HOUSE OF COMMONS

Science and Technology Committee

Oral evidence: UK Space Strategy and UK Satellite Infrastructure, HC 98

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Watch the meeting

Members present: Greg Clark (Chair); Aaron Bell; Katherine Fletcher; Carol Monaghan.

Questions 499-523

Witnesses

I: Professor Malcolm Macdonald, Chair of Applied Space Technology, University of Strathclyde, and Professor Iain Woodhouse, Professor of Applied Earth Observation, University of Edinburgh.

Examination of witnesses

Witnesses: Professor Malcolm Macdonald and Professor Iain Woodhouse.

Q499 **Chair:** The Science and Technology Committee is delighted to be in Glasgow this afternoon at the University of Strathclyde's Technology and Innovation Centre. I extend our thanks to the university for hosting us here today for an evidence session that will take in many of the themes that the Committee is currently inquiring into, starting with space and satellites but also looking at the role of science and technology in recovering from the pandemic and in driving growth across the United Kingdom. We will touch on questions of diversity in STEM also.

It is a delight to welcome our first panel of witnesses. They are Professor Malcolm Macdonald, who is the Chair of Applied Space Technology here at the University of Strathclyde, and Professor Iain Woodhouse, who is Professor of Earth Observation at the University of Edinburgh. Thank you both for coming. I should acknowledge that we have students from the University of Strathclyde in our audience in person today and we enjoyed a good discussion with them just before this meeting. You are very welcome, as are people watching in on the livestream.

I will start. In thanking Professor Macdonald for your role, representing the university, in having us at this great institution, I will ask you to reflect on and give us a summary of what you regard as the reasons for the strengths of Scotland, and Glasgow in particular, in the space and satellite sector.

Professor Macdonald: Thank you for the opportunity to speak here today. I get asked quite a lot about how we ended up with a strong Scottish space sector and the honest reflection is that a number of very happy coincidences occurred at about the same time. However, when you end up with that number of coincidences, there is something underpinning them. I think the underpinning thing is that there is a long history of people getting their university education in Scotland, wanting to work in the space sector and not being able to do so and going to work elsewhere in Europe, in England, France, Germany, wherever it is. The coincidence was that a number of people about the same time all decided, "I kind of want to go home," and arrived back in Glasgow and Edinburgh looking for opportunities to work in the space sector and do that locally, where they came from.

I think that the experience that those people brought home with them was one of the things that enabled there to be this commercial space sector. There has always been a strong academic sector but the experience that people brought back from the rest of Europe effectively gave the sector a step up. For me, that is the basis that has created the sector we see today.

Professor Woodhouse: I definitely agree that it was the coincidence of individuals happening to be at the right place at the right time and also

the culture of entrepreneurism that some of those people brought. Often all it needs is a few people demonstrating and leading the way to set an example that leads lots of other students and postdocs, and even academics, to get involved in starting new companies and getting involved with that. What has probably driven quite a lot of the new company generation is the fact that there have been some examples of people doing it before them and being able to follow in those footsteps and also get the experience and insights from how they have experienced doing it.

I say about the west coast that there is the tradition of building ships and we now build spaceships. The east coast with Edinburgh and Dundee is much more about exploration and discovery. There tends to be a bit of that culture still, so that a lot of the upstream technology stuff is in the west and the downstream data stuff is in the east. It is not exclusively, but that is kind of how the pattern works. It works very well. You can go from this building to the Bayes Centre in Edinburgh in probably just over an hour door to door, so everybody is well connected. I think it helps that there is quite a concentration of that activity.

Q500 **Chair:** One of the themes of the Levelling Up White Paper that was published by the UK Government last week was the importance of clusters—clusters of industries, and professions in some cases—that are mutually reinforcing. I think I can say on behalf of the Committee that, having visited some of the companies involved in the space sector, and having talked to some of the students about the academic education and research that is done here, we have seen that in action today. Would you say something about how important clusters are—that clustering effect? There is not a uniformity of specialism across the whole of the UK in these matters and Scotland has emerged as one of the prime points of that.

Professor Macdonald: If I think back to my PhD, if we wanted to work with an industry partner while doing that we had to travel down to Airbus in Stevenage or somewhere like that. Today we work closely with Clyde Space and lots of local companies. It is 15 minutes; I can walk to a lot of my industry partners. That clustering is important because it gives you things on your local doorstep. I think a lot of the space sector traditionally is perhaps a bit more focused on the M4 corridor, so having a local community who are doing things, having ideas, and reading about what the world is doing, enables us to do that more easily and not need to travel.

