



Science and Technology Committee

Corrected oral evidence: Delivering a UK science and technology strategy

Tuesday 15 March 2022

10.15 am

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Members present: Baroness Brown of Cambridge (Chair); Viscount Hanworth; Lord Holmes of Richmond; Lord Krebs; Lord Mitchell; Lord Patel; Lord Rees of Ludlow; Baroness Rock; Baroness Sheehan; Baroness Walmsley; Baroness Warwick of Undercliffe; Lord Winston.

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Questions 47 - 56

Witnesses

Andrew McCosh, Director-General, Office for Science and Technology Strategy; Stuart Wainwright OBE, Director, Government Office for Science; Louise Dunsby, Deputy Director, Office for Science and Technology Strategy.

USE OF THE TRANSCRIPT

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

Examination of witnesses

Andrew McCosh, Stuart Wainwright OBE and Louise Dunsby.

Q47 **The Chair:** Good morning to our witnesses and a very warm welcome. It is lovely to see you here in person. Thank you very much for joining us today. Before we start with questions, let me remind you that the session is being broadcast on the internet. A transcript of today's session will be made available to you in a few days' time for you to check for minor corrections. If there is anything you feel you would have liked to say but do not get a chance to, or anything that you want to clarify or provide supplementary evidence on, please provide us evidence in writing after the meeting. We would be very pleased to receive that. If that is all clear to our witnesses, I will kick off with the first question.

We are very interested in how the science, technology and innovation ecosystem in the UK will work to deliver the Government's many objectives in this area. We are particularly interested in how the new Office for Science and Technology Strategy and the National Science and Technology Council will integrate or have an overarching role. What will the roles of these new bodies be within that ecosystem? How will they contribute to making it work more effectively?

I would like to kick off by asking each of you to outline the role that your departments or organisations are intended to play. Perhaps Louise Dunsby could tell us about the role of the unit in the Cabinet Office, where you were before, I believe.

Louise Dunsby: I am the deputy director in the Office for Science and Technology Strategy. We are, as you say, a new unit in the Cabinet Office. We were established last year and our provenance was from the integrated review, which said that the Government would put new structures in place at the centre to deliver on the science and technology advantage part of the integrated review. That is why the Office for Science and Technology Strategy was set up.

Andrew McCosh, who is sitting next to me and who I am sure will elaborate on this in a minute, undertook an internal review that led to the setting-up of the Office for Science and Technology Strategy and the National Science and Technology Council, which we will probably come on to in a minute, based on your introduction.

OSTS sits independently of other DG areas in the Cabinet Office, and we are there to play a holistic role in delivering science and technology advantage by identifying priority outcomes that the UK is seeking to achieve through science and technology, and critical technologies that the UK will need to use to achieve those outcomes. I think we will come on to the issue of own collaborate access later in this meeting. It will then identify how the Government should use and direct their levers to optimise the S&T system.

We are in Cabinet Office and, as you know, there are lots of large delivery departments around us that have responsibility for lots of parts

of the S&T system. It is important to say that our role is about making sure that we use that whole system more effectively and more strategically, rather than replacing the remits of any existing departments.

The Chair: Let me come to Stuart Wainwright from the Government Office for Science. There appears to be some overlap between the Government Office for Science and this new office. How will your roles be complementary?

Stuart Wainwright: Good morning, everyone. As the Chair just said, I am the director of the Government Office for Science. The creation of OSTS is actually a really good thing for us. It gives us a strong new partner. GO-Science supports the Government's Chief Scientific Adviser in his role as GCSA. That is primarily to provide science advice for policy. That can be science for any policy. Most famously, it has been for Covid over the last couple of years, but it can be for net zero, health or ageing. It can also be on technologies.

Over the years, we have tended not to be involved with the actual setting of strategy and policy relating to science and technology. The GCSA is a science advisory role. It does not set and drive strategy and policy. As Louise said, the integrated review signalled that the Government wanted to do even more to become a great science power and harness science and technology to achieve their major strategic policy objectives.

To do that, you need a decision-making forum, which is the new National Science and Technology Council, and a Cabinet Office team to make that work, to set the strategy and drive the policy objectives. They are very complementary to what GO-Science does. It is leading to more demands on our time, which is a good thing. With the creation of OSTS, we are having to provide even more technology assessments for them. That is what they want from us—independent technology assessments and independent views of how different nations are doing or how different markets are looking.

We will provide the analysis, with a fair amount of rigour, but where OSTS comes in is to consider that, set the strategic objectives and drive the policy action across departments. Inevitably, because there has not been an OSTS, there is a little bit of realignment that we are having to do. On the whole, it is a very good thing that OSTS is there. It is leading to more demands on our time.

The Chair: Andrew, how big is OSTS going to be?

Andrew McCosh: Good morning, everyone. I am the director-general of the Office for Science and Technology Strategy. I also double-hat as the deputy national technology adviser and deputy national security adviser for science and technology, all of which are new roles. Right now, we are around 20 people. We are aiming to grow to around 45 by the end of next year.

