HOUSE OF LORDS

Science and Technology

Corrected oral evidence: Delivering a UK science and technology strategy

Tuesday 5 April 2022

11.20 am

Watch the meeting

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.

Evidence Session No. 13 Heard in Public Questions 106 - 112

Witnesses

Professor Charlotte Watts, Chief Scientific Adviser, Foreign, Commonwealth and Development Office; Professor Dame Angela McLean, Chief Scientific Adviser, Ministry of Defence; Professor Lucy Chappell, Chief Scientific Adviser, Department of Health and Social Care.

Examination of witnesses

Professor Charlotte Watts, Professor Dame Angela McLean and Professor Lucy Chappell.

Q106 **The Chair:** Good morning to our second panel of witnesses. Having had an all-male panel, it is a real pleasure to have a panel of three female Chief Scientific Advisers. That is really brilliant. Thank you again very much for joining us today.

We are very keen to hear your thoughts on the new Office for Science and Technology Strategy and the National Science and Technology Council; the increased departmental science budgets; the role of and relationships with UKRI; the scientific strength of the Civil Service in your departments; and, in particular, how all of these will affect your roles as departmental Chief Scientific Advisers.

There are a few issues before I get on to the first question. The session is being broadcast on the internet. You will receive a transcript of today's session in a few days' time to check and send in minor corrections. If there is anything you feel you would like to have said to us, or you want to clarify, please feel free to provide supplementary evidence in writing after the meeting. When you first speak, if you could say who you are and which department you are from, it would be appreciated. If you are clear about all of that, I will kick off with the first question.

We would be interested to hear, briefly, about the key R&D priorities for your department and about the mechanisms you have either to conduct or commission R&D and whether there are things that could be done to make those processes more effective. I will start, if I may, with Professor Chappell.

Professor Lucy Chappell: I am Chief Scientific Adviser at the Department of Health and Social Care. Our R&D priority is to improve the health and wealth of the nation. We do that through a number of vehicles, including the National Institute for Health Research and the Office for Life Sciences, which includes bodies such as Genomics England.

We use a number of core workstreams and we have strategic focus areas to enable that delivery. For the core workstreams, that is broadly through funding research, typically projects and programmes; investing in infrastructure; thinking about how we partner with patients and the public; thinking about how we train and build capacity in our researchers; how we collaborate, for example with charities and industry; and finally how we deliver for global health research in partnerships with others such as the FCDO.

At the moment, we have seven key strategic focus areas delivered in a strategic document last year for the National Institute for Health Research and through the *Life Sciences Vision*. They include learning from Covid; building in areas such as preventive healthcare and social care research; thinking about those with multiple long-term conditions

who have historically been underrepresented; and thinking more broadly about levelling up and ensuring that we are conducting research in areas of high disease burden that again may have been underrepresented. We are clear about ED&I underpinning our R&D. If we have strong ED&I, both through participants and through our R&D workforce, that is important. We are really clearly working with the life sciences industry.

That is high level.

For us, it is important that we think about impacts on practice and on policy. For example, we have seen from the R&D response to Covid-19 that we had a very clear, rapid impact, at a scale and speed that we had not seen before, on clinical practice. We are also thinking about the impact on policy across the department—for example, how we are using our evidence to inform our obesity policy.

The Chair: Thank you. I will move on to Professor Watts.

Professor Charlotte Watts: Thank you for inviting me. It is a pleasure to be here. I am the Chief Scientific Adviser at the Foreign, Commonwealth and Development Office.

On our research priorities, as you will be aware, we have just gone through a merger of the Foreign Office and DfID. Currently, our research budget is largely ODA and very much focused on supporting delivery of the UK's priority development objectives. All our research is very outcome focused. We are interested in how we use science, how we use the opportunities of science and how we generate the evidence that we need to deliver impact. In development, there is often optimism bias; there is a risk that people assume something that is a great idea that feels right will deliver impact. What we have learned over years of supporting rigorous research, including trials, is that some things work fantastically and give you high returns, but other things do not deliver the transformative impact we aim for.

In development R&D, our priorities include major investments in climate, both better predictions of the types of impact that developing countries face, and how we support adaptation and resilience. How do we support sustainable clean growth? What are the opportunities of new technologies and getting clean technologies out at scale? Our priorities include global health. That includes infectious diseases of poverty and neglected tropical diseases, as well as Covid, for example, and other areas where impacts have been substantial on developing countries.

It includes a range of areas on generating evidence. For example, how do you deliver learning outcomes? How do you get girls back into school? How do we get evidence about what works in humanitarian settings? What innovations could be applied in very complex, difficult environments? Flagships include major initiatives on clean energy, such as the Ayrton Fund, which we do with BEIS; a range of product development partnerships that bring together the private sector and universities in combination to provide portfolios of research; and a range of research consortia focused on different areas. That is the ODA R&D portfolio that I manage. I have teams that work with me on that.

I want to flag that we also have some small amounts of non-ODA. I think it is important for the FCDO to have non-ODA and to try to increase the amount of non-ODA R&D that it has so that we can commission the types of evidence that we need to inform other aspects of FCDO work. How do we make our diplomacy as effective as it can be? How do we support and expand some of the geographies of the work that we might be doing in developing countries to other geographies as well? I am pleased that the department, along with our ODA allocation from Treasury, has given me small amounts of capital to try to ensure that we can also start to grow our non-ODA research commissioning capabilities.

