

Science and Technology Committee

Oral evidence: A new UK research funding agency, HC 778

Wednesday 11 November 2020

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

Peter Gibson, member of the Women and Equalities Committee, attended the meeting.

Questions 100 - 167

Witnesses

[I](#): Professor Dame Ottoline Leyser, Chief Executive, UKRI; and Sir John Kingman, Chair, UKRI.

[II](#): Amanda Solloway MP, Minister for Science, Research and Innovation; and Sarah Hodgetts, Deputy Director for UKRI Sponsorship and Advanced Research Projects Agency, Department for Business, Energy and Industrial Strategy.

Written evidence from witnesses:

– [Add names of witnesses and hyperlink to submissions]

Examination of witnesses

Witnesses: Professor Dame Ottoline Leyser and Sir John Kingman.

Q100 **Chair:** Welcome to this meeting of the Science and Technology Committee, as we continue our inquiry into the Government's proposed new research funding agency modelled on ARPA, the American Advanced Research Projects Agency. This morning, we are delighted to have the chair and chief executive of UK Research and Innovation, and, following that, the Minister for Science, Research and Innovation and one of her officials.

I welcome to the Committee this morning Peter Gibson, who is joining us from the Women and Equalities Select Committee. The two Committees have agreed to work together to make sure that we inquire into and promote diversity in science and research. It is very good to have you here, Peter, on behalf of your Committee.

Let me start by welcoming our first two witnesses. Professor Dame Ottoline Leyser is the chief executive of UKRI. Dame Ottoline is professor of plant development at the University of Cambridge and was appointed chief executive of UKRI this summer. In that capacity, this is her first appearance of what I hope will be many before this Committee. Welcome to your role and welcome to the Committee, Dame Ottoline. I am also very pleased to welcome Sir John Kingman, who has made many appearances before this Committee. He is the chair of UKRI and he is welcome this morning.

Given that this is your first appearance before the Committee since taking up your post, Dame Ottoline, perhaps I can start with some questions on your vision for UKRI, and where we are with research funding. Would you briefly set out your priorities for UKRI and the main challenges that you think the organisation faces?

Professor Dame Ottoline Leyser: Thank you very much for the opportunity to be here and to contribute to this inquiry. Indeed, I look forward to contributing to many more, if I have that opportunity.

UKRI is a relatively young organisation. We are only two and a half years old. We were established by bringing together the seven disciplinary research councils that existed before, along with Innovate UK, the UK's innovation agency, and Research England, which, with its counterparts in the devolved Administrations, invests in higher education institutions, providing block grant support as well as a large number of knowledge exchange activities.

We have in one place, under one umbrella, the full range of disciplines and the full range of sectors that conduct research. That gives us extraordinary breadth and depth of reach across the system, which is, I think, exactly what we need now, from the point of view of 21st-century research and innovation, which is very heavily interdisciplinary these days, and requires those disciplines and sectors to be working together closely.

I see UKRI as an opportunity to provide that join-up to connect the whole research and innovation system, so that we can provide a much more fluid, dynamic system through which both ideas and people can flow freely. For me, that is one of the key things that has been holding back the UK's system. We have tended to balkanise our research into different boxes of one kind or another and, as a result, although we have been absolutely exceptional at producing high-quality discovery research, and we have some fantastic companies in the business sector also driving forward very impressive R&D activity, we have a well characterised and described valley of death between the two, so it is harder than it should be for ideas and innovation to flow across the divide and fuel the kind of knowledge economy we are aiming at.

The creation of UKRI is an opportunity to connect things up. That is my top priority: to harness the power of the fundamental research base, which is so strong, and the vibrancy in our business sector, and bring them together to drive an inclusive knowledge economy.

Q101 **Chair:** Thank you. You have taken over quite recently. Can we expect, and have you thought about, a big change in the direction of UKRI, or will it be a development of the approach that was taken by your predecessor?

Professor Dame Ottoline Leyser: Sir Mark did an extraordinary job in bringing together the nine founding organisations. There was a huge amount of work just getting the show on the road. At some level, I am left with the fun part, as I have said before, in that, now that we are a well-functioning organisation, we have the opportunity to drive some of the changes that I suggested. I do not see it as a fundamental change in direction, but it is a new phase for UKRI, where we can grow on the extraordinary foundations Sir Mark built.

Q102 **Chair:** Obviously, it is in the context of a proposed big increase in publicly funded research. Do you know what impact the Government's increased investment in R&D will have on UKRI's budget?

Professor Dame Ottoline Leyser: We do not know. Like everyone in Government, we are currently in the throes of the spending review process, and we will not know until after that is settled. As I am sure everybody here is well aware, there is still a lot of uncertainty about the nature of the settlement we will receive, let alone its quantum.

Q103 **Chair:** Do you know your budget yet for 2021-22, the next financial year?

Professor Dame Ottoline Leyser: No.

Q104 **Chair:** Given that a very important part of UK science and research is multi-year programmes and investigations, are you concerned that the need to be able to make commitments, and indeed to continue commitments, will be threatened by not knowing what your budget is for the next year?

Professor Dame Ottoline Leyser: I would very much welcome a long-term budget settlement. It would provide a lot more opportunity to

plan longer-term commitments in a thoughtful and robust way. Having said that, we have institutes, for example, that have run for many years through a whole variety of funding cycles of various lengths. While it is more challenging to work with short-term settlements, it is not impossible. You wind up needing to constrain your decisions in future years by prioritising things where you feel you need to commit—with Treasury permission—to funding in future years. It is not generally accepted that the budget will disappear altogether next year, and, therefore, it is possible to make those longer-term commitments.

Q105 **Chair:** The decisions affect institutions but they also affect researchers, especially early-career researchers, who are usually on fixed-term contracts. Is it not a concern, especially in the context of a manifesto commitment to have a big increase in funding, that just at the point when early-career researchers may be concerned—perhaps with justification—that their contracts will come to an end, it might disrupt their career to the point that they go off and choose something more predictable?

Professor Dame Ottoline Leyser: Absolutely. The career pipeline, if one wants to look at it in that way, is very unstable for early-career researchers. They are typically employed on research grants funded through UK Research and Innovation, which are, on average, three years in length. We make those three-year commitments at the time as we invest in the programmes, so there is nothing about the one-year settlement that will inherently destabilise the careers of those researchers.

I am more concerned about the impact of Covid on the system, which means that universities, for example, are struggling with their finances and not necessarily appointing. There is a freeze on appointments in quite a number of universities to the longer-term positions that early-career researchers aspire to move into, where they get to lead their own groups—lectureships and principal investigator positions. Stabilising the pipeline across this period of great uncertainty is an important priority.

Q106 **Chair:** Indeed. But don't the two forces come together? The fact that you do not have your budget, and therefore you are not able to give commitments to the agencies and organisations that you fund, and the reduction in fundraising due to Covid and some of the research activity there, means that this is a particularly difficult time for institutions and researchers. You said that many research grants are over three years and that provides some buffer against year-to-year changes, but of course, if someone is coming to the end of a three-year appointment or three-year funding, not knowing whether there are funds available for a follow-on project can be just as fatal as if the grants were available on an annual basis. That is right, is it not?

Professor Dame Ottoline Leyser: So far, we have not had to curtail any of our grant funding rounds. Most of the research councils operate on the basis of several funding rounds per year. Those roll forward and they commit to the three-year research programmes that I have discussed. So

far, there is no indication that our budgets are so constrained, and that the lack of knowledge of our budget for next year is sufficiently problematic, that we will need to stop any of those rounds. From that point of view, things are relatively unaffected. Of course, we have been working on one-year budgets for a few years now and have been able to smooth through that.

None the less, it is extraordinarily valuable from a research and innovation point of view to have that longer-term support. One area that we are particularly concerned about is the large infrastructure commitments; they are very lumpy and very difficult to manage on one-year budgets, and, because of that, one needs to be able to integrate those kinds of costs over multiple years. Investing in half a bit of kit in year one without the knowledge that you will be able to buy the other half next year, so to speak, is not viable.

