



Science and Technology Committee

Corrected oral evidence: Delivering a UK science and technology strategy

Tuesday 5 April 2022

10.15 am

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Members present: Baroness Brown of Cambridge (The Chair); Baroness Blackwood of North Oxford; Viscount Hanworth; Lord Holmes of Richmond; Lord Krebs; Baroness Manningham-Buller; Lord Mitchell; Lord Rees of Ludlow; Baroness Rock; Baroness Sheehan; Baroness Walmsley; Baroness Warwick of Undercliffe.

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Questions 99 - 105

Witnesses

Professor Paul Monks, Chief Scientific Adviser, Department for Business, Energy, and Industrial Strategy; Professor Gideon Henderson, Chief Scientific Adviser, Department for Environment, Food and Rural Affairs.

USE OF THE TRANSCRIPT

This is a corrected transcript of evidence taken in public and webcast on www.parliamentlive.tv.

Examination of witnesses

Professor Paul Monks and Professor Gideon Henderson.

Q99 **The Chair:** Good morning to our witnesses. Thank you very much for joining us today. It is particularly lovely to see people here in person. We are very keen to hear your views on the new Office for Science and Technology Strategy and the National Science and Technology Council, the increased departmental science budgets, the role of UKRI, the scientific strength of the Civil Service and, indeed, how all of it will affect your roles as departmental chief scientific advisers.

Before we start the questions, I remind you that the session is being broadcast on the internet. A transcript of today's session will be sent to you in a few days' time so that you can check it and send in minor corrections. If there is anything that you do not get a chance to say and would like to tell us, we will be very happy to receive supplementary evidence in writing after the meeting.

If that is all clear, I will kick off with the first question. I will be cheeky and make it into two questions, I am afraid. I would be interested to hear about the R&D priorities for your department. How do you commission or conduct R&D, and are there ways in which that could be made more effective? Can I start with you, Professor Monks?

Professor Paul Monks: Thank you very much for the opportunity to come and talk to you this morning. Before I get into the R&D priorities of the department, it is worth remembering that I represent the Department for Business, Energy and Industrial Strategy. We have a slightly unusual role in the science landscape in that we do science for policy and policy for science. In a sense, we are the sponsors of the science academies, UKRI and a number of PSREs, which we may get to a bit later. We also have a set of departmental science interests, particularly around energy, climate, net zero and business innovation.

As we wander across the topics this morning, we will wander across those two sides of the department, first as the owner of the science system, if you will, and some of the views around that. As the departmental CSA, I spend a lot of my time thinking about what the R&D priorities are apart from for UKRI, which has a different process and delivery around that.

With that landscape set, I will answer your original question: what are the priorities of the department? The priorities for the department are enterprise, net zero and innovation. Net zero is defined by the net-zero strategy, which is a cross-government strategy. You asked me about the department, but it is actually a government strategy. On the R&D side, we put down a net-zero R&D road map as part of that process last October. Again, that worked across government to bring together the R&D requirements for net zero.

On the innovation side, we put down an innovation strategy, which lays out the priorities around innovation. No doubt we will come to the seven

technologies and the four pillars of the innovation strategy. Again, that is a cross-government strategy.

On enterprise, it is very much around growing and supporting companies. That includes R&D programmes of the department that are set to specifics such as the Aerospace Technology Institute and the Advanced Propulsion Centre. We support cross-departmental offices such as the Office for Life Sciences and the Office for AI. I will not list them all. In a way, we support enterprise by working across sectors and supporting R&D in those sectors. We support net zero by innovating in order to meet the requirements of net zero, both now and in the next decade. We support the innovation system across government, growing companies and supporting R&D in order to do that.

The Chair: I am tempted to ask you what difference the Office for Science and Technology Strategy will make, since those were all cross-government, but that question is coming later, so I will not.

Professor Paul Monks: Thank you for the warning.

The Chair: It is tantalising. Professor Henderson?

Professor Gideon Henderson: Thank you. Like Paul, I am very glad to be here. First, in Defra, our priorities are to support the work that spans the department's remit. To pick on some examples, they include things such as animal and plant health. We are responsible for looking after the biosecurity of the country in that area. We also support research and development that goes into maintaining the health of the sea and the livelihood that comes from the sea—the marine setting—and environmental quality more broadly, such as air quality, water quality and biodiversity. The R&D that underpins that broad range, although often not delivered as our flagship programmes, is absolutely a priority for the department. Without that R&D, we are not able to protect and look after the environment and the people in the country.

We have a number of flagship programmes. I will quickly run through five of those. One of them is on net zero. It was announced in the cross-government strategy that Paul has already mentioned and is for R&D spending in Defra sectors to work out how we can efficiently reduce emissions. We have something called the natural capital and ecosystem assessment. That is an R&D programme to do a better job of measuring environmental outcomes, including biodiversity and the carbon footprint for the UK, so that we can measure progress towards government ambitions to make the environment better for the next generation, as set out in the Environment Act and the future farming programme.

Coupled to that is a programme of R&D on data, making Defra's very wide data holdings much more widely available across government and publicly. Then there is a farm innovation programme, which looks to innovate the way that food is produced to enhance food security and our environmental outcomes. Finally, there is an ODA R&D programme, which is a relatively new endeavour for Defra. It is very important to recognise the strengths that come from using UK R&D capabilities in partnership

with developing countries to achieve science for good, and influence around the world. Those are our flagship items, on top of our fundamental priorities to support our outcomes.