The Chair: Will you have oversight of that budget as well?

Professor Charlotte Watts: Yes. I think what is important about the research budgets is that as part of the science capability review there is a very clear steer that there is an earmarked capital budget for R&D, and that the CSA has prime responsibility for that. Clearly, it is our responsibility to work with our policy colleagues to think about how we use that research to support our departmental and broader HMG objectives.

The Chair: It is very good to hear that positive message about research, because you are sitting between two very big hitters in terms of research budgets. I come to Professor McLean.

Professor Dame Angela McLean: I echo the thanks for having us. I am Chief Scientific Adviser in the Ministry of Defence.

We organise our R&D according to what we call defence challenges, of which we name five. Those are: pervasive intelligence, surveillance and reconnaissance—knowing what is happening; multi-domain command and control—making good decisions about what we are going to do about it; freedom of access and manoeuvre—being able to get to the places where we need to do these things; and then the two sorts of things we need to do are what we call asymmetric hard power, and advantage in the sub-threshold. One of those is the old-fashioned things you think of as doing in war fighting, such as throwing things at each other. Some of it is the more modern stuff that you do before you actually get to a battle. The obvious one would be cyber effects at the moment. Indeed, as we have recently seen, there is the enormous importance of economic effects as part of taking on conflict with a nation.

That is agreed across the whole of what we call our core R&D pipeline, of which I own only a part. In defence, because we do so much R&D, the CSA is in charge of the lower technology readiness level part. It is the more speculative, mostly lab-based stuff.

One of the things that has worked well for us over the last couple of years is aligning right across from what I think of as my research through to what we call capability development, which is what my colleagues in the military would actually want to buy. We are using those five ways of thinking about our overall task as a way to do that.

Q107 **Baroness Walmsley:** Could you describe your role as Chief Scientific

Adviser in your department? Could you tell us what say you have in its research budget? Do you know if it is going to be increased? Do you already have plans as to how to spend it, if that is the case?

I will come to Professor Watts first and ask you also to cover, in your answer, to what extent you have influence over the official development assistance budget, and how it is going to be spent. It perhaps relates to what you have just said.

Professor Charlotte Watts: To give you a flavour, I think an important part of my job is to continue to stress the value and significance of ODA R&D. If you look at the history of progress and development, some of the main areas of progress have been through scientific innovation; improved treatments for malaria, for example, or next-generation agricultural products that give high yields and more resilient crops. There is a range of areas where science is important and transformative as well as the evidence around what works and what does not work.

In that respect, in the engagements with Treasury and with other CSAs, I think I have an important role to play in just continuing to make that case and provide evidence around the types of returns that you get. We support impact assessments, and returns on investment analyses to continue to make the case to Treasury and others.

In overall ODA R&D for this SR, there is a positive story. We are moving from about £600 million in 2021-22 up to about £1 billion in 2024-25. As you will be aware, there was an overall reduction in that move from 0.7 to 0.5. That impacted across all areas of development, including R&D, but I am pleased that Treasury has seen fit to increase the ODA R&D allocation in this SR. That resource comes both to my department and to BEIS and, through that, to UKRI as well as to DHSC and Defra.

Baroness Walmsley: Is knowing that there is a trajectory to increase over several years helping you to plan how you are going to spend the money?

Professor Charlotte Watts: Yes. We are in the process of business planning right now. The international development strategy is under development. We are using that to shape the priorities. Our aim for our R&D is very much to support the delivery of the development strategy. We have a cross-Whitehall governance board called SCOR that we use to have conversations between CSAs and budget holders about how we get synergies and investments in the different aspects of development research that different departments and UKRI are considering.

Baroness Walmsley: Thank you very much. Dame Angela, could you describe your role in your department as Chief Scientific Adviser, and your role in how the budget is spent?

Professor Dame Angela McLean: Happily. The description I like best, which I heard from someone else—I cannot remember who—was "licensed maverick". I think our job is to go in and say, "That is a very weird way to do that. Why are you doing it that way, because that is not what other people do? Here is another way you could do it". The other

one, although I have not got the T-shirt yet but I think I should, is "Defender of the Future".

When I had been in defence for a few months, I realised that I was the only senior person without some very pressing and worrying immediate problems. That is why we agreed in defence that we would spend at least 1.2% of our budget on science and technology under the control of the CSA. That is why we say, other things being equal, that we will spend that money on what we call the generation after next of science and technology, the more future-focused work. I am the only person who does not have to do the pretty horrible balancing act of, "I've got this desperate thing I have to do today but I know I have to invest in the future as well". My job is the future, other things being equal.

That is going well at the moment, as for most government spending, in that we are expecting not only an increased absolute amount of money—the defence budget has gone up—but an increased relative spend for next year as well. The way that is spent for science and technology, which we define as the lower TRL stuff, was set out in the science and technology strategy that we published back in 2020. That is where the five enduring challenges came from.

We have a pretty mature commissioning outfit. That science will be commissioned from head office and mostly delivered through the DSTL, largely our laboratories in Wiltshire. A lot of it will be placed outside, so the research will be commissioned from other providers outside DSTL. I think it is a good time for defence science and technology.

Baroness Walmsley: Thank you. Professor Chappell, how would you describe your role?

Professor Lucy Chappell: As CSA, I am also chief executive officer for the National Institute for Health Research. In that role I have direct oversight. I have three directorates as director-general, one of which is science, research and evidence in the department. We have extensive NIHR commissioning centres, distributed across Southampton, Twickenham and Leeds, to do the research management and research delivery aspects.