Q107 Chair: Given that and, in combination, the evident importance of science and research generally, which I think the whole nation has concentrated on over the last few months, and given the very favourable commitments by the Government—no one doubts that they are serious about that—is there not a case for a settlement to be permitted for UK research and for UKRI? Within the overall projections that have been given, would you not be able to make commitments to institutions, and thereby to researchers, and, indeed, bring forward some of the commitments to help charity fundraised organisations that rely for their research on fundraising, which has dropped off, to make that up in whatever form, so that we can have the continuity that the research and science community needs?

Professor Dame Ottoline Leyser: I absolutely agree that there would be a huge number of benefits if it were possible to have a longer-term settlement, a four-year settlement for example, for research and innovation funding—UKRI is a core part of that—for a whole variety of reasons. I mentioned infrastructure. I am very supportive of the Government’s ambition to build back through an inclusive knowledge economy that will support levelling up. Of course, it requires huge investment also from the private sector to drive that kind of economy. Under those circumstances, confidence that the UK is serious about its research and innovation commitments, through a long-term settlement for the system through the public sector spend, will help to build the private sector investment that we need to more than match it. Two thirds of our R&D spend is in the business sector. The business sector is in serious Covid shock and, as a result, supporting the transition to build back better is key, and a four-year settlement would be super-helpful from that point of view.

Q108 Chair: You have made a powerful case for a four-year settlement and the long-term stability that comes from that, but it needs to be urgent, doesn’t it? If you do not have your budget for next April, and we are now in the middle of November, there is an urgency to give you the budget settlement for next year as well as the years ahead, is there not?

Professor Dame Ottoline Leyser: It would be extremely helpful to have some clarity about our budgets as soon as possible, as we are seeking to make the best use of whatever money we are supplied with to drive the agenda of building, as I said, a connected and inclusive knowledge economy. The sooner we know, the sooner we will be able to get on with it, and I am very keen to do that.

Q109 **Chair:** Sir John, do you have any comments to make about the research funding prospects?

Sir John Kingman: No, I do not have anything to add to what Ottoline said, other than that we are operating within the context, as you say, of the very strong commitments the Government have made to funding science. Obviously, there will be a debate within Government on the point about one year versus multi-year. I think the case for a multi-year settlement is well understood in Government. Whether it will prevail will depend on wider considerations that are outside our control. Whatever the outcome, there is, as you say, very strong recognition across the political spectrum of the value of what we are able to do. That has been very powerfully demonstrated through this crisis.

Chair: Thank you.

Q110 **Andrew Griffith:** Good morning, Sir John and Professor Dame Ottoline. I would like to talk a little about the modern industrial strategy. Many of us would see the brilliant interventions of UKRI, which even on current budgets amount to £27 billion over a three-year period, as a real middle stump of an industrial strategy that opens up huge areas of prosperity and jobs. Everyone has their own view, but there are some fantastic opportunities in things such as sustainable aviation, clean energy, quantum and artificial intelligence. May I start by asking how comfortable you are with the characterisation of a core purpose of UKRI through all of its different agencies as central to our industrial strategy?

Professor Dame Ottoline Leyser: I am very comfortable with the idea of our activity being core to the industrial strategy. There are a number of reasons for public sector funding for research and innovation. A key element has to be the very strongly demonstrated role of research and innovation in supporting prosperity, high-quality public sector services, and economic growth more generally. There is a tremendous opportunity, having brought together UKRI into a single umbrella organisation, to use that connectivity to enhance further the ability of research and innovation to drive productivity, levelling-up and a healthy and well-supported society.

Q111 **Andrew Griffith:** Sir John, you have formidable experience as one of the stewards of the economy. How do you think we are doing against that today, and where would you like to see more done?

Sir John Kingman: First, I echo Ottoline's point that we are able to act under the UKRI structure in a way that simply was not possible before it, and in a way that is relevant to the economy and the industrial strategy. At the time the Bill creating UKRI went through Parliament, there was a

big debate about whether Innovate UK should be part of the structure or not. I was always very strongly in favour of Innovate UK being part of the structure, and we have seen the fruits of that, in particular through the massive intervention of the umbrella of the industrial strategy challenge fund, which was a concept developed by Innovate UK, but critically dependent, in each of the challenges, on partnerships with the relevant research councils. That would have been very difficult to build under the old structure.

How are we doing? We have planted some seeds—big seeds—of what I hope will be big plants and trees, but they take time to grow, and they do not grow quite so well if we go off and water different plants, or we yank up the seedlings. That is the only thing we need to avoid.

Q112 Andrew Griffith: Of course it is for Ministers to decide ultimately, but I hope one of the strong benefits coming out of UKRI is a feedback loop to Ministers. Bringing everything under a single umbrella gives us the ability to allocate and reallocate resources. As you advise Ministers, for them to make those decisions, where are the areas that you think the industrial strategy might push further and faster? That is broadly in a personal capacity, but to both of you.

Professor Dame Ottoline Leyser: That is an excellent question. I am keen to build the horizon-scanning function of UKRI much more strongly. As I say, we reach right down and across the research base and research sectors, and we should be able very early to capture information about what is new and exciting and what the opportunities are, and integrate it and feed it through to Ministers. We have a very strong relationship with BEIS, where a lot of the industrial strategy sits. I am very keen to build that feedback loop exactly as you describe.

In the context of different areas, there are a couple of different ways to look at it. There is a lot of importance around what I would call transformative platform technology such as artificial intelligence, where there is a lot of very exciting discussion at the moment about digital twins, for example. There are very generic tools that you can use right across the system, in the research itself and right across the business sector, to drive up productivity, develop innovative products and transform the system in a range of ways. It is always very important to spot those and to draw them through from the research base and drive high-quality adoption and diffusion systems across the sector. That is a classic example where the join-up we can provide as a key node in the network is really helpful in supporting economic growth, job creation and all the things that go with it. Platform technologies, absolutely.

The other way to look at it is in terms of national priorities. For example, we have the net zero by 2050 commitment, and a whole range of core challenges that face the world and certainly the UK. They provide an opportunity to get people behind them—to build some social cohesion, almost, behind the big social challenges that we all face and collectively can address, in which research and innovation are a core element. Those

two sides are important and illustrate the bidirectional flow you highlighted.

Sir John Kingman: If I take the challenges that we have funded through the industrial strategy, we have had several waves, and each wave has given us a higher level of confidence about what we are doing and the way we are doing it. As a result, we have ended up with a portfolio of challenges, something of the order of 25 or so in total, and like any portfolio, we should expect some of those to be more successful than others. The portfolio needs to be managed in a dynamic way. We need to be willing to take serious decisions about which of the challenges look incredibly promising, and we should be willing to grow them and fund them more ambitiously.

We should also be realistic about the fact that not all of them will be phenomenally successful. It would be surprising if they were all wonderful; life does not work like that, and science certainly does not work like that. We need to be willing to take grown-up decisions about deprioritising, or even stopping, some elements of the portfolio to allow us to fund those that are most promising. The board of UKRI certainly sees itself as having that responsibility, but, as you say, it will need to work very closely with Ministers in taking those decisions.

Q113 **Andrew Griffith:** Sir John, you have magnificently anticipated my final question. I would like to put that back to Dame Ottoline for a final word. On the industrial strategy, do you feel that you have both the clarity from Ministers about the Government's priorities and the cover if you need to make tough decisions to reallocate within the portfolio?

Professor Dame Ottoline Leyser: I am very pleased with the relationships that UKRI has with BEIS, and we do indeed have a strong and active dialogue on exactly those issues. That is a very positive sign. I am also working very closely with Patrick Vallance, who has of course done a fantastic job in bringing together the scientific adviser network right across Government. One of the key issues we face now is that most of the challenges require interdepartmental, multi-departmental, cross-governmental thinking and policy join-up. Interfacing that with UKRI research and innovation capability will be extraordinarily powerful. I am very keen that we continue to develop cross-Government thinking on a lot of those big issues.