Your second question was about how we commission. In the run-up to a spending review, we have multiple cross-departmental conversations about what the departmental delivery priorities are. Then we align our research and development needs in the medium and long term to meet those priorities. That is run through a series of departmental committees. It is also tested against some external audiences in that process.

Once the funding is secured, we commission partly through our public sector research establishments. We have eight of those, including one joint venture. We commission widely across the quite good UK landscape for environmental and farming research. Sometimes that is competitive and sometimes it is not, where there is a clear best provider.

The Chair: When you talk about the UK landscape, it includes universities, but it sounds as if it is broader than the universities. Can you say a bit more about that?

Professor Gideon Henderson: I am happy to. In some areas, such as animal and plant health, we rely quite heavily on our own agency, the Animal and Plant Health Agency. In other areas, we will either look at some favoured providers in that landscape or compete across the wide landscape. We often see universities that have a strong research base in our sectors bidding. There are a number of very strong research institutes. Some are ex-research council and some, particularly in the agricultural sector, have longer periods of independence. We certainly commission work from those as well. We use quite a broad range of providers for R&D.

The Chair: Thank you very much.

Q100 **Lord Krebs:** Thank you, Gideon and Paul, for coming to give evidence to us. I want to pick up a point that Gideon just made about commissioning research. I would like both of you to tell us what your role as departmental CSA is in determining how the research is commissioned and evaluated. Is that done by you and your team or by the relevant policy departments? Gideon, can you kick off?

Professor Gideon Henderson: I am happy to. It is a team effort, very explicitly, because we need the policy driver to know what the R&D needs are, but the CSA—my office—is extensively involved.

The fundamental place in Defra where this happens is the science funding sub-committee, which is connected to ExCo, through two layers. I chair that committee and make sure that the papers that come to it and the decisions that are made at it are fit for purpose. It assigns the funding to policy teams. Those policy teams then often do the commissioning themselves. To come back to the animal and plant health example, that team knows that landscape very well and has a strong relationship with the agency, so it is best placed to commission the research itself. In

areas where Defra is exploring new territory—the net-zero area might be one of those—we hold the funding centrally and commission with more control from my office, so there is more oversight from the CSA.

Lord Krebs: I will get to you in a moment, Paul. In those policy teams, is there the relevant scientific expertise? You said that the animal health people know the relevant PSRE very well, but do they have sufficient scientific expertise to act as intelligent customers?

Professor Gideon Henderson: They do, in that team and in many teams. It is one of my roles as a CSA and as head of profession for scientists in the department to make sure that that quality is upheld. In some areas where the department has expanded its policy remit or ambition, that has been an issue that we have had to correct to make sure that we can bring in the scientific strength that is needed, that they are intelligent customers and that they know the science that is needed. That is a process that I have some oversight of, and I make sure that it functions.

Professor Paul Monks: It is not massively dissimilar in BEIS, as you would imagine. Ministers set the strategic direction for the funding in the department. I work alongside those teams looking at the budgets, which are delegated mainly to the directorates in BEIS. The energy directorate has a big thing, for example.

As part of the science capability review, which was instigated by the Treasury and Patrick Vallance a number of years ago, we have mapped the committees across the department that have R&D in them and have made sure that we now have R&D oversight at a high level in all the different areas across the portfolio: energy, climate and business innovation. I sat on the committees through the current SR process to influence and to have oversight of, in particular, the departmental spend area—again, apart from UKRI, which has a slightly different process for that.

My job is absolutely to assure the quality of the science being put forward for R&D and to challenge those teams. We have examples where we have done that, particularly in some of the net-zero innovation areas, around the prioritisation of different solutions for mitigation around net zero. Making sure that the decisions around the choice of those technologies, for example, are well science-based is quite an important way of doing it.

For the last couple of years, we have had a well-developed science system within the department. As CSA, I have oversight of that. The individual directorates have delegated budgets and execute the projects through that. We also have a research commissioning process, which I have oversight of. I get sight of everything that is commissioned to assure the quality of it.

Lord Krebs: Can I ask a very small supplementary, focused primarily on Gideon? I was just looking up the history of the departmental research budgets, particularly the Rothschild principle. In the 1970s, a huge chunk of money was transferred from research councils into government departments. The figure that I got was that by the 1980s what is now

Defra—DoE and MAFF—had a research budget of around £0.5 billion at today's prices, which had been taken out of the Agricultural Research Council and NERC. That was the customer-contractor principle.

Of course, the trouble was that those budgets were then savaged by successive Governments, partly because Mrs Thatcher believed that near-market research should not be funded by the public sector and partly because, whenever there was a squeeze on funding, research budgets were the easiest thing to cut. When we see that departmental budgets are going to be increased in the latest settlement, we worry slightly. There is money going into departmental research budgets, but history tells us that that is not a safe place for it to be. Can you tell us how safe you think it is?

Professor Gideon Henderson: I would start with the positive issue that, finally, we are seeing a turnaround in the channelling of funding towards government departments that need it. Of course, I know that best for Defra. The numbers that I have to hand are that, in 2008, at those prices, we had an R&D budget of £198 million. By 2019, it had shrunk to £53 million—that is a progressive decline in the R&D budget for a department with a substantive science need across its range of subjects. We are now seeing that turn around. Of course, it depends slightly on how you count R&D. What I would see as the central R&D budget is rising to £103 million in the year just started. By the end of the spending review period, it will be £236 million. That is a climb-back, finally, above the values that we had in 2008. There is also fairly substantive investment in research infrastructure at Kew and, particularly, at the Animal and Plant Health Agency to support that R&D.

