



Science and Technology Committee

Oral evidence: [Legacy—Parliament 2010–15](#), HC 758

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Members present: Andrew Miller (Chair); Mr David Heath; Stephen Metcalfe; Stephen Mosley; Graham Stringer; David Tredinnick

Questions 202-339

Witnesses: **Rt Hon Greg Clark MP**, Minister of State for Universities, Science and Cities, Department for Business, Innovation and Skills, gave evidence.

Q202 Chair: Good morning, Minister, and welcome back.

Greg Clark: Good morning, Chair; thank you.

Q203 Chair: This could be our last session with you, I suspect, unless there is some dire emergency, but there is quite a lot of ground to cover, much of which covers the period before you took up your current post. Of course, you had previously been a Minister, and you have carried on with some of those responsibilities in addition to your post as Science Minister. As Science Minister, do you consider it part of your role to ensure that policy making across Government is properly informed by science and scientific advice?

Greg Clark: Yes, I do. It is the role of the Science Minister, and certainly how I interpret it, to be the champion for science in Government. It is well known that we do well as a country because of the strength and excellence of our science base. You know my views on not respecting boundaries between disciplines and the various silos, so you could not possibly take that view and think that Government should be immune from that injunction.

Q204 Chair: How do you go about doing that?

Greg Clark: For example, I meet regularly with the departmental chief science advisers. That network is an incredibly important asset that we have in this country. It is known around the world, and I think we should promote it a bit more. That is very important.

Obviously, the Government's chief scientific adviser, whom you are hearing from next, reports to the Prime Minister rather than to me, as is quite appropriate, but he is based in

the Business Department, and he and I have very frequent conversations. Later today, for example, we are conducting a seminar on the challenges of complexity in urban settings with some of the key scientists in this field.

Q205 Chair: You mentioned the importance of the network of science advisers. You presumably therefore agree with the Committee that it is important that the current vacancies are filled with high calibre people.

Greg Clark: I do agree with it, yes.

Q206 Chair: Last week, we had an interesting exchange about the definitions of science that are used in the Science and Innovation strategy. We have been looking at some of the definitions that other people use. Let me throw one back at you.

I preface this by saying that it is chosen partly because it is very clear, but I am putting this question to you and I would point out that the source—the Science Council—said very nice things about me last year, so I do not pick it entirely at random. It said: “Science is the pursuit...of knowledge and understanding of the natural and social world following a systematic methodology based on evidence.” Why did you not use that existing definition, rather than the peculiar one that we were discussing last week?

Greg Clark: We have a friendly disagreement about this. I do not think that it is peculiar. The social sciences and humanities are absolutely worthy of the same place of prominence and respect as the physical sciences. They increasingly inform each other. I had the pleasure of being at the LSE last night, talking to students from the social sciences. Our contributions in economics, and I should declare an interest as an economist, with an economics degree—

Q207 Chair: When I was at the LSE I regarded economics, and I still do, as a black art rather than a science.

Greg Clark: There you are; even social science you would classify as an art. These things are very important. I mentioned some points last time about how the connections between what might have been thought of as disciplines that were not part of the physical sciences, such as anthropology, could be important in understanding and making scientific progress. I make no apology for taking a broad view of science, and interpreting my role and remit to advance all of that. I know that the research councils, for which I am responsible—you have the Arts and Humanities research council—do incredibly important work; and Sir Drummond Bone, who chairs that, takes the same view that it is important and is part of the whole, and not in a different and, by implication, second division—absolutely not.

Q208 Chair: In the strategy documents, there are strong statements about the economic benefits and opportunities that come from having a strong science base. There are other

broader societal benefits for having a strong science base, and I am sure you would agree with that.

Greg Clark: Yes.

Q209 Chair: Given that science ought to be at the heart of our nation, it still seems odd to us that the Government Office for Science is not located at the heart of Government in the Cabinet Office. You have come into the Department from slightly left field, but do you not feel that that is the case?

Greg Clark: All I can observe is from my experience. Colleagues around your table have had some experience of this themselves, and I am sure that they will inform your conclusions on this. But I have found that the role of the Government's chief scientist, whether it is for pay and rations in the Cabinet Office, the Business Department, or whatever it is, is unambiguously for the Government and informs the Government collectively. The practice has been for the Science Minister to be in the Department for Business, Innovation and Skills, and it has been very convenient that the Government's chief scientist is in the same building and easily accessible. I dare say that other arrangements are possible, but I have not found any deficiency with the present arrangement.

Of course, the research councils are an important part of my responsibilities. The Government's chief scientist, as part of his job, needs to have close connections with the world of the research councils and universities. The relations, as it were, are conducted from my Department. There is a case for that. To be honest, I have not myself considered the case for an alternative, but I dare say the Committee has and can make some recommendations.

Q210 Chair: Finally, the Committee has welcomed the Government's ring-fencing of the core science budget. There are issues around that in terms of inflation and capital, and, again, the definition of the core science budget. As you know, we have looked at key aspects of Government science well beyond the responsibilities of your Department. What are you doing to protect science funding in the build-up to the 2015 spending review?

Greg Clark: I said that the Science Minister should be a champion for science in Government. I will be, and I shall be making the strongest possible case in advance of the spending review. I regard investment in science as literally that—an investment in our future. It is a good investment.

That has been the view of the Government. The fact is that the science revenue budget was ring-fenced and maintained in cash terms. More than that, I draw the Committee's attention to the Science and Innovation strategy, of which I am proud. We have put a lot of effort and work into it, and I did. It has quite a lot to say about this. In terms of capital consultation, it is embedding a rising capital budget throughout the whole of the next Parliament, and it makes clear statements about the importance of science investment.

You mentioned other Government Departments. I completely take the view and it is consistent with what I have said in terms of the interpretation of my role. In the Science and Innovation strategy we very carefully mentioned this. It perhaps has not had much attention, but at paragraph 4.35 it says: “We will examine how to ensure that R and D spending by departments is properly prioritised against other capital investment spending, for example by considering controls that can be placed on this spending to ensure that valuable R and D is not unduly deprioritised in favour of short-term pressures. We will report on this by the next Spending Review.” I am acting in the way that you in this Committee would hope.

Q211 Chair: I think I heard you correctly, but my memory of the paragraph is that it uses the word “departments” in the plural.

Greg Clark: Correct.

Q212 Chair: Are you looking, in that context, to broaden the definition of the ring fence from previous spending rounds?

Greg Clark: I accept the implication of your question that science does not just happen in the science budget of the Department for Business, Innovation and Skills. There is important scientific research and development work, as well as science in the way that we might define it more narrowly, in other Government Departments, and that should be a matter for the debates that we have about the science budget. We have given a strong indication that we want to look at that in advance of the spending review so that it can inform it.

Q213 Chair: That is in the context not just of protecting the science per se but in terms of the important work that science does to deliver that Department’s objectives.

Greg Clark: Absolutely.

Q214 Chair: You will have seen last week’s report by the National Audit Office on forensic science. That report stemmed from our two earlier inquiries. One of our concerns is rather like the conversations that I have had with you and your predecessor about what happens with, for example, the NERC laboratories and their restructuring, and we said that the issue was not who owns them but the protection of British science. That is something that you and Sir Mark have previously agreed.

Similarly, given the restructuring of forensic science, in the context of your previous response we want to be assured that quality British science is protected, whatever happens to that rather important sector. You see that as part of your overall role in the run-up to the 2015 spending review.

Greg Clark: In the case of the forensic science service, that is a particular matter that this Committee has opined on, and there has been much debate on it. I do not want to comment on that, as it is something on which decisions were taken in times past. Neither am I saying that I am declaring control over every piece of science and research right across Government. Clearly, I do not have that. However, I agree with you that I do have an interest in it, and I think the Science Minister should have an interest in making sure—going back to your first question—that the whole of Government benefits from the best quality of scientific advice. Through my own choice, we explicitly chose to make a very clear mention of that in the Science and Innovation strategy, which, as your Legacy report is doing, is looking to the future. We have entrenched that, and it is my strong view that that is now the Government view. It is not just my view; it is now adopted in our strategy.

Q215 Chair: I chose that particular example of forensic science because it is unusually, for want of a better word, a commodity that starts its ownership in one Government Department and ends up in another. It was predominantly commissioned by investigating police forces, but finally it comes under the ownership of the criminal justice system in the courts; so there are cross-departmental issues. Another example might be to look at what has happened in the Department for Education, where the research spend fell from £31 million to £12 million between 2008 and 2013, which were the last figures that I have seen.

Greg Clark: The reason for the inclusion of this paragraph in the strategy was to draw attention to the existence of important budgets across Government Departments, and to say that we need to consider before the spending review how they should be viewed across Government. That is a significant statement, but you obviously would not expect me at this stage to go into the line items of every Department.

Q216 Stephen Metcalfe: It is pretty universally recognised that, as a country, we are among the best at blue-sky research and developing new concepts and new ideas, but perhaps we do not necessarily do as well as we could in the commercialisation of those ideas, in taking them from bench to market. We looked at that in our “Bridging the valley of death” report. Can you tell us whether the establishment of the British Business Bank has improved that situation—whether it has increased access for small and medium-sized companies to the kind of finance that they need?

Greg Clark: Let me say a couple of things about that. As the Committee said, it is a long-standing observation that people have made about the UK. We have great ideas, but we do not always translate them into practice. There is a sense that this is improving. We are moving up the league tables for innovation, particularly for university-industry collaboration, which I know has been a concern of the Committee. We are making big advances. Is the problem completely solved? Obviously not. As the Chair said, these reports were published before my time in office, but it has given me a welcome opportunity to look at what the Committee recommended.