As regards flexibility within the programmes, we are very keen to build on the confidence that Government have in us as a relatively new organisation to manage our money well. We have done extremely well over the last couple of years in bringing in our budgets within a 1% tolerance limit and have done a very high-quality job in managing the large amounts of money with which we have been entrusted. I hope that building on that relationship will give us the opportunity to develop greater flexibilities in the way we allocate our money so that we can work more dynamically in the way John described.

Andrew Griffith: Thank you. It is fair to say that the whole Committee is

here to support you, and the nation's prosperity—and the planet, in terms of net zero—is relying on you. Thank you both for the work you are doing. It could not be more important.

Q114 **Katherine Fletcher:** It is a really interesting segue. We have been taking evidence in the Committee about ARPA and we have been listening to people. To slightly unfairly characterise the evidence we have heard, they described almost a skunkworks environment, where oversight and integration with Government is relatively limited, to allow for the scientific method to go through, but there is a rigorous culture of data and analysis, and checking to make sure that an idea, almost as you described it, Sir John, is viable going forward within a peer-review environment. Do we need something like that within the system, or would you suggest that UKRI is best placed to play the role of a US DARPA-style innovation centre?

Sir John Kingman: I think Ottoline should speak to the concept of ARPA because she has been most closely involved in intense dialogue with key players in Government about that, what it is for, and what it will add. There absolutely is a case for the sort of concept that is being advanced. One can perfectly well make a case for doing it either inside the UKRI structure or outside. The principal case that is being made for doing it outside the UKRI structure is that it needs the freedom to operate in a more freewheeling way. Personally, I am very sympathetic to that argument.

However, it is also worth thinking about, and we have been encouraging the Government to think carefully about, the panoply of controls that apply to UKRI, and whether, at the same time as thinking about the right way to construct ARPA, the Government should also be thinking about the framework of controls that applies to UKRI, and the best framework to balance the perfectly legitimate need for public accountability around the absolutely massive sums of money required for topics that are hugely relevant to all sorts of Government priorities, with the need for us to operate in a way that is agile, so that we can move at the speed we ideally need to be able to move at.

Professor Dame Ottoline Leyser: I have been listening very hard to the public debates around the whole ARPA concept. They tend to focus very heavily on the current standard MO for DARPA, which revolves very heavily around a challenge-led funding model, with a strong procurement pull from the defence Department, and is very focused on innovation in that context.

That was not the immediate ARPA goal when it was established. It had a much broader remit to do with creating technological strategic advantage for the US. It had two other key innovative elements, one of which was to have its research programmes run entirely by very high-quality visionary researchers who were pulled in from across the research base to drive those programmes. It was driven by high-calibre visionary individuals and, as we have already highlighted, they were given extraordinary freedoms to spend the money that they were entrusted with in an

incredibly flexible and free way, and to experiment with all kinds of other ways of funding research and innovation than those typically used with public sector spend.

In the conversations I have had with Government, and indeed in the way that the manifesto and Queen's Speech commitments are written, it is those latter two elements that are the key drivers for establishing a UK ARPA: to bring in visionary leaders and give them the freedom to drive forward their ideas in a way that allows them to experiment very widely with alternative funding models.

Q115 **Katherine Fletcher:** How could you see our system benefiting from that? There is almost an implication that they are a little bit crushed at the moment within the current structures.

Professor Dame Ottoline Leyser: A protected pot of money to experiment with alternative funding models, and to bring together very high-calibre individuals to do that, is a valuable thing. In the rising budget we have now, if we had the flexibilities to do that, as John discussed, one could do that in the current system, but in the long term it is valuable to have a small percentage of public sector R&D spend committed to very experimental approaches.

I am the accounting officer of UKRI, and the checks I have to go through in starting a new programme explicitly include the question: is it novel and contentious? If it is novel and contentious, I need a whole raft of extra sign-off measures, through Government, to allow me to do that. As John said, in many ways, that is perfectly reasonable. If I want to do novel and contentious things with public money, it is quite right that there should be some scrutiny.

How much is a different question. That inherently leads to a slowing down of the process, as you describe. Having some money that is protected to do only things that are novel and contentious is quite a valuable part of the landscape, but it is difficult to protect through tougher times than might otherwise be the case.

Q116 **Katherine Fletcher:** You have just mentioned a small pot of ring-fenced money. Some of the evidence we have had from other countries suggests that that only works if you back it quite big. In that beautifully constructed explanation, are you worried about any risks or threats to the current system of creating an ARPA either within or outside the UKRI structure?

Professor Dame Ottoline Leyser: I think the discussions about quantum relate to the fact that most people are focused on the role of DARPA in providing strategic advantage to the US defence system. It is a very big operation that needs big budgets to make a significant impact. If one is talking about providing protected money for high-risk approaches to funding research, that is less of an issue. The current budget being suggested is a significant sum of money. It is not trivial in any sense, and one could make good progress at that kind of level of funding, so I think—

Q117 **Katherine Fletcher:** Forgive me for interrupting. If we go down that route, are we going to attract a different type of person? Are we going to get a more diverse person—a person who probably doesn't ever want to fill in a series of forms but might stick a frog in a blender, for want of a better example? Ultimately, what we are about is trying to change the landscape to give us competitive advantage.

Sir John Kingman: It is possible. It is certainly part of the vision the Government have. We are able to attract incredibly talented people to UKRI, but there are horses for courses. To the point you were making, it is important to remember that the Government are making the commitment to ARPA in the context of a much wider commitment to growing overall R&D spend. The two things hang together. If the Government were talking about creating ARPA at the expense of the very important investments we are able to make through the existing system, it would be a very different proposition, but that is not what the Government are saying.

Q118 **Katherine Fletcher:** On the diversification of research, Professor Dame Ottoline?

Professor Dame Ottoline Leyser: Preserving diversity right across the research system is crucial—a whole range of different sorts of diversity. As I hope I have emphasised, that part of it is the very extreme end of the system. It requires innovative and different ways of funding, and different ways of thinking about it. I agree that it may well attract a different sort of person, but that diversity in the way we think about the research portfolio is important in generating the high-quality portfolio that drives innovation and discovery, and pulls that through to give us the outputs and outcomes we want for our society.

Katherine Fletcher: Thank you.

Q119 **Graham Stringer:** Dame Ottoline, where are all these high-calibre researchers at the moment? The implication of what you are saying is that there is a large pool of very able people out there who are deeply frustrated. Is that the case?

Professor Dame Ottoline Leyser: Rather by definition, the people we are talking about are a very small pool. The full employment number of people in DARPA is 200-odd, I think, and that is a very substantial activity. The way it works is that there is a small pool of high-calibre individuals, who understand the research system right across the US and internationally, and it pulls in from that very vibrant creative research base all the expertise and skills it needs from across different disciplines to deliver its programmes. The number of people we are talking about to drive the ARPA schemes is quite small and, by definition, the high-calibre individuals, unfortunately, are in short supply. Where one gets them from, I hope, would be a wide range of different places and different sectors—absolutely internationally. It is very attractive to those kinds of people to be able to work together in a community to take forward their visionary ideas.

Q120 **Graham Stringer:** Some years ago, a predecessor of this Committee went to the Howard Hughes centre for brain research just outside Washington, which is a different model of collecting able people to look at a very difficult problem. There is the DARPA model and the Howard Hughes one; there are other different models of getting high-quality research. Have you thought about whether it would be better not to use the DARPA model but to look at a different model to deal with the problem?

Professor Dame Ottoline Leyser: I would argue that those are different problems. I agree absolutely that we need diversity of approaches across the system. The focused institute-type model that Howard Hughes adopted involves some common features—lots of freedom to operate with a decent-sized budget—but is very focused on a particular problem and very driven by one site where the research is taking place. That has an important part to play in the system. We absolutely need that element in the UK system, and we have some excellent examples of that kind of approach going on here. I agree that we need to continue to do that, but it is different, and in addition to, rather than instead of.

Q121 **Graham Stringer:** Have you been consulted about a UK ARPA? If you have, by whom?

Professor Dame Ottoline Leyser: I have been in quite a lot of conversations about UK ARPA, both outside and inside Government. Inside Government, I have discussed it at BEIS, at No. 10 and more widely, for example in the context of the CSA network.