Your question was about how secure that funding is. That is a continued argument that we have to keep making. At the moment, we seem to be winning that argument. There is an understanding that government needs some science and research to carry out its business effectively and that some of that investment needs to go into its agencies, which are so important to its delivery. That is an argument that we will keep having to make.

Lord Krebs: Paul, do you have a very brief comment? I think that then I should stop.

Professor Paul Monks: That question is slightly difficult for me to answer. Our budget over the next SR is £39.7 billion, because we have the UKRI budget in there as well, which is £25 billion. As an R&D-led department, we have always had good departmental R&D budgets.

Why should departments have an R&D budget separate from any other budget? For me, it drives diversity in the system. It allows aligned research and leverage to be gained from bringing departmental R&D budgets alongside UKRI budgets, PSRE budgets and the like. The tension in the question that you asked is whether it will stay the same for the future. If we show the value of it and we can demonstrate the value of

departmental R&D as distinct in what it can deliver, that will make the case for its continuation stronger.

The Chair: Gideon, you mentioned that Defra has eight PSREs. Did you have eight through that period when the departmental research budget halved? If so, how did they survive?

Professor Gideon Henderson: We had the same eight institutes. The label PSRE has changed its definition at some points, but those same institutes were part of the Defra family.

In 2015, one of them, FERA, which is focused on food and environment, left Defra and became a joint venture, three-quarters owned by Capita Group. One of the ways that survival was enabled was to shed one of the public sector research establishments. In other areas, they survived with diminishing capability. Frankly, there was a bit of a crisis imminent in many of them, which we hope is now averted through the investment that is now being channelled towards them.

I am sorry to keep coming back to the same example, but the labs and environment of the Animal and Plant Health Agency, which provides fundamental biosecurity support for the UK, were not really fit for purpose. The investment that is now being put into them is very welcome.

Viscount Hanworth: I have a question for Paul Monks. Has the recruitment of scientists to BEIS increased perceptibly in recent years? Can you describe a trajectory? Can you also talk about the specialties?

Professor Paul Monks: That is a good question. I cannot give the absolute numbers for the growth in scientists. The science capability review saw growth in that respect. For instance, within BEIS there was no science profession until about five years ago; it was part of the science analysis profession. It is now separate. At a recent science and engineering week in BEIS, we had hundreds of scientists turn up to events. There is growth in the number of scientists working on both the science in BEIS and the science policy in BEIS, which is advantageous.

The Chair: Can you provide us with any data on the growth in the number of scientists in BEIS?

Professor Paul Monks: Yes.

The Chair: That will be really helpful.

Q101 **Lord Holmes of Richmond:** Good morning to our witnesses. Thank you for taking the time to be with us today. How do you think that the National Science and Technology Council and the Office for Science and Technology Strategy will affect your departments, if at all?

Professor Paul Monks: I really welcome the National Science and Technology Council. The value that it can bring is to problems that are cross-government and not particularly owned by a department, but on which we need to take a strategic position. At the moment, it will add

value to what we are doing in departments by providing a strategic steer and pulling those sorts of things together. If it can act as an authoritative expert function that sits above that, it could really add value.

I will give you an example of the way it could work. As I said earlier, we laid out seven key technologies as part of the innovation strategy, but we did not say what the prioritisation for those would be. The NSTC and OSTs are the people to turn to for that prioritisation, because they can look across government in order to deliver that.

In some senses, we have a proto-example of that in what I think is the highly successful quantum technology programme, which is run by my department. At the moment, we are working very well with the OSTs, which has recognised the importance of quantum technology as a key area for UK R&D. We are working alongside it to produce an R&D strategy to help it deliver greater impact across government and to UK industry and the UK R&D community.

Professor Gideon Henderson: Like Paul, I welcome the arrival of these new bodies. One of the flagship areas for the NSTC and OSTs is the sustainable environment. Of course, that is Defra's area, but that is the problem as well; it has been seen as Defra's area and has been put in a bit of a pigeonhole as a consequence. It needs to be factored into thinking across government. The OSTs and NSTC will help that process to happen and help the environment to be seen as an important governmental responsibility across Whitehall.

That is one way I welcome it. Like Paul, I welcome the join-up that it will effect across government. Many departments are quite effective at delivering science for advantage and for policy in their particular areas, but where areas cross over between government departments, co-ordination can be more challenging and we are slower to respond. I will use one example. Engineering biology or the bio-economy is an area where there are significant strengths in the UK. Multiple departments have interest in that subject, but there has not really been effective co-ordination of those interests. That is the sort of area where the OSTs will be welcome.

Lord Holmes of Richmond: You raised the important issue of climate. Defra is not in the NSTC tent, if you will. What is your view on that?

Professor Gideon Henderson: There is a ministerial and an officials meeting for the NSTC. I attend the officials meeting, so there is a Defra footprint in the operation as a whole. The ministerial membership at the top NSTC is a decision for the Prime Minister. There is a core membership, but it is my understanding that the Secretary of State from Defra will be invited when subjects are particularly relevant to Defra's footprint. I do not see that as a problem.