It is important to recognise that Scotland is almost a cluster of clusters. You have a cluster in Glasgow and a cluster in Edinburgh but then, as Iain was saying, they are so close together that they interlink and overlap with each other and they strengthen each other as well. It is important to recognise that it is quite a complex environment, but it is certainly a beneficial environment and everybody is very supportive of everybody else. That is a key feature of any good cluster.

Q501 **Chair:** Thank you. Professor Woodhouse, if you could comment on that and also say something about the Scottish Space Leadership Council and what contribution it has made?

Professor Woodhouse: I will leave that to Malcolm specifically because he has had more experience of being a part of that. In parallel to that is the Scottish Space Academics Forum, which was also set up to reflect the more academic groups. I chair that one. Malcolm is part of it and the universities in Scotland all have representatives on it.

I guess the reason that that formed is because the Scottish Space Leadership Council was starting to make some progress in raising the profile of Scottish space but it was formed more from an industry perspective. The Scottish Space Academics Forum was to match that and work with them.

We have representatives on each now to make sure that there is a place where the Scottish academics can have some collective discussion, have a voice that reflects what our contribution will be going forward, largely on the innovation and skill side of things.

I think that element of community comes out in the Scottish Space Strategy. There are groups that are interlinked and connected and are speaking on behalf of larger collections of the community, and there are people willing to chip into these groups and make them work. That seems to work very well. It is a bit like what Malcolm was saying about the cluster of clusters. There is a number of these communities but they are all talking together. It is easy to talk because we can access and meet up in person, not so much over the last couple of years but it is possible to do that.

I think of the innovation ecosystem model, which I think was promoted by Harvard Business School, rather than a cluster. A cluster suggests lots of people doing similar things, a bit like Harwell; whereas I would argue that the best innovation and the supportive environment for companies is when you have a mixture and your neighbours are your potential partners and customers rather than your competition.

Q502 **Chair:** Thank you for that. Professor Macdonald, how significant has the leadership council been in the development of the sector here?

Professor Macdonald: One of the things that the leadership council achieved very early on was to create a forum for the whole of the space sector to come together. I don't think that had existed before. There were forums for different bits of the space sector, but not the sector as a whole.

The other thing it has done is ensure very strong engagement with the Scottish Government—not just the economic development agencies but the Scottish Government Minister who has responsibility for the space sector sits on the leadership council. We have a quarterly engagement with him that provides a very clear line of sight into what the

Government are thinking but also puts him into the sector to understand as well.

The Scottish sector is structured slightly differently to the English sector. They are not good terms but you know what I mean. There is a lot less membership of UK Space, the trade body, here in Scotland, so again the Scottish Space Leadership Council provides a very clear engagement mechanism into the development of the sector for the Catapult space agency and the bodies that are UK-wide. The leadership council provides a nice collective forum and voice for the sector.

Chair: I will go to my colleagues on the Committee now, starting with Carol Monaghan, who is a Glasgow MP—the MP for Glasgow North West.

Q503 **Carol Monaghan:** It is an absolute delight and pleasure to have you here today and to be at the University of Strathclyde. I am a graduate of the University of Strathclyde, where I studied physics. It is also good to have students here with us today. One of the issues we often have in politics is that there is too big a divide between those who are making the policy and those who are impacted by it. It is good to see young students and researchers being part of this today and understanding more how Committees work and feed in. That is fantastic.

I spend a lot of time talking about the flourishing space sector in Glasgow and the importance of space. I also talk a lot about photonics and quantum, which is a great strength across the central belt of Scotland. It is good for us to have an understanding in Glasgow of how it all works. I was a teacher for 20 years and I want to turn first to Professor Macdonald. You run the Scottish Space School at Strathclyde and, as a physics teacher, I often sent students to the Scottish Space School and we engaged quite strongly with that. Can you say a bit about the importance of the space school and how it encourages young people to consider careers in STEM generally or space specifically?

Professor Macdonald: The Scottish Space School is a great example of how we can use space to engage particularly secondary school children in the whole of the STEM subjects. Space is an exciting topic and gets people interested. The space school actively targets people who are not considering applying to a STEM subject in a university. We bring them to the university for a week of intensive activities themed around the space sector and we use that to explain to them what all the different types of engineering are. We give them a first-hand, hands-on experience of what science and engineering is.

