



Science and Technology Committee

Corrected oral evidence: Delivering a UK science and technology strategy

Tuesday 22 February 2022

10.15 am

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

Evidence Session No. 1

Heard in Public

Questions 1 - 8

Witnesses

Professor James Wilsdon, Digital Science Professor of Research Policy, University of Sheffield; Dr Beth Thompson MBE, Associate Director, Policy, Wellcome Trust; The Rt Hon Lord Willetts, former Minister of State for Universities and Science, May 2010 to July 2014, Department for Business, Innovation and Skills.

USE OF THE TRANSCRIPT

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

Examination of witnesses

Professor James Wilsdon, Dr Beth Thompson MBE and The Rt Hon. Lord Willetts.

Q1 **The Chair:** Good morning to our witnesses. Thank you very much for joining us today for this oral evidence session in our inquiry on delivering a UK science and technology strategy.

Before we start the questions, may I remind you that the session is being broadcast on the internet. A transcript of today's session will be sent to you in a few days' time so that you can check it and send in minor corrections. If there is anything that you would have liked to say but did not get a chance, if there is something that you would like to clarify or if there is some supplementary evidence that you think would be useful to us, we would be delighted to receive that in writing after the meeting.

If that is clear to everybody, I will kick off with the first question for you.

We are very interested in whether the Government have the right policy levers and influence to deliver the ambitious outcomes that they have talked about, such as becoming a science superpower and delivering their science and technology strategy. We are interested in how we get the jigsaw pieces of this complex landscape to fit together really effectively, what may be missing and what we should be doing better. What are the strengths and weaknesses of the research, development and innovation landscape in the UK? What can we learn from what others are doing overseas? May I kick off with Professor Wilsdon?

Professor James Wilsdon: I am Professor of Research Policy at the University of Sheffield and director of the Research on Research Institute, an initiative set up with the Wellcome Trust and others.

Thank you for the invitation to join you this morning and to contribute. This is a very timely inquiry. From the call for evidence that you issued, I think that the committee is asking all the right questions. They are particularly timely at this point, when we have more clarity on one piece of the jigsaw—the level of public investment over the next three years.

You ask a very big opening question. I will not attempt a comprehensive survey of the entire landscape. Let me just pick out two or three areas where I think that there is a need for greater clarity and more strategic focus from government and the many other actors in the system.

Over the past few years, we have had a lot of discussion about input levels to the system. That is a very important discussion. Of course, we underinvest relative to many other OECD and European countries. It is good to see levels of public investment rising. We can talk about the challenges of getting the private sector part of that equation up as well, which is definitely one of the big issues.

The debate about inputs and the institutional arrangement of the system has dominated discussions to a very large degree and squeezed out the more important question that should be at the heart of the strategy: what do we want all this R&D to do for the country and for the world?

I suppose that it is an obvious point to make in relation to any thoughts about strategy, gaps, strengths and weaknesses, but I do not think that we have a sufficiently clear picture of the, no doubt, multidimensional answer to that question, which plays through to all the other issues around structures and everything else.

My first gap would be the need for that effort to draw the strands together and to paint a clearer picture of what we are trying to do with the investment, both public and private, in a variety of ways.

I will make two other starting points before I hand over to others. A long-standing critique of many aspects of research and innovation policy from social scientists such as me relates to the dominance of linear pipeline models of basic research through to innovation. We have come a long way in policy over recent years in complicating, pluralising and moving away from lines to all sorts of other diagrammatic and metaphorical ways of thinking about the flow of knowledge through to application and the diffusion and exchange of knowledge.

The risk at the moment is that we are hearing a lot more in policy terms about certain parts of the system than about the holistic system and how it fits together. There are particular risks associated with the undisputed success of aspects of the vaccine development pipeline and the AstraZeneca/Oxford model. It is often the case in research and innovation policy that we take specific successes in one area and extend their application across the entire system in ways that can be unhelpful. As part of that, we are not hearing enough about the very important role of service-related R&D and arts, humanities and social sciences, in a disciplinary sense, within the mix. The discussion that the British Academy and others have been trying to initiate through the idea of SHAPE as a way of thinking about those disciplines and the knowledge that they create in the economy, as a corollary of and complement to STEM-related knowledge, is a very important part of the overall picture that, at least from my observation, feels rather underdiscussed in current policy, compared with the time when David Willetts was Minister, for example. He gave a lot of attention to these sorts of questions.

The Chair: We need to move on. Will you finish your points quickly?

Professor James Wilsdon: My final point is about international strategy, which I am sure we will come on to. That is another area where big gaps have arisen as a consequence of other shifts that we need to address. We have ended up with an international R&D strategy that at the moment feels somewhat incoherent.

The Chair: You have made some very important points. I move on to Dr Thompson.

Dr Beth Thompson: May I pick up one broad point to start? James has set out some of the challenges in having a coherent vision across the landscape. We have a number of policies and strategies from the Government that set out a direction of travel. However, I want to highlight the implementation gap that we are seeing at the moment. We have a lot of talk, but we are not really seeing that progress into action,

whether it be on investment, the Horizon deal, the integrated review, which touches on some of the international aspects, or research culture. There is good intent, but there are lots of gaps to fill. I am sure that we will touch on many of those in more detail as we go.

