engineering capacity is available?

Dr Heidi Thiemann: Absolutely. Honestly, half the time the challenge with skills is one of housing and transport. I previously worked in Cornwall, from where it was very hard to get up to London. Trying to

persuade companies that Cornwall is the place to set up when you are way past the M5 is a real challenge.

The challenge around Harwell, especially for early careers people, is huge. Rent is absolutely massive. You really need to be able to drive a car, and so for young people or those from a lower socioeconomic background, trying to enter the space sector can be a huge challenge when it is concentrated in London and the south-east.

Lord Tarassenko: Could I ask a follow-up before we go to international students and immigration and so on? You are preaching to the converted when you talk about the domestic pipeline. I have asked questions in the House a couple of times about this. I really do worry about it. Four or five years after the introduction of £9,000 fees—so around 2017, 2018—you start to see a fall-off in home students staying on to do a PhD, because they have £50,000 or £60,000 of debt, and it is very hard then to decide to stay on to do a PhD and acquire more debt. So we are losing a fraction of our domestic pipeline.

A potential solution would be industrial PhDs, for example, whilst working for Surrey satellites or Airbus—other companies are available—who would pay for your fees to go back to Bristol, Leicester, Oxford or other universities one or two days a week and do a PhD in space. Do you think would work within the space sector?

Professor Lucy Berthoud: This is a great idea. They are generally called engineering doctorates. They are particularly popular with employees, of course. The challenge is getting companies to support them. If you went to companies in the space sector and asked, “Are you going to finance your staff to go off and do this for three or four years?”, I do not think many are going to say yes, unfortunately.

Lord Tarassenko: You could do a part-time version. It is not an EngD then, but they still work for the company and spend one or two days a week in the university. That is far more popular with companies.

Professor Lucy Berthoud: Yes. It would need support, though, from the companies. That is the problem.

Dr Heidi Thiemann: Very briefly and more anecdotally, I did my PhD at the Open University. I was on site in Milton Keynes, but we had colleagues at Airbus doing a part-time PhD. It was hard for them, but very worth it, so I would be supportive if companies could do that.

Lord Shamash: Did they stay in the industry?

Dr Heidi Thiemann: As far as I know, yes.

Q162 **Baroness Donaghy:** My question is on the immigration and visa rules. One of our own House of Lords select committees recently said that the current system is almost equivalent to national self-harm. Do you think it prevents us from accessing talent from abroad and retaining them? If so, what type of changes would you like to see? Also, how big an opportunity

are the US cuts to space science for us in the UK? Would they be an opportunity for us?

Professor Lucy Berthoud: This is a great question. When we talk about visas, they affect recruitment in industry, in research and academia, and also of international students, so it is something that affects a lot of people. I want to go back to my student, Jaya. If she were to stay in the UK, she could get a graduate visa fairly straightforwardly—that is the first step—which would last about two years. It is mooted to come down to 18 months now. There is then a problem because after that two years she would have to transition to a skilled worker visa, and the threshold for that has recently changed to £38,700. Remember, she was only earning £30,000. That means that within two years she has to jump her salary up to £38,000 in order to qualify for a skilled worker visa. This is a problem. Only 5% to 10% of our graduate visa STEM students are staying on in the country because of this.

So yes, I am with you in terms of the self-harm, because it is a slightly crazy system. We could do quite an easy fix for it, because there is something called an immigration salary list, which used to be called the shortage lists. That gave you a discount—great—which would bring it back down to £30,000 for the salary. But engineering is not on there. We could put it back, and that would solve the problem. So for me, there is quite an easy fix for that. There is also something called a global talent visa. It is very clever. A lot of engineering is on there, particularly digital health, gaming, fintech and so on, but it is very onerous, very expensive and also not that easy to use.

Dr Heidi Thiemann: I am happy to cover some US points, but I will add a couple of quick statistics on the immigration rules. When we carried out the skills survey, over half of organisations who had tried to recruit from abroad said the costs of the visas and the paperwork were a barrier which put them off hiring from abroad. The latest Size and Health report said that about 13% of the space workforce is foreign nationals, mostly from the European Union, so you can see the challenge: if we were to lose quite a lot of these people, it would be quite a large dent.

In terms of the US, it is a really interesting question. I would be very hesitant to support any of the US cuts to science. It is a terrible thing, and there are a lot of missions that we were involved in such as LISA, the gravitational wave instrument and vision; the new Athena and X-ray observatory; and the Rosalind Franklin mission that the UK has done so well in. Our scientists and engineers are building components and working on projects. If that cut happens, we will probably have the instant impact that a lot of missions, projects and components are cancelled. What do they go and do? Maybe they cannot stay in space; they maybe go to another sector or country. Maybe in the long term we build up our own resilience and our own missions, but that is long term, whereas short term, there could be a lot of negative impacts.