More recently, I have taken over as director-general for the Office for Life Sciences, which is held jointly with BEIS. We have healthcare missions, for example. Within the OLS sits Genomics England, where it is determining areas such as new-born sequencing, which is a key part of its spending review. We arrange the overall budget across those three areas: the National Institute for Health Research; Office for Life Sciences; and Genomics England.

The priorities I have responsibility for are shaped by what the patients and the public need. They are shaped by governmental priorities. For example, whether it is our own Secretary of State, who has been very vocal about tackling health disparities and is looking towards cancer, or the *Life Sciences Vision* which has been clear on tackling areas such as dementia and obesity, it is a combination of both public and patient need, and inevitably some government priorities.

Baroness Walmsley: NHS England is a very large research organisation. What is your role in interacting with that?

Professor Lucy Chappell: The NIHR is the research arm of NHS England, but we work, through the DHSC, very closely with NHS England colleagues. They are one part of it. I recognise that there is now much broader recognition, for example, of local authorities that have responsibility for public health. We cover social care research. Of course, the social care landscape is very different. There are multiple providers. It is not just what might be obvious, such as care homes. There is domiciliary care, and that is provided in myriad ways. We are clear about our focus to increase our offering in social care research so that we find out what works.

We are all familiar with the idea that, for example, if you went into hospital with chest pain you would expect to have effective diagnostics followed by effective treatment that has come through the research pathway. We are going to see an increase in what we do in social care and what works, whether it is for young adults with learning disabilities or older people with dementia. As a society, we need to ask how we both do what works and stop doing what does not work. If we just carry on putting more and more into the system it might get overwhelmed, whereas if we say, "Let's do what is effective", I think that is the best approach.

Q108 **Baroness Blackwood of North Oxford:** I was very taken, Professor McLean, with you naming yourself as defender of the future. We need people who are laying down the foundations for the next generation in our departments, so please keep doing that, all of you.

You heard us ask Professor Monks and Professor Henderson about how the National Science and Technology Council will engage with your roles, and how it will affect your work in the department. We have heard from Patrick Vallance that his vision for the council is indeed to be long term and future facing, as you have described your roles, but also to be cross-departmental. How do you think the council will engage with your roles? What are some of the challenges that you found in cross-departmental working? How have you found that it actually works? What do you think has worked well and how could the council do well?

Professor Dame Angela McLean: That is a great question. Sometimes we can work across departments quite well, but sometimes we find it very difficult. It is worth thinking about an example where we are finding it really difficult even though we know it is very important. That is position, navigation and timing. It is the thing that lets your car know where you are. It is the timing drives. That is in everybody's department. It is an issue for every single government department, but because it is such a big issue for every department there is no emergent lead department. At the moment, we do not have a solution to what we would do as a second line of defence if we lost the current capability. I think that is something where OSTS can help us with guidance from NSTC to decide between us, "Okay, this job needs to be split up into several different blocks, and who is going to do which bit?"

In other places, it is usually obvious which is the main department. For example, the national quantum technology programme, which Paul may have talked about, I view as having been led by BEIS very well with some of us chipping in. It is more about things like the quantum technology programme and real progress on things like PNT where we are stuck at the moment.

Baroness Blackwood of North Oxford: Professor Chappell, I declare my interest as chair of Genomics England.

Professor Lucy Chappell: There are a number of areas where NSTC and OSTS could add value, some of which Angela has mentioned. There are topic areas that cut across government departments. Spending review settlements are broadly within department, but it is anything that can increase cross-cutting work that would be useful. In my area there are things like the 100-day mission for broader pandemic preparedness and what we have seen on climate change and net zero, which was emphasised by a number of us going to COP 26 and talking about where we were going to work together, or for example something like antimicrobial resistance, which is not just a health problem. It is absolutely essential that we have Defra, the FCDO and many others joined up on this. Because of the mechanisms of government, where it is typically settled within departments, we need all the infrastructure and mechanisms that pull us to collaborate across government. At CSA level it is very clear that that is what we do, but we need it woven throughout all the departments.

The second thing is the longer-term horizon. It is essential that science and technology is over and above the timescale of elections and politics. For example, in my area of public health, if we are to tackle obesity, it is crucial that we have a longer-term horizon where investment in public health, not just in the health sector but in active travel, smarter cities and across the patch, will be crucial.

Perhaps a third area is where I think we should be looking for science and technology and, by extension, research to be embedded as business as usual; by that I mean that in the minds of patients and the public, but also, for me, in the minds of healthcare professionals, it should not be seen as something special. For that I think we need two things. We need to be ambitious about the percentage. At the moment, we are working on about 1% of the NHS budget. I would like to see that go up.

The other thing is trust. OSTS has a real role in the science and technology and research piece. How do we get trust, for example, in the use of data and in working with the life science industry, so that it is not "them and us" but all for patient benefit? It all needs to be seen as that. I am sure that OSTS has a role, for example, in very cross-cutting areas like that.

Baroness Blackwood of North Oxford: Thank you. Professor Watts, ODA has been in different departments. What is your view on this?