Q122 **Graham Stringer:** I know UKRI is a new body, but is there any sense in which trying to create a UK ARPA is a criticism of UKRI? Did you feel it that way?

Professor Dame Ottoline Leyser: I absolutely do not feel it that way. As I say, the core priority is to create a pot of money to be available to a group of visionary researchers to drive forward experimental and different research programmes. It is a very particular part of the landscape. I agree with John that there are a whole variety of ways in which you could do that, and there are all kinds of different models for the relationship between the new body and UKRI, but I definitely do not see the need to do that as a criticism.

I see UKRI occupying a core role, as I described before, in the research and innovation system. I see our role as acting as a steward of that system, and to understand the whole system—what is there and what is not there—and how we need to take the money we have to best support the whole system. I absolutely see a role for the experimental funding approach that currently does not exist. I am very excited that the Government are keen to invest in that area. I am very happy for UKRI to work in the most productive way to make it a reality.

Q123 **Graham Stringer:** Can you tell the Committee, since UKRI has started, what have been the biggest changes one would notice in the UK's

research structure or research ecology, for want of a better word?

Professor Dame Ottoline Leyser: Some of the biggest changes are those we have already discussed. As UKRI was created, there was significant public investment in cross-cutting activities that draw on the expertise of the research councils, to bring them together to deliver, for example, in the context of the industrial strategy. We also have funds to allow us to work closely with other Government Departments, to take forward their areas of research interest, for example. NPIF, the productivity fund that your Chair put in place, has provided an extraordinary range of opportunities to capture the benefit of bringing UKRI together.

Another good example would be the future leader fellowships we have developed to build up the talent pool in the research system right across the sector, in academia and in business, to support the productivity challenge. Those are new and different. We have done that in the context, though, of, essentially, flat cash across the core research councils—the founding partners that we brought together—and that is beginning to be quite problematic. Unless we can get some high-quality investment back down to the research councils, it will be difficult for them to sustain their core communities in a way that allows us to capture that interaction and synergy to drive forward the broader agendas.

Q124 **Chair:** Sir John, do you have anything to add to the answer to Graham's last point about significant changes in the landscape during your tenure as chair of UKRI?

Sir John Kingman: It is very important to remember that UKRI was successful, on its creation, in persuading the then Government to invest very heavily in new cross-cutting opportunities. I would add to Ottoline's list the strength in places fund, which is incredibly promising and interesting, and relevant to the levelling-up agenda, and would have been hard to do under the historic structures, which were much more siloed.

There were fears in the community when UKRI was created that it would be a hideous new bureaucracy and that the research councils would somehow be subsumed. In particular, there was a fear that it would not be possible to attract talented people to run the research councils. I think we have demonstrated conclusively that, on the contrary, we have been able to attract really good people into key roles in the new system. I think Sir Mark Walport said to you, so far, so good, and I echo that.

Q125 **Aaron Bell:** Thank you both for your time this morning. Dame Ottoline, you have been very persuasive about the benefits of an experimental funding model and the idea of getting into novel and contentious areas. Do you have a view on what the focus of UK ARPA should be? Should it be focused on a particular field? Should we, like DARPA, be looking at a particular single customer, which some people have suggested to this Committee could be the NHS, or would you see it as a more generalist operation?

Professor Dame Ottoline Leyser: That is a very interesting question. As I say, a lot of the discussion has been driven by the focus on ARPA in the DARPA model, where the emphasis has been on pull-through to the defence and innovation space, whereas my view is that the emphasis should be on bringing together extraordinary individuals in a way that catalyses alternative ways of funding. One of the main things that will come out is not only the transformative research and innovation they deliver but deep understanding of which funding models work well and why, and, as a result, some of those can be imported into the wider mainstream system. I am quite excited about that opportunity.

If those sorts of things are the main drivers, at some level, there is not such an issue about what the focus is. Having said that, I see huge advantage in having a focus and bringing people together to tackle a particular broad problem. Either could work. To me, the core crucial element is to get the right people as the early hires. If one can get people in who are motivated by some collective vision to drive forward a key challenge such as net zero, it would crystallise the organisation around that. If the early people one gets in are more focused on a particular technology, perhaps it would crystallise around that, but I would want to retain the opportunity for the early appointments to shape it.

Q126 **Aaron Bell:** Should the UK ARPA be situated inside or outside the overall UKRI umbrella?

Professor Dame Ottoline Leyser: As we have discussed, it can work in a variety of ways. It is absolutely crucial that it has protections in the context of its budget. It needs to be able to make long-term very stable investments. It needs to work very freely and fluidly. If those protections can be delivered inside UKRI, so that it is not being asked endlessly whether something is novel or contentious, it could operate entirely effectively inside UKRI. It could also operate entirely effectively outside UKRI. I would be very happy to collaborate closely if it wound up as an external body. You are the legislators, and you understand how best to set up an organisation that has those key characteristics, and the best way to do that is the way we should do it.

Sir John Kingman: May I add one point? We work very closely with massive funders of research who are not part of UKRI. A good example is the Wellcome Trust, which is a huge funder of UK research but is an independent charity. Over many years, there has been effective and, I would say, fruitful collaboration. We can make any structure work; it will come down to human interaction and doing business in a sensible way. We are very confident that whatever structure the Government choose we can make it work.

Q127 **Aaron Bell:** We are not the experts in this. Part of the point of this inquiry is how best to establish the UK ARPA. Dame Ottoline your predecessor, Sir Mark Walport, and the former Science Minister, Jo Johnson, suggested there were very few reasons why UKRI could not accommodate an ARPA-like organisation. Based on your previous answer, I presume you are ready, able and willing to do that if it is what the

Government decide.

Professor Dame Ottoline Leyser: Absolutely.

Q128 **Aaron Bell:** If on the other hand it is established as a separate entity, how will we avoid duplication with UKRI, particularly with Innovate UK?

Professor Dame Ottoline Leyser: To my mind, at some level the role of the organisation should be to do things that are not being done elsewhere. If it gets the freedoms and flexibilities to experiment with alternative funding models, that is an absolutely unique role in the research and innovation landscape. That is how I would see it. Some of the duplication anxieties are based on the assumption that it is an innovation organisation very tightly focused on delivering for a particular industry, and that is not the framing I have for it.

Q129 **Aaron Bell:** If it is established outside UKRI, you will need clear lines of communication. Have you been discussing that already with the Government, and have you worked out what form it might take on an ongoing basis?

Professor Dame Ottoline Leyser: That will depend a little bit on how it is set up, but there have certainly been discussions, formal and informal, about shared positions on various committees in the organisations. There are a whole variety of ways one can maintain close collaboration. Indeed, as Sir John pointed out, we collaborate extremely closely with a wide range of organisations with no such formal arrangements, so I am not too concerned about not having them.

Q130 **Aaron Bell:** That is good to hear. Do you want to add anything, Sir John?

Sir John Kingman: No, thank you.

Q131 **Carol Monaghan:** Dame Ottoline, may I start by asking something slightly different? It is about the board of UKRI. When the Higher Education and Research Act was passed a couple of years ago, a concern raised by many, particularly in the devolved Administrations, was that, although Research England was under the umbrella of UKRI, the Scottish Funding Council and the Welsh and Northern Irish equivalents were not. Assurances were given that there would always be some sort of representative on the board of UKRI who had knowledge of the devolved Administrations. Who is that person at the moment?

Professor Dame Ottoline Leyser: I am going to pass that question to Sir John, who chairs the board and has a longer-term view on how the membership has been put together.

Sir John Kingman: You are right; it was discussed at length in the passage of the Bill, and I think it is very important. We have structures that involve regular consultation with the devolved Administrations and the funding agencies in the devolved Administrations. In practice, what I observe is that collaboration between Research England and its peers around the UK is incredibly close and effective, as far as I can discern.

It was decided at the time that there should not be representatives of the devolved countries on the board. In practice, I would say that there are two members of the current board, Ian Diamond and Leszek Borysiewicz, who are—Ian is very plugged in to the Scottish scene, and Borys to the Welsh scene—

Q132 **Carol Monaghan:** Sorry to interrupt, but Ian is not actually a board member.