There are huge strengths to build from, whether it be the strength of the charity sector or the strength of our NHS and life sciences, as well as those that James touched on, but we need a holistic approach and an approach to sustained, ongoing implementation that can drive meaningful change in the longer term.

The Chair: As an independent funder, do you think that we have the right incentive structure and culture in academia? Do you see need for improvements there?

Dr Beth Thompson: We see significant need for improvement. The research culture in the UK at the moment has delivered us enormous strengths, but there has been a focus in the incentives structure on what is achieved by that research, rather than how it has been done. That has led to a research culture that has produced brilliant research in its content but has led to an environment that is not inclusive. We do not see the kind of diversity that we would like to see. We hear about the experiences of researchers who have been bullied or harassed. We see a lack of openness and transparency.

There are things in our research culture that Wellcome feels we need to address. They can be addressed by working on the underlying incentives. What are we looking for when we fund? Do we think about the leadership of the people we are giving money to, as well as their ability to do brilliant science? What is really important in all of this is that we are not talking about a compromise. We think that it is possible still to have that high level of scientific rigour and excellence, but to expect that research to be done in a way that is more inclusive, with role models and good leadership.

We think that will actually produce better research results. We know that in other sectors more diverse teams lead to better results. We can therefore boost the quality of our science by improving the culture. We think that there is a moral imperative, too, but it is really important that we improve the quality of our science culture while maintaining the standards of excellence. We are starting to take steps. It is a long journey. We now have the people and culture strategy, which sets out a pathway for government and is taking us on the right track.

The Chair: Let me move on to Lord Willetts.

Lord Willetts: Thank you very much for the invitation. Of course, I am a Member of your Lordships' House. I was Minister for Universities and Science. I now serve on the board of UKRI, but I should make it clear that these are my personal opinions; they are not necessarily UKRI policy.

The strengths of our system arise from our rather unusual funding model. A relatively high proportion of our public money goes into universities. That means that we score highly on the things that the incentive

structure within universities rewards: highly cited research at the intellectual and theoretical frontier—we are excellent at that.

However, because of the rather unusual pattern of our funding, we are less good at the things that universities themselves are not incentivised to do. We are less good at application. We have a relatively weak network of institutes outside universities.

Following on from the question that you have just put, there is therefore this endless policy dilemma: do you try to change the incentive structure within universities, where there may be some things that you can do, or, especially with the opportunity of extra funding, do you try to put that into non-higher education institutes, expecting them to behave differently from universities? Of course, I am not against universities being well funded. I would not like to see their funding reduced. It is the increase in funding that is now starting that is the opportunity.

The Chair: Baroness Blackwood will pick up that point with you. Given the time, I will move on to Baroness Blackwood and let her do so.

Q2 Baroness Blackwood of North Oxford: I declare my interests, as chair of Genomics England, chair of Oxford University Innovation and a trustee of the Turing Institute.

I take James's point that form must follow function, but it is also important to get the form right. Can we discuss a little the issue of how funding should flow? As Lord Willetts just said, there has been a commitment to increase research and development funding over the next few years. I would be interested to hear your views on how the funding should be allocated. How should it flow through different organisations, whether they be PSREs, universities or government departments? How can we make sure that that is well decided, transparent and effective?

There is a second part to the question. Is it sensible to have more R&D go through government departments? It is an old chestnut, I know. If so, how should that be co-ordinated and effected so that it links in well with the other bits of R&D and innovation? We will start the other way around, with Lord Willetts.

Lord Willetts: Of course, it is almost exactly 50 years since the Rothschild report, which proposed that departments should take the lead in funding applied research. He saw that as what departments could do. The frustration subsequently was that departments cut their R&D budgets when they are under public spending pressure.

I think that departments should have healthy R&D budgets. That does not just mean the main ones—health and defence. The Department for Education could be funding research on social mobility and Defra funding research on agriscience, provided that it is co-ordinated and is not cut the first time that there is public spending pressure. I guess that that is one of the roles of the new council and of the Prime Minister, who chairs that Cabinet committee.

PSREs are an important part of the landscape. It would be good to see them properly funded. The frustration is that PSREs are overmanaged. They have excessive burdens and things like pay controls. One of the drivers of research excellence in universities is that they can offer internationally competitive pay. They are not subject to pay controls, but PSREs are. Yes, there should be more money for PRSEs, but only if as part of it they have greater freedom, so that they can offer it more flexibly.

Baroness Blackwood of North Oxford: I will come back to that in a second. Let us go to Beth and James.

Dr Beth Thompson: What is critical is the diversity of funding streams and approaches that we have in the landscape and making sure that they are properly funded, and that we encourage that breadth and diversity. As Lord Willetts said, different models will incentivise or favour different approaches. That is a healthy thing for the environment to have in it. For example, we may come on to talk about ARIA. We see that there is a place in the system for that kind of high-risk, high-reward approach to funding, but you would not want a research system entirely made up of that. Diversity is key.