Professor Charlotte Watts: I am answering not solely around ODA but as the department that leads on international engagement across a range

of areas. Within my responsibilities, for example, I co-parent the Science and Innovation Network, which has research hubs around the world. I do not like to say it is overdue, but it is really important that we have OSTS and that we have a Cabinet-level structure that is thinking about science and technology. Given the significance, the ARIs are very clear on that. You need Cabinet-level discussion to be able to ensure that we have the high-level attention that science and tech deserve. As others have said, there is an opportunity to ensure that the sum is bigger than the parts when we are thinking about the contributions of different departments.

It is also an important opportunity to say how we achieve pull-through. In the UK, we are brilliant at doing science, but are we really spotting the opportunities? Departments could be saying what this means for levelling-up agendas and what it means for the ways we might achieve net zero and other targets. For me, it is not only the question about whether we are investing our funding in the right types of science and the right combinations of science; it is much more how we get the translational aspect right and get pull-through using the political and other levers that each of the departments has.

An example of a good piece of work that is under way currently is the international science and technology strategy. The FCDO and DCMS are jointly leading that. Our Foreign Secretary is very engaged in thinking through its content. It will be a strategy document for all of HMG. It will go to NSTC relatively soon for comments. It tries to say what the core principles that we need to be clear about are in relation to advancements in different types of technologies, what is going to guide our deliberations and decisions about who we want to collaborate with, where we are going to be more cautious, and what norms around technology use we want to embed and use our diplomatic and other capability to try to protect. That is something that may well have happened without OSTS, but to get that buy-in and have the high-level political discussion, those are the structures that are facilitating that and helping us take an overall international view.

Baroness Blackwood of North Oxford: Thank you very much. One area that I understand is likely to be an area of focus of the OSTS is national security, and each of your departments, I imagine, would have a reason to need to work together on emerging technologies and strategies, depending on the area of focus—obviously, the MoD, but biohazard and health as well. What do you think is the benefit of the OSTS in making those working practices more effective going forward and developing long-term strategies for more effective practices? I will start with Professor Chappell and work backwards.

Professor Lucy Chappell: The co-ordination happens partly because the CSAs are a very strong network, but higher-level co-ordination and Cabinet-level interaction is crucial. My area is biosecurity, but that overlaps with the FCDO and defence. Underpinning it with the right infrastructure means that it is not left to that co-ordination; strong personal relationships are part of it, but it needs a combination of both. We have examples of where it is working well on biosecurity, but it would

be very logical to ensure that it has an even stronger base through the OSTS approach.

Professor Dame Angela McLean: Most CSAs are not career civil servants. We are not here for all that long. One of the things OSTS will do is build at officials level an absolutely rock-solid set of interactions across departments. That is done rather well by CSAs at the moment, partly because we all meet once every week and talk about all sorts of things. We know each other. We are a small enough group and we have a similar enough background to get on rather well, and that is a great basis on which to set these things up, but it needs more. It is not enough for Lucy and me to have a good chat and then go home and talk to some of our colleagues: "Here's what we think you need to do". It needs more than that, and that is what I hope OSTS will provide.

Professor Charlotte Watts: To second what my colleagues have said, it is providing the glue and a high-level forum for quite difficult conversations and strategic conversations. Some of them really need to be at senior political level. It is not sufficient for CSAs alone to be saying, "This is how we think it should work", or for official-level conversations. It is giving a space to elevate key decisions and policy areas to our senior political leaders.

Professor Lucy Chappell: As well, perhaps, as reflecting science, policy and operational areas all coming together.

Baroness Blackwood of North Oxford: Thank you very much.

Q109 **Viscount Hanworth:** I will go first to Angela McLean for a clarification. I am fascinated by your list of initiatives, your five ways, as I think you called them. Military equipment does not appear to be in your remit. Is that correct?

Professor Dame Angela McLean: No. We talk about challenges, and equipment is part of the way we address those challenges. You will have noticed that I also did not talk about AI and autonomy. That is because that is a set of techniques we would use to address the challenges. For example, if you want freedom of access and manoeuvre, you are very likely to want some military equipment to achieve that. It is a very high-level way of carving up the tasks we have to do and ascribing them in terms of a problem you have to solve rather than a technique that you might use to solve them. Much of what we do feeds into either kinds of military equipment or ways of using military equipment.

Viscount Hanworth: How does your department interact with public sector research establishments? What is your interaction with them as Chief Scientific Adviser?

Professor Dame Angela McLean: I think of DSTL as ours. We separate defence science into two things: an operation that happens in head office called defence science and technology, where we basically run the customer function; and DSTL, our labs in Wiltshire and, as I forgot to mention, very newly in Newcastle, we are very pleased to say. Our labs deliver. That is one of the PSREs. We manage our relationships with the

other PSREs through DSTL. Most people who do science in the head office have at one stage of their lives worked at DSTL. It is a lot of the same people doing a job where they think of themselves as either a customer or a deliverer. The people in head office have deep expertise in defence science and technology.

Viscount Hanworth: Is it true that the role of research establishments in your area has been diminishing over time? I am thinking, for example, of the demise of the Pyestock research laboratory, which was for gas turbines, or the diminution of the role of RAE Farnborough. Is it true, or do I have a misperception about that? I get the feeling that a lot of that has gone into the private sector.

Professor Dame Angela McLean: I had better take notice of that question. They tell me, "Oh my god, don't take notice of any questions because it makes work for us". I do not want to answer that question and get it wrong. Can I come back to you on that?