The “Bridging the valley of death” report was particularly influential when drafting the Science and Innovation strategy. There are various references in the innovation section, and I hope that I will not be accused of scientific plagiarism if there is common language,

but the analysis that you made in your report has found expression here. For example, the British Business Bank has been established, not least to bring together what your report said was sometimes a confusing array of different initiatives available to business. It is still early days, but the signs are promising. In the first 12 months, 21,000 small and medium-sized businesses have been helped by the British Business Bank. The recommendation has been adopted, it is being implemented, and I am sure that your successor Committee will want to keep a close eye on its performance.

Q217 Stephen Metcalfe: Thank you for that, and, yes, I am sure it will. You said that 21,000 businesses have been helped.

Greg Clark: Yes.

Q218 Stephen Metcalfe: Presumably, that is the headline figure. Do we know how many of those would be using that help to further research or to commercialise research?

Greg Clark: I do not have the figures to hand, but I am happy to write to the Committee to inform its final report, if we can break it down by the sources of help that they obtained.

Q219 Stephen Metcalfe: If you can, that would be very useful.

The other thing that we found problems with in our report was access to equity markets. It was about encouraging small and medium-sized businesses that were trying to commercialise something or to grow their businesses to think of approaching equity markets, but it was also then about how you educate the equity markets to understand what it is that a small technology company is bringing to market with nascent technology and trying to grow. Have the Government had any role in bringing those two sides together?

Greg Clark: Yes. I had some experience as Financial Secretary to the Treasury, and one of the frequent conversations that I had with institutions such as the London stock exchange, for example, was to establish an easier way to the market for those smaller entrepreneurial and, in some cases but not always, more risky companies. There was great interest in that and a great response to it. Outside the main market, there has been great concern, and a great move to attract more of those types of companies to consider a listing, which can help to address the problems that you mention. Not only is it very much on people's agenda but it is being acted upon.

Q220 Stephen Metcalfe: We are pleased with the direction of travel. The question is how to communicate that and to get as many people as possible to understand that things may be improving.

The final area I want to look at is the use of R and D tax credits. What is the split between the large and small companies that use them? There were some changes in the amount that they were able to claim back. How is that market looking?

Greg Clark: Again, I do not have the figures to hand, but in response to the increased generosity of the taxpayer, if I can put it like that, claims have risen by about a third in the last year. As to the split, I shall make sure that you have the figures to be able to reflect on the matter.

Q221 Stephen Metcalfe: The number of small and medium-sized enterprises claiming has gone up by a third.

Greg Clark: Yes, of those businesses entitled to it. I shall write to the Committee with the figures. They are broken down by different sizes of business, but I shall make sure that you have them.

Q222 Stephen Metcalfe: The overall amount being claimed—the totality—has gone up, but we do not know the split between small and medium-sized enterprises and large businesses. Is that right?

Greg Clark: SME claims have gone up by 30%, but I do not have a percentage figure for the larger ones.

Q223 Stephen Metcalfe: It seems to be working well.

Greg Clark: Yes.

Q224 Stephen Metcalfe: That is good. We are pleased with the direction of travel. One thing, and this applies not just to technology businesses, is that we do not seem to be very good at getting businesses beyond the smaller medium-sized companies. We have a missing level of business in the UK of largish medium-sized businesses. Is there any evidence that any of these changes are having an influence on that?

Greg Clark: It is still early days. To move from something that has been established either as a start-up or a small business to something that is clearly recognisable as a medium-sized business—so that it has bridged this valley, in that sense—to identify it as having reached the next stage, probably requires at least a couple of years, so there is a lag in the data. However, I can say with confidence that right across the country there is more explicit and clearer support for companies making that transition.

One of the things that I have been working on with all the local enterprise partnerships across England is to create what are called growth hubs. They are precisely that; they are for existing companies that are growing, that have the capacity to grow, and in each area of the country, in each one of the 39 local enterprise partnerships in the UK, there are people there dedicated to helping them do that. Whether that is through access to finance or access to export markets—the UKTI, for example, plays an important role in that—there has been a big change, and it was drawn on the advice of the Committee that there

should be a greater coherence to the arrangements, for the purposes of making them visible and accessible to businesses.

Stephen Metcalfe: Thank you very much.

Q225 David Tredinnick: I want to ask you about procurement budgets. What has your Department done to ensure that a significant proportion of the procurement budgets of all Government Departments are accessible to small and innovative companies? Secondly, what discussions do you have with the Cabinet Office about this, if any? You have already set out your stall, saying that you are the Science Minister.

Greg Clark: Yes.

Q226 David Tredinnick: Will you explain that relationship as an adjunct to the first part of my question on accessibility?

Greg Clark: There are a couple of points. I speak frequently with Francis Maude, my colleague in the Cabinet Office, who is responsible for the machinery of Government. He takes a particular interest in this. He is quite a crusader on the matter, and we have regular conversations about it. In terms of specific initiatives, there is the SBRI—the Small Business Research Initiative—for which we have set ambitious targets right across Government. We have moved a long way, and procurement under the SBRI is up by 75% compared with when we came in.

Q227 David Tredinnick: There is a pretty low base, then.

Greg Clark: I was going on to say that I don't think that is good enough. We need to go further. In recent months, I have been in discussions with the Cabinet Office and the Treasury, which obviously has an interest in financial matters across Government, to reinforce the seriousness with which we take this. However, Mr Tredinnick, I accept what you say—that we have further to go on it.

Q228 David Tredinnick: The next question is on what I might call the Sir Humphrey factor. To what extent are you making sure that your civil servants are trained so that they understand the benefit of procuring from innovative, small and medium-sized enterprises?

Greg Clark: I emphasise to Ministers—in the case of Francis Maude, he does not require my further emphasis because we are completely *ad idem* on this—and to officials across Government that an improvement in the availability of Government procurement to small businesses is a very important Government priority.

Q229 David Tredinnick: Including training courses.

Greg Clark: It is not for me to arrange training courses. It is for me to give a policy direction and instruction that this is important, and it is for officials to deliver it.

Q230 David Tredinnick: When the Public Accounts Committee looked at the matter, it found that there were quasi-monopoly suppliers for public service contracts and that SMEs were being squeezed out. Does that not suggest that your Department has a lot to do in order to embed innovative procurement procedures? I am slightly concerned that the Public Accounts Committee is gainsaying some of the points that you have made.

Greg Clark: I do not think that there is any contradiction. We all want to go further. We have made some progress, but we can go further. In my own Department, use of the SBRI is at 42% from SMEs, so we are making progress.

My officials have given me some information on how these things are embedded. You mentioned training. For example, it is the case that procurement skills are now part of the civil service training programme that is required of civil servants as part of their acquisition of competencies for promotion. There are various other training courses in identifying potential partners for procurement. Commercial engagement has been identified in the civil service capabilities plan as a priority. The message is getting through, but as with the “Bridging the valley of death” report, the interest of the Committee is important in pushing it forward.

Q231 David Tredinnick: I move on to results. Do you have any idea what value of Government contracts have been allocated or allotted to businesses supported by the Small Business Research Initiative since 2012? Do you know what percentage of Government procurements budgets that figure represents? What is the percentage?

Greg Clark: I do not have the figure in my head, but I am certainly happy to write to you to inform you of it.

Q232 David Tredinnick: In 2013-14, do you know how much of your Department’s annual budget was spent directly with SMEs? Do you have any idea of that or would you like to write to us on that?

Greg Clark: I think it was about 30%, but I will give you the precise figure.

Q233 David Tredinnick: What was the value of projects supported by the Department through the SBRI? Again, if it is convenient, you can write to us.

Greg Clark: I will write to you, but my recollection was correct: BIS currently spends 30.8% of its budget on SMEs. We want to raise that. Across Government, it is just short of 20%.

Q234 Stephen Mosley: We did our “Bridging the valley of death” report just over two years ago. In their response, the Government made a big deal about innovation vouchers. Would you update us? The use of innovation vouchers seems to have declined in the past two years, and we have not heard as much about them. Would you update us on the position?

Greg Clark: Innovation vouchers are part of a suite of products that Innovate UK has. I had not picked up the feeling that they were not as popular as in the past, but they are one of a number of offers that Innovate UK has.

Q235 Stephen Mosley: It was not that so much as the big focus in the Government’s response on innovation vouchers. It does not seem to have lived up to the hype that we received at the time. I wonder whether you have any comment to make on that.

Greg Clark: I am not sure whether they were hyped at the time or whether they were mentioned. In the last six months, I have been working quite closely with Innovate UK. It has a lot of initiatives, and I am sure we are going to come on to talk about the Catapults, for example. I have taken quite an interest in the KTP—the knowledge transfer partnership. I get the impression that the institution is now establishing itself as a useful place to go if you are a growing business, especially in the knowledge and innovation space.

I shall write with the facts and figures, but we are getting to the point now, through the innovation vouchers, where you can see some products coming to market as a result. That brings us back to the kind of questions that we had from Mr Metcalfe, as to whether you can tell whether a small company is now a medium-sized company. We are now getting to that point, and my officials have just shared with me an example of acorns leading, if not to oak trees, at least to some promising saplings. A £3,000 innovation voucher, combined with a knowledge transfer partnership, has resulted in a rechargeable battery company now employing 90 staff and exporting 92% of its output.

It might help the Committee if I were to write with a few more examples of things that were given out as vouchers. It is interesting to know how many were given out, but also to know what has happened to them.

Q236 Stephen Mosley: Looking at the bigger picture, you mentioned a couple of other things. Do you have any evidence to show whether the commercialisation of innovative technology has increased over the past couple of years?