Each year we bring in about 100 fifth or sixth-year students, so they are looking to go on to university. It is a roughly 50:50 split across the genders. We have found that between 65% and 85% of them will then apply to study a STEM subject at university. These are students who were not going to do a STEM, and two-thirds of them will go on and apply to study a STEM subject.

For me, that is the success of the space school. It shows that if you get out and show people who may not have had the engagement and not had explained to them what science and engineering are, they then think, "That is really interesting. That is something I want to do." That is the success of the space school—the fact that it is gender-balanced and it shows how easy it is to pull people through, who were going to do medicine or veterinary or something else, and get them to do engineering and science.

Q504 **Carol Monaghan:** You mentioned the gender aspect, which is obviously very important and it is a topic that is close to my heart, but there are other aspects of diversity. Could you say a bit about that for youngsters from a BAME background or from different socioeconomic backgrounds?

Professor Macdonald: Coming into the meeting, I had a look and we don't have the internal statistics on that. The only statistics we have are on the gender split, so I cannot point to specific figures and say this is what we do. However, we engage very strongly with local schools and around the university we have a higher proportion of less advantaged communities. Therefore, there is an expectation that that is reflected and certainly in our university intake we do very well on the metrics that are set by the Scottish Government. I don't have the same figures that I can point to as a basic conversion rate for gender, but I would expect to see those represented in less advantaged communities.

Q505 **Carol Monaghan:** We were out visiting space sector companies this morning and one of the representatives from the sector said to us, "The Scottish Space School is a great opportunity but it often looks at NASA and astronauts and all of that. Why are they not looking at somebody like me who grew up in Glasgow, went to a local comprehensive school and studied at Strathclyde uni? Why are they not using me as a role model?" Are you guilty of going for the high profile rather than looking at the more tangible role models within the community?

Professor Macdonald: I might get into trouble for saying this but I completely agree with you and I have said it before internally. If we set out to create the space school today we would not be able to get NASA engaged in the way it is. We could now bring in the European Space Agency, the UK Space Agency and all the local companies and create something that would be impossible to create today, and I would love it if we did.

Q506 **Carol Monaghan:** Professor Woodhouse, thank you for joining us this afternoon. The University of Edinburgh hosts a centre for doctoral training in earth observation. What benefits does that bring to the Scottish space sector?

Professor Woodhouse: The doctoral training centre, SENSE, is a collaboration with the University of Leeds. Anna Hogg, who is a former student from Edinburgh, is the lead on the Leeds side, and Ed Mitchard leads in Edinburgh and there are other partners around the UK. The key

thing is that they get very focused training across a wide range of skills to do with earth observation. They have a narrow topic for their thesis but they have training and collaboration and do projects around a wide range of things. They are graduating from there and coming into the community.

We can have a discussion about whether PhD level is the optimum, because I think that we don't do a very good job of supporting Masters level. A lot of companies I talk to want to employ Masters-level graduates because they are not too academic, essentially. We don't have similar funding to help UK-based students. Therefore, a lot of the Masters programmes in earth observation that I see around the UK are dominated by overseas students, not UK students, and I think that is a real issue. We need to address that for the "everybody picks up on the skills" issue.

Q507 **Carol Monaghan:** You have both been involved in the creation of spinout companies. If a small company in the space sector wants to grow into a larger company, how do they do that without being bought out by a huge multinational?

Professor Woodhouse: Full disclosure: I have interests in a few start-up and spinout companies, so I will answer that question specifically from an Earth Blox's perspective—I am a science adviser for Earth Blox. I will link this back into your previous question to Malcolm to do with diversity, because one of the challenges for a lot of companies that I speak to in the UK is that they are desperate to diversify their workforce.

The challenge that has to be addressed is that it may be 50:50 at the school level—which has been running for 20 years—but we don't see that pull through. Somewhere along that process the 50:50 becomes 80:20 and that has to be addressed. There are lots of tangible things that we can be doing to address that in the industry.

Generally, for companies, I don't know a company that wouldn't rather have more customers than an investment. It is easy to talk about investment and you can have the big numbers and everything else, but I think that changing the procurement system for the government entities in the UK would go a long way to supporting those companies, whether that is data as a service model or other software as a service model.