Clearly, we are very interested in having good relationships with the private sector. One of the ways things work is that our labs and their collaborators invent things, but we do not build them. If we invented some fantastic new device, we would not build it; we would hand it over to the private sector to build, and then we would buy it from them. I do not regret a growing role for the private sector because that is a good way to generate prosperity.

Viscount Hanworth: The establishments I mentioned were indeed on the interface. That is exactly where they were.

Lucy Chappell, should there be a rebalancing of the R&D funding between universities and research establishments?

Professor Lucy Chappell: Our PSREs are broadly organisations such as MHRA, UKHSA and NICE, and they do not have large research commissioning budgets mainly because we have a good system, broadly through the National Institute for Health Research, and we work closely with the UKRI Research Councils. The view is that we have the academic institutions and the mechanisms through NIHR, and, for us, mainly MRC, but with others. That is working well. The Covid-19 response showed that. It was a good example where we stood up rapidly to deliver research, and it delivered impact. Those PSREs have capabilities, which are very clear, and we are going to be working very closely with UKHSA, as we already have been, to look at the research needs and how we deliver those. I do not think we need a major rebalancing.

Viscount Hanworth: Are there major changes under way?

Professor Lucy Chappell: Nothing major in the spending review.

Viscount Hanworth: Charlotte Watts, can I ask the same questions of you, if I do not need to rephrase them?

Professor Charlotte Watts: No, I am happy to answer them. As I mentioned, our research commissioning is very much focused on what are the right capabilities we want to bring together to make progress in delivering development impact. In practice, that often means that we are

drawing on UK strengths in science, and that is both in universities and in other bodies. For example, the Met Office is a really important partner for us. We have a range of different types of partnership with them, linked to our climate research as well as to humanitarian work and others.

We are interested in how we evolve that relationship and potentially get to a more strategic level of conversation, as well as having them as a partner that we work with to deliver on particular projects. That gives us an opportunity not only to get impact from our direct funded relationships but to ensure that we are learning from the broader range of international activity that the Met Office is conducting, and, as we think about communicating the strengths of UK science internationally, ensure that at the FCDO we support and enhance the international presence that organisations like the Met Office have in the global international space.

We work with UKRI very closely. Just this week, we signed a new concordat with it, which is taking our relationship up a level, very much a strategic level, to ensure that we are working closely together and thinking about how we bring the right strategic thinking to our international engagement on science, and how our activity enhances the visibility of UK scientific strengths. We are also thinking about ways we might want to work together on co-funding, for example.

I can name other institutions. For example, Pirbright for us is a great partner linked to our interest in livestock vaccines. As part of the G7, we had good conversations with BBSRC and the Gates Foundation, with which we work very closely for our investments in agriculture, to ultimately pool our funding to provide quite significant funding to Pirbright to develop its work on livestock vaccines. Those relationships are very important, and often we can leverage and combine resources to support the UK science sector in promising and innovative ways.

Viscount Hanworth: Yours is a very wide remit. Did you mention the Met Office in particular because you are interested in changing agricultural environments?

Professor Charlotte Watts: No, the relationship with the Met Office covers a lot of how we improve our ability to understand at a granular level the impacts of climate change, and related to that how we support developing countries to adapt and respond to those impacts. That includes in the agricultural space how we ensure that farmers have better information about extremes in weather, and how we use that information to inform our investments in agricultural technologies and in other types of businesses and economic growth that countries might be making, and to inform that decision-making. Given the significance of climate change, the types of analysis the Met Office can support is very important to us.

Viscount Hanworth: Thank you very much.

Q110 **Lord Rees of Ludlow:** We have had evidence from research councils and UKRI. How are your interactions with research councils and the departments? You talk to other departments and you talk to different research councils. Can you interact directly with research councils, or is it mediated by UKRI in the system? As a follow-up to that, if your

departmental budgets are to be increased, which is a policy, is that going to sharpen up those issues, and how will you interact with research councils?

Professor Lucy Chappell: We have very strong links both with UKRI—

Lord Rees of Ludlow: And the MRC of course.

Professor Lucy Chappell: Yes, both at UKRI level with Ottoline Leyser and with the Research Councils. I speak on an extremely regular basis with my counterparts in MRC on every topic because we think it is crucial to have a coherent, cohesive offer. To take the life sciences visions, we are working on each of those to look at them as a joined-up pair of MRC and NIHR to make sure that we do not have gaps, because we should not have researchers saying, "There is no home for this piece of work". Some of our work in NIHR has been specifically with other Research Councils.

For example, we have done a call with the EPSRC on transforming care and health at home and enabling independence. We want engineers, and we want the breadth of expertise and discipline that engineers will bring. Typically, they may often have sat within the EPSRC domain, and we want to marry up health researchers with them to get better solutions. I have met the ESRC and AHRC heads, and I am looking for opportunities where we can gain from that breadth.

Our budget is quite hockey stick; it is pretty much flat for year 1 and 2 and then it has an uplift in year 3. It is a nice problem to have. We are lining up in year 1 how we are going to spend that and how we can work with partners in a sensible way and, going back to Angela's phrase "Defender of the Future", where we should place innovation to see good use of the uplift.

Lord Rees of Ludlow: Will you be constrained by priorities set by UKRI?

Professor Lucy Chappell: I very much doubt it, given that theirs are as ambitious and innovative as ours. We would not be constrained by UKRI, because we have our own priority setting. Working in partnership, as Charlotte mentioned earlier, we are asking where the sum is more than just the parts.