The Chair: Is it not inevitable that another set of organisations in this landscape will lead to more bureaucracy and slower decision-making? There is now yet another layer to make decisions at.

Andrew McCosh: We do not believe that it is inevitable. We aspire to add value to the whole system. In the past, matters pertaining to our science and technology advantage have not been consistently considered by a Cabinet committee or Cabinet. They have gone to various committees, either domestic or national security, at various moments.

When I conducted my internal review, the conclusion, which we worked up with many partners across government, was that there was value in pulling together the different strands of policy that were going on across government and harnessing them to a set of clear, long-term outcomes. Of course there is some overhead to having a central function, but our intention is that we make the overall process slicker, more efficient and more decisive.

The Chair: Will that be based on the White House Office of Science and Technology Policy? Will it work in very much the same way as that does?

Andrew McCosh: They are analogous, but not exactly the same. We looked at that when we were setting up the Office for Science and Technology Strategy. I spoke to them very recently. They do not have a single Cabinet-level committee focused on science and technology advantage that they propose strategy into. That is the primary difference. We see our role very much as working with the best policy and strategy brains, inside and outside government, to frame good strategic propositions for Cabinet. OSTP does not have that second layer, if you see what I mean.

Q48 **Lord Krebs:** Speaking as an academic researcher in a university, I am struggling to understand in what way these new structures will make my life better. I have traditionally been funded by the Natural Environment Research Council, so I think of that as my home within this panoply of structures. How will these new organisations that have been set up make my life as an academic researcher better?

Andrew McCosh: At that level, our intention is that OSTS supports the Government in improving the overall science, technology and innovation system. Where something is working, we do not intend to alter it. Where there is a consensus that there could be improvement in any bit of that system, we wish to support it.

Lord Krebs: For example, one of the complaints that we have is that there is too much bureaucracy. Are you planning to scythe through the bureaucracy to make it simpler for us to get research funding and carry out the research we want to carry out?

Andrew McCosh: The vice-chancellor of Birmingham University, Adam Tickell, is currently leading a review for BEIS on science bureaucracy and will report soon. BEIS will take its conclusions. If change is needed as a result of those, we will support that change happening.

Lord Krebs: It is slightly odd to set up more bureaucracy to figure out how to cut bureaucracy.

Andrew McCosh: I do not quite see it like that. The value of OSTS will be ensuring that any such questions get a moment in Cabinet and we can

amplify the points that come out of such reviews, working with BEIS to ensure that there is implementation thereafter.

Q49 **Lord Winston:** Whether you like it or not, to continue this question, researchers feel that they own the research that they do. Of course they do not; they are doing it for the purposes it has been appointed for. It seems to me that you need proper feedback directly to researchers. Are you intending to speak to researchers? Do you intend to give them information about how their grants might be modified or focused, for example? How does that involve you with the actual research that is going on?

Andrew McCosh: We feel that the funding by UKRI of core research is the business of UKRI, the research councils and the academics. The Haldane principle still applies very strongly. One of the great strengths of the UK is its broad-based discovery science research. Other countries tell us that we should be immensely proud of that and that we change it at our peril. We heed that message strongly.

When we are into a layer of more applied research, there is the question of the extent to which we want to steer that towards government priorities and government funds, the steer from NSTC into the funding of applied research, or what PSREs and others focus on. We see it as a high-level steer, and it is then for UKRI, working with BEIS, to take the steer from the council and turn it into sensible research proposals and research activity.

Stuart Wainwright: It is important to keep in mind that if the new National Science and Technology Council and the organisation in the Cabinet Office supporting it are to be successful, it is not just about R&D; it is about using all the policy levers available to government to make sure that we can realise what the Government want on major technologies or to tackle major problems such as net zero.

Picking one out at random, if we want to become truly excellent as a nation at quantum for all sorts of reasons, yes, we need to invest a lot in R&D, but we might also need to do things on the regulatory and security sides, attracting inward investment and building infrastructure. As you all know, government operates through individual departments. Before OSTs, there was no mechanism to make those policy levers all act together to try to achieve what you want to.

To pick up Lord Krebs's very reasonable challenge—apologies, I may be straying a little bit out of my area—how would that relate to individual researchers? If government is successful in bringing all the policy levers to bear on particular technology areas or major challenges, I would have thought that that, in time, would lead to increased opportunities for academics. We might be able to create a better regulatory system and attract more inward investment in technology areas of major challenge. R&D money can then flow in and help those academics to deliver on those challenges.

I hope that helps. It is not just about R&D. It is a much wider set of policy measures that I hope the new committee can bring to bear on the challenges we face.

Q50 Lord Rees of Ludlow: Following up what Mr Wainwright has just said, these two bodies have been set up in part to encourage more cross-departmental working in S&T issues. How is it working so far? Are there examples where it has already proved itself?

Perhaps I can give a special illustration. I was on a special Lords inquiry last year on preparedness for extreme threats and risks. One point we made was that there was not enough joined-up thinking between different departments, particularly on the planning for what happens in cascading risk or something like that. In general, and maybe in such a context, how will this structure help to stimulate more co-ordination between government departments in dealing with issues where they need to act together, often urgently?