Also, just briefly—we spoke a lot about this as well—with Covid, we thought, “Oh, brilliant; the aviation sector is down. We can steal all their

people. We can get loads of talent". We never did. We never got around to actually doing it, and so there is a risk of saying there is a great pool of people over there, and then we talk about getting them and never actually do it. If we are going to do it, we need to act quickly.

Professor Lucy Berthoud: Can I jump in there on the US cuts? We have seen von der Leyen and Macron circling and offering 50% subsidy to any universities which provide funding for US researchers to switch over. I am all in favour of providing a safe haven for science, as they call it. If somebody has been made redundant, then it is good that we support them. But I would hesitate to recommend it for the UK university sector, where we have just shed 10,000 jobs. If we start saying we are going to spend our precious money recruiting from the US and we are shedding jobs in French, German and history, our staff are not going to be very happy about that.

Lord Shamash: Can I come back to the question I asked? I am not sure you properly answered it, whether we have an advantage over other countries. I know we speak English—you touched on it—and we have the skills. You picked up on our view that we were world-leading, and I take the point: self-praise is no recommendation. What do you think about our competition and how we relate to other countries?

Dr Heidi Thiemann: We are very British, so we can never say we are the best, can we?

Lord Shamash: No.

Dr Heidi Thiemann: In terms of skills we have a lot of advantages. We have strategies, and we have a great pipeline. There are just some tweaks that we could make to give ourselves a proper advantage. I would not want to necessarily recommend this, but one country we spoke to said, "Oh, we don't have a skills problem whatsoever". We said, "Well, why is that? They said, "Well, we basically choose the three or four things we want to go for. We fund that entirely, and we do not focus on anything else". Then, you risk not having all the other skills and the other things, but that was the only way they said not to have a shortage. But we have many advantages because we have such a breadth of talent and breadth of experience.

Professor Lucy Berthoud: I would add to that. The problem with competing for skills with other international colleagues is that both our salaries and our funding is lagging. If you compare our salaries with any of the English-speaking countries—the US, Australia, Canada—I can go and more than double my salary tomorrow if I wanted to. The same applies to industry. That is one problem. Funding is also less generous and has been cut recently. That is our problem when we are competing for skills.

Lord Shamash: That would be a downward spiral in a way, would it not, in terms of where we are going. I am sorry to see you nodding in agreement with that, but it must be, must it not?

Professor Lucy Berthoud: Yes.

Lord Shamash: If we cannot compete financially, gradually we will lose them. People coming up in this country do the training, then go back to their countries because we cannot afford to keep them here. Both of you look rather sad.

Baroness Donaghy: I have a follow-up question about students' families. Is there any evidence of barriers because of the immigration and visa rules for people to keep their families here, which is an incentive to remain here, especially if they have particularly rare skills? Is there any evidence that it is a handicap?

Professor Lucy Berthoud: Certainly from a university point of view, in recruitment of international students, when the change was made about dependants not being able to join the student, our numbers fell off a cliff. So that had a big impact.

Q163 **Lord St John of Bletso:** We have received evidence that the space sector has a branding problem, and by this I mean all too often the public perception of it is all about astronauts and satellites. They do not realise the diverse career opportunities. Does this contribute to the skills shortage?

Dr Heidi Thiemann: Yes. That is the quickest answer ever, but yes, definitely. The European Space Agency put out an advert for astronauts a couple of years ago. There were five positions and 23,000 applications. When you look at the surveys, almost every child knows that rocket scientists and astronauts are jobs which are really exciting. I grew up reading Tintin and looked at *Explorers on the Moon* and said, "Brilliant; that is what I want". But some of the challenges are that we are promoting just rocket science and astronauts as the career options.

A couple of years ago, the UK Space Agency did a Space for Everyone tour, where they took a 72-foot rocket around the UK with staff in astronaut costumes. It would have been a fantastic opportunity to showcase the earth observation, the telecoms and the PNT that the UK is excellent at, rather than just focusing on rockets and astronauts. If I were to point to a success story, it would be the RAF in 2009. They were having a few struggles with this as well, and they had an advertising campaign that said, "You don't need to be a pilot to work in the RAF", because 94% of their jobs were not pilot roles. There is a great opportunity for the space sector to do something similar. Actually, you do not need to be an astronaut to work in the space sector—we need electronics engineers, systems engineers, AI engineers.

In some of the evidence I have read through, listened to and watched, Josh Western of Space Forge, has been very clear on this. We are sometimes our own worst enemy in the space industry. He said that we can do a lot better to promote the amazing range of jobs that space has—even though rockets and astronauts still are very cool.