Sir John Kingman: Strictly speaking you are correct, because he is now a civil servant; he has been appointed as national statistician, and, constitutionally, cannot be on the board, but he attends every board meeting, and we treat him precisely as we would any other board member. I do not think that is an issue.

Q133 **Carol Monaghan:** Dame Ottoline, may I look at how awards are given? A female recipient of an award can expect to receive on average 15% less than her male counterpart. How do we persuade a young female researcher that they have a genuine and valued future in research?

Professor Dame Ottoline Leyser: We have done a huge amount of work analysing the research funding portfolio that we currently support. We have looked at it across a whole variety of criteria, including gender and ethnic minority populations. We have indeed detected some really concerning data. One of them, as you highlight, is that on average the awards to female principal investigators are lower than the awards to male principal investigators. That is because they apply for less. It is not because they are awarded less, in some kind of “Cut their grants differentially” sort of way.

In doing further analysis, one of the key determinants seems to be that there are very few female investigators on the very large projects, which skew the distributions. Some of them are large university-wide projects, where, typically, a very senior member of the university is the official principal investigator, even though a large number of people usually put the bids together. There is a very active debate in the community now about the advantages and disadvantages of that kind of model for the really large projects, where, typically, a pro vice-chancellor holds the award, and there are fewer female pro vice-chancellors than male pro vice-chancellors.

You highlight a good example of where capturing the data flags the question. One goes away and investigates in detail what the underlying causes of the differences are, and one can then consider what changes to put in place to mitigate the issues, or not, if they turn out not to be issues that we and the community in particular feel need mitigating.

I would say to a female young researcher that research and innovation is an incredibly exciting career, and there is a whole range of wonderful opportunities to contribute in very positive ways to the system and to society. I absolutely encourage them to take up that challenge.

Q134 **Carol Monaghan:** May I probe a little more? The diversity results that

you have provided give us data across different research councils. Have you drilled down to look across disciplines to see how awards have been given?

Professor Dame Ottoline Leyser: Do you mean sub-disciplines within the research council?

Q135 **Carol Monaghan:** Yes; engineering as opposed to medicine, for example.

Professor Dame Ottoline Leyser: Medical research is funded broadly across the councils. It turns out that there is a lot of medical-related research across the research councils; none the less, the vast majority of our medical research is funded through the Medical Research Council, whereas the vast majority of our engineering research is funded through the Engineering and Physical Sciences Research Council. The data you describe are available by research council and freely available on our website to anybody who wants to analyse them.

We have some ability to compare across disciplines in that way, by comparing straightforwardly across councils. The councils have their own data and are able to do more detailed analyses. Of course, the more you drill down, the smaller the sample sizes become, and the more difficult it is to draw robust conclusions, but yes, we have those analyses.

Q136 **Carol Monaghan:** One of the great schemes for encouraging female researchers, through providing support, role models and systems that enable their research to develop, is Athena SWAN. The Government have told UKRI not to place any weight on institutions or groups that sign up to groups such as Athena SWAN. What sort of message does that send?

Professor Dame Ottoline Leyser: I am a huge fan of the Athena SWAN process. I have led Athena SWAN submissions work at all the organisations I have worked at for the last 20 years. I find the process extremely valuable and useful because it is deeply self-reflective. The whole principle of it is to ask what is going on locally, how things work locally and how I can put in place locally an action plan to address issues that are clear and identifiable through a data-driven approach. That is why it has such extraordinary value; it is very locally focused.

Q137 **Carol Monaghan:** Do this Government not appreciate the value of such a scheme?

Professor Dame Ottoline Leyser: A number of years ago, NIHR decided to make it compulsory to get a particular level in Athena SWAN for receiving its awards. While in some ways that had a very positive impact by driving the issue up the agenda, as regards doing the process in a high-quality way, there is a strong argument that it had a negative impact, because people are forced to do it in a way that is against the philosophy of the process. Also, it has become something you have to do, and that self-reflective, "What's going on in my area?" element, in my opinion, has been diluted. I think that is a real shame.

None of the research councils that are part of UKRI has ever had a compulsory requirement to do any particular scheme, because we are interested in whether the organisations we fund are genuinely committed to, and engaged in, driving up equality, diversity and inclusion in their systems, by whatever mechanism, right across the range of protected, and indeed, unprotected characteristics. It is much more important to ask the substantive question, "Are you addressing these really key issues to build up a high-quality research and innovation system?" than it is to ask for particular schemes. That is how I interpret the Government directive, which is, "Don't place any emphasis on particular schemes. Ask the substantive question about whether the system you are building is really high quality." To be high quality, it has to be inclusive and take into consideration diversity.

Q138 **Carol Monaghan:** If I were to look at the awards being offered to researchers in five or 10 years' time, would I see a difference in the figures?

Professor Dame Ottoline Leyser: I hope so. That is certainly why we are collecting these figures, so that we can track that the interventions we are making, which are substantial, are indeed driving up diversity.

Q139 **Peter Gibson:** My questions are directed mainly to Dame Ottoline, but I am happy to take contributions from Sir John as well. When does UKRI intend to publish its equality strategy?

Professor Dame Ottoline Leyser: We had originally intended to publish an equality strategy at the end of last year. It got delayed first by purdah and then by Covid. Now, very excitingly, the Government have published their R&D road map, which includes as a core element—I am hugely supportive of this—the development of a Government R&D people and culture strategy.

In the context of working closely with BEIS in the development of that strategy, it makes sense to pause the publication of our EDI strategy and align it fully with a much broader people and culture strategy, which I think it is key for us to deliver. We can then publish that alongside the people and culture strategy that BEIS is developing. I acknowledge that the delay is not ideal, but, at the same time, it provides an opportunity to reframe the strategy in a much broader context and provide therefore a much stronger influence for it right across our activities.

Q140 **Peter Gibson:** Can you give us a timescale?

Professor Dame Ottoline Leyser: Minister Solloway is your next witness, and I know that she is very keen to develop the people and culture strategy over the next few months. At the same time, we are all working very hard on a whole wide range of different things, so I would not like to commit her to a date.

Q141 **Peter Gibson:** Can you tell us what evidence there is that UKRI's current processes for enhancing equality, diversity, inclusion and accessibility are effective?

Professor Dame Ottoline Leyser: As I mentioned on the previous question, the data we are now collecting, and the way we are analysing it, will allow us to track that better over time. There are examples right across the organisation where I think there is good evidence that our policies are effective. I could highlight, for example, the future leader fellowships, our new cross-cutting fellowship scheme for early-career researchers in the transition between their training and postdoctoral career and their independent researcher career. That scheme was put in place with very deeply embedded EDI criteria and has done an impressive job of attracting a much wider range of very high-quality candidates, crucially from across sectors, not just in academia. We can point to areas where our policies have definitely had an impact.

Q142 **Peter Gibson:** Are you able to share that evidence with the Committee later on in writing?

Professor Dame Ottoline Leyser: Absolutely.

Q143 **Peter Gibson:** What do you think UK ARPA could learn from your policies and processes that improve equality and diversity, if indeed they do?

Professor Dame Ottoline Leyser: There are a number of ways to look at EDI policy. The way I view it is that high-quality research and innovation need diversity. You have to have people with different ideas and different backgrounds coming together to create the kind of environment where extraordinary things happen. It is disagreement that is almost the fuel of creativity. Building cultures and environments where disagreement is valued as an engaging thing, where, if someone disagrees with you, you are pulled in to discuss the disagreement rather than pushed away by anxiety about a confrontation, is key to underpinning the whole process. A lot of the philosophy behind some of the skunkworks-type ways of working that we discussed earlier, which in principle should be embedded in the way ARPA thinks, and not constrained by current moulds and models for how research works, should be inherently about a more diverse way of thinking about things. I hope that their open horizons would support diversity. I am very keen to think about that more broadly across the UKRI system.

To try to address diversity, we have almost constrained it by putting in place objective criteria to get rid of biases. I understand the need for them, and they have some benefit—we need to think hard about biases and where they come from—but if one constrains too far the criteria one is using to select, by definition, you will constrain diversity. That tension is an important one to address.