Professor James Wilsdon: I agree 100% with both Lord Willetts and the points that Beth has just made. Diversity is crucial. Given that we have some extra money flowing through the system from the public side, it is important, as Lord Willetts said, that we have a good debate about not weakening the existing strengths in the system when spending that money in other areas.

I will give one data point on this. If we look globally at Covid-19-related research over the past two years—a topic that did not exist in 2019, of course—we find that, in 2020, 4.5% of all scientific papers were Covid-19 related. In 2021, that rose to about 8% to 8.5% of all scientific papers. You therefore have something entirely new. It cannot be called a field, because it cuts across. Very few of those papers were linked to named, specific grants. Of course, such grants did then flow, and some funding was given, but mostly it was tapping into latent flexible capacity in research systems, including in the UK. People repurposed existing grants, capacity that they had and highly skilled people towards the big pressing issue of the day.

That is a great illustration of Beth's point about the importance of maintaining that flexible capacity, which resides in people rather than in specific structures or programmes. As Lord Willetts said, it is weighted to the universities here.

I am very sympathetic to the argument that Lord Willetts and others such as Richard Jones, who has just published a very good paper with a colleague, make about expanding both investment and the role of other intermediate RDI structures in the system. I think that that is a gap. It has been well identified. We have tried to tackle it in various ways over the past 20 years, but I do not think that we have done enough. I hope that that is one thing we will be able to do more with through the new

Nurse review that is now under way and the extra money that is in the system.

While I am supportive of research culture reform, as David said, it is perhaps unrealistic to expect the universities to be able to deliver all these other functions in the system, given all the other competing pressures on universities and structures. I think that there is real opportunity, with the new money, to do some new things, but we have to be very careful that in doing so we do not weaken the existing base of capacity on which so much relies and may rely in the future, in areas that we just do not know about now.

Baroness Blackwood of North Oxford: That is helpful. I want to follow up on the point that Lord Willetts made about the challenge of the overmanagement and bureaucracy that resides in certain parts of the system. We all know about the frustrations that exist in PSREs and other areas and how they clog up the route from the level of investment that the Government want to what actually gets to funding, whether that is blue sky or applied.

I am trying to understand whether we should be applying some, if not all, of the principles that have been put into ARIA: the low-oversight and low-bureaucracy principles, if not the high-risk principle. Would that address some of the problems that exist in the innovation ecosystem, in your experience? Do you think that would encourage more private sector investment in R&D? Are there other ways of doing that? I will start with James and then go to Beth and David. I can see that David has his thinking face on.

Professor James Wilsdon: Adam Tickell is midway through his review of research bureaucracy. Although his interim report did not set out the answers, it defined the problem with a very welcome degree of clarity and granularity and set out a very sensible direction of travel. We will wait to see how far he goes with proposals in the final report.

On behalf of UKRI and other bits of the system, I get a little frustrated with the debate around ARIA, in that we seem to have posited ARIA as an oasis of unbureaucratic, agile breakthrough funding at the expense of having a proper discussion about what we do with the rest of the system. I am all in favour of ARIA. As Beth said, there is a role in the system for something that is doing something different. It would be great if we knew a bit more clearly what that different objective was, but let us leave that until later.

On the bureaucracy issue, as I understand it, under the terms of the Higher Education and Research Act, many of the things that ARIA is being expected and asked to do could be done through UKRI, which has the capacity to do all sorts of different things with its funding instruments and mechanisms. David can clarify that, as he is on the UKRI board. Of course, there are obligations on UKRI with respect to balance across the system and various things, but that does not preclude UKRI and, indeed, other bits such as PSREs from being more agile, experimental and innovative in the way in which they fund.

You mentioned other countries. There are lots of examples of efforts that funders are making in other countries to do things with their money differently and in less bureaucratic and disruptive ways. I do not feel that we, as the UK system, are really at the forefront of that, partly because we have been spending the whole time having a debate about structures. That goes back to my first point.

Baroness Blackwood of North Oxford: My question was more about whether we should be having the discussion that we have been having about ARIA about the wider system, rather than about whether we should be having it about ARIA.

Professor James Wilsdon: I agree 100%. If we are going to spend £20 billion of public money on research by 2025 and ARIA has a £200 million budget, we are talking about 1% of the system. That is the public system, without the private sector side. I understand the need to discuss a new thing when it has been put in, but I think that it is a shame, because it has distracted political and other attention from a very important set of questions about how we make the rest of the system, particularly UKRI, which is itself a very new overarching structure, work in less bureaucratic, more agile ways.

Dr Beth Thompson: I will be brief. Part of the attraction of looking at bureaucracy within ARIA is that it is new. It is easier to think from scratch, "How do we come up with a funding system in that way that has less bureaucracy?" No one intended the bureaucracy that is in the rest of the system to be there. It was not put there to make researchers' and universities' lives difficult. It has evolved over time as we have tried either to shape incentives or to shape the research system in different ways. That has often become unwieldy and clunky.