Greg Clark: It is a bit like the situation with medium-sized companies; the data lags, so it is somewhat anecdotal. That is why I point to particular examples where it has, and that is one. Perception and mood can be important in these things. The UK’s position in the rankings as a place that is supportive of innovation has increased. These things are done objectively by institutions other than the Government, so I dare say there is something in it.

Of course, evaluations are under way. Whenever we have a programme like this, evaluations are under way. There is still more analysis to be done, but early indications

suggest that, where you have these instances of public funding, it brings in—it attracts; it crowds in—about 30% of additional private funding. I do not want to pretend that we are at the point where there has been a comprehensive and definitive study of the effects of this. Some of the initiatives have been taken in recent years, and it will take a few years for their impact to be definitive.

Q237 Stephen Mosley: Another of the recommendations in our report was that universities should be more welcoming to staff from non-academic backgrounds, and from business and commercial backgrounds. Is there any evidence that that has happened in our universities?

Greg Clark: Yes, there is. I spend a lot of time in our universities, and with my responsibilities for local growth I visit a lot of the collaborations between universities and business. I would say that it is now the default in universities—they are not just open to partnership with business but they positively go out to attract them.

It goes both ways. In terms of the business community, vice-chancellors of universities are now represented on the boards of every local enterprise partnership. There is a huge increase in the sense in which universities regard themselves not just as part of the business community in their locality but as one of the leaders. That is one of the things that I am particularly gratified to see.

Q238 Stephen Mosley: We are going to talk about Catapult centres in the next question, but I am a big believer in the fact that, in this job, the way to get things changed is to keep bringing them up and to keep nagging. I shall therefore mention the University of Chester, and the work that it is doing at Thornton. I know the chairman of that particular organisation. Are you aware of the work that it is doing to bring people together?

Greg Clark: I am indeed. I met one of the leaders of the University of Chester a couple of weeks ago. That is a good example of a university that sees itself as being not just connected with the business world but benefiting from those connections, both for its students and for businesses.

Q239 Stephen Mosley: Turning to a slightly different topic, but related, has there been any evidence that the Public Sector Research Establishments are able fully to exploit their capability to support Government policy in supporting innovation in the business world?

Greg Clark: In the Science and Innovation strategy, we very much set out the ambition that the Public Sector Research Establishments should, as universities and other establishments, fully engage with business. There is a range of establishments there, although there have been some changes. Not all of them fall under this definition, but I give an example of something that is publicly funded that is not a university. The Met Office, for example, will be familiar to many members of the Committee, and I am sure that you will have been to see its work. Its new supercomputer, which has been commissioned and paid for, will be located on the university of Exeter Science and Business Park. One of the explicit reasons and benefits of that is that it should be able to

ensure the greatest collaboration between business and the university. That is a good example of where, generally, we want to go.

Q240 Chair: That was particularly interesting, and I note Stephen's comments about which I have a non-pecuniary interest. Have you had any discussions with your colleagues in the Treasury about the interface or relationship between small businesses and universities? The tax bases of universities and small businesses are different, and where small businesses are using university research facilities you can get into an awfully confused mess. That is something that has been raised with me by people in the advanced manufacturing sector. It would be something worthy of a careful study.

Greg Clark: I take that advice. The Treasury has been very engaged.

Q241 Chair: It was pleasing to see, despite our criticisms of the definitions, that the Treasury was a lead signatory on the Science and Innovation strategy. That is good news, but there are some complex delivery mechanisms that they need to think of in detail.

Greg Clark: Indeed. I might also mention the university enterprise zones that we are piloting. That, of course, involves the enthusiastic participation of the Treasury.

Q242 Mr Heath: I note the gross abuse of the Committee's procedures to pursue constituency interests by some of my colleagues. We do not have a university in the administrative county of Somerset. We are the only county in the country not to have one. I make that point to begin with, Minister.

You anticipated that we will come on to Catapult centres, and it is important that we do. Do you now have evidence of the degree of involvement of SMEs with Catapult centres—whether they are getting directly engaged, and whether they are benefiting from it?

Greg Clark: Yes. If I take the high value manufacturing Catapult, one of the reasons that we got an expansion of the budget in the autumn statement was that it was oversubscribed in terms of the number of projects in which it can participate. I do not have the breakdown between larger and smaller businesses, but I have visited most of the Catapults myself, and in each and every case I have had conversations with the small businesses in the Catapults that were working on innovations. A particularly memorable one in the high value manufacturing Catapult was a virtual reality room that will be available to architects, for them to demonstrate their buildings and have people virtually walk through them. That is fantastically transformational, and that is a small business working with the Catapult.

The reason that I give that example, and the reason that lies behind your question, is that in some ways the smaller businesses would not otherwise have access to the research and development infrastructure that perhaps the larger businesses could count on. It is important, and from what I have seen it is represented there. I shall see whether it is possible to split the figures on use between large and small businesses.

Q243 Mr Heath: One of the observations that the Committee received previously was about the difficulty that SMEs have in accessing large-scale high-tech testing facilities. The intimation was that the Catapult centres would fill that gap. Are you satisfied that that is happening? It sounds as though you are.

Greg Clark: Governments are elected for five-year terms, and it would be nice to think that everything was completed and that the results were definitive at the end of it, but they clearly are not. The Catapults are building up in many cases. They were launched at different periods, but in each of the ones that I have been to, they have had a clear commitment to attracting small businesses for exactly the reasons that you mention.

Q244 Mr Heath: They have that commitment, but how do businesses know? How do architects' practices across the country know about the wonderful facility that you describe and that they might have access to it?

Greg Clark: I would say two things. First, Innovate UK and the people in the Catapults have people who are dedicated to going out and liaising with small businesses, and to spreading the word. It is their job, as it were, to prospect for small business partners.

The other thing goes back to some of our earlier discussions. In the past there has been a fairly confusing landscape of what help and support is available to businesses, especially small businesses in particular places. The advantage of having these growth hubs, with people who are there to bring them all together, is to give bespoke advice to each business—for example, to say, “If you have an interesting transport app that you want to develop, you could go to Milton Keynes and talk to the transport systems Catapult there. They would be right up your street.” They are briefed and informed about what is available.

Q245 Mr Heath: Would they advertise in the trade and professional press, for instance? It seems that there are more ways of reaching these companies than simply waiting for them to know that they have to ask the right question.

Greg Clark: There are multiple ways of getting the message across. One of the things that I am sure members of the Committee will be familiar with over the years is Innovate's annual conference. I had the great pleasure of speaking there, and more importantly of meeting some of the other exhibitors. That is a tremendously successful shop window, not only to show off some of the successes but to say what is available in terms of support. That, you might say, is a kind of promotional activity, but I do not know whether it literally has paid advertising budgets for trade magazines. I shall write to the Committee and share that information. If it does not, that might be a suggestion.

The Committee knows as well as I do that the way that Innovate UK and the Catapults are organised is very much at arm's length. I do not direct them. They have independent boards and chief executives, but I am sure that the view of the Committee and perhaps even my view might carry some weight.

Q246 Mr Heath: It occurs to me, from what you said earlier about the capacity of small high-tech companies to open new export markets, to ask to what extent would the Catapult centres and others be plugged in to Milan Expo?

Greg Clark: That is a very good question. Milan Expo is going to be important. I was discussing this with the Italian Science Minister a couple of weeks ago. I cannot say for certain, but my strong expectation is that it will be, because that is what we use to show off what we are most proud of. Many of the technologies that we are developing in the Catapults are part of that. I shall check that that is the case.

I shall write with the comprehensive figures. I mentioned that the high value manufacturing Catapult has been oversubscribed, and I am told that in the last financial year it had worked on 1,500 SME projects. As a percentage of the total, I shall write to you.

Q247 Mr Heath: I have one more question. You may think it a cheek, coming from a Committee that today is all male, but the Government have a commitment to the Davies review's findings to increase the number of women members on the boards of the FTSE 100 companies. If we look at the Catapult centres, we find that all the CEOs and all the chairmen are men. It doesn't look as if the Government are quite carrying out their own philosophy.

Greg Clark: I very strongly agree with your observation. We might be going on to talk about your work in this area. It is incredibly important. It is disappointing, to put it extremely mildly, that that is the case. It is important that the Catapults—and, indeed, Innovate UK—lead by setting a good example.

I do not have any role in the appointments for the Catapults, but I do in the case of Innovate UK, and I have been very clear that I will not accept being presented with lists that consist entirely of men, when there are hundreds of thousands, if not millions, of excellent candidates who ought to be being brought forward and presented for appointments. I have taken a particular interest in this. With Francis Maude, I hosted an event in the Cabinet Office just before Christmas to encourage more people from diverse backgrounds to apply for these posts. Frankly, however, it is not good enough just to encourage people to apply. My view is that when these recruitments are being made you need positively to go out and talent spot.

I am not at all resistant to your observation. It would be very helpful if the Committee reinforced it in its report.

Chair: We are going to develop that point.

Q248 David Tredinnick: I want to stay with equality and diversity. From what you have said, do the Government have a role to play in increasing diversity in higher education careers, or is it purely the responsibility of the higher education sector?

Greg Clark: They do have a responsibility, and I take that responsibility directly and personally. I do not have the power, nor would I want to have it, to direct universities and institutions. There is, as the Committee well knows, a firmly established autonomy for universities, learned societies and others, and that is absolutely as it should be. Does that mean that I cannot make some pretty pertinent observations? No. I can and I will.

It is a matter of great concern to me that, while we are making some progress in attracting more young women in particular, but also people from other under-represented groups, to come into science and technology, the leadership of our universities, for example, is still lagging way behind what we would expect of a set of organisations and institutions that want to promote opportunity not only for women and others who are under-represented but those whose very existence depends on excellence. My view is that, so long as you are arranged in such a way that for one reason or another you are not getting the right people with talent there, you are doing yourself a disservice.