Q144 **Peter Gibson:** Sir John, do you have any comments to make with regard to equality and diversity?

Sir John Kingman: No, I think Ottoline has been very lucid. Sparing her blushes, these are topics that she cares very passionately about and were an important part of her manifesto, as it were, in applying for the job. She is correctly recognised as a real thought leader on these issues.

Q145 **Chair:** Finally and briefly, Dame Ottoline, negotiations are going on in Europe at the moment, and the science community has a particular interest in the Horizon programmes. Are you being consulted by the Government on the negotiations? Are you satisfied that, one way or another, UK science is not going to lose out, either in cash terms or through participation, as regards the outcome?

Professor Dame Ottoline Leyser: This is a complex issue, which is indeed a very active topic of discussion. I have been very encouraged by the widespread agreement that association with the Horizon Europe programme is the best outcome. The question then becomes how much we are willing to pay for that.

At the moment, the formula suggests that we would have to pay into the system, simply to participate, a significant sum of money that does not return to the UK. The community is very widely of the view that there are very strong non-monetary benefits to participating. I think there is very good evidence to support that. Paying in some money to cover those non-monetary benefits is absolutely fine. The question is: how much? That is still an ongoing matter for negotiation. I think that will be a key element in the final decision.

More broadly, the European position has typically been that nothing is agreed until everything is agreed, so there is always the possibility that the entire issue will be sidelined by difficulties with other parts of the negotiation. It is still a very uncertain situation, but there are lots of ongoing discussions, and I am indeed participating in a number of them. Our colleagues in BEIS are working extremely hard in the context of those discussions, and in the context of ensuring that the UK research and innovation community does not suffer, whatever the outcome.

Sir John Kingman: I am at several removes from the smoke-filled rooms, I am pleased to say, but one observation I would make is that I do not sense that anyone is approaching these difficult questions in an ideological spirit. There is clearly a very complex negotiation that is in turn part of a wider complex negotiation, and there are real decisions to be taken about what is the best course for the UK. I have a sense that everyone involved in the discussions is approaching them in the right spirit, which is what is best for British science.

Chair: Thank you very much indeed. We are very grateful for that. I am conscious that you have delayed your board meeting to appear before the Committee. It may be the case that your board members have been watching your appearance this morning. If they have, our thanks for their indulgence, and for their contribution and hard work for what Members have made very clear is an absolutely pivotal institution for the country and, increasingly, the world. Thank you very much indeed.

Examination of witnesses

Witnesses: Amanda Solloway and Sarah Hodgetts.

Q146 **Chair:** We turn now to our next panel of witnesses, principally the Minister for Science, Research and Innovation, Amanda Solloway, a woman with one of the best jobs in Government, as I know she agrees. She is accompanied by Sarah Hodgetts, deputy director in the BEIS Department for UKRI sponsorship and ARPA. Welcome, Minister.

I will kick off with some general questions. The Committee has been inquiring into the notion of a new research projects agency. It was in the Queen's Speech before the end of last year. When do the Government expect to finalise their plans for the new agency?

Amanda Solloway: You are right, Chair; I believe I have one of the best jobs available, as you know. I will come on to say what we are planning, but perhaps I could take this opportunity to set out some of my priorities.

Thank you so much for inviting me here today. I am extremely pleased with what we have managed to achieve over the last year. We heard earlier from Dame Ottoline about the road map launched in July, which I might have a chance to go into more fully. For me, the reason this was such an important opportunity was to give us a focus on what we need to do for the R&D landscape. That is what the road map sets out to do. It sets out the firm foundations that we clearly need to put in place. As you know, I have the very great privilege of knowing that the R&D investment will be £22 billion by 2024-25. That is not only a great privilege but a great responsibility.

I highlight that, within the Department, we have been responding rapidly to the Covid-19 pandemic and investing £750 million in new measures to support innovation. On priorities, one of the things we need to do is bring the road map alive, which I am sure I will get an opportunity to talk about later. I would like to bring it into action, but we also have the economic and social recovery from Covid-19. Within the road map we talk about levelling-up—I am sure we will come on to that as well—and why it is so important that we see levelling-up. You were talking about Horizon Europe. We might even get a chance to look at that, but we will certainly be looking to make sure that we either participate or have alternatives.

ARPA is a fantastic opportunity. You are right that it was in the Queen's Speech. We know that £800 million has been committed, and it is a manifesto commitment. We have reaffirmed it in the road map. You will see it very clearly stated that we will have £800 million for a new funding agency.

It is not without its challenges. You talked about length of time. My major focus in all of this is making sure that it is absolutely fit for purpose. The start point is a position where we are as strong as can be as we work our way through it. To be perfectly frank with you, we are still working our way through quite a few particular questions, so coming before you today is helpful. I welcome the inquiry and maybe taking some lines from you as well. I have been working very closely with stakeholders, and I know that you have been doing so as well.

You asked specifically about timeline. We need to get that right. Organisations like Oxford University have been talking about this as a highly ambitious investment, mostly considered too high-risk for public funds. We need to listen to that carefully and create a mechanism geared towards making sure that we support all the ambition we have. ¹

To reiterate the ambition for ARPA, it is, as you know, to make sure that it is high in ambition and has high reward, and that it is a long-term supporter of the science system. Within that, it is to look at things like tackling bureaucracy and making sure that we work with UKRI in enhancing what they do. I will leave it there for the minute. I am sure you have lots more questions.

Q147 **Chair:** We have, Minister. You said that things had not been decided yet. We have taken evidence in this Committee from experts in this country and around the world. I hope that the fact that no final decisions have been taken might give you the chance to reflect on some of the evidence and, when we produce our report, some of our thoughts. It has been my experience that sometimes the contribution of Select Committees can be helpful to policy making. I hope you will regard our work in that way and take it into account.

Amanda Solloway: Yes. Thank you very much.

Q148 **Graham Stringer:** Can you tell us something about the consultations you have been having on a UK ARPA?

Amanda Solloway: To reiterate, it is important to bear in mind that ARPA is a funding agency. That is exactly what it is setting out to do. We have been having a look, as I know you have yourselves, at what other agencies are doing. I know you have talked to DARPA. We have also been having consultations with stakeholders and working across, looking at academies and other places.

However, it needs to be ours. That is one of the reasons we are looking at it in a very considered manner. It has to be fit for the UK. We have definitely been taking lots of views from other organisations, agencies and stakeholders, but ultimately one of the things I am really keen to do is make it fit for purpose for the UK. That is where we are at the moment. We are taking in all those views and making sure we have the right foundations.

Sarah Hodgetts: One of the things my team, in particular, has been doing is looking at the more technocratic aspects, talking to some of the experts in DARPA, Google X and SPRIN-D, the German version of what

¹ Note by witness: Amanda Solloway intended to say 'When you have organisations like Oxford University responding to the inquiry saying that 'highly ambitious investments are mostly considered too risk for public funds' - we need to listen to that carefully and create a mechanism geared towards making sure that we support all the ambition we have'.

we are trying to set up here. We are looking at how you deliver the vision that the Minister has clearly set out.

We are looking at strategic operations like financial freedoms, how you put in the appropriate governance and assurance, with an appropriate regime, and how you do the funding. We have had some interesting conversations with colleagues in DARPA, in particular a gentleman called Scott Ulrey, deputy director of the contract management office over there. One of the key elements of giving the freedoms we want for this organisation to deliver its vision and ambition is how you give agility and freedom while having the correct control and assurance about the governance. I want to make it clear that we are having those kinds of conversations, as well as conversations with leading scientists like Professor Hopper and members of the Royal Society.

Q149 Graham Stringer: That is a crucial point. It is the Government's responsibility to look after public money, but often in science the nature of research is that you do not know what you will come up with, so you have to give freedoms that you cannot always account for. One can give a whole list of scientific breakthroughs where nobody knew where they were going when they started. You have identified a real problem. How do you solve it?