We have seen that as Wellcome. We are in the process of trying to simplify the way in which a number of our grants work. It is important that all funders try to make efforts to make things as simple as possible and think really consciously about the power that they hold to shape the system, the incentives and the drivers that their requirements create, because something that seems small to us becomes something of enormous magnitude to researchers once it is written on a piece of paper. We have huge power to shape the system through that bureaucracy. We will always need some of it for accountability reasons and so that we can judge the research on its merits, but we need to make sure that we are judging the right things. It is absolutely the case that that should go beyond ARIA. It should be throughout UKRI and the rest of the system.

Lord Willetts: There is too much bureaucracy in the system. It is great to have ARIA, which adds to the diversity of the system. I hope that ARIA will become an example of how we can achieve better-quality research if we cut back bureaucracy, not just by ARIA being free of it but in other places as well.

One of the classic problems is pay, which I have mentioned. The issue is not just the rates, but the incredibly cumbersome process you need to go

through as soon as you wish to appoint anyone who is on a six-figure salary. It is time consuming as well.

Cabinet Office procurement rules are an issue as well. They are not designed for public sector research establishments or research programmes, where sometimes partnering in the design of new kit is a great way forward.

Funding is in jam jars—pots of money that can be spent only on something quite specific. If you find that demand is quite low in one area but you have another jam jar where you are oversubscribed and could spend more, moving money around the system is harder than it should be.

The process of clearance through BEIS and the Treasury is cumbersome. There is a lot of stuff like that. The more that can be pushed back, taking ARIA as a model, as a result of the three reviews that are now under way, the better.

Q3 Lord Mitchell: There is always the feeling that many of these initiatives have been done before, have somehow petered out and have started again. I come at all of this with a slightly sceptical view. It is not that I do not want it to happen, but somehow it dissipates and dilutes in the process.

I would be interested to know what our three panellists personally feel are the chances of this happening successfully. It is all very well announcing it, but do they really think that it is going to happen anyhow? What can be learned from previous attempts to co-ordinate science and technology policy in the UK? What has worked well, and what was less successful?

Lord Willetts: There have been previous attempts. For example, there was an advisory board sitting in the business department, the DTI, that tried to co-ordinate the activities of the different research councils.

The new Cabinet committee is quite an important innovation and could be really valuable. UKRI itself was supposed to be a co-ordinating body. Indeed, it tries to do that. It brings together in interdisciplinary funding streams research that goes beyond a single research council. It brings together ESRC or AHRC work on human behaviour and MRC work on a new drug. UKRI itself can contribute to that co-ordination.

I am a little more optimistic than you. You are a bit pessimistic. We have the combination of extra money and the urge to scrape the barnacles off the hull of the ship. Yes, barnacles grow, but this is a moment when we may be able to scrape some off.

UKRI is a resource that can be used by other bodies. For example, if departments get proper R&D budgets of their own and then have to decide how to spend them, rather than creating an extra bureaucracy inside each department, they can use UKRI as a delivery agency. Perhaps they can even partner with a research council and Innovate UK. I am

cautiously optimistic that this may be a moment when things get a bit better.

Dr Beth Thompson: I share that cautious optimism. We are hearing lots of the right things. There is a sense of impetus, but that now needs to turn into practice. Ultimately, R&D is a long-term game. This is not something for quick wins. We need to see a sustained approach over time. I hope that that is where we are going and where the changes that we see in the structures can help us.

The other change that will help is co-ordinating across government. Not only is science a long-term game, but it requires different policy levers or parts of the policy environment that are not controlled by BEIS to be working really well to support it at its best.

We need to take a genuinely cross-government approach to issues such as immigration. In the past, balls have been dropped because the Government have said one thing to attract researchers into the country but done another with their visa policy. That has started to get better recently, which is very encouraging. If we can take that a step further by being more joined up across all of government, there is all to play for.

Lord Mitchell: Professor Wilsdon, what do you think?

Professor James Wilsdon: I am always disposed to be optimistic, where possible. Clearly, the extra money on the public side of the balance sheet gives real opportunity. We need to keep sustaining and, indeed, increasing that.

To your point about inconsistency, as I said briefly at the start, we are in a system that has had a lot of rapid shifts of focus over a relatively short period. As Beth just said, the system does not respond well to that. Much as we might want to encourage a culture of constant disruption and turmoil, it is very difficult to invest and grow the R&D system, whether in universities or elsewhere, on that basis.

It is great that we have this fresh set of strategic reviews ongoing, but I hope that fairly quickly off the back of those we will get a period of greater stability. We have had multiple one-year spending reviews, overnight cuts to ODA-related funding, all the uncertainty over Horizon Europe and changes to the role of innovation in the industrial strategy. That is not the climate in which that kind of patient, stable growth can happen.

Going back to my earlier point, more than anything I would put in a plea for both clarity and stability. I do not think that we can have a strategy that sets out everything in detail. That would be impossible. We just need a sense of how the different bits fit together and where we are heading. That is what you are looking at in this inquiry. We should then leave the system to get on with it.

Q4 **Lord Mitchell:** Consistency is absolutely vital, is it not, in R&D projects, in ensuring that it is not turned on and off—that people can see that it is going to be around for a long time to make things happen?

Lord Willetts, I would like to ask you a question, please. In your view, what are the major levers, including public procurement, that the Government could use to support the wider research sector to engage with their strategy?