Q249 David Tredinnick: You said that you are against all-male shortlists in terms of appointments, using a jargon that we all understand, and that you want to see women having the opportunity to be selected. Do you think that the universities should also adopt that philosophy and make sure that they have a gender balance when selecting academics for posts?

Greg Clark: In terms of shortlists, sometimes if there are one or two there might be good reasons for that, but I do not want to be presented with a list of 12 people when I am certain that there are talented women and other under-represented groups out there. I do not want to cross the line into saying what the policies of universities should be, but I am using my influence in what I hope is the right direction.

I have set up a steering group for diversity in appointments across the science and university sector. We are meeting next month, and we have people from universities, the research councils and industry who are dedicated to being active in solving the problem—not simply to make sure that the policies are right and that adverts are expressed in the right way, but positively wanting to go out and find talented people and encourage them to apply.

Q250 David Tredinnick: How much has the issue of money affected your policy? Am I right in thinking that, in cash terms, your funding diversity programme was reduced by two thirds between 2010 and 2015? Her Majesty's Government say that they will review the reach and effect of their programmes as part of the 2015 spending review process. Are the Government promising to increase diversity in STEM careers while at the same time drastically cutting budgets?

Greg Clark: To be frank, Mr Tredinnick, it is not principally a matter of money. Across these different organisations, some are in receipt of public funding and some are not, and there is a way to go. It is a matter of practices and what you do when you recruit. For example, if you are advertising, it is not sufficient to put an advert on a website and wait

for people to come, and then be disappointed that only a small number of people apply. You need to use your free networks to spread the word and to get people to apply.

Some funding is being allocated. For example, the STEM ambassadors programme has volunteers engaged in it, but we help co-ordinate that, and 40% of STEM ambassadors are female. They are usually younger people; they are fantastic role models to be going out and saying that a career in STEM is a great thing to pursue and to aspire to.

Q251 David Tredinnick: Some members of the Committee went to a STEM event at the Science museum. It was wonderful to see so many brilliant academics— indeed some from my own constituency.

Do you think short-term academic appointments, the need for academic reputation building and patronage, and the difficulties of maintaining a work-life balance disproportionately affect women, deterring them from pursuing academic careers?

Greg Clark: I know that the Committee has considered this in detail, and I do not want to give a glib response, because frankly you have devoted some time to it. I note your observation. It stands there for universities to reflect on. In other walks of life, employers have adjusted their practices in order to be able to accommodate people of talent who otherwise would not be able to work there, and that applies to universities and research institutions.

Q252 David Tredinnick: Do you think that the Government have improved the academic career structure for women? Do you think that it is easier for women to return to an academic career following a career break?

Greg Clark: I do not want to be obtuse, but the Government do not have the power to determine career structures. That is for the universities.

Q253 David Tredinnick: Governments are facilitating. They make things possible, do they not? The art of the possible is politics. Is that not what RAB Butler said?

Greg Clark: I was going to say that we have influence. If you talk to anyone in the university sector, they are well aware of my views on this, and the importance that I attach to it. I shall be speaking next week to vice-chancellors, and I shall be reinforcing that. I have set up a group, drawn across the sector, not really to advise me but for them to take it further themselves. It is in their interests to improve it, and I hope and expect that they will.

Q254 Chair: Before we leave that point, we talked last week about the relatively short time frame of the advert for John Perkins's successor. What are you doing to go out and talent spot?

Greg Clark: We have done precisely that. When the advert was made, the officials in my Department and beyond in the scientific community were asked to approach people and to invite them to apply—to make a personal approach. That was the instruction that I gave.

Q255 Chair: How has that talent spotting been done? Is it based on documents, information held within the Department, or have you actively gone out?

Greg Clark: It is about activating personal networks. One of the fantastic things about the sector, as you know, is that it is highly collaborative, people talk to each other and they use networks more intensively than in many other walks of life. It is about making use of them, and the group that is to meet under my chairmanship is there to be personally active in encouraging people to apply for these positions.

Q256 Mr Heath: Chair, I have a constituency interest in the space sector. I have a company that made essential parts of Beagle 2, which is happily still alive, if stranded. How do we use the advances in the space industry across a wider Government sphere? How plugged in are Government Departments to the space sector, and what is being done to encourage them to look at what is going on there?

Greg Clark: They are increasingly well plugged in. There is a rising tide of enthusiasm about space, not just in this country but around the world. As you know, and your report was helpful in this, it is a tremendous success story. More people need to know about it, but the word is getting out. The fact that one in four telecom satellites commissioned in the world are built in the UK is a fantastic success story. It is known in Government, and the recommendation of your report, I know, was very influential in terms of the Government's response. In response to your report, we have launched the Space for Smarter Government programme, to co-ordinate and draw attention to the possibility of using space. Mr Heath has had experience in DEFRA, and that is one of the Departments where satellite monitoring of environmental conditions and agriculture is of particular benefit. It is very much on the cross-Government agenda.

I might just mention another thing. We have set up the satellite applications Catapult, which again is Government funded. As with all Catapults, the mission is to bring together the private and public sectors. That is another example where we are joining things up. I have had the great pleasure of visiting the Catapults and many of the industrial sites.

Q257 Mr Heath: Would you characterise the Government and the public sector generally now as an intelligent customer?

Greg Clark: They are more intelligent than in the past. It is about future opportunities; so there is a bit of catch-up to do, which the Committee recommended.

I mention the Met Office again. The space weather capability that it now has is tremendously important for the Government. Again, Mr Heath, having the benefit of recent experience in Government, you know that the consequence of adverse space

weather events can be very important for the resilience of important parts of the infrastructure, such as energy and telecommunications. These connections are increasingly well understood, I would say.

Q258 Mr Heath: Wearing another hat, as a trade envoy, I found the Met Office's interest in developing new markets laudable.

That brings me to my next question, which is on the extent to which the Government have looked at the competitiveness of the sector in overseas markets, and whether the export licensing system is fit for purpose in this area. Has any work been done on that?

Greg Clark: Yes, we have looked at it. First, the competitiveness of the UK space sector is revealed in its performance. In terms of the UK, it has grown by an average of about 7% a year in the last couple of years, which is way in excess of the rate of growth of the economy. It has generated 5,000 new jobs in the last couple of years alone—that is directly, and then of course there is the supply chain. We are winning orders galore.

It is a tremendous success, but, again, the Committee recommended some changes. A particular concern was liability insurance for sending things into space. For smaller entrepreneurial companies, that seemed to be a problem, so we have reduced the requirement for liability insurance from £100 million to €60 million, and unlimited liability will be capped at €60 million through legislation—it is in the Deregulation Bill that is before Parliament.

In terms of the relationship on export control order arrangements, about which some concerns were expressed, Dave Parker, who is with us, is responsible for a lot of the Space Agency's work in establishing a fast track; if there are any export concerns, it has people that can help in that.

Q259 Mr Heath: On the European Space Agency, the Government response to us was that “It is manifestly unfair that such a major contributor to ESA as the UK does not have a national holding a post at Director level or above.” I am not sure that “unfair” is entirely the right word—“inappropriate” possibly—but what has been done about it?

Greg Clark: We had a ministerial meeting on this just before Christmas, and I raised the matter with ESA leadership. I take your view, Mr Heath, that I do not want a UK person to be there whoever they are: I want a UK person there because we have very talented administrators and very capable space scientists, engineers and industrialists. We have some good people, and I am hopeful that we will be able to remedy that situation.

Q260 Mr Heath: A reshuffle of places is coming up, is it?

Greg Clark: Indeed, exactly. I would say that the point has been understood and well taken by the leadership of ESA.

Q261 Graham Stringer: I would like to talk about astronomy and particle physics. The Government's policy on funding for science is to protect the cash base. It is good that there were not more cuts; one would wish for a bit more, but one understands that. Within that context, however, I am concerned with what has happened to particle physics and astronomy. It is the part of science, very small and very large, that really inspires children and gets them involved in science, yet it seems to be taking a disproportionate amount of cuts. While you have been in post, have you had time to consider and reflect on that?

Greg Clark: I have read the Committee's report and its observations. I am in a somewhat difficult position, because most of the decisions are taken by the STFC. We talked on a previous occasion about the role of the research councils, and one of the important applications of the Haldane principle is that we should not direct the work in terms of the particular allocations of the research councils. I note what has been said, but I do not want to give a running commentary on their decisions. I could do so, but I want to abide by the principles in the Science and Innovation strategy that we said we would adopt, which is to allow these decisions to be taken by arm's length bodies.

Q262 Graham Stringer: I do not think that we can allow you to hide completely behind the Haldane principle.

Greg Clark: I did not think you would.

Q263 Graham Stringer: While I would be appalled if you decided that you wanted to do research in this particular kind of nuclear physics as opposed to that kind, it is legitimate for Ministers to decide on the quantum going into science. We are getting 50% capital cuts in both astronomy and particle physics, areas where we are pre-eminent in the world. In the northern hemisphere, we are left with no research grade telescopes, both in the visible and the infrared spectrums. There is talk about the Met Office improving our space weather forecast, yet our terrestrial-based solar physics has been devastated.

You may not know this, but under your predecessor but one there was a mistake in the particle physics and astronomy research council's budget, and it seems to be coming through as an accident rather than a decision by the research councils or Ministers, I believe. If you take a step back, where we are really good at something we are cutting it. Can you justify that?