Amanda Solloway: That is a really good question, and I acknowledge exactly what you are saying. We identify that there is a great need for an ARPA-type agency. That is certainly the premise we are working through. I have listened with great interest to your inquiry and the stakeholder comments. Without exception, there is a necessity for this. The challenge is how to make sure that it is robust and fit for purpose. We need to make sure that, to achieve high ambition and high reward, we have the foundations set in place.

There are several elements that we need to take into consideration, and we are working through them. As an example, the governance will be really important, and we need to make sure that we are doing that. We also need to make sure that we give freedom—Dame Ottoline talked about this earlier—to have the opportunity to make great discoveries. Going back to ARPA originally and to ARPANET and what came out way back, we can think about what came out of the discovery. We think about GPS and the internet—all those things. Today, we are talking to each other from different places, which is a distinct advantage in having something like the internet. When we think about ARPA, and when we think about what we are aiming to achieve, we probably do not know what it is, because it might not exist yet. That is the whole glory of something like ARPA; it allows freedom for discovery.

Q150 Graham Stringer: It is a funding agency, Minister, but it has to be a funding agency with a mission statement. What is the mission statement likely to be?

Amanda Solloway: We are working our way through that, and one of the things I am conscious of is that we need to be mindful that, while it is

a funding agency, and we have committed £800 million and have said we will set it up because it is a manifesto commitment, the people who can lead the direction of it will need to be scientists. When we talk about opportunity and where the science will go, they, rather than politicians, will be the experts.

If I say what I hope this ARPA will achieve, I firmly believe we are talking about high ambition, opportunity and rewards. It will give reward in terms of new jobs and opportunities. A key thing—I have mentioned the internet already—is about transformational science and the technology that benefits the UK. That, for me, is where the ARPA funding agency will, hopefully, be able to unleash all of those possibilities.

Q151 **Graham Stringer:** It has been long established, for more than 100 years—the Haldane principle—that scientists decide on particular research programmes and how they are best carried out, but it is the role of Government to decide where the large chunks of money go, whether they go to medical research, astronomy or wherever. Accepting the Haldane principle, which I think you have just enunciated, there still needs to be a mission statement that says where this funding agency will be aiming its resources.

Amanda Solloway: To reiterate, we are absolutely making it a high ambition, and it will be high reward. That is clearly the focus. It is to deliver unique and transformational science. If I may just point this out, it is £800 million. As you heard me say in my opening comments, we have a £22 billion R&D commitment by 2024-25. That will also go towards all the science and technology we are funding. This is a unique funding agency that will deliver on high ambition and high reward. One of the key things—I am sure you will come on to this—is around the bureaucracy. We are hoping that what happens is that the funding opportunity will be as agile as having private investment. That will be the key. We will be looking at an agile and quick-to-use funding pot.

Q152 **Graham Stringer:** My final question is in a sense the same question the other way round. What problem is this agency trying to solve?

Amanda Solloway: That is a really good question. I will hand that over to the scientists. We know that we face many challenges today. We have the climate challenge, innovation and lots of different things, all of which require a very large budget. From the Government point of view, we are very mindful of that and are working towards combatting all those challenges.

ARPA's uniqueness is around the scientists. That is why it is so important that we have an expert scientist leading ARPA. It will be about the scientists defining that. To be honest, it may be that we do not know what those challenges are. For example, when GPS and the internet were discovered, I do not think people set out to discover them. It was about how one computer talked to another computer, if I remember correctly. That is where the whole idea of ARPA will, hopefully, lead us—to amazing and fantastical advances. May I bring in Sarah?

Chair: We are keen to finish the session in time for the two-minute silence at 11 o'clock for Armistice Day. I will bring Sarah in, but perhaps we could have precise answers.

Sarah Hodgetts: I will be very concise. One of the other challenges that it addresses is the global race for talent. The UK's R&D infrastructure is vast and comprehensive across the country, but ARPA is an addition that makes it part of the global race.

Q153 **Carol Monaghan:** I do not think any of us would argue with spending money on science and research, Minister, but I want to push you a little further on what Graham Stringer was asking about. You have just talked about blue-skies research and the discoveries that take place as a result of blue-skies research. We know that happens. We are trying to understand the difference between ARPA and what happens anyway.

It is difficult for us to understand why we would set up an organisation such as ARPA and throw £800 million at it if it does not have an aim, a target or some sort of goal that it is hoping to achieve. I do not mean in terms of bringing in talent or blue-skies research; I mean a specific target. Are we looking at developing our quantum technologies? Are we looking at driverless vehicles? Are we looking at dealing with our ageing population? What specifically will be the tasks of ARPA?

Amanda Solloway: I appreciate the question. To try to be really clear, that is one of the challenges we are working through. The challenge is that this is something unique that gives the opportunity to do something that we are not doing already. You are right. It could well be autonomous cars or anything you mentioned. If we look at organisations like Oxford University, which responded to this inquiry saying that highly ambitious investments are mostly considered to be too high risk, that is what we are talking about.

I want the scientists to lead on this. It is about a gap that we are not filling and where we need to be agile. There is a clear appetite. You will have heard from many witnesses that there is a clear appetite within the scientific community for this new funding to be able explicitly to support the most ambitious, long-term science that cuts bureaucracy. That is what the agency will do. It will be unique in the way it works from exactly that point of view.

Q154 **Carol Monaghan:** How do we ensure that it is not isolated from any existing research and innovation system, and how do we ensure that there is not duplication of research that is currently taking place?

Amanda Solloway: I reiterate Dame Ottoline's earlier comments. As you have probably gathered, we have been working very closely and we have very regular meetings. BEIS and UKRI have been working together to make sure that this actually fills a gap, as opposed to just doing something that exists already. We will have those conversations, but the clear steer will be from the scientists, making sure that what it is doing is filling a gap. ARPA will work with UKRI to ensure that their activities are complementary. I see that as a key part of what they will be doing. It is

also important that we share what the Government and UKRI are working on, so that when we develop this agency there will not be an overlap, but it will be fit for purpose.

Q155 **Carol Monaghan:** Your Department's evidence to the inquiry states that "future funding decisions" affecting ARPA will be based on "how effectively ARPA has embedded itself in the UK research landscape." How will we determine its success?

Amanda Solloway: The great thing about ARPA is that it is long term. I am really keen to make sure that we do this and that it is a long-term financial investment in projects that are succeeding. I guess we will only know success when we see it. I don't think when they were getting the internet they knew that was what they were doing.

If a project does not seem to be going down the right route, or is not succeeding, we make sure that that project will be stopped and we can move on to something else. The key thing is that the finance pot will be agile and can be used on long-term projects, but if a project is not getting to where it should be, we can stop it.

Q156 **Aaron Bell:** How will you appoint the director of UK ARPA? What qualities are you looking for, and who will they report to?

Amanda Solloway: I can probably answer one part of that question slightly more succinctly. Let me answer the second part. We are working through how we are going to do the appointment. It is really important that we get the right person, and we are working through what that process will look like. At the moment, no decision has been made on that. However, I can certainly tell you some of the qualities we are looking for in that person. It is really important for governance that the person is absolutely the right person because they will be driving forward the whole ARPA concept.

I have given much thought to this. I think the person would need to be an expert scientist, somebody exceptional and revered for the work they do. I would also definitely want them to be a leader because they will be leading the £800 million pot we are going to take through to the future. That person must have leadership skills. It is also important that they are a visionary and can articulate what they want to see. You have heard me say several times that this is not about what politicians think; it is about the scientists. It is key that the person is a visionary.

I think Sir Mark referred to this earlier in the inquiry. It has to be somebody who would like the challenges. A really important part of it is that the person will want to take on challenges and focus on delivering them. We are talking about somebody exceptional; I know that. However, I do not believe that it is beyond us to get that person. That will be an absolute key: an expert scientist who is a visionary and likes lots of challenge and can articulate a clear direction.

Q157 **Aaron Bell:** Will they be reporting to you or the Department?

Amanda Solloway: I answered the second part of your question first. We are in the process of looking at that.

Q158 **Aaron Bell:** I think the early personnel will be absolutely key. Having got a director, will the personnel and project managers be hired outside the normal civil service processes, to ensure that they have sufficient remuneration and freedom to operate and that they are of sufficiently high calibre?