Lord Holmes of Richmond: I have a final question. What do you see as some of the key problems with trying to get a horizontal rather than a vertical approach? It is the age-old issue of cross-Whitehall working. Perhaps you could answer first, Professor Monks. You identified the very successful quantum work, but AI is in a different part of government and

other new technologies are not really anywhere in government. What are some of the problems that you see in getting a horizontal approach?

Professor Paul Monks: What are the likely problems? Position, navigation and timing are good examples. No department has enough of the problem to expend the political capital to deliver it, if I can use that phraseology. The NSTC can prioritise PNT, or the OSTs can come up with a strategy. The challenge is to make sure that the delivery then that follows through on that, particularly on those very widespread, cross-departmental problems. It is about making sure that we get behind it and that the system follows through to delivery, not just strategy. We are all very good at writing problem statements. Since I joined government, I have been very keen that the department is delivery focused and that it is science for solutions, growing from the great R&D base that we have. For me, one of the challenges for the OSTs will be the push to delivery, much of which lies within the department's gift.

Lord Holmes of Richmond: Professor Henderson, what is your view on problems? How do we move from problem statements to problem solutions? Are there any other issues that you foresee?

Professor Gideon Henderson: The reason why the NSTC and OSTs might fail is that they fail to act sufficiently centrally. If you simply put a collection of people from different departments into the same room and say, "Talk about subject X", they will go back to their department and you will not have achieved the join-up that is needed. I hope that the OSTs will manage to establish itself as a central function that has enough teeth and enough authority to effect that join-up. That will involve making sure that there is personal responsibility at senior level in the organisation for the activities it pursues and some of the funding held there, and that departments are brought into that conversation when they are needed. That is my principal fear about failure.

Professor Paul Monks: Another challenge is that technology takes real time to deliver. You have to stick at things for long periods of time. Five years are the bare minimum in any given area. I use technology as an example, but I could choose any science area. That sense of purpose over a long period is quite important as well.

The Chair: Baroness Sheehan and Baroness Blackwood would both like to come in with supplementary questions.

Baroness Sheehan: It is a very quick one. Professor Henderson, have you felt any impact yet from the NSTC and the OSTs as regards cross-departmental working?

Professor Gideon Henderson: Not yet is the honest answer, except for the optimism that it will make an impact. It is in its early days and has not yet really set out its stall for what it will spend its money and its principal effort on. Not yet, but we are hopeful.

Baroness Blackwood of North Oxford: Given the level of ministerial engagement with the NSTC and the issues we have just been hearing

about with departmental R&D—how you count it, how you prove value over the long term and the need to protect it—do you think that there might be a job for the NSTC to do a piece of work on how there could be consistency across government in counting and proving value for the future?

Professor Gideon Henderson: Who are you going to send that to first?

Baroness Blackwood of North Oxford: Maybe Professor Monks could start.

Professor Paul Monks: Thank you for that. Would there be value in counting? We have accounting standards, anyway, that define what R&D is. There is a case for considering what the R&D portfolio across government looks like. It is very much the job of the OSTs to map that out.

I just pause as I think about whether it is a good idea to map the money out. On one level, yes, it is. On another level, if we spent too much time mapping the money out and not enough time thinking about delivery, I should worry about what the balance of that is. It is very easy to spend a lot of time defining the problem. By the time you have defined the problem, your data is out of date. What I am countenancing, in some sense, is a balance in the element of accountancy for R&D. In my view, it is more important that we understand what the departments are doing in the main—the quanta that they are spending on R&D—and whether it looks like the right portfolio across government for R&D, than trying to worry about every pound. Maybe I am naive about that.

Professor Gideon Henderson: We have pretty well-established metrics for what is R&D and what is not. They are defined by principles such as the Frascati principles and the ESA 10 rules. We know in broad terms what R&D is, and that is counted quite effectively across government.

I urge a little caution about trying to subdivide that too much. If you try to start thought processes such as, “Is it applied or strategic?”, those are often difficult distinctions to make. There is already an attempt to do that in government. That mapping and those numbers are collected by the Office for National Statistics.

Earlier, I made the comment that sometimes it is a little difficult to compare like for like. I will give you an example. We currently hold in our budget the funding for the Copernicus satellite programme in the EU. That counts as R&D budget. Obviously, that is very much a lump-sum, single-item issue. I was trying to separate out those things when I said that we try to compare like with like in our central R&D spending.

Q102 **Baroness Rock:** We have spent a bit of time talking about departmental spend. I would like to come on to how your department manages its publicly funded R&D organisations. What are your interactions with them as CSAs? In your answers, could you tell me whether you think that the contribution from those organisations is being fully realised, and about the balance of the R&D funding between universities and research establishments?

Professor Gideon Henderson: There is a lot in your question. Thank you for that. The answer depends on the agency. Some of them are executive agencies and are held quite close to government with a lot of policy engagement. Their R&D is quite closely commissioned. In other areas, they are more arm's length and more independent. It depends which agency you look at. In general, I think they are managed effectively by a combination of working with the policy teams to identify the needs of those teams and working between my office and the equivalent chief scientists in the organisations to make sure that we have join-up on the scientific side.

I think your second question was about the relationship between those agencies, the public sector research establishments, and the broader landscape. We are on a positive path in that area, in that there has been a bit of a narrative in the past that the public sector labs were quite separate from the rest of the landscape. We are breaking that down now; for instance, UKRI funding can go to those laboratories. When we spend money, the Government seek actively to procure from outside our own agencies as well. We seek much more to go to the best providers for the best research.