Greg Clark: I agree with you that it is an area of UK excellence. We are first in the world in our reputation for particle physics, and third in recent rankings in astronomy. That clearly conforms to what I described to the Committee and in the Science and Innovation strategy as areas of strength. Are these areas of strength likely to be in demand in the future? Unambiguously, yes, so we need to keep faith with it.

The funding comes through the STFC, and certainly my enthusiasm and the Committee's enthusiasm for this area of research is well known. It has to allocate the budgets that it has, but it is fair to say that we have made some recent decisions. For example, in the capital consultation—it was one of the pre-announced decisions—we pre-committed ourselves to

the square kilometre array, and we very much hope that we will be able to have it run from Jodrell Bank.

We want to continue that position of eminence in this field. I agree with your interpretation of Haldane—that particular funding decisions have to be taken by the research councils—but that is not to say that Ministers and Committees should not have views as to whether it is an important and desirable area, and I think unambiguously that it is.

Q264 Graham Stringer: While the square kilometre array is a good thing, and the Committee has supported it, it does not deal with the point that we do not have any research grade telescopes in the visible or infrared spectrums. I make that as a point. The other side of the cuts, as well as the capital cuts, is that we have reduced the number of post-doctoral research physicians. What are you doing to reverse that? As well as the funding in the area, these are the people—the new Brian Coxes—who will inspire others. Are you looking to get more post-doctoral research?

Greg Clark: Yes. We have allocated about £22 million for postgraduate training, including post-doctoral training, in this area. Clearly, across the board, in any area in which you want to retain and increase an eminent position, you need to invest at every stage, whether it is doctoral studies or post-doc studies.

Q265 Graham Stringer: Finally, as we are all focusing on the election, I ask you to take a look at this whole area and what has happened to the funding over the last six or seven years. It is not Haldane, and it is not ministerial decisions; in the middle, there have been cock-ups on budgets over the last six or seven years. You might be interested to take a look and see where that is going.

Greg Clark: I will indeed.

Q266 Chair: Dwelling on Graham's point on joining up Government, two to do with Education and one with another Department, you have been invited—I think that you have accepted, although somebody behind you might say no—to attend the exhibition at the National Schools Observatory on Monday 16 March. There is an exhibition in the Upper Waiting Hall—and somebody behind you has nodded.

You will recall from our previous discussions that John Womersley, the people that run the National Schools Observatory and I met your predecessor, David Willetts, to discuss the bridge between BIS and Education on funding projects like this. Have you made any progress with developing that kind of relationship with the Department for Education?

Greg Clark: We have an increasingly warm relationship with the Department for Education. When it came to writing the Science and Innovation strategy, the Department was happy—I was going to say that it was happy to accommodate, but it suggests that there was not equal enthusiasm on its part, which there was—to create some initiatives to

improve the possibility of specialist science teaching in schools, for example, which is a big part of the Science and Innovation strategy.

When it comes to these further outreach programmes, a lot of funding comes from the STFC. You mention John Womersley, and I am happy to talk to him, but relations between my Department and the Department for Education on science matters are constructive and positive. We completely recognise the division between Departments in terms of who is responsible for what. If you want to have a successful science base, you need to start right at the beginning by getting people interested in studying science at school, and allowing them to become expert. That engages both of our Departments equally.

Q267 Chair: Perhaps on 16 March you could persuade one of your senior colleagues from the Department for Education to come along and join you.

Greg Clark: I am sure I will be able to.

Q268 Chair: While we are on the subject, in a private session before you arrived, the Committee was looking at Nicky Morgan's speech of last night. She seemed to be endorsing the views of this Committee in terms of the relationship with Ofqual. She said, "While I fully understand the concerns Ofqual have in ensuring that assessment remains rigorous and resistant to gaming"—that is a nice way of saying malpractice or cheating; by the way, we agree with that—"I am concerned that a decision to remove practical assessment from science qualifications is in danger of holding back the next generation of scientists." She went on in a positive way, as has been reported in the media today. Is it your view that it would be helpful if Ofqual did rethink the strategy that it has adopted? It certainly is the view of the Wellcome Trust and many leading science organisations.

Greg Clark: That is a matter for Nicky, but it is my view, and I know it is Nicky's, that conducting practical experiments in science at school is one of the ways in which people first develop a taste for the possibilities and the excitement in science. All of us want to ensure not only that that continues, but that if you want to see more young people going into science it is a good way of firing up an interest to see more of it.

Q269 Chair: I absolutely agree, but you will understand from your discussions with the science community, both employers' organisations and academics, that they want to see those practical experiments being properly measured and incorporated into the overall exam results.

Greg Clark: Yes. School exams are something that Nicky focuses on, and I cannot pretend that I am an expert in the technical aspects, but I do know and share Nicky's enthusiasm for practical experiments in science in schools—and the more of it the better.

Q270 Chair: Finally, as you know, it is usual after an oral evidence session that a witness like yourself would look at what they say on the transcript and provide us with clarifications

if they have used a word inadvertently. In a previous session, your colleague the Life Sciences Minister made two very subtle corrections. I am concerned about their meaning. On two occasions, one about regulation within his sector and the other about the location of agricultural innovation centres, he changed the transcript from saying “our” preference is to regulate by product, on the first one, and, on the second one, “our” vision to be no more than an hour or so from an agricultural innovation centre. He changed both of those to “my”. That was not as a result of a turf dispute in your Department, was it?

Greg Clark: Absolutely not. This is the first that I have heard of it, and I have had no discussion with him. George is a fantastic enthusiast and expert in the life sciences, and we work closely together. We regularly have joint meetings between ourselves and with our officials. The previous week, we were at the Agri-Tech leadership council. He did not mention it, so it is probably just a syntactical thing, when looking at the evidence, that he—

Q271 Chair: We can conclude on both of those points that it is the Life Sciences Minister and the Science Minister’s views that—

Greg Clark: When George Freeman speaks to the Committee, he speaks on behalf of us both.

Q272 Chair: Excellent. Thank you very much, Minister.

Greg Clark: Barring any unforeseen events, this may be the last opportunity that we will have in this Parliament to meet, and I think that you are stepping down at the end of this Parliament. On behalf of my predecessor in this role, I express our gratitude for the interest that you and the Committee have taken during this Parliament. It is incredibly important to our shared view that we want to get more people as enthusiastic about science as we all are in this room. I know that the work of the Committee, even when it has occasionally nudged the Government in different ways and caused a bit of controversy, is good controversy if it gets people passionate about science. I am grateful for your personal contribution, and for the hard work of the Committee’s members.

Q273 Chair: That is very kind, Minister. Perhaps you can help us by ensuring that the next time comments are made by Ministers like yourself that, “We’re going to spend N million pounds on a computer for the Met Office”—I choose this one randomly as an example—you might just point out that the first place in Parliament where that message was recorded was by this Committee in one of its recommendations.

Greg Clark: Indeed.

Chair: We get there in the end, very slowly. Thank you for your attendance. We look forward to a more detailed follow-up on some of the questions that you raised, and all power to your elbow in terms of getting the right results for the 2015 spending review during the

remaining part of this Parliament anyway. What happens next remains to be seen, and there are split views on that around the Committee. Thank you very much.

Examination of Witness

Witness: **Professor Sir Mark Walport**, Government Chief Scientific Adviser, Government Office for Science, gave evidence.

Q274 Chair: Sir Mark, welcome back for what, bearing unforeseen circumstances and those unknown unknowns, might well be our last formal meeting with you. We want to cover some of the ground that we discussed before in terms of our previous reports as part of our Legacy report to the House.

I want to start with a question to which I am certain I know the answer from you, but, just to get it firmly on the record, I presume we agree that scientific advice to the Government should be independent.

Sir Mark Walport: Yes.

Q275 Chair: Can you define what you think makes that advice independent?

Sir Mark Walport: It is significantly in the quality of the individual. In other words, it is the independent-mindedness of the individual that matters at least as much as where they have come from, because I can suspect some of the drift of your question, Chair. Clearly, strong independent advice can come from outside Government altogether, which is why the role of the national academies is so important. It is why the role of the learned societies is so important, it is why universities are important and it is why advice from industry is important. But, of course, wherever you come from, you have some kind of affiliation, and so it is important to understand what that is. I also believe that scientific advice can come from people who have had a career in the civil service. Indeed, a great deal of the excellent scientific advice that I am able to transmit to Government comes from scientists in organisations such as the Met Office, the Dstl or many of the other organisations. It is in the quality of the advice, the independent-mindedness of the individual and their ability to speak in an untrammelled fashion. Those are the key criteria.

Q276 Chair: You did not touch on the process. We have talked before about the code of practices that exists.

Sir Mark Walport: Yes. In a sense, that codifies those criteria.

Q277 Chair: The Prime Minister has been on record—it was for something that I, unusually for a Labour politician, praised him—of accepting that chief scientists should be able to give

advice clearly and not then be used as a whipping post if the Government decide to go somewhere else.

Sir Mark Walport: I think that is true. It has been made clear to me by the Prime Minister and by other politicians that what they expect from me is independent advice, but of course that does not alter the fact that I am also subject to the civil service code.

Chair: Of course.

Sir Mark Walport: So I am not going to criticise Government outside, because that is against the code.

Q278 Chair: In an ideal world, is there anything that you would change about the current structure and provision of scientific advice to Government?

Sir Mark Walport: The structure is not the issue. It is the function that matters. As you know, there are different sorts of scientific advisory councils and there are different types of scientific advisers in Government Departments. The challenge is always to improve the quality and the quantity. Some Departments are more open to it than others. It is a constant drive to raise the game. In terms of the actual structural arrangements, fundamentally, they work quite well.

Q279 Chair: Notwithstanding the vacancies in the light of your remarks, do you think that you have a stronger team of Government chief scientists than when you started?