Amanda Solloway: Exactly what we are working through at the moment is making sure that we look at that. We are very keen to get exactly those people. I am sure it is apparent, but the agency we are setting up—we have not defined how many people will be working in it—is a funding agency that will distribute funds throughout the rest of the country. We do not even have a name for them, but whatever those people are called, whether it is funding agents or whatever, their skills will need to be absolutely in line with what we require. Sarah, do you want to come in on that?

Sarah Hodgetts: I reiterate that a decision is not yet made. We recognise that remuneration will be key, because attracting the calibre of person the Minister has just described is likely to be outside the normal pay restrictions.

Q159 **Aaron Bell:** How will you ensure that the organisation's senior leaders promote and develop a diverse workforce? We had some evidence on that in the first session.

Amanda Solloway: I am sure you have all read the road map. Within the road map, we have themes and pillars. One of the key themes is about diversity. It is incredibly important. Dame Ottoline articulated that as well. In all our conversations, we make sure that we think about the diversity agenda, about people and culture. We are in the process of defining the people and culture strategy.

I do not want to dwell on things that are non-specific to ARPA, but we are taking into account certain considerations to make sure that we get a diverse workplace, provide opportunities, think of it holistically—from start to finish—and enable people to achieve their full potential. All of that will be threaded in. It is something we are working on. I think Dame Ottoline said she did not want to commit to when the people and culture strategy would be coming out, but I am keen to make sure that over the next three or four months we get something out, so that it will be aligned, hopefully, with the launch of ARPA.

Q160 **Aaron Bell:** Wrapping it all up—you may be working on this at the moment—how will you ensure that a UK ARPA has operational independence, while still maintaining the accountability and transparency we would expect?

Amanda Solloway: This area is an absolute challenge as well, and it is one of the things we are working through. I am keen that it will be a transformational scientific and technological vision. We just need to

ensure that there is cohesion between different research in other parts of the programme and the way it works and with Government. I am looking forward to comments from the inquiry. Continuing to work on thinking about how we actually achieve this is one of the great challenges.

Q161 **Katherine Fletcher:** What gaps in the current landscape is this trying to fill?

Amanda Solloway: That is a great question. The answer will be from the scientists as to specifically what the projects will be, as I think I mentioned before. I thought I had answered this question, but let me reiterate a few things we are trying to do.

The high ambition is about doing things that maybe would not ordinarily be done in the normal landscape. That is the first part. Then it is around enabling high reward, so that from the higher vision we have an opportunity, we hope, to get high reward. Within that, one of the key things we are looking for is to make sure that the bureaucracy is as limited as it can be. It has to be there. Nobody would say we need to remove bureaucracy completely. However, we want the funding to be available as swiftly as possible, as if it were the private sector.

The gaps will be identified by the scientists. I have heard evidence throughout this morning and listened to evidence during the rest of the inquiry. Without exception, scientists across the whole spectrum recognise the need for this agile, high-ambition and high-reward pot.

Q162 **Katherine Fletcher:** In previous evidence, we heard about the key success criteria for these types of things. It is about culture and people not being permanently attached to it; it is about a rigorous, almost skunkworks approach, as I said in the first panel, and doing it despite the bureaucracy. Both you and Sarah talk about it almost as a funding vehicle. I worry that we might lose something if it is just a funding vehicle with limited bureaucracy. What can you do to talk to the idea of a single site with a culture of continual challenge and skunkworks, for want of a better way of putting it?

Amanda Solloway: That is a great question. If we have not made it clear—I will give Sarah an opportunity to come in on this as well—ARPA itself will be a funding agency. However, it is not just a funding agency. Apologies if that is the impression I gave.

This agency will unleash talent and opportunity and enable research to be carried out that is not being carried out at the moment. It will have high ambition and high reward, and allow long-term scientific projects to take place, which is why it is absolutely crucial that we get the right leader, the inspirational director we talked about, to ensure that all of that is carried out. Sarah, is there anything I have missed?

Sarah Hodgetts: It is a funding agency, but one of its tasks will be to experiment with funding models. Going back to the question about the gap in the system, and something Dame Ottoline and Sir John were talking about earlier, normal, uncontentious spending involves a longer

process. One of the tasks of the leadership of this organisation will be to come up with novel ways of injecting money into the system. UKRI does not have the freedom to do that at the moment. That would be one observation on top of what you said, Minister.

Q163 **Katherine Fletcher:** On the peer review side, Dame Ottoline and Sir John were very clear about the need to take a portfolio of ideas and have an almost brutal look at them and say, "This one's working and this one's not." The mechanism for that is expertise and rigorous peer review. How close are we to making sure that that is happening and that it does not get captured as an arm of the British state?

Amanda Solloway: That is exactly one of the things we are working through at the moment. It is crucial, and that is why we are thinking about how to define it. There are aspects of the peer review grant process elsewhere in our R&D funding system, as you know, that are quite difficult to reconcile with the freedom and agility that this new agency will have. For example, research councils generally aim to deliver funding verdicts in a matter of months. I have probably said already that I want to push for this to happen at the speed of private investment, because it might be that it will lead us on to discoveries and enable us to have those discoveries; at the moment, we don't know what we don't know. Therefore, I would want ARPA to be an agile agency that is able to continue that.

Q164 **Katherine Fletcher:** Who have you consulted to make that happen? Have you gone out to the private sector? What lessons learnt are coming into the Department? I am assuming you have consulted.

Amanda Solloway: Yes. Sarah came in earlier on all the engagement we have been doing, and I am happy to bring her back in. Perhaps she would reiterate what she stated earlier.

Sarah Hodgetts: We have had very interesting conversations and evidence given to us by the CBI and other institutions like AIRTO and the Life Sciences Council. One of the things I picked up from those conversations is that the private sector does this well. We should not necessarily hold it up as a panacea, because, equally, it has control regimes around institutions and the way they work, but what they are better at "doing" is accepting that things can go wrong. Sir John made a point earlier about the ability to recognise when you need to invest a lot in order to get some success, and things fall away along the way.

That is definitely a lesson we have learnt from some of the big companies we have talked to. They have high levels of ambition but also high levels of risk appetite, and they recognise that small percentages of their projects will never proceed to commercialisation. That is the attitude ARPA will need to have as well.

Amanda Solloway: It does not finish there. This is one of the things we are working through. We are continuing to engage from an R&D community point of view, and we continue to have stakeholder meetings.

We have made a commitment to deliver this new independent funding agency.

Q165 **Katherine Fletcher:** Brilliant. That is a long list of important existing structures. As a final question from me, have you consulted the types of wearing baseball caps backwards people we want to do the job? I appreciate that I am dating myself by that comment. Are you confident that as arms of the British state you can get to the type of people we need to think outside the box and make sure that what you are putting in place will work for them? If not, I am happy to apply for the role.

Amanda Solloway: Let's catch up for a coffee at some point. We are, actually; we have scientists who work within the field and we have been consulting them. I think you are right. They are exactly the kinds of people we need to consult as well. However, I will definitely take you up on your offer. And just to say, I know it was your final question, but I have not been able to have my drink, thanks to your earlier reference to blended toads.

Q166 **Katherine Fletcher:** Sorry. It's an old one from my biology days. I rather shocked Sir John with that comment. No frog has been involved in the production of that drink.

Amanda Solloway: Thank you. I can drink it now.

Q167 **Chair:** Thank you very much indeed, Minister and Sarah. We will leave you to go back to your drink without being put off further.

It is evident that you are continuing to think and reflect, and to talk to people about the shape and purpose of the new agency. As I said at the outset, we have taken some care to interview witnesses from around the world from different perspectives. If, as we intend in the weeks ahead, we distil that into some recommendations, can I have your assurance that, as part of your open-mindedness, you will be willing to take very seriously the recommendations we offer?

Amanda Solloway: Yes, of course. One of the things I am really keen to do is acknowledge the expertise in this Committee. I thank you for this inquiry. I am very happy to keep you informed and I am very happy to come back whenever it is appropriate.

Chair: Thank you. That concludes this meeting of the Science and Technology Committee.