Professor Lucy Berthoud: If I were to promote space jobs, I might push the five strategic areas that were identified in the UK space industrial plan. They include space data, which we have already talked about a lot, space communications, in-space manufacture, position navigation and timing, and space domain awareness, which is all about sensors and tracking. I would be saying that this is what we want to do in the UK, these are the jobs we are going to have in the future; let us promote those.

Lord St John of Bletso: If I could ask a supplementary to that, what outreach programmes are there to better showcase the real-world applications in the space sector?

Dr Heidi Thiemann: I want to highlight the work done by ESERO UK—the European Space Education Resources Office. The UK branch is absolutely brilliant in providing teacher resources across pretty much every single aspect of the curriculum. You can find resources that fit into an English or a computing lesson, and they have done a really good job at getting space into the classroom in a relatable way. The National Space Academy have also been doing a lot of work in schools, taking lots of different aspects of space jobs and hands-on building stuff that students can engage in. Those are success stories to look at and learn from.

Professor Lucy Berthoud: It is really important to go into schools, but we must also not forget to engage with media. Dr Thiemann did a survey and found out why everybody had chosen to be in the space industry. A lot of them said it was because of TV or books. Certainly, I chose to be in the space industry because I read a science fiction book and thought “It’s really cool. I want to explore space”. But I became an engineer because a female engineer came into my school and talked about engineering. We have to do both.

The Chair: Our first witness was Brian Cox, which fits very well with that narrative. Lord Lansley.

Lord Lansley: My question slightly links to something you said a moment ago. What role, or potential role, do you see in this for the Space Command and the services? As I understand it, the Defence Academy that has a Space Academy element in it, but perhaps more generally, is there a need for additional staffing and training and the ability to train people up?

Dr Heidi Thiemann: I am not an expert in the defence side of things, but from speaking with service personnel I know they have been really excited about the fact that space is a career opportunity that they could be involved in. Again, it is anecdotal, but friends have said, “I’ve decided to go and retrain and go on a different pathway within the RAF because I know that space is an option”. It is a very good retention tool as well. Even in popular media, I get a lot of adverts which say, “You can cook this so you can make a satellite in space”. It is joking a bit, but those adverts come up a lot, and people are aware of them. They show that

being in the forces is not just your typical three; there is also this extra space thing, and that could attract new people into the forces.

Lord Lansley: There is a benefit for the space sector but also for the services themselves in terms of recruitment and retention.

Dr Heidi Thiemann: Yes, absolutely.

Lord Shamash: It is a pity that you cannot have the equivalent of David Attenborough's "Ocean" about space on the TV for everybody to see, just bringing the whole thing that we have discussed over the weeks we have been doing this.

Q164 **Viscount Stansgate:** Actually, you make a very good point about the RAF because of course the recent appointment of the air chief marshal, which is the very top post in the RAF, has gone for the first time not to a pilot but to an engineer. That is a breakthrough in the perception of what the RAF is. I know we are not here to discuss the RAF but space, but nevertheless it is a very good point I thought you made.

I just wanted to ask, as an end question, are there any core policy changes you would like to recommend to us as a committee that should be addressed when it comes to skills issues in the space sector? In other words, we have to produce a report. The report has recommendations; that is why we are here. What type of recommendations would you like to see in it?

Professor Lucy Berthoud: I would say we need to support the space industry to train up graduates. That was really clear from your last session with Dr Hart. One of the problems with the space sector is there is one big company in the UK, there are a few medium-sized companies, and there are 1,600 startups. It is not easy for a start-up to train up graduates. We have to give them some support. That would be one thing.

We have already talked about strengthening the domestic pipeline with bursaries for certain shortages of courses. We have talked about re-skilling and up-skilling, so developing and encouraging cross-training initiatives. The University of Portsmouth has just developed a four-week course to cross-train people coming into the space sector. We need to support things like that. We have also talked about the international talent retention and a more nuanced visa system. I want to push you towards those four things.

Viscount Stansgate: The word "nuanced" is such a diplomatic word to use, but we get the point.

The Chair: "Effective" and all sorts of other adjectives occur.

Dr Heidi Thiemann: I agree with everything Professor Berthoud has said. We laid out our 26 recommendations, our space skills roadmap. It covers a lot of things that you might find useful, but for me, it is having better co-ordination, and better leadership to make sure all these things are enacted. We can learn a lot from the nuclear sector, which has

equally long-term horizons—very interesting and impactful projects—but we need that leadership. We need an independent body to make sure that actions are taken so that we do not just sit and talk about the skills problem for another five years.

The Chair: Thank you very much indeed. That ends today's public evidence sessions. Thank you both very much indeed. This session is now concluded.