I know a lot of companies who won't bid for UK Government or Scottish Government contracts, largely because they want to keep all the IP. Start-up companies are not going to give you all their IP, so they have to look elsewhere. If you can change the procurement system so that these companies can get more clients and customers, that is how you will grow. That is how you gain interest and get other investment, external, outside of the UK investment, because these companies can sell things. If there is one thing you could do, it is to try to make that easier.

Professor Macdonald: I fully agree with everything that Iain said. There is definitely increased access to capital now within the space sector.

There is more available to companies to allow them to grow, but I think that the UK needs to look at how we support all companies, start-ups and larger companies.

When we look at how things are done elsewhere—in Europe and in North America—there is a tendency more towards contracts than grants, using contracts to support the development of a service and then to anchor customers for that service. If a company has a contract it becomes more investable as well. Government can use the placement of contracts to increase the amount of private capital going into businesses. There is a number of things that could be done that would bring space services into Government but also help to grow the sector. It is a mix of making that private capital available but also there are things that Government could look to do differently.

Professor Woodhouse: If I may quickly add to that, one of the positives I see from the UK Space Strategy is getting the MoD more involved in the dual use. Companies in the US can keep their lights on by getting steady defence contracts to basically keep things going, whereas in the UK I don't know of any earth observation company that does that.

Chair: Thank you, Professor Woodhouse. That is a very important point and it will be helpful for our report. I will turn to my colleague Aaron Bell.

Q508 **Aaron Bell:** Thank you both for coming and for the warm welcome. You have anticipated my opening question, Professor Woodhouse. I want to talk about the National Space Strategy, which was launched last September, and the Strategy for Space in Scotland that followed a month later. Starting with the UK one, I will ask you both what you see as the strengths and the weaknesses of the UK National Space Strategy. I will go straight back to you, Professor Woodhouse, because you have already started.

Professor Woodhouse: On the strengths of the UK strategy I am a supporter of getting the MoD involved in the dual use aspect. I have seen examples in the US of applications and things where that has worked successfully. Looking at the strength of climate studies in the UK and picking up on the earth observation I think is very important.

That brings me to the cons or the downside of the strategy. I don't think that the UK puts enough emphasis on data and the value of data. Where maybe 20 years ago we started to recognise the value of medical data, space data and environmental intelligence data have to be absolutely front and centre. Because that is not just from an industry perspective and the way that you grow the revenue stream from that but also our understanding of security angles and many different angles where data has to be front and centre.

There are other things that I know people yesterday picked up on: that it is not quite a plan yet and there is no budget so it is quite difficult to write a strategy if you don't know how much you have to spend. They

could have picked up on the diversity issue. The Scottish Space Strategy has managed to pick up on that and the Canadian space strategy picked up on that. If you can turn the 50:50 at 16 into 50:50, when they are 40 and in boardrooms and everything, if you can achieve that you will radically change the quality of the workforce in the space industry.

Unfortunately, they did not pick up on that as something that should be front and centre. Arguably it should be front and centre of every strategy the Government produces, but focusing on this one.

The other major downside for me is it is not even a year old and the strategy is already under question. On the 10-point plan, number 2 says "including participating in Copernicus". The strategy says that we will commit to being in Copernicus and it is now not very sure. That raises questions about everything else in the strategy: what else is negotiable? My main concern is that the strategy has lots of valuable points but we have to stick by it and push it or it is not really a strategy.

Q509 **Aaron Bell:** Thank you. Before I turn to Professor Macdonald, your forum was obviously involved in the Scottish Space Strategy. Did you have any input into the UK Space Strategy as well?

Professor Woodhouse: Input to the UK Space Strategy was through the same mechanisms that everybody had an input through. We probably formed too late in the Scottish Space Academics Forum to have any real solid input in that. We did have some input for the Scottish one.

Professor Macdonald: The UK strategy, for me, was very much a continuation of the path that we have been going on. There was not a major surprise in there, nor was there major deviation from it. In some respects that is a strength of it but also a bit of a weakness, because it did not address some of the very specific issues that Iain mentioned that are emerging opportunities that we could have done more on. There was potentially an issue there.

Looking at what has worked very well in the sector in the last few years, we have a strong track record in starting companies. We don't have a particularly strong record in scaling them up, gaining bigger shares of the market. That is something that Germany has done very well. It has fewer start-ups but a bigger share of the market. There are things that we could have looked at: what has worked, what has not worked and what could we do differently in the future? I think that would have been nice to see that.