Lord Willetts: May I come back to your earlier comment? One example of where policy has been erratic is attitudes to near-market research and applied technologies. There are periods when people think, "Hang on, the Government can't possibly do that", and that their only job is to fund pure research. Then people realise that that has created a valley of death and there is the re-creation of a set of business-facing, more near-market institutions. More stability there in realising that is a role of government would be good.

A second example is a policy dilemma within the research community about whether peer review is what matters and whether you always want to fund the programmes that appear best in peer review. Let me give you an example. I remember one year the Government had a strategy—a priority for antimicrobial resistance—but when that year's proposals for research came up, the antimicrobial resistance proposals did not score top on peer review. Do you discontinue them because the academic peer review test is crucial, or if you want to have a patient strategy you say you stick with the strategy, even if that year something else has done better on peer review?

Those are dilemmas partly from within the research community that need to be addressed. There are government levers, procurement, co-funding with business, standard setting, regulations that are pro innovation. There is a toolkit of measures such as that that can be used.

Q5 Baroness Manningham-Buller: I have two interests to declare. I am a fellow of the Academy of Medical Sciences and a member of the advisory board of the Royal Society.

We have all heard the phrase "science superpower", and the Government say that they are ambitious for the UK to become one. I am going to ask you all what you think this phrase should mean and how we are going to measure whether we have got there. Lord Willetts.

Lord Willetts: It is partly the classic measures of doing well in citations in a field-weighted citation index. One of our distinct strengths so far, which means we are a candidate to be a superpower, is that our cobweb—the areas where we do research that is cited more than average—is across a wide range of disciplines. We are very fortunate for a medium-sized economy in having strengths in so many different areas, which itself becomes a distinct strength.

What I would look to for the future is that we are not doing very well on patents—as a result of research. There is some rather dispiriting evidence there. We are a low IP, low patent economy. That is partly because we are a service economy, but that does not fully explain it.

As it is a global ambition, are people continuing to flow to the UK to do their research here because it is a fantastic environment for research? I

remember I had the privilege of going to the Nobel Prize ceremony when Britain had four Nobel Prizes, but only one was won by somebody actually been born in Britain. The others were researchers who had gone to Britain and done their research. It is metrics that test that we are continuing to attract world-class researchers to do their work in the UK.

Dr Beth Thompson: I agree with what David said, but I would add another layer. Being a science superpower is about more than being at the top of the league in research. It is also about how you use that position to make a difference to the world and the leadership that the UK can play by using that research strength to make progress on some of the most pressing issues that face the world today, whether that is antimicrobial resistance, which we have talked about, or climate change.

About 18 months ago, we published a report at Wellcome on global Britain and trying to bring to life what these expressions could mean. I appreciate that it is harder to measure the contribution of leadership [than the classic measures described above], but I think it is important that the UK takes that to the world and works collaboratively with our colleagues. This may be providing solutions to global challenges, such as Sally Davies's work on AMR, and being a thought leader in that space.

It might be about science diplomacy, and using science to break down barriers, or regulatory diplomacy to influence norms and rules around the world. The UK could unleash something really interesting for the benefit of us all if we brought that scientific strength to bear.

To me, what Lord Willetts has said is important, but it is not enough on its own to reach real science superpower status. We have seen this intent in the Government's integrated review, but we are not yet seeing that come about in practice.

Professor James Wilsdon: I agree with both Lord Willetts and Beth's points.

I have to say that I do not like the term "scientific superpower". I understand the political salience of these sorts of slogans, but in a more substantive sense it is problematic because we do not really know what it means, and it puts the back up of the rest of the scientific world, which rather undermines the objectives of the slogan in the first place. I spend most of my time working with other international research groups and funders, and it is greeted either with a quizzical eyebrow or a bit of a laugh as a strapline for what we are trying to do. I just do not think it is terribly helpful.

We know now that there has been huge success in the UK over the last 25 years in increasing the overall volume of our high-quality scientific papers that are internationally co-authored. Around 60% of those now are coming from collaborations. Again, it is unclear to me what the UK superpower role relative to all of those collaborators actually constitutes.

I agree with Beth that it would be great to hear more about our role in the international leadership of science in a range of ways, including in the overall governance direction of the science system, and the orientation of that system towards the big, shared global objectives, whether it is the

UN sustainable development goals or other agreed objectives. We have not heard as much about that side of the system, as regards our international strategy, as we have about the more hard-edged, security-driven concerns, which of course are also real and, particularly sitting here today, feel more real than ever.

The balance appears to have shifted, which is a shame. Making the claim to superpower status when you are simultaneously cutting collaborative research through the Global Challenges Research Fund—and, as I have said, you have the uncertainty over Europe—makes it quite hard to sustain the argument, as it were.

I would prefer fewer slogans and more focus on the actual nuts and bolts of how we build what have been crucial collaborative structures and networks to the success of UK research over the past 20 years, and I am sure will need to be if the rest of our domestic objectives are to be achieved.

Baroness Manningham-Buller: I think the Chair is going to start getting fidgety about time quite soon, but I might have time for a supplementary, with an encouragement for you to answer it crisply.