Andrew McCosh: It is at the heart of what we are trying to achieve. You will all recall that the Government published an AI strategy last year, which was a product of some excellent work between BEIS and DCMS, supported by their joint Office for Artificial Intelligence. It set out a vision for what the country should be gaining and how it should approach the harnessing of artificial intelligence to our national prosperity and well-being.

Working with the new council, OSTs can ensure that such strategies get turned into a delivery plan that is monitored and evaluated, where the Government are really clear which departments have a role in delivering what, through funding and driving R&D, procuring, regulating or forging international partnerships. The new National Science and Technology Council gives us a mechanism to ensure cross-government buy-in, that moment of collective responsibility where government as a whole agrees to implement something and gives OSTs the ability to track progress and bring it back to the council.

In the case of AI, the Government have been very clear about what now needs to happen across government in order to deliver on the promise of that strategy and turn it into an action plan. OSTs is working very closely with both BEIS and DCMS to ensure that it is not just a BEIS and DCMS proposition but a whole of government, co-ordinated, coherent approach to delivering what that strategy sets out.

Stuart Wainwright: Having had a little more time to think, I would add that Andrew is absolutely right. From my own parochial perspective, one of the mechanisms we have in GO-Science for providing science advice to the PM and Cabinet is our Council for Science and Technology, which I am sure you are all familiar with. It regularly produces advice for the Prime Minister, usually in the form of letters or reports, on issues such as net zero, innovation or how to use procurement more to spur innovation. We help those get produced. They get sent into government. Sometimes things happen really well and sometimes they do not.

The creation of OSTS will help make sure that there is a better landing zone in government for that kind of advice. When CST advises, “If you really want to boost innovation, you should do X, Y and Z”, there is a key part of government ready to catch it and, I hope, start making things happen.

To pick up your question about major crises, it is early days. One that I hope this can help with will be some of the risks emanating from changes in biosecurity. As well as the classic getting ready for particular risks and the capabilities we would need for that, it also takes you into the realm of needing particular sorts of research, regulatory frameworks and security considerations. I would hope that, in time, that is also the kind of thing that OSTS can help with.

Lord Rees of Ludlow: To what extent do you draw on academic expertise from outside the Civil Service? I know that when we discussed the national risk register we felt that it was too secretive and could have been firmed up if they had consulted expert advisers from academia a bit more. Do you feel that needs to be a channel that is opened up a bit?

Louise Dunsby: We absolutely want to bring in external expertise. Since the Office for Science and Technology Strategy was set up, we have had lots of really wonderful offers from academic organisations, but also ones that represent technology, small businesses et cetera. It is very much in the fibre of the way we want to do things that what we create will be a collaborative proposition that the whole S&T system can get behind.

That is for two reasons. One is that—conscious of the conversation we had before about the Haldane principle—we are not directing research, but we are sending signals to the whole system about what is important to government. It is important that we do that. This is also an enormously complex system and we are not naive enough to think that 20 people in the Office for Science and Technology Strategy will come up with all the answers. It is vital to us that we use external expertise in our thinking.

Q51 **Lord Krebs:** I would like to ask our witnesses about what a successful science and technology strategy would look like. Related to that, do you have in mind particular metrics to determine whether the UK has met the Prime Minister’s ambition to become a science superpower by 2030? If you have the metrics, how far away from being a superpower are we at the moment?

Andrew McCosh: Perhaps I will start with describing what we think being a science superpower is. We believe that that means a country that is developing, sustaining and harnessing all the strengths that exist in our science, technology and innovation system, including our international partnerships, to the solution of the UK’s most strategic challenges and some of the world’s most strategic challenges. In those, I would list climate and sustainability, challenges to health, at home and globally, challenges to national security in physical space and cyberspace, and the challenges of sustaining the UK’s prosperity in the long term.

Do we have metrics yet on that? No, we do not. How we will get to metrics is by advising the Government on how to set out clear goals for what they want to achieve through science and technology advantage, and the intermediate outcomes they feel are necessary to achieve those goals. That, in turn, will illuminate a number of dependencies on particular technologies and bits of our ecosystem.

Why do we not have metrics today? It is because that is a work in progress. We are working towards the definition of those goals and outcomes. We are working towards a definition of really clear criteria by which we can make those difficult strategic choices between technologies, where our focus should be. We are working really hard, including with GO-Science, to understand how we sit in the world with respect to our technological, science and innovation strengths.

From that, we will emerge, by the end of the year, with a clear set of the main things that we will need to achieve over the next 10 years as a country to secure the advantage we want. We intend to put in place monitoring and evaluation of all the elements of that, and periodically or regularly return to the council and say, "This is how we're doing. This is what we said we'd do and this is how we've done, but also this is what GO-Science and the new technology and science insight unit in GO-Science are telling us about how we're doing relative to other countries".