Sir Mark Walport: I don't want in any sense to be critical of the legacy. I inherited a very strong team and it remains very strong. From my perspective, it is somewhat stronger, but that is subjective. My predecessors did a very good job in inculcating a culture in Government that it is normal to have a chief scientist. I, constantly, strive to make sure that when we appoint new chief scientists they are the best possible appointees.

Q280 Chair: In a previous meeting we discussed the number of one-to-one meetings that you had had with the Prime Minister; I think it was two last year or something like that. Obviously you want to ensure, as part of your function, that scientific evidence is at the heart of Government policy making. Do you think that you or your successor ought to have more such meetings?

Sir Mark Walport: I have as much access as I need to do my job well, Chair. I know that if I need to see the Prime Minister I will be able to do so. I see the Prime Minister much more often in relatively small meetings around a table, where I have the opportunity to provide input. I have a very, very strong relationship with my permanent secretary colleagues, which is also very important, and with the Cabinet Secretary in particular. Although the relationship with the Prime Minister is paramount, it is the ability to meet Ministers in general. I am satisfied that, if you look at the breadth of my interactions with

senior members of the Government, I have what I need to do the job well and they know how to find me.

Q281 Chair: I take it from that that nobody has ever said to you, “No, you can’t have a meeting.”

Sir Mark Walport: Correct—no one has ever said that.

Chair: And that is how it should remain.

Sir Mark Walport: Yes.

Q282 Stephen Metcalfe: Changing track, I would like to talk a little about the horizon scanning programme, if I may. The Horizon Scanning programme team recently published a couple of papers, which were “Emerging Technologies: Big Data” and the other one was “Resource Nationalism”, which resembled our report on strategically important metals a few years ago. Are these not, really, current issues rather than horizon issues?

Sir Mark Walport: The answer is that they are a bit of both. I will make a general statement and then a specific statement in response to your question. The general statement is that the embeddedness of horizon scanning in Government has changed very significantly since I started in post. In response to your work and others, and I pay particular tribute to the review that Jon Day did, horizon scanning is very well joined-up in Government now. The Cabinet Secretary has his advisory group, of which most of the permanent secretaries are members. Jon Day and I chair a committee with the acronym of GOSH—Government horizon scanning oversight group—which is a case where the words were altered in order to fit the acronym, but leave that aside. The serious point is that that is a good committee and it brings together the senior officials across the spectrum. We are having joint events on a very regular basis; so the scale of horizon scanning has increased. We are bringing in outsiders; we have had a series of two-hour seminars over lunch on a variety of topics. An example is tackling risky behaviour in children and young people, and the future of trust, and they have been summarised in recent web outputs from the programme. The quantity and engagement have increased.

On the futures work, there is also a lot of other futures work that is going on. For example, through the work of GO-Science, we are conducting major foresight projects on the future of cities, and the question then is 2065 and an interim of 2040. So it is 25 years from this year and 50 years. We are doing work in response to Lord Filkin’s review on the future of ageing. So we are doing a lot of very far-sighted work as well.

Horizon scanning has got to be a mixture of scanning short-term horizons and long-term horizons. We have discussed the semantics of this here before, but there is a lot of very forward-looking work going on. There are many outputs from the cities and the ageing programmes. The easiest way to find them is to look at the website of the Government Office for Science, where we have numerous papers. We have had seminars in 19 cities around the UK. I am going to Cambridge this evening to do an event in partnership with

Prospect Magazine, asking the question of what Cambridge will look like in 2065. That stimulated foresight work in cities around the UK.

The scale and scope of horizon scanning is very broad. It attacks a lot of issues. More importantly, the transmission mechanisms within Government for the work are much more effective than they used to be. In the case of both ageing and foresight, there is now an internal Government directors' group that I chair in one case and co-chair in another to look at what the implications of this work are for Government policy.

Q283 Stephen Metcalfe: Thank you. The criticism that you are not being imaginative enough in what you decide to look at you would refute.

Sir Mark Walport: Yes.

Q284 Stephen Metcalfe: Can you take us through the process of how you, or the group perhaps, identify issues that should be looked at and how you decide whether you should look at them at the 20-year term, the 10-year term or the 50-year term?

Sir Mark Walport: Ultimately, that crystallises in the meeting that the Cabinet Secretary chairs—CSAG—but the answer is that we talk to a lot of people. As it were, we horizon scan ourselves to see what the horizons are. As we have discussed in this Committee before, a great deal of horizon scanning goes on outside Government. It is very important not simply to duplicate work that is done. The bottom line is that we consult widely, and, at the end of the day, of course, the horizon scanning that needs to be done needs to have a customer within Government as well. That is a criterion as well. Ultimately, there is no point in doing it if there is not someone on the receiving side of Government as well.

Q285 Stephen Metcalfe: That is an interesting point. That, therefore, requires someone to have identified what they might do with your research.

Sir Mark Walport: No, not necessarily; no, I don't think so. It is to have identified that there are scanning horizons that are relevant to Government issues. We don't know what the answer is before we start.

Q286 Stephen Metcalfe: No; okay. But there must be issues that a Government should need to know about but do not necessarily have a Government client at the point at which you start to investigate that or scan the horizon.

Sir Mark Walport: Yes and no. The model for foresight programmes goes back a very long way. They have always had sponsor Ministers. While not every single horizon scanning programme has an individual ministerial sponsor—Oliver Letwin is the Minister who has the very broad interest in this and responsibility—one of the things I have learned during my first almost two years now is that it is very important to think about not only outside Government but also inside Government in terms of making sure that there is a

customer for the work you do, because, otherwise, the right piece of work at the wrong time can have no impact.

Q287 Stephen Metcalfe: That is something we may want to explore again later. Was the analysis for the papers that were published in December last year completed in 2013?

Sir Mark Walport: I would need to check the precise dates. Things, wherever possible, should be published and as soon as possible.

Q288 Stephen Metcalfe: Yes, that would be the point. If you are horizon scanning—and we know that science changes rapidly—if something is completed in 2013 and we are reading about it and discussing it in 2014 or 2015, that is quite a big gap. I would be interested to know if there was any particular reason for that, or is it just the slow-turning wheels of Government?

Sir Mark Walport: I think the latter, yes.

Q289 Stephen Metcalfe: So we need to find a way of oiling those wheels.

Sir Mark Walport: I am always keen to oil the wheels.

Q290 Stephen Metcalfe: Absolutely; very good. You have talked about the way the recommendations in the papers are then communicated across Government. You have talked a little bit about some of the work you are already working on. You have talked about how you identify some of those projects—that you need a Government customer.

Sir Mark Walport: Yes, but also widespread external consultation. We do talk to a lot of people.

Q291 Stephen Metcalfe: Both inside Government and outside, to make sure—

Sir Mark Walport: Absolutely. The process for the foresight programmes is to have a lead expert group with an external chair. Sir Alan Wilson chairs the future of cities work, and Professor Sarah Harper, from Oxford, chairs the ageing work.

Q292 Stephen Metcalfe: Looking at the pipeline of issues that you have identified, is there anything that is not on there at the moment that you think should be, which has slipped through the grate?

Sir Mark Walport: If you take the scope of the technologies work that we have been doing—we might return to the time horizon, because in terms of policy impacts, if you are

looking at 2065, you have to read back to the nearer term if you are going to necessarily effect Government policy—we have a mixture of much more long term, where the immediate implications for policy are less, compared with areas such as emerging technologies, where the policy implications have been immediate and the impacts have been now. On emerging technologies, there have been a great many activities, including seminars in each Government Department at official level, usually attended by a permanent secretary, where we have discussed the impact of, for example, in DEFRA, the opportunities for remote monitoring. There is very active discussion around the emerging technologies, which is having an impact on, if not Government policy, how Departments do their work and how they deliver their services. To specifically answer your question, I don't think there are any huge gaps, but I am always open to input.

Q293 Stephen Metcalfe: This Committee recently did a one-off session on mitochondrial donation. Science is advancing very rapidly and getting to the point where, perhaps, we could have designer babies. Is that something—

Sir Mark Walport: That is an unfortunate terminology, if I may say so.

Q294 Stephen Metcalfe: It may well be, but it is possible.

Sir Mark Walport: This is an active area where there has been parliamentary discussion recently. It is a very good example where there is adaptive regulation, so the Human Fertilisation and Embryology Authority have been able to conduct a public debate. They have acted as a regulator who discusses with the public and Parliament. There have been votes. This, in a sense, is less horizon scanning than the hearing now. This is an area that I know about because of my previous life at the Wellcome Trust. We are at a point now where scientists at Newcastle, for example, are in a position, potentially, to offer prevention to families who have, in the past, had children with devastating mitochondrial diseases. I really do refute the concept that these are designer babies.

Q295 Stephen Metcalfe: I agree with that and I would support the technology in terms of how it is currently being framed for medical reasons, but the technology can be used for other things. With horizon scanning of the technology, what about the social impact of that further down the road and in other countries where we have no control where you do, genuinely, have problems arising, perhaps?

Sir Mark Walport: I would refer you to the annual report that I did on innovation and risk. You make the very important point that innovation in and of itself can often be used for both good purposes and bad purposes. That goes back to fire, in the first place. Imagine a discussion about electricity, where you have this stuff that comes out of plugs, and if you put your finger in them it will make you drop dead. The answer is that engineering and technology provides the innovation. It is for democracy, in the case of the UK, to decide how we use the technologies. The area you have picked of mitochondrial disease is a very good example where, clearly, there is the potential to use genetic engineering for purposes that many people would find unacceptable or disagreeable. That is why we have

Parliament, that is why we have you, and you are able to make those decisions on our behalf.