The balance of where the research and development money should go is very subject specific. It depends on the nature of the subject, but it needs to go to the places that can best deliver the research. I would struggle to come up with a number for the nation as a whole in that context.

Baroness Rock: Professor Henderson, how much interaction do you have yourself with the different organisations, would you say?

Professor Gideon Henderson: Officially, we have a quarterly meeting with all the chief scientists from those agencies, which I chair. They also join another quarterly meeting, which is joined by policy leads in their areas. I meet the individual chief scientists one to one frequently as well. The CEOs of those organisations attend ExCo and suchlike on occasion, so we have quite good connections with them, I believe.

Baroness Rock: That is very helpful; thank you. Professor Monks, perhaps I could ask you to answer the same set of three questions.

Professor Paul Monks: Thank you very much indeed. PSREs are a real strategic resource for us. They provide key areas of scientific research, give us significant in-house R&D capability and form our policy-making, as well as performing many statutory and regulatory functions.

In BEIS, we are responsible for about 10 PSREs out of 42 arm's-length bodies. As the CSA, I am a member of the scientific advisory committees—for example, the Met Office and NPL. I see at first hand the work that they do. I sit on the technical advisory board for the National Nuclear Laboratory and the Space Sector Council. I meet regularly with the CEOs of the national laboratories, NPL, Met Office, UKAEA and NNL, as well as having a full programme of visits with them. My focus of discussions with them is very much on ensuring that they have the right

level of RD&I to meet some of the challenges that we have as a department in delivering the science.

They have an important role in our landscape. Going slightly off your question, why could you not do what they do in universities? Well, they have the ability to focus on problems in the longer term and deliver longer-term outcomes. They have the ability to do strategic research, and deliver the national capability that we need. We focus on making sure that they are delivering that and often underpinning strategic research advantage through that. They are very mission-led organisations.

Have I answered all three parts of your question? I meet them regularly; they are of real value; and they have a clear profile, and they understand and support the department around the commissioning of what they do.

The Chair: I have two supplementary questions from Lord Krebs and Baroness Walmsley.

Lord Krebs: My question is specifically to Gideon. I wondered about the relationship between the Defra PSREs and research council-based research institutions that have an adjacent or even a very similar remit. For example, you referred quite a bit to APHA. The Pirbright Institute is the major national centre for animal viral disease research—foot and mouth disease and so on. Similarly, one could argue that much of the work on natural capital might be carried out at the CEH. How does your department link into those research council-funded PSREs?

Professor Gideon Henderson: It is an evolving landscape, as I referred to earlier. Evolution is a bit different in different areas, but in the Pirbright and APHA example, there is a long history of them working closely together, certainly since the time of the foot and mouth disasters, and, I think, before that as well. There is an explicit hand-off and formal arrangement about what Pirbright looks after in normal times and in emergencies, and what APHA looks after. I think that is a fairly mature relationship.

In the other example you called on, with government agencies such as the Natural Environment Research Council and perhaps CEFAS—the Centre for Environment, Fisheries and Aquaculture Science—there are relations with cognate institutes such as CEH, which you mentioned, and the National Oceanography Centre. Those are growing. They exist already. We certainly fund research in the non-agency organisations and institutes we mentioned, but the linkages between them are growing stronger because of the openness of the funding regime.

Professor Paul Monks: Perhaps I could give you another example very quickly from my side of the house. We sponsor the Met Office, one of the world's leading climate organisations, and we are pulling together a national climate science partnership. That pulls together not only the Met Office but the UKRI-funded institutes, the National Centre for Atmospheric Science, the National Centre for Oceanography, as well as UKCEH. We are pulling together those science partnerships, the PSREs

and the research communities funded by UKRI, as well as the universities, which are an important vehicle in pulling that together.

Lord Krebs: Do you include the ECMWF in that?

Professor Paul Monks: The ECMWF as well, yes.

Baroness Walmsley: When you have all these meetings with the senior people from the PSREs, are they by way of monitoring what they are delivering for your department, or do you sometimes ask them more open questions? If so, are you ever surprised by the answers?

Professor Paul Monks: The answer to that question is yes. Very little of it is about monitoring, on reflection. Often, it is talking to them about science priorities. They have a great deal of science understanding that I want to offer, as a CSA, and bring into government. They are often our trusted advisers. They often say, "We have been working on this new timing problem."

I will give you an example. I met with the national laboratory yesterday. We were talking about a timing problem. The day before I met with a company that also has a timing problem. I was able to say, "You two now need to be speaking to each other because here we have something that could be really useful to the UK as a capability if you put together your capability in the national laboratory with this industrial interest."

Often, it is not about guiding or shaping their programmes. That is agreed by what is called the sponsorship team in BEIS. My thing is to get their knowledge and often use that in the policy domain, making sure the policy domain has up-to-date knowledge from the PSRE base.

Professor Gideon Henderson: Similarly, one example for me would be a recent visit that I made to one of the labs and acreages of Forest Research—one of our PSREs—very much trying to learn more about the science that it is doing and to feed it directly into policy. I was joined by a policy person from the relevant team in that endeavour. It is the same as Paul in terms of trying to get its wisdom into the conversations.

Another way that we interact with the PSREs very profitably is in the process of doing science. For example, dealing with how we are going to tackle open-access publication is a question that you can talk about best across the whole of the Defra group rather than agency by agency. We talk to the scientists on that. We need the support of the scientists, making sure that the scientists in the agencies are looked after and have the training and tools they need. Those sorts of conversations are really important across the group.