Is 2.4% of GDP enough to get us to this wonderful status of science superpower, however we interpret it? Of course you could all say no, but may we have a constructive comment?

Lord Willetts: Of course it is a hell of a sight better than 1.7% or 1.8%, which is where we are now. It was set when 2.4% was the OECD average. Over the last few years the OECD average has increased to 2.5%, and probably north of that. It is a moving target, and even to get to the OECD average nowadays is above 2.4%, and clearly some countries are way ahead, such as Korea and Sweden. Having got to 2.4%, let us hope, if the money is well spent, and if it is effective and it is tackling the global challenges, which Beth rightly identified, there is an appetite to go further.

If you increase too fast, there is a risk of waste. There have been some really interesting American studies on the boom/bust cycle in science funding, which is really dangerous, so heading on this type of trajectory to 2.4% is a good way to start.

Q6 Lord Krebs: I have a few interests to declare as a fellow of the Royal Society, a fellow of the Academy of Medical Sciences and an emeritus professor at Oxford University.

I want to ask our witnesses about the balance between top down and bottom up in developing research strategy. Should the Government be trying to pick winners, whether they are areas or projects? We know from the past that the Government have a very poor record in successfully picking winners. Should part of the increase in R&D be associated with the levelling-up agenda, as we have seen in the levelling-up White Paper, to redistribute funding across the country?

Should Ministers interfere in senior appointments, as we have seen

recently with the rejection by the Secretary of State of the selected candidate to be the executive chair of the ESRC?

To what extent should we be allowing the science system, UKRI and other components, to get on with the job of funding the best research? To what extent should the Government be using their influence to direct projects, direct areas and direct people who are appointed and regional distribution? Perhaps, James, I will ask you first.

Professor James Wilsdon: Of course, that is a perennial question. There is no right answer. It is a balance. Going back to earlier points, you need diversity in the system. There is definitely scope for government to set priorities, challenges and missions of various kinds, but it is very important to retain and continue to support that capacity in a more flexible way through the system. The example I gave earlier of Covid-19-related papers largely coming from non-targeted funding sources is just one of many that we could point to.

In our system, of course, the role of QR funding has been particularly crucial on the universities side in allowing research groups in universities and universities as institutions to retain strategic flexibility as required as well as enabling them to cover the full costs of research that do not get met elsewhere costs that do not get met elsewhere.

To your point, Lord Krebs, about government interference, going back to the discussion about ARIA, I find it a bit contradictory or ironic that on the one hand we are positing this intervention-free, bureaucratic oasis scenario, while, as you say, on the other we have micro-level interference in what to my mind should be left to the good governance of UKRI to decide. The appointment you mentioned of Jonathan Michie is one good example.

Listening to Sir John Kingman's valedictory remarks as he stepped down as chair of UKRI in the summer of last year, albeit phrased diplomatically, you got a very strong sense from what John said of the challenges that that had posed for UKRI as a funder over its relatively short life. Lord Willetts of course can speak to this better than I can.

We need to be very mindful of extending the arguments for non-interference and retaining that capacity and flexibility in the system, as well as of course looking for particular areas of opportunity for new investment.

Lord Willetts: We have the protections of QR funding for universities, which is key. We also need responsive-mode funding where an academic who has an exciting, interesting research project can just pitch for funding and, protected by the Haldane principle, will feel that a research council will ruthlessly identify good-quality research and fund it. That is a key strand.

There is this other part, and, if I may say so, occasionally I have this argument with colleagues in my own party, where they say, "Government can't pick winners. We're terrible at it. It will just be like British Leyland". That is a pessimistic view of our history. Vodafone became a very

successful mobile phone company partly because of a deliberate strategy of using our technical lead to help shape international mobile phone regulations in a way that worked for Vodafone.

In my own time, there was definitely a view that cell and gene therapies was an area where the UK had a distinct advantage, partly because of erratic policy elsewhere, including in the US where not least religious pressures in Congress had limited the freedom for them to do that research. There was a deliberate view that this was an area where we had some strengths, we had a good regulatory regime, and we should invest in cell and gene therapies.

I think Governments are entitled to reach those types of judgments on priorities but drawing on expert advice. When I identified the eight great technologies for funding to put extra money in, it was not a personal whim of mine. It was drawing on the technology innovation futures exercises and the advice of the chief scientist, but then we as Ministers decided that there were some key ones that we must back.

I think that is legitimate. Government cannot be completely hands off. It is entitled to set big challenges such as net zero and big opportunities such as, most recently, the seven key technology families in the innovation strategy.

Dr Beth Thompson: I agree. I think that top down/bottom up do not have to be in tension, especially with the additional funding coming into the system. We can see them playing well together. It is a strength of the system that we should seek to build on, so, bottom up via those response-mode grants and via quality-related funding, which has taken a significant inflationary hit over recent years and I think is ripe for further investment. That can be balanced with that important, challenge-led work. We have seen some fantastic work in the life sciences.