Q510 **Aaron Bell:** Following on from that, is it a potential failing—and we have heard this from some other witnesses—that there is a lack of focus? It is trying to do a bit of everything but the UK may be best served, given the relative size of our economy and the academic research and so on, to focus on it more intensely?

Professor Macdonald: It is always a difficult thing because you want to include as many people as possible. You want to get buy-in from as large

a community as possible but, at the same time, you end up writing quite a broad strategy that then lacks the focus and it delays some of the difficult decisions that may need to be taken.

I put in my submission that I think perhaps there will come a point where we need to make some of those difficult decisions and say, "This is what we are doing. This is a strategic priority for the next number of years" and focus in on that and accept that parts of the community will not feel quite as lost as they have in the past.

Q511 **Aaron Bell:** Turning to the Scottish Space Strategy—I will stick with you, Professor Macdonald—without getting into the constitutional arguments, why does Scotland need its own strategy for space?

Professor Macdonald: We have talked already this morning about the fact that there is an established space cluster here. Not getting into constitutional things but, within the current devolution settlement, there are elements of economic development that are devolved to the Scottish Government. The space sector is clearly part of the Scottish economy and it makes sense that not just Scotland but other areas of the UK should have their own strategy for how they support key strategic sectors.

The Scottish Government have recognised space as one of the key strategic sectors that they want to support. I think it is logical that you have these strategies at different levels and, hopefully, as we go forward, we will see them become more integrated and more overlapping so that they start to support each other better.

Q512 **Aaron Bell:** You must see it as complementary to the UK Space Strategy. How do you think the prospects for launch in Scotland affect the Scottish space sector? Will that make a substantial difference, given that there will be the opportunities from Sutherland or Shetland?

Professor Macdonald: The fact that launch is the one thing we cannot do now makes it of clear added value to the sector. It is also something that attracts people into the sector. It is very high profile and something that people want to get involved with. The fact that it gives that high profile and means we can do everything in Scotland is a clear added value to the Scottish community but also to the UK community. It gives us the launch capability in Europe that should be more accessible and cheaper. It should only be a positive to us.

Q513 **Aaron Bell:** The same questions to you, Professor Woodhouse: why does Scotland need its own strategy? You had a role in formulating that: would you speak about that? How does it complement the UK strategy and do you have any comments on launch in Scotland?

Professor Woodhouse: The Scottish Space Academics Forum was asked to contribute, so we discussed it and made some recommendations. Many of those recommendations have not yet seen the light of day. They were perhaps too very clear and tangible and required a budget attached to them, which is part of the problem with

both of the strategies. To answer your previous question: I suspect some of these will be prioritised very quickly once we know how much money is available.

Does Scotland need a space strategy? Everybody should have a space strategy. The University of Edinburgh is developing a space strategy; Strathclyde probably is or has already. I would encourage every major company in the UK to be developing a strategy of how they can take advantage of what is happening in the space sector, because it is moving fast and will change everything. It is entirely appropriate that the Scottish Government should have that. The particular aspect of the academics is that the innovation, talent and skills will come through higher education. That has to be fed. Fill that funnel from higher education, and primary education even, and that is all devolved. To have a strategy that makes sure that we are filling that pipeline of talent and innovation has to be dealt with at Scottish level.

Q514 **Aaron Bell:** Is it complementary?

Professor Woodhouse: I think it is complementary. When discussing space generally and why it is clearly important and a real opportunity, the one thing I tell everybody is that the Scottish Government and Westminster agree. That should tell you something. I think it is very much complementary.

My understanding is that the Scottish Space Strategy was written with some visibility of what the UK strategy was going to be. I don't think they are saying anything different. I think that one of the downsides of possibly both strategies is that they are much the same as many other countries' strategies, such as Canada or Australia. We don't differentiate ourselves especially well but I don't see any incompatibility between the strategies within the UK.

Q515 **Aaron Bell:** To follow up on the point you have already picked up on, if it is the same as everybody else's strategy, surely focus has to be the answer. You are right that that requires some knowledge of budgets but, as you see things at the moment, what would you recommend without that knowledge of budget? Is there a particular area that we should be focusing on?

Professor Woodhouse: I don't know about the particular area but I think we need some moonshot scale of ambition. We launched the Scottish Space Strategy in Dubai at the expo before Christmas and talking to the people in the Dubai space agency; they are already planning Mars colonisation and everything else. They are looking at a very long timescale. Why do we not similarly have very clear ambitions?