Professor Charlotte Watts: We have a long history of working very closely with a range of councils and now with UKRI. An important contact for me is Christopher Smith, the international lead in UKRI. We were recently working closely on Ukraine and our approach to support researchers at risk, and how we bring others into that conversation and mobilise resource, as well as how we work very closely on the international agendas around science.

In my portfolio, I have a range of sectors. My teams leading those areas work with the respective councils, and I tend to work at the more senior level. That includes Innovate UK, which is also a very important partner for us in bringing its expertise into our thinking about how we scale up promising technologies and create new development opportunities linked to the application of new innovations in developing contexts.

Professor Dame Angela McLean: We interact with the research councils directly in two directions, one of which I would call technology-specific. I am a great fan of a thing a called the National Quantum Technologies Programme, which is really important for providing new technologies for defence. We are very excited about it. One of the things we are hoping to provide to it would be a purchaser of first resort. We want to be some of the people who buy some of the first things it makes. We have big platforms. We can put out quite large examples of prototypes. We are reasonably forgiving because we have a long time horizon. We have problems that we know we will have for a very long time.

We are very keen to see a successor to the NQTP for engineering biology, sometimes known as synthetic biology, which is of great interest to us all, including in defence. We are tremendously excited about some of the novel materials that we hope will come out of synthetic biology. Those are things about technologies. From the other end, we have a forum where the national security departments meet the research council heads to talk about shared problems.

I am happy that we have good interaction with them. Regarding your other question, we expect some of the uplift in spending to go straight out to the research councils. We hope that might be possible.

Professor Charlotte Watts: Lord Rees, would you mind me adding an additional point? For me, it is really important with departmental budgets and UKRI budgets to think about what the healthy ecosystem is. For example, my development R&D budget is focused on the more applied end. Unless the return is hugely significant in the whole, I will not invest resources in very upstream, blue-sky work because I am using development funding, but I am interested in what is coming out of UKRI investments or other departments' investments where there might be a development application. To Angela's point, there are particular applications where there might be a next stage of research funding that I would support that can draw on the types of work that UKRI is so brilliant at supporting. That interaction is often what we are trying to spot. It is those opportunities.

Professor Lucy Chappell: We are not trying to create silos; we are trying to create pull-through. We are trying to get out of the silos—the "This is my patch". There is a real shift to how we work together rather than just parcelling everything up. Whether it is pull-through or cross-discipline, I see that happening across the piece.

Lord Rees of Ludlow: As a postscript, Professor Watts, you obviously have a special international watching brief. Can you say something about scientific attachés in embassies? I do not know how the numbers change, but they are clearly an important source of information for collaboration.

Professor Charlotte Watts: We have the Science and Innovation Network, and with the merger that now comes under my leadership as well. I am forming new departments within my directorate on global science, and they are in about 40 countries. They are co-parented with BEIS. At the moment, we are looking very closely at how we support

them. They are important both in projecting outward and as a source of information about the granularity of where there are particular skills that we might want to collaborate with or important partnerships that we want to foster. We are also reviewing the geographies of that—trying to ensure that we support the Indo-Pacific tilt in particular and that we have the right people in the right place. We continue to think they are brilliant, and we will continue to draw on their expertise in strategic ways.

Q111 **Lord Mitchell:** Good morning. Not for the first time, we have heard that the Government want to use public procurements to pull through new technologies from R&D stages to industrial scale-up. Are there opportunities to do so with technologies under your departments' remit? I have an impression, which I hope is wrong, that big departments like yours feel comfortable talking to big FTSE companies, the sorts of companies we all know; you have been talking to them for a long time and there are relationships between them. I want to know how the small to medium-sized companies that may have great ideas and great technologies get through to your departments. Can I ask Professor McLean to answer that first?

Professor Dame Angela McLean: It is a great question. We are very interested in talking to both big and small industries about pulling through technologies. An example that we are proud of and excited about is a directed energy weapon called Dragonfire, which we very much hope will become a prosperity-driving success for the UK. You are absolutely right that it is more difficult for us to talk to small and medium-sized enterprises, and for that reason we have a whole unit called DASA, which stands for Defence and Security Accelerator, whose job it is to talk to such companies. You are right that we could still do more, and we spend time thinking about ways to do that even better. Thank you.

Lord Mitchell: Professor McLean, if I was one of those small companies and I wanted to talk to your department, what is the phone number I call?

Professor Dame Angela McLean: You call DASA.[1]

Lord Mitchell: Okay, thank you. Professor Chappell.

Professor Lucy Chappell: To answer that part of the question, we have a number of mechanisms, and we are actively working on this to have an open door for SMEs especially, not just the big life sciences industry. It is co-ordinated through a part of the National Institute for Health Research called NOCRI, with a very strong mandate from the Office for Life Sciences to ensure that there is an open door. Because OLS is jointly looked after with BEIS, we have that join-up. We also have grant schemes within NIHR such as i4i that look at how that can be achieved.

[1] Professor McLean after the session explained that "companies can approach Dstl directly. Dstl also run Searchlight events which reach out to SMEs and Non Traditional Defence Suppliers (NTDS) to highlight new opportunities for industry, whilst providing information about the work that Dstl is doing to respond to defence challenges. They also provide guidance on how to Sell to Dstl as well as an opportunity to ask questions."