Lord Krebs: Thank you, that is very helpful. Going back a few minutes, you referred to the fact that one of the particular strengths of the UK is its broad base in pure discovery research. How does that fit with what you painted just now as a much more strategically focused science and technology strategy on a number of key areas, such as climate change and health? After all, most of the important discoveries in those areas did not arise through strategic initiatives. They arose through basic curiosity of academics. How will that be folded into this wish to become a science superpower and have a strategy to underpin that?

Andrew McCosh: There is a simple answer to that, which is that we do not intend to change a system where we have extremely well-funded, broad-based discovery science in the UK. It would not be for OSTs to make that change and we do not intend to recommend it. BEIS, we and others in the system know that it is a source of strength and we intend to keep funding it. It has been very clear that one ambition of the additional funding that has gone into R&D from the Government is to preserve that source of strength, not to adjust it. We see that as a foundational layer, on which all the rest of our applied science and emerging technology strengths rest, alongside our international partnerships.

Lord Krebs: But your view is that that fundamental base is adequately funded.

Andrew McCosh: It is adequately funded at the moment. There was a long discussion leading into the SR and it has been funded by the Treasury. There has been no diminution in that funding. In fact, there is an increase.

The Chair: Do you have a common definition of “applied research” with UKRI? I think it would see that it funds a lot of applied research, as well as pure research. Will your direction be on the applied research that it funds, or do you envisage a more applied level of applied research?

Andrew McCosh: I will turn to Stu, but the steer may become more direct, the further up the technical readiness scale we are.

Stuart Wainwright: That is absolutely right. I will answer your question and add a little bit on Lord Krebs’s, which is a very good question as well. We do not want multiple definitions. We will be led by UKRI on how it defines things. It has a crucial role to play. You are right that the UK has absolute strengths. One of the jewels in the crown for us is the strength of that academic base. We have other strengths, of course, in certain sectors, but in many areas we are not as strong as other nations at turning our science into practical economic or policy gain. We have improvements to make in some areas. That is what a lot of this is about.

UKRI will be a major partner and a major delivery agent in making that R&D investment work, as it does already in wonderful ways. It may take further steers from this. Again, it is not just about R&D. This is about bringing all the other policy levers to bear, regulatory, construction, inward investment, to try to help the science and technology agenda in the UK. UKRI has a crucial role to play, but it is much broader than R&D investment.

Q52 **Baroness Walmsley:** Does defining the UK science and technology strategy mean picking winners or areas where we are already doing well and have a strategic advantage over other countries? If so, what would they be? How will the science and technology strategy mesh with the innovation strategy and the own-collaborate-access approach that we have heard about?

Andrew McCosh: I will start on picking winners, which is a great question. It certainly does not mean picking winners at the layer that Lord Krebs has described, or saying in any particular technology area, “This route is likely, at an early stage of readiness, to be more successful than another, so we should focus on that versus the other”. It means the Government deciding where they will focus the alignment of all their activity and action with respect to particular technology families.

That has to start, it seems to me, with a view of the outcomes the Government seeks for the country in the long term, allied to the potential of a particular technology to make a significant difference to the well-being, prosperity and security of our people, and to our relative strength or weakness in that technology. The criteria are quite complicated and we are really clear that we need to work through what those criteria are with the whole of government and get real buy-in for them. That is the work that my strategy team is doing at the moment.

For that reason, I will not set out a list of the technologies I think we should be focusing on at this stage. It is absolutely our intention that we take those criteria, which broadly are how we are doing relative to others in the world in a particular technology area, what goals and outcomes we

are seeking to achieve, and what potential or risk is associated with the technology family, and say, "Broadly, we think that government should be aligning its efforts around these big strategic choices across a small number of strategically significant technology families."

It is not to say that, within those families, the answer is A, B, C or D. We want to stimulate and incentivise academia and business to generate, through science and technology innovation, the solutions to our biggest challenges in the UK and do it in ways that incentivise the growth of big, globally significant, profitable UK companies that are capturing value in the UK and spreading our values globally.

Baroness Walmsley: Before we move on to the other panellists, can I probe you about something else? When you were talking about cross-government working earlier, you did not mention the pipeline of people, starting with schools. You did not mention the Department for Education. In STEM subjects, we are a bit behind the OECD average, are we not?

Andrew McCosh: It is really important that we engage all departments relevant to this, so please do not read into my focus on BEIS and DCMS with respect to AI. I was referring to their authorship of the strategy, not who needs to come together to deliver it. In general, you are completely right. The functioning of a successful system depends on those who generate the societal, workplace and expert skills in society that we need to develop, harness and exploit technologies.

It depends on those conducting the research, those translating research from universities into businesses, those investing in start-up companies, those investing in scale-up, those regulating and those protecting our IP. Across the board, we can see that we have multiple government departments that we need to work with, whose activities we need to synchronise in support of science and technology advantage.

I think firmly that skills are an important part of this mix, as is attracting the best talent from overseas into our open science system. There are many important parts of this mix.

Baroness Walmsley: We have been hearing from other witnesses how important it is for people to be able to work in interdisciplinary teams. Perhaps when the other panellists respond they might say something about how the Government could encourage that kind of working.