I am not arguing in favour of Mars but something that clearly has the UK or Scotland at the forefront and leading on something. Whereas, for the most part, we are keeping up with the neighbours and kicking the football around and saying, "Well, it is my football. I'll play with it and go and kick

it about on my own," which is part of the rhetoric that we get at the moment.

We have to identify things that we are definitely going to lead on in the next 10, 20 years. I know that it is difficult for politicians to commit to those kinds of timescales but we have to find those moonshot ideas and say, "This is what we are definitely going to lead on and everybody else can jump on our bus or not."

Q516 **Katherine Fletcher:** I had a couple of questions prepared but I want to return to some of the themes. You have just said that we need some big targets. Would you share what you think they should be?

Professor Woodhouse: The short answer to that is no. I have not sat down and thought exactly what those are from the data side of things about what is or is not plausible. We had the discussion in the Scottish Space Academics Forum of trying to push for ambitions of what Scotland might achieve. I think a moon mission or something was talked about. We have to be clear in having that discussion and pushing it forward. I am not sure it is for me to specify exactly what that would be.

Q517 **Katherine Fletcher:** Thank you both for your time, by the way. Professor Macdonald, would you like to give an idea of what we should be thinking about? While historically politicians have not been keen on 20 to 30-year timescales, if you are talking about space I think you could be pushing against an open door here. As you said, if we have a series of different sets of people agreeing on the basic thrust, there is an opportunity space for us to fill it with content.

Professor Macdonald: I think I will stick with Iain and say no. If we look back to the Space Innovation and Growth Strategy, the Case for Space, the documents were coming out a decade or more ago. The UK established a position of thought leadership and the sector grew on the back of that. We have not shown quite that same thought leadership more recently. At the same time, we now have more access to risk capital, so I definitely would encourage the Government to think about focusing on higher-risk activities, because you cannot rely on the private sector to take on things that they might not have been able to do a decade ago.

If we think about what space is good for and what are the key challenges that we face as a society, you are thinking about things like net zero, the sustainable development goals, the climate emergency. There is a whole raft of things there, where I think civil space could be set up in a similar way to what we are seeing on the defence side of space where it is all about national security and everything they have used from that perspective. You could take civil space and say, "Everything is about this climate emergency. How do we make our world sustainable for the future?" You could set up a large challenge there, right across society, that integrates space with different parts of the community, different parts of the economy, all geared towards this one big challenge.

To go back to the point that Iain made earlier, to have the risk of walking away from Copernicus, when that is the challenge that we have today, would be very disappointing.

Q518 **Katherine Fletcher:** I will confess to having a slight interest in the sector, having spent two weeks here in November discussing those very topics. I find that often it is quite a good idea to take an example and chase it through. Professor Woodhouse, let me evolve this a touch. Part of the job of politicians is to set the ground conditions for success and part of the job of politicians is to get out of the way where at all possible.

I want to chase an example in two areas. We could use our capabilities in space to be the world leaders in space-based agricultural monitoring that removes the need for excess hydration, excess fertilisers, excess nitrogen. I will pick one very detailed one. If you were to stimulate that environment, do you need Government setting metric targets for how many satellites we have up or how many people are employed, or do you need a Government procurement system that is swung in behind that target, or do you need a change to primary legislation to recognise the value of the per 30 centimetre data that would come back from the area of soil under cultivation? Do you see what I mean?

Could you help me and the Committee chase an example through that gives us clear recommendations to make? I can see Professor Woodhouse waving at me, so I will stop talking.

Professor Woodhouse: I had some time to think about your first question. Let's take an example that leads directly from what you were suggesting, which I think is a good one. Take one of the sustainable development goals—say, no hunger, and let's say that the UK will lead on using space to contribute to making sure that nobody is hungry any more and make that a north star, something that drives the choice of procurement and the decisions that are made.

It could be from procurement, and there are some examples through the IPP programme that was essentially UK Space Agency respending FCDO moneys, as I understand it—that idea of recognising that there is a need and a role for the UK Space Agency in helping these other agencies on where their money is best put. You could take something like one of the sustainable development goals and say that will be our contribution. I used the term "moonshot" but it could be a local thing on Earth to say there is something that the UK has some great expertise in that we could put to even greater effect and over a 10-year period we will eradicate hunger.

Q519 **Katherine Fletcher:** What would you change in the procurement system, for example, to make that happen?