Q296 Stephen Metcalfe: I have one final question, just for clarity. Are you saying that horizon scanning wouldn't look at the social impact but only the technical?

Sir Mark Walport: No. Horizon scanning looks at all of the implications. Going back to another discussion, it is why the social sciences and humanities are very much part of the sciences. If you look at the report on innovation and risk, there is a large social science component to that.

Q297 Stephen Metcalfe: Did the Government, through their horizon scanning programme, see things like social media taking the role that they have now in society?

Sir Mark Walport: It is something that is certainly discussed. Societies around the world are questioning social media, which, of course, enables everyone to have a voice of a sort they did not have before, and what the implications are for governance in all varieties of models of governance. These are important questions. It turns on another area of technology, which is that new technology brings unanticipated consequences as well. We are seeing unanticipated consequences in relation to the internet where what humans have, effectively, done is created a new, ungoverned technological space, where the internet is not subject to individual national sovereignty, in much the same way as outer space is not subject to sovereignty. Is that a subject for horizon scanning? Absolutely, it is. Some of this is considered, for example, in the report on "The Internet of Things", which the Prime Minister commissioned.

Q298 Stephen Metcalfe: That brings me right back to my very first point, which is, do we need to be more imaginative in the way we select the topics for horizon scanning?

Sir Mark Walport: I don't know whether we need to be more imaginative, but we need to be imaginative—and you can always be more imaginative.

Q299 Stephen Mosley: Since we did our report into scientific advice in emergencies in 2010, we have seen scientific advisory groups in emergencies set up on three occasions: for Fukushima, the winter floods and Ebola.

Sir Mark Walport: Yes; correct.

Q300 Stephen Mosley: In 2012 we also saw the Enhanced SAGE Guidance being published. With that new guidance, could you tell us who is responsible for ensuring that SAGE complies with that guidance and what does that involve?

Sir Mark Walport: Ultimately, it is my responsibility because I chair SAGE. I came in after it had been established by my predecessor. In some senses, you would need to ask others what they think about it because I am rather *parti pris*. It seems to me that it is a mechanism that does work very effectively. We have very close communication between my team, the Government Office for Science and the Civil Contingencies Secretariat. We rehearse on a regular basis. We have substantial input into the National Risk Assessment. We are always discussing how it could be used more effectively. The National Risk Assessment itself is much closer to central Government than it has been. We are constantly trying to identify people who have the potential to help so that we know in advance, although you can never anticipate the precise details of an emergency. In my experience, it worked well. We brought in independent experts during the flooding. It worked well, indirectly, as a peer-review mechanism. I suppose it was slightly different from SAGE formerly, but we held a meeting at the request of No. 10 to bring in international experts on flood management, who essentially peer-reviewed what the UK was doing, so from the Netherlands and the United States. It is a mechanism that works pretty well.

Q301 Stephen Mosley: As to the SAGE that met in 2013-14 to look at the winter floods, were any lessons learned from that SAGE? Was any assessment made and were any lessons carried forward into the SAGE that was set up for Ebola?

Sir Mark Walport: Again, you probably need to ask others, but I think it worked very well during the flooding. In a sense, the lesson was that it is a model that works well. You always need to rehearse as well, and that is very important, but we have been doing that and we will continue to rehearse SAGE. I don't know that there were any lessons learned *per se* that meant it was different for Ebola.

Flexibility is quite an important aspect of this, so the SAGEs that we have conducted around Ebola I have co-chaired with Sally Davies, because she is a very senior colleague who has been absolutely at the coal face of managing the Ebola emergency. In that case, I worked by co-chairing SAGE with her. In the case of flooding, I chaired it on my own. We will always, to some extent, adapt SAGE to the circumstances of the emergency, and that is quite important.

Q302 Chair: Just to be clear on that, in the GO-Science 2013-14 annual report there is reference to the flooding event, and it says: "The SAGE Secretariat performed well during this crisis, although lessons have been learned to improve mechanisms for future events." What were those lessons?

Sir Mark Walport: I will need to write to you about those because I can't remember them off the top of my head. This is serious. They would have been small lessons rather than big ones.

Q303 Stephen Mosley: The most recent one you have held has been on Ebola that you co-chaired. When was a decision taken to call those meetings, because it seemed to be very

much when it started appearing on the TV news and we have had warnings of the danger of Ebola for a good many years? We have had it suggested that, maybe, that SAGE should have met quite a bit earlier than it did.

Sir Mark Walport: The first thing to say is that it met as the crisis ramped up. There are lessons for the whole world in terms of the early recognition of the epidemic, which happened much later than it should have done. People didn't realise early on that it was likely to ramp up, but I don't think that SAGE was, in any sense, out of kilter with the rest of the response. There is a whole different question, and the President of the World Bank raised it yesterday, about the preparedness of the populations of global nations to pandemic infection. If you look at the National Risk Register, it is at the top right—in other words, likelihood and impact. Pandemic infection is pretty much at the top right, together with space weather, which is there with somewhat less impact but again with quite a high likelihood. The big challenge is whether we could be more effectively prepared in terms of vaccination, because, in principle, it is possible to develop a vaccine for Ebola, but you have seen that there was a market failure beforehand so we did not have a vaccine when we needed it. Of course, it happened to be Ebola. It could have been a variety of other haemorrhagic viral diseases as well.

Q304 Stephen Mosley: The Ebola SAGE group met seven months ago. The minutes have not yet been published. Are we expecting them soon?

Sir Mark Walport: The minutes will be published. The purpose of SAGE is to advise Cobra during an emergency, and publishing minutes in the thick of battle, if I may put it like that, is not the top priority.

Q305 Stephen Mosley: I can understand that. The Enhanced SAGE Guidance says that SAGE papers and products should be published in accordance with the Freedom of Information Act.

Sir Mark Walport: They will be. The answer is that we do plan to publish them, and that is for transparency, but I would defend the fact that I don't think they should be published during the event.

Q306 Stephen Mosley: I can understand that. At the moment, you only publish the minutes. What about any other products or papers that are produced by SAGE? They are not currently published, are they?

Sir Mark Walport: The minutes are the summary of the discussion, and that is the appropriate thing to do. We are not concealing anything.

Q307 Stephen Mosley: I am sure that other papers were produced and discussed at those meetings. Do you think that they should be published?

Sir Mark Walport: Some of them will be published by other routes, because we are receiving privileged advice, for example, in order to enable the modelling of the likely trajectory of the epidemic. The answer is that a lot of that material will come into the public domain by other routes as well.

Q308 Stephen Mosley: Finally, just looking ahead to the next Parliament, it is accepted good practice that scientific and technical advice is always reviewed to reflect the latest evidence and lessons learned. In the future, in the next Parliament, can our successor Committee expect the Government to review the operation of SAGEs in light of the three SAGEs that we have had in this Parliament?

Sir Mark Walport: Yes. It is the job of any well-functioning committee to review its own function from time to time. The extent of external review depends on the perceptions of the performance, but, yes, we constantly do review SAGE.

Q309 Mr Heath: Can I just go back to Ebola for a moment? I guess this would apply to any major communicable disease that we are talking about, be it human, animal, plant or whatever. Do we have sufficient intelligence on a global scale so that we can recognise sufficiently early the prospect or dangers of clinical disease that will affect us?

Sir Mark Walport: The answer to that has always got to be that we are always going to need to do better. Of course, we have very much better intelligence than we have ever had in the history of humanity. The most dangerous infections are always the infections that have jumped from one species to another; so, in this case, with Ebola, it is from bats to humans. This is a question about the functioning of organisations such as the WHO Centers for Disease Control, which has global activity, and Public Health England. The tools for doing this are much more sophisticated than they were, and it is an area in which social media has started to be quite important as well because it has been used, for example, to try and anticipate and measure the spread of a flu pandemic—and it does it quite successfully.

Can we do better? Yes. Is there a magic bullet? No, I don't think there is, because a lot of these infections do crop up in quite remote places. We have no sovereignty in a lot of the parts of the world where infections arise. I think the global community is much more collaborative. We learn from each episode. Of course, each infection is *sui generis*; they are all slightly different. We have had the experience of SARS; we have had the experience of a flu pandemic recently, which, fortunately, was not as severe as it might have been; and now we have had the extremely unpleasant experience of Ebola in West Africa.

Q310 Mr Heath: It does seem to vary. Remembering my own ministerial experience, I found that I had good intelligence about animal disease. I knew where classical swine fever was happening, but I had appalling intelligence about *Chalara fraxinea*. Ash dieback was, clearly, advancing across Europe, and nobody was making any attempt to map its process or to find appropriate responses.

Sir Mark Walport: Yes. You raise an interesting question. One of the things that I have done in partnership with Ian Boyd during the past year is to review the evidence capability needs specifically for DEFRA. You can divide infections into the ones you know about, that you can observe and are spreading. It was not, frankly, that it was not known by specialists in the plant health community that ash dieback was around—Chalara—and that it was spreading. That was a failure of communication. Important lessons have been learned from that, and, if you were to explore what went on in DEFRA now, it is very much better. It is not really horizon scanning. It is just scanning of what is out there now in terms of the infectious threats. There are an enormous number of infectious threats in both animal and plant disease. It does raise interesting questions about how humans move species around the planet, which we have done on an extraordinary scale.

So, yes, we need very good horizon scanning on the things we know about. Many of these pandemic infections we don't know about in the same way. Ebola popping up in West Africa was the first time it had happened. It was a long way from where it would be. Could it have been anticipated? That is a possibility, yes, but, of course, there are many other infections that fall into that category as well.

Q311 Mr Heath: Yes. It would not have been impossible to have had a contingency against haemorrhagic viruses of some kind, whether it was Ebola or not.