Louise Dunsby: I am trying to go in the right order, because there is a lot behind this. NSTC is the only place where Cabinet comes together to talk about science and technology specifically. That is the beauty of this. When we talk about picking winners, to me, that will be going to that group and saying, "this is the suite of options that you have on technologies. The UK is a relatively small country, in terms of how much money we have to spend on this stuff, compared to, say, the US. What do you want to do with the resource we have across this landscape?" That is what we mean by picking winners, not saying, "Here's a list of three things".

You asked about own collaborate access. That was in the integrated review. I want to stress that we are not planning to make a thing that is called the own-collaborate-access framework. It is a way of articulating our posture on technologies and helping us think about technology decisions. There is not going to be a thing where we pop a technology in one end and out comes “own”, “collaborate” or “access”.

“Own” is a difficult concept when it comes to a technology. It is quite hard to say what it really means, but it could be owning a part of the supply chain that means that we have a critical role that other people rely on. They are not mutually exclusive either. If you own a technology, however we are going to define that, you will also need to collaborate with other nations on that and you may need to access things. When you collaborate, you also need to access. I find it quite a helpful framework for thinking about what space you are in, as opposed to a practical tool that we will be creating.

What would I say in interdisciplinary terms? When we set up OSTS, Andrew and I wrote a resourcing strategy that remains quite important to me. We will be a unit that does not necessarily feel like every other Civil Service unit and that has a really interesting mix of people in it. Right now, we have quite a good mix of backgrounds. We have scientists. I am an engineer. Andrew has a security and history background; I am paraphrasing awfully there. We have a secondee from the Royal Academy of Engineering. The Office for Talent has been moved into OSTS. We have already started to get a really good mix of people. As we grow to that 45, it is our firm intention that around a third of the unit are external secondees that bring a wide range of backgrounds and thought with them.

Baroness Walmsley: Do you think that that structure at the top is likely to encourage similar interdisciplinary working further down the system, or is something particular being done to encourage that?

Stuart Wainwright: You have hit on a really important issue that certainly we, in GO-Science, care about a great deal. I will talk through a few things. First, I will flag two government publications that came out last year and are relevant here. There was *A Modern Civil Service* from Cabinet Office, which talked about how government will try to change. Within that, it was quite prominently talking about the need for more people with quite deep expertise within government, to have interdisciplinary teams. It spoke about scientists, data scientists and economists, and wanting to have more of that. That strategy is out there and, using that, we are trying to help make this happen more within government.

We also published—it got a bit less fanfare—the latest strategy for the government science and engineering profession last summer. That talked about the need for more interdisciplinary working, more expertise within government, but also greater interchange with academia and industry. We are trying to establish quite a number of mechanisms to do that.

Interdisciplinary working is important within government, but so is bringing experts in. I will talk through a couple of examples of how we

are building on this. Louise has talked about OSTs. To meet its needs, we are having to grow a new team, as we said, in GO-Science, called the technology and science insight team. It is very exciting, because it draws together disciplines like we have never done before. It has the things that we usually have in GO-Science, which are people with quite deep science and technology expertise, but we also have economists, data analysts and intelligence analysts. Getting them working together in that way is quite exciting.

The last two years have shown the importance of this and bringing in outside expertise in really important ways. A lot of my time in the last two years has been involved in running the SAGE committee and its numerous sub-committees. Nobody wants what has happened in the last couple of years, but we have had some wonderful examples of genuine outside experts from academia working with government officials in small teams. I remember one particular example of a very high-end epidemiologist, physicist and social researcher working with two of my team frantically hard over a week to produce some excellent science advice. We need more of that and not just in emergencies. We are looking to build on that and get that more embedded in government.

Baroness Walmsley: It sounds very exciting. Is anything being done to let young scientists leaving university know about these sorts of exciting opportunities?

Stuart Wainwright: Yes, but we need to do more there.

Q53

Viscount Hanworth: Stuart Wainwright has been touching on the various things that I was going to question you about. The government departments will see an increase in their R&D budgets. How could they most effectively use the money to support the science and technology strategy? Should they channel the money wholly through their affiliated research establishments, or also through other agencies? Should they deploy their own experts to some extent?

Stuart Wainwright: I do not want to speak for the departments, but, at the moment, a lot of R&D money gets funnelled through BEIS, to UKRI of course. That is a huge amount. There is also an awful lot that goes through individual departments such as the Ministry of Defence or the Department for Transport. That feels absolutely right, because they have actual research and evidence needs that they need to meet their policy and delivery requirements. That is absolutely right and really important.

Increasingly, we are also trying to encourage all the Civil Service to have more scientists, engineers and other experts within it. Over the last few years, we have managed to increase the number of science fast streamers coming into government. We have managed to up that level quite significantly. We are currently working with others in Civil Service HR to try to increase the number of scientists coming into the generalist fast stream as well.