Professor Woodhouse: On the procurement—I think Malcolm suggested this as well—instead of putting out grants, just procuring services and doing it without having to hog all the IP. Then you will get a

lot more interest from not just the start-ups and the small companies; as Malcolm was saying, the big companies will get into that as well.

Q520 **Katherine Fletcher:** I will give you a "for instance" just to make sure I am following you. Should FCDO want to track maize yields in Kenya, would presenting that as a commercial contract to supply of baseline business work?

Professor Woodhouse: As I understand it, the IPP programme was all grant-base, whereas what you want is a procurement that is not just a one-off "show me that it can be done" but saying, "We need this information every year for the next 10 years".

Professor Macdonald: I very much agree with all of that. One of the challenges that we have had, particularly in the last few years, has been single-year budgets within Government. That has led to the space agency getting their budget quite late in the year. It is then trying to spend its budget quite often within three, four or five months, so you end up with very short projects that, by their very nature, limit innovation; because you cannot go off and do a large research project and then deliver a programme on the back of it. It has to be very much something that is ready to go.

We have the multi-year settlement. I think that if we can use that to set in train longer programmes of activity, where we can develop these new capabilities and then operationalise them, that will set a change from where we have been in the last few years.

Q521 **Katherine Fletcher:** Given that we have chased that example through and it is possible, is there anything in your mind that you are thinking about but not necessarily sharing that you would like to see in addition? For example, Harwell has a big satellite testing facility that looks a little bit James Bond-y. Is there something that you are thinking, "It would be lovely if we had" or are you saying that the nous and innovation and ecosystem as you described it is well placed and Government need to get out of the way to make it successful?

Professor Woodhouse: I will go back to my thing about data. The infrastructure to support that is one of the key things. The Edinburgh city deal is investing quite a lot in the Edinburgh international data facility. We need more of that, essentially. We need more to make sure that we are in control of that data and knowhow to manage it and can bring it together with other forms of data. Space data on its own is very rarely of value. You have to bring that together with other data to add that value, so I think having the infrastructure to do that is what we need.

Q522 **Katherine Fletcher:** I have a clarifying question: you would not want to buy that? You want the data centres—for reasons of security and accessibility and IP—to be physically located on these shores?

Professor Woodhouse: I want the companies that own them to be based on these shores, yes. At the moment, your choice is Amazon,

Google, IBM and so on. From a Government perspective, you should be thinking, "We can buy it in but it is all offshore. It is all export money." You want the next big data company to be home-grown, not something with which we are helping fuel US companies.

Professor Macdonald: You are never going to get anybody sitting in front of a committee of politicians saying, "We don't need any more money. We don't need any more support." There are areas of the space sector that are very high capital and there are always things that are difficult, particularly for start-up companies when you have new emerging areas of the sector and those facilities may not exist or are not that accessible for them. At the same time, there has been quite large investment into particularly the Harwell campus recently.

I urge that future investment is well thought through and that there is a clear use for it and that it is not a case of, "This is what I need now," failing to recognise that it takes three or four years to build it and by the time it is built the thing that we actually want might be different. I think perhaps that process of investment and delivery could be better thought through in the future.

Q523 **Chair:** A final question from me to Professor Woodhouse. You mentioned Copernicus. The UK has applied to participate in Copernicus but that application has not been granted, yet at least. The Committee had a session yesterday in Westminster in which we heard from the UK Space Agency. One of the points that was made—I think it was by the agency—is that the UK would still have access to the data supplied by Copernicus in whatever circumstances, whether we were participating or not. If that is the case, in your view, does that mitigate or solve the problem? What would we be losing out on and is access to the data not good enough?

Professor Woodhouse: You lose control of the data because you are outside the tent, not in it. At the moment the agreement says that non-members will get the data slightly later, so anybody who is doing rapid services will be disadvantaged by that. Who is to say that in a few years' time they don't change it again, so that in fact you don't get it until a week later? We will have no say or contribution to how that goes forward.

The key thing is that the Copernicus programme is at risk for us not being a part of that and then our trusted partner status becomes questionable. It is all very well talking about international programmes and everything else, but if our trusted partner status is eroded that does not put us in a good position for future negotiating with other international agencies.

Chair: Thank you. It is very helpful to hear from you on that. I thank both professors for your evidence today. That will be the final oral evidence we will take on our space inquiry. Along with your evidence and the sessions that we have had, we will add our reflections on the visits we made this morning and to Harwell, and the Committee will produce its report during the weeks ahead. Thank you very much indeed for coming

on your home patch to see us today.