On public procurement, we work closely with the NHS through schemes such as the Accelerated Access Collaborative and the Medtech collaborative to look at the route to commissioning products that are shown to be effective. The Innovative Licensing and Access Pathway, which is owned by MHRA, is looking at how we get safe and effective development of medicines into patient access. That is because there is a join-up with NHSE/I, the Health Research Authority that oversees ethical regulation, and ourselves at NIHR.

There are challenges for procurement in the social care sector, but it is very much early days.

One example would be Genomics England working with the Genomic Medicine Service in NHSE/I, which Baroness Blackwood is very familiar with, where we are looking to see pull-through into the Genomic Medicine Service and to patients; how it is making a difference, what the diagnostic yield is, what the turnaround is and how it is going to change outcomes. We have a number of opportunities. We could almost certainly always go further and faster, but we have a strong foundation.

Lord Mitchell: Thank you. Professor Watts, a comment, please.

Professor Charlotte Watts: Thank you. We do not play such a central role in procurement at scale processes. With our R&D, we support a range of SMEs—a number in the UK as well as overseas—in our development funding. An area of interest for us is how we think about the trajectories of financing that those SMEs can access, to try to support them to get to a place where they can access the more substantial capital investments that are being made in developments through initiatives such as BII. We have some successes in that. I like to see our investments as an early innovation fund that can support start-ups to get to a point where they are able to compete and access far more significant financing from the larger programmes that we manage.

Lord Mitchell: Thank you.

The Chair: You have all said that there are initiatives in place to do good things with SMEs, which sounds really positive, but we are being told that the Government envisage a step change in how effective public procurement will be in supporting technical innovation in the UK. What needs to change to get the step change? You are apparently doing the right things already.

Professor Dame Angela McLean: The integration piece that OSTS offers could help with that. Many of us have similar problems, and it would be easier, I guess, for little companies to talk to one front door rather than each of our front doors. I would view that as one of the parts of integration that we need to get to be a great science power.

The Chair: Do you think OSTS should provide that front door?

Professor Dame Angela McLean: I do not know if OSTS should provide it. OSTS should husband a conversation between the departments, both those that spend a lot of money on stuff and those that spend less money on stuff, about whether we need a front door.

Professor Lucy Chappell: To go back to Charlotte's point, the pull-through into implementation and adoption is absolutely crucial; otherwise we are less appealing to invest in. We need to demonstrate to life sciences that we have that pathway, and that it will not always take 17 years. We cannot implement what does not work. We should be implementing what works.

The Chair: What needs to change for us to do that?

Professor Lucy Chappell: Some areas are probably the same across sectors. It is about getting greater agility from the point of view of those who undertake public procurement constantly to ask what is effective, what is innovative and what is cost effective. That element has to be built in. It comes back to stopping doing what is not effective. It is a more holistic approach, and it can be underpinned by OSTS with an expectation that part of the development piece asks what the pathway to implementation is. Rather than being an afterthought, it needs to be woven in as a forethought to all our work. That is already happening, but I think it can go further.

Professor Charlotte Watts: There is a conversation happening at the moment about whether we have the bureaucracy that is proportionate to a particular situation or opportunity. Even on the research commissioning side, it can be easier for a big organisation to compete and manage the risk that they will not be successful. If you are a small organisation, having the upfront ability to invest resource is far more challenging. The opportunity cost proportionally is bigger.

There is an element of access that Angela has talked about. How do you make it easy to be aware of what other tendering processes, or whatever, are happening? There is a need for us to think about what our commissioning processes look like if you are on the receiving end—we have all been on the receiving end of that in our careers—and how we get them right, so that smaller players can be part of it and we can tap into their capabilities and the opportunities that we want to create.

Professor Lucy Chappell: Implementation of the Tickell review will be a crucial part of that.

The Chair: Thank you.

Q112 **Baroness Warwick of Undercliffe:** The final question reverts to international strategy, which you have all mentioned and one or two of you have explored a little. I would like to go into it in more depth.

We have heard a lot about the challenge of when to compete and when to collaborate. One of the themes running through some of the evidence we have had is the "own, collaborate, access" framework. Could you look at your departments' remit and say whether there are projects where you think the framework either has been applied or could or should be applied? Let me start with Professor McLean.

Professor Dame Angela McLean: Do you mean "own, collaborate, access" from the point of view of international collaboration?

Baroness Warwick of Undercliffe: Yes.

Professor Dame Angela McLean: Very good. We think about that very carefully. We have terrific science collaborations, particularly with our Five Eyes international partners. Even there we do not necessarily share absolutely everything, and we know that they do not share everything with us. We have what you would call intellectual equities, where we would think very carefully before we shared them with all our partners. Because we do not speak publicly about a lot of the research we do, international collaborators are incredibly important as the scientific peer review for those people. In that way alone, international collaborations are absolutely essential to us.

We think very carefully about what we want to work on side by side with people and when we want to parcel the work out, acknowledging that here is a bit that we are really good at and here is a bit that, say, the Canadians are incredibly good at, and we know we can split it up and make faster progress that way. In the past, we did not call that "own, collaborate, access". "Own, collaborate, access" captures a way of thinking that would be inherent in any thoughtful way of devising a big set of international collaborations. There is not just one. We work with Five Eyes. We work with NATO. We have endless individual agreements with many other countries. One of the things that would be exciting would be if Charlotte came up with a list of who else we should work with, because there are so many opportunities of other countries that we could do more work with. There might be a case—

Baroness Warwick of Undercliffe: Where does competition fit into all of that?