The other thing we are trying to do is smooth out the interchange, allow easier, freer mechanisms to come into government. We have established some of these things ourselves in GO-Science in the last few years,

where we have been able to bring in younger, mid-career academics to help us on Covid. We cut through a lot of the bureaucracy to make that work more quickly and smoothly. The last two years have shown to every government department how intrinsically important science and engineering is to policy-making and delivery in government. We have to work with that and help encourage all departments to have more scientists and engineers inside their organisations.

Viscount Hanworth: That sounds very hopeful. I was going to assert that one of the demands on outsourcing strategy is that it requires in-house experts in order to know where to seek external help. In the absence of such expertise, things can go very badly wrong. Have we not had experience of this in the Civil Service in the past? Is there now sufficient scientific expertise in the Civil Service to determine where to spend this money? Perhaps we can dwell on some of the things that have happened in the past. In particular, IT has been an issue.

Stuart Wainwright: I am probably straying a little bit from what I am able to talk about there. With respect to science and engineering, it is right. It is critical within departments that you have people who understand the science and engineering to commission research in intelligent ways, but also to engage with outside experts on what the evidence and advice is saying and to then translate it through into policy advice. There are quite a number of critical roles scientists and engineers need to play in government. There are some wonderful examples of people doing that really well in government.

Are there enough scientists and engineers in government? In our view, no, not yet. We have to try to increase that. Over the last couple of years, we have managed to increase slightly the number of chief scientists in government. The Department for Education is now recruiting one for the first time. That is good to see on the back of what we are doing. Almost every department has a chief scientist now and we are working with the remainder to try to fill the gaps.

Viscount Hanworth: I have rather overworked Stuart Wainwright. Louise, do you have something to add?

Louise Dunsby: I will try to be brief. I came into government in a specialist engineering role and I have now moved into more generalist and strategy roles, so I have experienced both sides. I would like to stress that you need both. It is really important. You really need scientists and engineers who understand the policy and political landscape, and policy people who can talk intelligently to scientists and engineers. That is all I would say.

Viscount Hanworth: Where and how was your electrical engineering deployed?

Louise Dunsby: I was working on smart energy policy. I am an electrical engineer by background, and I sat with the smart energy team and helped them understand the technical implications of the policies they were making. That was seven years ago now, so I am sure it has moved on since then.

Andrew McCosh: Can I build on that? I do not have a scientific background.

Viscount Hanworth: You are a historian.

Andrew McCosh: I am proof of some of the problem we have. There is a shortage, but it is not just of STEM expertise in government. There is also a relative shortage of expertise, for example, in how markets work, particularly innovation and VC markets. As you say, if we will outsource the delivery of this strategy, and the outcomes we want are fundamentally going to be delivered by academia and the market, incentivised by government, we need to understand better what incentivises people and listen to those communities.

I am optimistic about it. Our chief scientists are not just pure scientists. The chief scientist for national security has just joined the Government from Amadeus Capital Partners, which is one of the country's leading VC investors in technology. Our new tech envoy to the United States is a founder and serial investor in technology who really understands the market. Increasingly, we are able to draw not just on the scientific and engineering expertise that we have in government, but on expertise that is really familiar with how global innovation markets work and how we tap into that. I wanted to add that gloss to it.

Q54 **Baroness Warwick of Undercliffe:** It is very nice to meet you all. Thank you for those very lucid responses. One thing we have heard about consistently from our witnesses is the importance of a both consistent and long-term science and technology practice. Everybody speaks of 10 years or longer. It would be interesting to know from your perception whether there are structures in place that you think will survive changes in Government or, indeed, changes in Ministers because their ideas of policy and their ideas of making an impact change. I wondered whether you felt that there might be ways in which you could sustain this rather exciting collaborative approach through that kind of political change.

Andrew McCosh: We absolutely agree that becoming a science superpower, achieving strategic advantage for the country in and through science and technology, is a long-term game. If it is vulnerable to changes in Government or changes to individual policies of individual Governments, it will not work. I am glad to say that the Government completely agree with that. They have agreed to focus achieving science and technology advantage on long-term goals: much better health for the country and globally, achieving net zero by 2050 and a sustainable environment, sustaining a national security edge, ensuring that our society and economy benefit from the potential of digital.

These things are fundamentally bipartisan propositions. They are part of the national discourse. They are a national endeavour to do well. The Government have been encouraging us to engage the devolved Administrations on this approach and to engage with opposition parties. We now have permission from the Government to go and talk to all the opposition parties about this endeavour. The aim is basically that this is a

national endeavour. Achieving science and technology advantage is not really a party-political thing.

How any individual Government decides to exercise their muscles in getting towards those long-term goals is, quite properly, the domain of any particular Government at any particular moment, but we are setting up the system for the long term.

It is our ambition, and the ambition of the Government, to embed the new architecture, the new mechanisms, the ambition of this, for the long term. It is a signal of intent that the Prime Minister established a National Science and Technology Council, chairs it, is interested in it and is talking in public about science and technology advantage. This is a long-term plan. It is why we are not rushing to definition on the particular technology choices or rushing to conclusions about which bit of our ecosystem we need to effect first.