Q103 **Baroness Manningham-Buller:** You will detect, Professors, that our main interest is in how these relationships work. The committee has heard evidence from the research councils. We will be hearing from UKRI in due course. We have just been talking about your relationship with one set of organisations in the science sector.

To start with Professor Henderson, could you explain how the research councils and your department work together, and to what extent they

tune into and follow any of your priorities, or does it not work like that? Perhaps you could elaborate for us.

Professor Gideon Henderson: Of course. The first thing to mention is that each of the research councils has a CSA sitting on it as an observer to help to bring a relationship between government desires, government activities and what is happening in the councils. We try to align those CSAs broadly with cognate disciplines. I sit on both the NERC and BBSRC as an observer. That is a very effective way of bringing some of the government ambition and activity into UKRI conversations, and hearing what the UKRI and research landscape looks like and feels like. That is one important touchpoint. I also meet the CEOs and other senior people from those organisations.

The question of how much of UKRI spending is directed towards government priorities as a consequence is a balancing act. On one hand, some of it needs to be directed towards government priorities, but we must respect the broad Haldane principle that we need discovery mode, pure science, to be going on as well, to create the next set of innovations that will stem from it. We have to recognise that in all our conversations.

At the government-facing end, I use the example of the strategic priorities fund, which was an explicit fund to bring government priorities into UKRI activity. As a recent learning example, it proved how difficult it can be to work across that interface but, during the lifetime of its work, it was very effective at bringing government and UKRI agencies together. I think there is a very strong desire, both in government and in UKRI, to see that sort of work continue in the future. We will be working on that now that we have spending review settlements.

Baroness Manningham-Buller: Thank you. I was interested that you described yourself as an observer, which I suppose is a way of protecting the Haldane principle, but of course you also have a fairly large budget of your own. Do you feel that the Haldane observer position is at all threatened, or does government fully understand the importance of it? I am sorry, that is a bit of an unfair question.

Professor Gideon Henderson: No, I do not think it is unfair. I am just trying to get to the nub of your question. The fact that I have budget probably makes it easier to protect the Haldane principle, in that if there is something that I think government really needs to do, I should get on and spend my own money doing it and not rely on UKRI to do it. I think that helps rather than hinders the conversation. There is a situation where having some money in a government department enables some co-design. Where there is a co-interest between UKRI and government, co-design and co-funding can be very profitable.

Baroness Manningham-Buller: Thank you. Professor Monks, would you like to pick up this theme?

Professor Paul Monks: Absolutely. I will deal with the departmental side of it and separate it from our sponsorship of UKRI, where there is a

whole process with the Secretary of State and the UKRI, where letters are written about budgets and research goals.

As a CSA, I have an ex officio appointment on one of the councils; in this case, the STFC. I pull together, as part of my work in the department as CSA, a GCSA-chaired group and all the chief executives of the research councils. We meet quarterly to discuss the big issues of government and government research wishes and to understand what UKRI's priorities were over the last period and the development of their strategies. I also meet one to one with chief executives to understand how their research programmes are evolving, how we can use those research programmes and how we can contribute and add value to them in a similar way to what Gideon was describing.

If we take a big area as another example, something slightly different is the Net Zero Innovation Board, which is a cross-Whitehall board chaired by the Government Chief Scientist Adviser, Patrick Vallance. It brings together all the government departments. It also brings together UKRI and UKRI funding. The idea is to make sure that we are all co-ordinated across government in the way we look at what the innovation priorities are for net zero and the way that we are funding them in the short, middle and long term. We have multiple layers of interaction to make sure that we are well aligned and have a good understanding of each other's priorities and where we can add value, while, as Gideon said, respecting the fundamental elements of the Haldane principle and the ability for research councils to self-determine their research portfolios.

Baroness Manningham-Buller: Thank you. I think the committee will be reassured to hear how good the relationships are. Where do you think there is scope for improvement?

Professor Paul Monks: Scope for improvement? We are regularising the appointment of CSAs to councils and making sure that we have a clear understanding of a mutually shared process around that, and an understanding of the roles and responsibilities as part of that. It is to make sure that we understand where the lines are in some senses, as you alluded to in your earlier question.

I talked about influencing outcomes. Gideon talked about the strategic priorities fund, which was a success. Trying to make sure that we have the vehicles to be able to align the short-term requirements of government R&D to the long-term research base is an area in which I think we could sometimes do a little bit more work.

Professor Gideon Henderson: I agree with Paul on that last point. I think that is the area where we learned a lot in the last five years from the strategic priorities fund about how UKRI and government departments can work better together. We need to take that learning forward. There is room for further improvement, but we have a good basis on which to improve. It is a case of our identifying the platforms and the mechanisms through which we can deliver the most effective research between us.

Baroness Manningham-Buller: Thank you both very much indeed.

Lord Rees of Ludlow: To follow up on that, I want to explore the value added by UKRI. In your capacity as chief scientists you talk to more than one research council and you talk to each other. You may agree priorities but, on the other hand, the research councils are beholden to UKRI in their priorities. Is there a possible tension between the priorities favoured by UKRI and those favoured collectively by the CSAs and their departments?