Something that we have not touched on so far in any detail is the regulatory environment. Lord Willetts just talked about regulation and a positive regulatory environment. I think that the Government can do much more to think very proactively about creating a pro-innovation, pro-R&D regulatory environment. We have lots of the components of that already in place. We have some real strengths in our regulation, and we could really look to build on that to support the challenge-led funding.

Q7 Lord Patel: I declare my interests. I am a fellow of the Royal Society of Edinburgh and the Academy of Medical Sciences, professor emeritus at the University of Dundee, and I have previous association with other universities and research councils.

My question is mainly to Lord Willetts. You have already mentioned that the new Cabinet sub-committee may be the way to influence government policy more strongly. We know from experience that when Science Ministers—you included, Lord Willetts—have been personally involved and highly respected within the Government and the Cabinet, that has driven government policy well.

My question to you is: do you think a Cabinet sub-committee is adequate to drive the big agenda that the Government have planned in R&D? Should the Science Minister have higher-profile representation, even at Cabinet level? What would be your solution to make the Government more responsible in driving the policy? I will start with Lord Willetts.

Lord Willetts: I think the Cabinet committee is an excellent initiative. George Freeman is a friend of mine. I have enormous respect for him. He worked as my life sciences adviser when I was the Minister. The more prominent and senior a position George has, the happier I am. That would be great.

There was not a golden age in the past. One of the distinctive features of this Cabinet committee that is very unusual is that it brings together the civil, security and military sides. We set up in my time one ad hoc Cabinet committee that involved me, the Home Office and MoD. One of the ways in which the world has changed—if I may say so, it may be that the committee can advise on this—is the rise of the awareness of the security and defence significance of a lot of science and technology. Even in my time, some of the security people could identify a dual use for almost any science or technology going on.

Now, there is a lot of that about and a very significant part of the increase in the budget is going to the MoD and other security agencies. How much is that spend to be planned in co-ordination with civil spend? To what extent are we going to be able to apply in civil contexts spend that might be in the MoD budget? I think that would be a really useful role for this committee, providing a place where those two historically rather separate strands of funding can be better co-ordinated than in the past.

Lord Patel: So what would make it fail?

Lord Willetts: Failing is if it just slows things up. At the moment the processes are too slow, and if you simply added some more stages to a decision process so that things have to go up to a Cabinet committee and collective clearance, where before there was greater flexibility, that would be very regrettable. I hope it does not happen. I am not part of this committee. I do not think that is happening yet, but that would be the problem. If it just becomes an extra tier of bureaucracy, that would be a disaster.

Lord Patel: Do you think that it will have the authority required to bring about integration of science policies in different departments and, in fact, even drive the R&D?

Lord Willetts: That is the key challenge. You have the Treasury, the MoD and BEIS, and, of course, UKRI, which is a BEIS body, but I know UKRI has a place on that committee. They are all sitting at the table. Whether at the end of the meeting you get genuine shared working on, say, space technologies, I do not know. They have a prominent role in the integrated review, which is a good thing—it is an impressive document—but whether we use the defence spend on space technologies successfully to build up a commercial civil space industry is a very good

example of a real-world challenge. It would be very hard to do without that Cabinet committee, so I hope it can be done.

Lord Patel: Beth, might I go to you next?

Dr Beth Thompson: I think the more we do to promote science within the centre of government the better, so from our perspective it is a positive move. It is hard for me to add anything more to the position that Lord Willetts has set out. More co-ordination and more profile at the centre of government has to be good to create the cross-government work and the depth of focus on the issue that we need.

Lord Patel: Who would hold this committee to account?

Dr Beth Thompson: I think there is a formal way to look at that question and I hope that that committee will come to Parliament. I also hope that the science community will look to the committee in an informal way, to ensure that the committee is making a real difference to the work of science on the ground. In a sense, the informal answer to that question is more important than the formal.

Professor James Wilsdon: I very much agree with much of what Lord Willetts said, and that last point Beth made is really crucial. There is always a danger that we focus too much in the governance of S&T discussion on the formal central structures, and not enough on mechanisms to tap into and draw in the distributed expertise that is obviously out there. This is a system full of experts and often we do not make enough use of them in informing strategy in various ways.

I welcome the existence of the new committee and the Office for Science and Technology Strategy. There are lots of good things that both of those structures can achieve.

I again flag my one concern. David set out the upside as regards bringing the defence security side of the system into closer conversation with the civil side of the system. There is a downside, of course, which I touched on earlier, and that is a creeping securitisation of the entire system, and I think that should be watched and protected against.

The Chair: We move to Lord Sarfraz for our final question.

Q8 **Lord Sarfraz:** I declare an interest in technology, venture capital and multiple early-stage technology companies, as set out in the register.

Professor Wilsdon, the Government have provided this menu of options on how to access science and technology. You can own it, collaborate with others or negotiate access to it. Is this framework at all helpful, or is it stating the obvious?

Professor James Wilsdon: That is a big question. I think it is helpful, at least as a starter, to think about some of the choices. Inevitably, I do not think that they are as cleanly separated as perhaps the framing of it in those terms might suggest, in that you are clearly going to have lots of blurring at the edges of ownership, collaboration and, indeed, access.