It is why we have encouraged the Government to focus on harnessing our future strengths and current strengths in science and technology innovation to long-term outcomes. We hope that, while the delivery journey to those long-term outcomes may adjust or adapt according to whoever is in power, the aiming points will remain stable.

When I conducted the internal review, I spoke to a lot of people outside government. They said to me, "The one thing we really need from government in order to decide where we're going to invest in research, in companies or in development is long-term aiming points. To know what the Government want to achieve over the long term". People frequently cited net zero to me as a very clear stable aiming point where the Government had put their stake in the ground and said, "By this date, this outcome will be true and, therefore, we want to incentivise the system to develop the research and opportunities in business in order to achieve those goals". That is the sort of thing we are aiming at.

Louise Dunsby: This harks back to a previous question, in a way, about what a science and technology strategy looks like. I would never answer that question by saying something about what will be happening in a year or two years. It is about pre-empting whatever the technology issue of the day is in 10 or 20 years' time, so that we already have the deep tech companies in the UK doing whatever they need to be doing, with the skills base and the people who can go to work in those companies and make them successful. It is incumbent upon us in OSTS to keep the eye on the prize of the centre of government and of Ministers, and keep talking about where we are aiming for, which is 10, 20 and 30 years down the line. That is very important.

Stuart Wainwright: I do not have very much to add. That was an excellent question and Andrew's answer was spot on. It underlines why this kind of discussion and this kind of committee looking at this is so important.

Baroness Warwick of Undercliffe: It is good to know that you are widening it out in that overall political sense as well. That was good to hear.

The Chair: Is the challenge not that those long-term goals, great though they are, could apply to any country in western Europe? How do they differentiate us and give stability that is more than we have today?

Andrew McCosh: It is about the focus with which we go after them. The challenge here is maybe not to set out the goal. The challenge is to do what only government can do to marshal all the levers at its disposal in a coherent and comprehensive way over time, to incentivise academia and the market to deliver. Our challenge is delivery.

It is great that we set out long-term goals. It is very important that we do, for the market, academia and government to see that. Our real challenge in OSTS over the next 10 years will be to help government marshal all its actions behind that, in a very tight feedback loop with business and government. Our strength will come from how well we do it, not from setting out the goals.

The Chair: That is a very good lead-in to Baroness Sheehan's question.

Q55 **Baroness Sheehan:** Indeed it is. Thank you to all three of our panellists for their time this morning. The OSTS has talked about "working collaboratively with civil society, academia, industry". I am quoting here from somewhere; I am not quite sure where. I wonder whether we can directly address the question of how the Government can help industry invest more in research and development.

Andrew McCosh: It is a great question, which is at the heart of the Government's innovation strategy and their interests at the moment. Maybe I will say a little bit about the issue. We have great discovery science. We have a good track record of spinning great ideas out of our universities into start-ups. We do not have as good a track record as, for example, the United States in attracting capital into start-ups or scale-ups. Although we achieved record investment last year in UK start-ups, in the United States, on average, three and a half times the amount of money flows into start-up companies than does in the UK. At scale-up, it is around nine times more.

The reasons for this appear to be complex and they are cultural. We talked about knowledge and understanding in government of science, technology and innovation. There is also a question we need to ask, which is whether we have the right repositories in the UK in our institutional capital markets and our private capital markets. Do we have enough expertise with respect to deep technologies?

We will be exploring the regulatory incentives that make the UK a more attractive place to invest. We will be exploring how we use government procurement, particularly of early-stage deep technologies, to incentivise private sector investment, knowing that the leverage effect is stronger when you are putting revenue through a company, rather than a grant. People see the revenue stream and it is something they understand in terms of de-risking. We think about how, over time, we optimise the whole ecosystem to make the UK an even more attractive place for specialist tech investors to come.

I was in the United States last week. I was in Silicon Valley, speaking to a group of the United States' top deep technology investors. They said to us, "You have all the makings of success in this area. You're already third in the world. You've got a great track record of generating big, powerful unicorn companies. The flywheel is starting to spin". Their chief message was that the UK needs to start developing an ecosystem of belief at every level that great things can happen if people take risks and invest in deep technologies.

With partners across government, we will be looking to pull together all the policy initiatives underway, as signalled in the innovation strategy, to implement the best mix of government activities to incentivise that investment. I do not think that there is a single panacea. It has something to do with encouraging, as the Prime Minister, Chancellor and others have done, UK institutional capital to invest in different asset classes. It has something to do with attracting the best tech investors to the UK and growing our own tech investment talent. It would have something to do with how we harness the £300 billion worth of government procurement every year to the task of de-risking some early-stage companies for private investment, showing early revenue, putting on a kitemark and regulating in ways that balance the protection of the individual with the opportunities we wish to create in the market for growth.

Baroness Sheehan: You mentioned the word "belief" and how important that is. Louise, in the previous question, when we were discussing consistency of funding and longevity, you talked about putting that stake in the ground that clearly says what our long-term aims and strategy are. Andrew did not mention that. Can you expand on how important giving that element of certainty to industry is?