Professor Gideon Henderson: I do not perceive there to be such a tension. Both UKRI and the CSAs in government are largely after the same set of outcomes. The important distinction between them—this is one view of it—is that when a government department has a very particular applied problem and knows how to solve it, it can commission the research itself. At the other end, there is the pure discovery mode where it takes someone to chase their curiosity. In between, we often have a problem; we know exactly what the problem is, but we need some innovation and some novel thinking to solve it. It is at that interface, where often there are strong shared interests in bringing the UKRI innovation style of research, novel research, against government priorities.

Professor Paul Monks: Translational research is a key area that we need to focus on because it will drive industrial growth from the SME communities through to the large tier 1 manufacturers. It is also an area where we have one of the best fundamental science bases in the world, but we cannot always seem to translate that into the industrial impact.

I do not want the impacts to be solely industrial. It is the relevant impact that we should be looking for. Do we have the right mechanisms to do that? We should be constantly challenging ourselves on that.

Lord Rees of Ludlow: Do you interact with Innovate UK directly?

Professor Paul Monks: Yes, I talk to Indro quite regularly, on some of the questions around net-zero batteries and the like. To give you an example, Innovate UK is an important funder and collaborator around some of the technologies that will enable the decarbonisation of our economy.

The Chair: If we have things like the Net Zero Innovation Board and the net-zero R&D road map already working so effectively across government, and it is one of the priority areas for the OSTS that is identified, what value is the OSTS going to add? Will it adopt those initiatives? Will it put something above them? More bureaucracy?

Professor Paul Monks: The obvious answer to that question is that you would have to ask the OSTS. If you want an opinion from me, if I was in the chair of the OSTS, I would be saying, "What is working well that I can adopt? What is not working well where I can look to fill in those sorts of gaps?" In the net-zero area, Andrew McCosh, as the DG, comes along to the Net Zero Innovation Board. The OSTS contribution to that area is probably less and perhaps it should focus on some of the areas where there are more gaps, in my humble opinion.

Professor Gideon Henderson: Can I come in on the specific example that you raised? On net zero, the Committee on Climate Change, which of course you know well, has advised government based on the sectors, and has sometimes given quite specific advice to individual government departments. That ethos still exists in the net-zero strategy and the net-zero research and innovation framework documents. Often, it is fairly clear which department owns the responsibility. Clearly, in Defra, we have responsibility for the agriculture and land-use sectors, for instance. That means that many bits of the net-zero space are not naturally an OSTs endeavour. One of its four pillars is sustainable environment, which is broader than simply carbon. In that area, there are some aspects where join-up across government could be very effective through OSTs action.

Q104 **Baroness Sheehan:** We have heard that the Government want to use public procurement to “pull through” new technologies from research and development stages to industrial scale-up. Are there opportunities to do that with technologies under your department’s remit?

Professor Paul Monks: Absolutely is the answer to the question. The Government spend about £300 billion per annum—a third of all expenditure—on procurement, so the question of driving that is important.

I can give you examples of where we have been thinking about how to use public procurement recently. The AI strategy made the clear point that we should be using public procurement to look at the application of artificial intelligence. As a CSA, I went out to the department and said, “Where are we using AI? Are we actually procuring the best of AI?” I am in the middle of setting up a showcase to make sure that teams understand what AI has to offer them.

You cannot procure something if you do not know what it delivers for you. There is a bit of a Catch-22 in there somewhere. What we are doing is setting up an AI showcase to make sure that teams commissioning innovative R&D are actually using, in this case, AI. I am thinking about procuring AI, which often is with the smaller start-ups currently around that. Across government we obviously have things like the SBRI, which pushes that sort of thing. That is an example of how we are using procurement.

We also do it in something called the net-zero innovation portfolio; everything in my department starts with net zero one way or the other. In the net-zero innovation portfolio, we are looking at how to use procurement to drive new technologies and new mitigations as part of that portfolio. So, yes, public procurement is a very strong tool and R&D is a key part—I am thinking about the role that it can play as it procures new tools and services in the Government.

Baroness Sheehan: How well does your department work with the private sector to facilitate it?

Professor Paul Monks: We use a mixture of both the private and the public sector to deliver our R&D portfolio. In the net-zero innovation portfolio, much of that is higher TRL research—levels 6, 7 or 8. Much of it is procured from companies to do demonstration-style projects and the like around alum technology for heat engines or CO₂ direct air capture, which was in the news yesterday. It is doing the R&D. That is often delivered by a mixture of industrials with universities. Much of it is delivered by industrials looking to push forward technologies into market.

Baroness Sheehan: How effective do you think you are in your public procurement pull-through?

Professor Paul Monks: What is the measure of effectiveness? I think the question is: are we providing the Government with the value for money that one would expect for the public purse, as a test, and are we innovating and creating, in our case, an RD&I portfolio? Are we creating commercial opportunities on the back of that government money for companies to grow? We assess our portfolio against a number of KPIs that demonstrate that we are fulfilling the sorts of outcomes that I detailed. I think we have about 15 KPIs, off the top of my head.

Baroness Sheehan: How do we compare internationally, for example with a country like Israel?

Professor Paul Monks: In terms of what?

Baroness Sheehan: Pulling through public procurements to help to scale up industry and technologies.

Professor Paul Monks: I do not know the answer to that question. I do not know how we compare specifically to a country like Israel. Gideon, do you know?

Professor Gideon Henderson: I know that Israel is very successful at it, so I imagine we compare less favourably against that country. I do not know the statistics either.