Again, there is a risk when we look at our existing R&D system and the balance of our economy that you are talking about a model that feels to me like it applies to a specific subset of high-tech R&D debates, which are only a small part of our overall research system. If we are using that model, to go back to one of my earlier points, as the lens through which we view all our choices in international R&D strategy and collaboration, it is potentially a limiting model because it shuts off aspects of what we do now well, internationally and domestically, and aspects of what we want to do in the future. That would be my main comment to that, but I am sure others will add to it.

Lord Sarfraz: Dr Thompson, do you think that the UK has been able successfully to identify which areas it wants to own, collaborate on or operate under the framework?

Dr Beth Thompson: The concept of ownership, as James has hinted at, is challenging, particularly for some forms of science. Part of that is because we are moving away from a model of the individual lone genius working in their lab, and where collaboration across borders is increasingly important to be able to get the best out of research. The collaboration point within this framework is absolutely critical, and that is where we are seeing current challenges with the Horizon programme from the EU, which should be the platform for much broader global elaboration but at the moment is under threat due to delays in those negotiations.

Lord Sarfraz: Lord Willetts, are you happy with this? The Government like to give three options, so they have given three options.

Lord Willetts: I think Professor Wilsdon made an important point. This is a security way of thinking. It comes from the integrated review, which is a serious and substantial document.

One of the changes in the global environment is that science and technology is seen as a crucial area of strategic competition, so ways of thinking that are not ones that, usually, civil-funded scientists and researchers are familiar with, are emerging from a security environment and spreading more widely. It is a question of how we handle that—how it happens. We saw in the investment legislation that just went through both Houses a shift to a much more interventionist approach on company takeovers on a list of strategically significant technologies. I regard this as the biggest change that is currently happening in the science and technology environment. It is under way now and it needs to be properly managed so that it does not inhibit civil and peaceful shared research projects. I suspect the security mentality is more prominent in thinking about science and technology in the US, Germany, China or the UK than it would have been five or 10 years ago.

The Chair: We have time for a couple of quick questions, if there are any burning questions. Perhaps you could direct it to a particular member of the panel.

Lord Krebs: In fact, it fits with what Lord Willetts just said about security. One of the decisions that the Government made was not to try

to be part of the €7.5 billion Digital Europe programme, which covers areas to do with cybersecurity as well as Earth observation, GPS and so on. Do you think that it was the right decision to go it on our own?

Lord Willetts: To be honest, I am not familiar with the thinking behind that decision. Of course, as we know, several other attempts to maintain partnership with Europe through Horizon Europe and Copernicus—a shared Earth observation programme—are sadly stuck at the moment. If we can collaborate with others, if it makes sense, we should do so, but I would not like to comment further on that specific decision.

Viscount Hanworth: I believe that we have witnessed the demise of the scientific Civil Service over time. Should we not seek to have well-qualified scientists embedded within government departments? Is this, in anyone's perception, part of the problem? Could we be a little more acute about sponsoring research and development if we had more knowledgeable people within the departments? Perhaps I can pick on Lord Willetts and anybody else who would like to intervene on that one.

Lord Willetts: We have a network now of chief scientific advisers. It has grown and every department should now have one. Occasionally, there is a vacancy, but I think that has been a success.

My parting observation is that I hope that science, instead of being seen as simply a special science budget with the Haldane principle protecting complete autonomy, while that is part of it, is also seen as a resource available for a whole host of public policy purposes that every department wishes to harness for legitimate national and global goals, so that it is used more by more people more interested in it, with departments confident that they can draw on UKRI to help them to do things drawing on science and technology. That would be a big prize. The 2.4% increase in spend is an opportunity, alongside the Haldane protected curiosity budget, for science to be seen as really useful for lots of public purposes.

The Chair: Thank you very much. If there is nothing else from the committee, I have one burning question I would like to throw at our witnesses.

A number of you have made the comment that, with the additional funding, we should be looking at putting more funding into other types of organisation than universities, yet every university I know has an ambition to increase its research budgets. It is one of the KPIs for every institution in the country. Are you suggesting that perhaps we are already doing enough research in our universities and that the increase we are seeing in research budgets should be going to PSREs and other organisations? Beth, may I start with you very quickly?

Dr Beth Thompson: I do not think it is as straightforward as saying that all the extra should go outside universities. As I mentioned, universities have seen significant cuts to their QR funding—a really valuable resource that they can and should call on. I do not think it is clear-cut that the rest goes to other places.

The Chair: A very quick answer from you, James.

Professor James Wilsdon: Yes, I agree with Beth. I think for most universities, and indeed university researchers, the benefits of increased budgets have not really filtered through.

The Chair: I will stop you there and ask Lord Willetts: have we saturated the universities?

Lord Willetts: I think there is an issue of full economic costing. Some universities are doing research at a loss, and that requires help, but if we got some more catapults, or some more research institutes outside universities, such as the very interesting new initiative of the maths institute, based at the Royal Institution in London, a bit more of that adding to the diversity of the system would be good.

The Chair: I thank all our witnesses for a very interesting session today. As I said at the start, if there are more things that you would like to say to us, we would be very pleased to have additional evidence from you in writing. For now, thank you very much and goodbye.