Professor Dame Angela McLean: Scientists are naturally pretty competitive, which is why we do not tell everybody everything. That is because we know that some of our science and technology gives us a competitive advantage that we want to be able to leverage. The glib answer is that we use competition very carefully. Charlotte, who should I best collaborate with next?

Professor Charlotte Watts: It depends on what and for what. "own, collaborate, access" is a really useful framing to focus minds on some of the strategic decisions that we need to make in our support for research and in our international engagement. Clearly, there are areas where we want to own that work very closely, or work with a very limited set of partners. I see Angela's world as a strong example of that. There will be others linked to where there might be particular commercial advantage for us in hanging on to a particular area of specialty and not collaborating too widely.

At the same time, if you look at the progress of science, the public image is of a few geniuses who come up with brilliant ideas, but as scientists we know that often the greatest progress is made through international and widespread collaboration. For me, that aspect of collaboration is central if we are to continue to be a science power. Covid is a classic example; we made progress on a range of vaccines because we had international collaboration as well as our own domestic science strengths.

In the space of collaboration, the question is how we get it right. With the threats to global health security and the pressures on climate change, there are some areas where we need progress quickly. It is about how we have the breadth of collaborations we need to support ourselves and others to make progress. There are areas where the UK is not strong, and that is where the assessments that the Science and Innovation Network can support and that GO-Science will do will help us to understand that we are brilliant at many things but there are areas where we are not strong and we do not need to be strong, and we can rely on others. Our strategy should be to invest in areas where we think we should do more, and potentially do less in areas where access is sufficient for us to continue to make progress.

Angela's question is very complex to answer. In practice, there will be some countries where we want broad collaborations across a range of scientific areas, and there will be other countries with which we want quite specialised collaboration, probably even in subsectors of fields. For me, the key issue is how we get the granularity of analysis right so that we put our efforts where collaboration is critical to us, and understand the nuance of where the collaborate element is most needed.

Baroness Warwick of Undercliffe: Thanks very much indeed. Before I move to Professor Chappell, could I ask you another question, Professor Watts? It is about soft power. In a way, it builds on the final point that you made. What role do you see the Foreign, Commonwealth and Development Office, as we now call it, playing in those efforts? Has science diplomacy been damaged just thinking about collaboration? Has it been damaged by recent developments, for example, with the official development assistance budget or Horizon?

Professor Charlotte Watts: The soft power benefits of our science collaborations are huge. The attention and respect UK science got from the Oxford/AstraZeneca vaccine is a very powerful example of how we are using science not only for our own interest but globally. With the importance of science, we are, if anything, recognising the geopolitical aspects of science, and diplomacy in a range of different forms is going to be really important to sustaining the science area.

Clearly, the impacts of the cuts in ODA were difficult for everybody to manage and it was not an easy thing. It was a decision made due to significant fiscal pressures. I am really pleased that there is now a commitment to return to 0.7%, and we have clear tests to determine when the return to 0.7% will happen. The skills of a diplomat are very much to navigate those difficult conversations by being open and explaining why that happened, but that we are in a position to be able to talk about the measures for when we will return to 0.7%.

More broadly, on science diplomacy, one of the conversations that Paul, Patrick Vallance and I are having is about how we strengthen our diplomatic approach and how we draw on the breadth of talents of all the CSAs in supporting our diplomatic efforts overseas, and very much ensuring that we are arming the SIN network with the right skills and capabilities to support continued diplomatic efforts.

Baroness Warwick of Undercliffe: Thank you very much indeed. Professor Chappell, finally—sorry to hold you up a little—would you mind in your answer picking up the point about Covid? That was an area where nobody had all the answers and it was inevitable that collaboration was essential.

Professor Lucy Chappell: Covid is also a good example of where we need a blend of "own, collaborate, access". They do not exist in isolation from each other. To start with the example of clinical trials, it is clear that we have expertise that extends from early-phase through to late-phase clinical trials and the flagship ones of RECOVERY and PANORAMIC, which were large phase 3 and have really delivered. What does that mean for the international perspective? Our teams are working with Charlotte's to look at clinical trials on a wider perspective, both, as Charlotte mentions, in the non-ODA space as well as in the ODA low and middle-income country settings. That is because we should be prepared to invest not just in one-off projects but in the infrastructure and capacity building across disciplines that would be needed to make a difference. We take the best of what we are doing and work equitably with partners in those areas.

Pandemic preparedness is a very good example of where we can do that, particularly the idea of keeping the system warm and addressing health priorities in other settings so that we are ready for a future pandemic. Vaccine development is another good example of a blend of own and collaborate. No single country was necessarily going to come to the solution by itself, and we needed a combination of those approaches. It is clear that we have areas—I could name others such as genomics or AI in health—where we both own and are looking to collaborate more broadly with our partners. The strong links with the FCDO and others make that possible.

Baroness Warwick of Undercliffe: Thank you all very much indeed.

The Chair: Thank you. Thank you very much for staying with us. We have used more of your time than we said we would, so we very much appreciate that. Thank you very much for talking to us today.

As I said at the beginning, if there are more things that you would like to draw to our attention—Dame Angela, you mentioned some information you might be able to send us—and if there is anything else that anybody would like to add to what they have said in writing, we would very much like to have that evidence. Thank you very much indeed. That is the end of the session.