Baroness Sheehan: Would you like to add anything on any of the other questions?

Professor Gideon Henderson: We procure a lot less than BEIS in Defra, so I would largely defer to Paul. There is a particular opportunity in our sectors, though, for procurement of environmental monitoring and measurement, where government already does a fairly large amount of procurement. We have to measure the landscape a lot for our own programmes and our own reasons. There is a large industry that does it. In the way that green finance operates, companies need to be able to measure climate or biodiversity outcomes, so that is one area where we can do more with public procurement for Defra to help pull through technologies.

As I think Paul mentioned, we are often in a place where we are trying to make sure that the research and the development is mature enough that we really are able to procure it adequately for our needs. The SBRI—the

small business research initiative—route is one of the ways that we can achieve that. To use an example from BEIS in that sector, the greenhouse gas removal SBRI is one way of checking out which technologies might work for greenhouse gas removal before government or industry procure them. We have a similar opportunity in the environmental monitoring and measuring area.

Q105 Baroness Walmsley: I want to move on to international strategy. When to compete and when to collaborate is obviously a very important decision. We have been hearing throughout our inquiry about the “own collaborate, access” framework. Considering your department’s remit, are there projects where you think the framework could or should be applied, or perhaps is being applied? I will go to Professor Henderson first because you mentioned earlier in your evidence an ODA programme. You may want to start with that, or you may choose something else.

Professor Gideon Henderson: The own, collaborate, access narrative is a good one, certainly for framing our domestic research agenda and thinking about what we should particularly focus on. Engineering biology, which I mentioned, is an opportunity, and is a case where we have a decision to make. It is a useful framework for thinking about how dominant we want to try to be in that landscape, and perhaps subdivide it to think about where we want ownership in that landscape. It is a useful way of framing things.

I do not think it is a complete framework when we are operating internationally with our own science. The ODA area is a case in point, where sometimes we have strong research in the UK and connections to countries where we know that research will have benefit to the country and enable capacity building there. We are doing that for the benefit of that country, clearly, as it is ODA spending, but with the knowledge that it will lead to longer-term influence and strategic advantage as a consequence. The own, collaborate, access narrative might be a little less suited there.

Professor Paul Monks: As Gideon says, the own, collaborate, access tool—or model—is useful. One challenge in using it is to see it through the different lenses of the outcomes that you want, particularly internationally. You can view it through a technology outcome; you can view it through a partnership outcome; you can view it through a talent outcome. You have to recognise where own, collaborate, access fits into the picture in what you are doing international research for.

In the technology area, we have been working with the FCDO on the international science and technology partnership framework. That looks at the question of how you prioritise across government that sort of technology partnership activity to try to develop a framework for international science partnerships, pulling in S&T. Own, collaborate, access gives you a tool, but there are other reasons. Like the good question on Israel, to which I did not know the answer, the question is, “Should we be collaborating with Israel?” Own, collaborate, access does not tell you the whole story. You have to build up partnerships over a period of time to get full fruit from them. I was in India last week and

met a lot of Indian scientists and entrepreneurs. There is a lot that we can do in the international sphere to work alongside them to gain strategic advantage.

Baroness Walmsley: Is there time for a very quick one?

The Chair: One very quick one.

Baroness Walmsley: It is a bit of a googly. Since you have been chief scientific adviser in your department, has there been any project that you have tried to achieve but failed? What have you learned from it?

Professor Gideon Henderson: That is a googly. The last question is always the hardest, they say. Do you have a ready answer, Paul, while I ponder? I have been in post two and a half years, and in that time I have not yet given up on anything. There may be things that are particularly hard to achieve and that I have not achieved, but I have not yet decided, "This is a project that simply is not going to work".

Baroness Walmsley: Excellent.

Professor Paul Monks: I will go for the same answer. I cannot think of anything. One of the challenges is that some things take longer than you feel they should take, but often, by waiting, you get a better outcome. I can think of a number of times where, by keeping on pushing and being consistent, a door has opened and a project has sprung to life or a policy window has opened which makes that work worthwhile. Never give up is probably the answer.

Baroness Walmsley: I wondered if there were any government structures that have perhaps got in the way.

Professor Paul Monks: I can give one example. I thought of one as I paused. When I first joined, there was a big push around smart cities. Although it has not gone away and is very much owned by DLUHC these days, it was another example of there being many different departments but no department owning the whole thing. We looked at smart cities and we did some work on it with research councils, but we probably have not realised the full potential of something like a smart city because of that multiple ownership.

If we run it back to what we have been talking about this morning—the OSTs and NSTC—we could take a view on whether something cross-cutting like smart cities would be a good way forward. That is probably the example I can think of on the downside.

Professor Gideon Henderson: That join-up is also true inside the individual bits of a department. Getting them to join up effectively is often one of the barriers. That is what makes projects harder to deliver, and it needs to be overcome.

Baroness Sheehan: I suppose another challenge would be a change of Administration on a regular basis.

Professor Gideon Henderson: Political Administration?

Baroness Sheehan: Yes, in terms of longevity.

Professor Gideon Henderson: It is not something I have witnessed in the time I have been a CSA. One hopes that the scientific narrative is strong enough to persist through changes of government.

The Chair: Thank you both very much for coming and talking to us today. As I said at the beginning, if there is anything you would like to add and could send us as evidence in writing, we would be absolutely delighted to receive it. For now, thank you very much and goodbye.