Louise Dunsby: It is absolutely pivotal. This speaks to the symbiotic relationship between the Office for Science and Technology Strategy and the National Science and Technology Council, setting the central strategy, and the delivery departments. Andrew mentioned the Innovation Strategy specifically, which was of course authored by BEIS. The delivery departments are making sure the system is permissive to pivoting to that direction that we have set. You cannot have one without the other. We have to signal what the Government are aiming for. Then the rest of the system has to be set up so we have the right investment and skills, all that, and they should work together. Without those long-term signals, you are setting up the system, but what are you setting it up for? It is really important.

Baroness Sheehan: OSTs will have real feed-in, will it, into those long-term signals, and the importance of maintaining them and not getting side-tracked? We know that stuff happens. For example, on energy policy, we have a net-zero strategy, but it is now being challenged with events around Ukraine.

Andrew McCosh: One of the most important things we can do when making strategy recommendations to government is to keep saying, "We think that this is a long-term thing". The clearer you can be in publicly

setting out long-term goals for this approach and intermediate outcomes, the better. As we said, it sends a signal to the markets and to researchers, and allows them to see where the Government are focused. In turn, that should incentivise them to turn their energy to the delivery of things that will be to the benefit of the public good, as well as other, more commercial, markets.

Baroness Sheehan: Stuart Wainwright, can I ask you about GO-Science? What role do you think the Science Minister can have in giving industry that confidence in the Government's thinking that longevity is important?

Stuart Wainwright: I probably cannot talk for the Science Minister. We do not report to BEIS Ministers. We are independent of them, so that question will have to be put to BEIS.

Baroness Sheehan: Do you not have any liaison with the Science Minister at all?

Stuart Wainwright: We do, but we do not report to him. I am not able to talk to his policies or his role.

Baroness Sheehan: I am just talking about how important you think that role might be.

Stuart Wainwright: Undoubtedly, it is incredibly important. The BEIS innovation strategy is a great thing in laying out the various measures that they want to see happen here. Of course, BEIS gets involved in particular sectors and tries to lay out strategic intent. That is a really important role. OSTs can help provide that broader view that is beyond R&D and beyond just BEIS's interests. It can, I hope, give a longer-term view.

Where GO-Science can help in particular is providing advice on how to do aspects of this well. I mentioned earlier the Council for Science and Technology. It is setting off on a new project to try to provide some advice on how to even better use government procurement to drive innovation, where there have been some successes, but probably quite a few areas to improve as well. Again, we will use the expertise of our committees to try to provide independent advice for government on how to do that kind of thing.

Baroness Sheehan: Would anyone else like to comment on the role of the Minister for Science, which is an important one?

Louise Dunsby: Of the little publicly available information about Cabinet committees, you will maybe have seen that he is a core member of the National Science and Technology Council, which speaks to his importance in this system.

Andrew McCosh: He has been extremely supportive of both the setting up of the council and the establishment of OSTs. These are discussions to have when you talk to BEIS in your inquiry. There is a very important role for all Ministers, to the point that it is not just BEIS and not just R&D that will make the difference here. There is a very important role for all Ministers in being part of that, forging part of that ecosystem of belief

and promulgating a narrative, nationally and internationally, that we are serious about being a science superpower, that we have intrinsic strengths and that we will build on those strengths with focus. I would expect the Science Minister to play a very important role in that.

Q56 The Chair: Can I bring up the public procurement again? I remember, which must have been nearly 30 years ago, when I first joined the brand-new Technology Strategy Board. That was one of the things that we were talking about then. What will be different now? We have spent 30 years or more, I am sure, talking about how we will use public procurement to stimulate development of new technologies and new companies, and we have not really succeeded yet. How can you make a difference? I hope you can.

Andrew McCosh: I hope we can. The simple answer is that we now have something new, which is a Cabinet committee that has the key spending departments on it and is committed to taking decisions in support of science and technology advantage, some of which are likely to be in this area. Perhaps for the first time in recent memory, we have a moment where such issues can be considered in the round and geared to very particular outcomes.

We are seeking not to distract any individual Government's procurement from their focus on delivering a particular public service. It is to ensure that, when they procure, enough of their procurement is geared to a spread bet of risk in earlier, more innovative technologies that offer the promise of better public services at reduced price. We need to work with them to shift the culture in departments around that to ensure that is something that people are comfortable doing.

It is another of these complicated issues. I do not think you can just say it and it happens. There are all sorts of incentives in procurement teams' and capability teams' minds across government that possibly make them do what they feel is safe for them, in terms of procurement decisions. We want to work with the council and have a moment where we can expose such issues, so that we have a more consolidated approach.

I will use someone else's metaphor, but using our procurement we want to seek to land more often on a triple word score on the Scrabble board. You are getting the proximate benefit, in procuring a better service or good in the pursuit of a departmental interest, but you are doing it in ways that have a secondary benefit, in stimulating our own economy and understanding the science and technology landscape better.

The Chair: Thank you very much to all of you for coming and talking to us today. As I said at the beginning, if there is anything additional you would like to submit to us or any minor clarifications you would like to make, we would be very pleased to hear from you. For now, thank you very much and goodbye.