Sir Mark Walport: Yes, but each haemorrhagic fever is different in the sense that there will be no common vaccine, for example. It is a very important question that there will be, rightly, a lot of global debate about, but there is not a simple single solution.

Q312 Mr Heath: Is part of the analysis also identifying capacity within our country for dealing with it?

Sir Mark Walport: Yes.

Mr Heath: I will give you a couple of examples. There appears to be a squeeze on taxonomy as a discipline. It is quite an important element of disease control. Yet we see taxonomists becoming an ever-smaller group. Another example is entomologists who have knowledge of pathologies. It is very difficult to recruit people into the research establishments who have those particular skills. Do you see it as part of your job to identify those areas where there may be capacity gaps and take steps to fill them?

Sir Mark Walport: Yes is the answer, where there are capacity gaps that are important for Government policy. I might slightly disagree with you about taxonomy, because taxonomy has become unbelievably interesting again recently. Now that there is a whole field of molecular taxonomy, there are ways of classifying the organisms that inhabit the planet in ways that were never possible before. If you like, there is a new breed of taxonomists. Taxonomists are now the molecular geneticists. A great deal of the work that goes on is very interesting and it tells you fascinating things. The field of infectious diseases has been an enormous beneficiary of new taxonomists. Traditional taxonomists may be endangered,

but taxonomy, in its broadest sense, is flourishing. I fully agree with you that there are important areas of science where there remain capacity issues. There is a limit to what Government can do, even though we often hear it said that Governments should do this or that.

Q313 Mr Heath: They could try not to close down specialist units.

Sir Mark Walport: Those are not decisions made by Government a lot of the time. They are made by research councils and the people who control research funding. Those are, as you know, arm's length bodies.

Q314 Chair: The Government control research funding.

Sir Mark Walport: Yes. We had a discussion last week about the review of the research councils.

Q315 Mr Heath: I have one last question. Should we be envious of the Centers for Disease Control and Prevention in Atlanta and want to have something similar here?

Sir Mark Walport: No. We should be proud of our own public health. We are very strong in public health and, in particular, in microbiology. It happened that two of the world experts on Ebola—two of the co-discoverers—are based in the UK. Our science in this area is enormously strong. CDC has a scale that we do not have, but the scale is the US economy. Is it a principle that it is important for the UK to have a very powerful clinical microbiology public health set-up? Yes, I agree with you fully.

Q316 Chair: Just pursuing David's example of taxonomy, where scientific information is collated over long periods of time as well—there are issues around the Met Office, oceanography and all of those other disciplines where long-term datasets have become hugely important—the Government, surely, must have a role to ensure that, in regard to the future needs of the science community and, indeed, in the example that David gave of the Government in an emergency, those data are collected properly.

Sir Mark Walport: Chair, I agree with you absolutely, and one of the great things about the UK is that we have very important archival collections, so the collections of organisations like Kew are very important for taxonomy. We have great archival collections and those are very important to us to understand what goes on. Some of our microbial collections are extremely important because they can tell you about infections in the 1950s, the 1940s and the 1930s. It is very important. It raises, again, the important question for science funding in general, which is the balance between supporting infrastructure and the revenue costs that go with that. Who is going to curate genome sequences? Who is going to curate organisms?

Q317 Chair: That can't be commercialised.

Sir Mark Walport: No, but these are questions for Government science. That is why a strategy for science is important.

Q318 Chair: Just sticking on the risk issue, have the Government's approach to using scientific input and evidence to assess risk changed in the light of Blackett?

Sir Mark Walport: I can only comment in the last two years. To go back to the discussion we were just having, the scientific input into the National Risk Register is at a very high level.

Q319 Chair: We know that there have been some changes and we have been very positive about the changes, because some of them came as a result of recommendations that we made. What involvement have you, personally, had in the most recent update to the National Risk Assessment?

Sir Mark Walport: A big review is going on for next year, but I have been quite closely involved in meetings and discussions. I would need to look at my diary to work out all of the individual events, but I have been quite closely involved. I regularly meet Civil Contingencies Secretariat staff. I chair a sub-committee of the National Security Committee on science and technology, which, again, is closely allied to national risk assessments.

Q320 Chair: Consequent upon Blackett and the recommendations of this Committee, obviously there have been massive improvements in the web presentation, but have there been other improvements in the way communications occur with the public? I am thinking, particularly, of last year, in the flood events, where I saw news broadcasts with blunt criticisms of Government failing to communicate. Do you think it has got better?

Sir Mark Walport: Again, I do not myself have a personal long-time window over which I could observe change. I do not know if this provides any reassurance, but we have specifically had a SAGE rehearsal around communications alone. We have brought in people with expertise. I cannot go into the details of the scenario here, but the scenario was all about communications. It was not about the science; it was about how we communicated. It is a subject that we do take very seriously. Rehearsal does happen. In terms of SAGE functioning, we have a very clear guideline, because there have been complaints from some quarters about the fact that scientists who are involved in SAGE may, in some way, be gagged from speaking about using their expertise. We have made clear in every SAGE meeting that that is not the case. We expect people who are experts in whatever their subject is to talk to the media. The one thing they must not use is the privileged information that they may have gained in confidence as part of the management of the national emergency, but they should certainly use their expertise to engage.

Q321 Chair: I know we have had discussions with some scientists who take the view that, when engaging in SAGE on civil issues, there should be no requirement for them to be committed to the Official Secrets Act.

Sir Mark Walport: It goes back to “in the heat of battle”. There is how you manage something, and then there are people, rightly, in my view, using their expertise to talk to the public. As I say, they should not use privileged information.

Q322 Chair: Going right back to the beginning of the process of how the register is compiled, in the light of the very obvious facts that there are events that have occurred that have required the triggering of Cobra and SAGE, are you satisfied that the mechanism for sucking in advice from the science community here in the UK and globally is as strong as it could be in terms of ensuring that all of the available knowns are there for consideration?

Sir Mark Walport: The short answer to that question is that I am satisfied that in the UK we have good processes and that, in the event of emergencies, we have managed to get the experts. But the global question is different, where I am not satisfied at all.

Q323 Chair: It seems to me that you and your colleagues, globally, need to be working on issues like this, but also there should be an open mechanism for members of the scientific community who have concerns about things that are absent from the register to make an input. Do you think that could be achieved?

Sir Mark Walport: I can assure you that I receive no shortage of input from people who have scientific views when emergencies are happening. Examples are often good, and I pick the example from Sir John Beddington’s time of Fukushima and the tsunami where, because we had an established mechanism for managing science in emergencies, he was able to assemble a group in very short order that included experts on nuclear power stations, meteorologists and people who monitor plumes, and so was able to provide advice through the British embassy in Tokyo to UK citizens living in Japan that they did not need to evacuate.

Q324 Chair: That was an exemplar of good practice and leadership by Sir John and Mike Weightman. That was not the question. I am thinking more of the event that we looked at involving volcanic ash, and endless numbers of volcanologists have asked me since how on earth did it go off the register when it was previously on. It is the input side that I am interested in.

Sir Mark Walport: I will respond in two parts, which is that it is extremely easy to be wise with the retrospectoscope. There is lots of wisdom after the event. I can’t comment because it was before my time on what was and what was not on the register at that time. But we do quite a lot of work and we speak to our colleagues in the United States about what should be included in the risk register. Each year there is a review of the National Risk Assessment in terms of whether there are new risks or not. It is a very widespread consultation. Is it perfect? I very much doubt it. Are we going to be caught by something

we don't expect? There is always a risk of that, but there is a good process for looking and seeing. I see an important part of my job as being getting out and about, if I can put it that way. These are topics that come up all the time.

Q325 Graham Stringer: We are running out of time. I am sorry that I missed the session last week when you discussed the Science and Innovation strategy. Could you tell us how that document was produced, and did you write it or have a major input into it?

Sir Mark Walport: I was asked by Ministers to contribute to it. There was no single author. It was a Government document. It was produced by a team, and, yes, I did have input into it but I would not claim to be the author.

Q326 Graham Stringer: In relation to the role of engineers in Government, have you managed to improve their involvement and influence within Government in your time as chief scientific adviser?

Sir Mark Walport: The short answer is that there is an enormous amount of engineering advice in Government. I have a really extensive briefing here on the number of engineers and where they are.

Q327 Graham Stringer: That was my next question.

Sir Mark Walport: Maybe I can combine the two. We have distinguished engineers as chief scientists. One of the most recent appointments of a chief scientist is John Loughhead at DECC. He is an extremely distinguished engineer. Going through them, DECC employs around 90 engineering specialists, and most of them are recruited externally and most of them are encouraged to achieve chartered status. The Forestry Commission has 65 engineers. At the DFT there are engineers inside and in places like the Highways Agency.

Q328 Graham Stringer: Does your list distinguish between policy and delivery in terms of the engineers?

Sir Mark Walport: These are professional engineers. There are people who have engineering, scientific and all sorts of qualifications who are in policy roles, who don't necessarily identify themselves as an engineer per se, but there are engineers all over the place, I am pleased to say. I view it as a good thing.

Q329 Graham Stringer: We do. Let me ask the question in a slightly different way. Would you say that their influence and importance in Government had improved or changed over the last three or four years?

Sir Mark Walport: Again, it is a very short time horizon to ask about improvement.

Graham Stringer: It is.

Sir Mark Walport: Sir John Perkins's review was influential, and that was on engineering outside Government. Engineers have a very strong and important position in Government. If you look at many of the challenges that Government Departments face in terms of policy issues, they are around engineering. The Department for Transport is engineering. It is also, of course, the social sciences. That is one of the things I have become very aware of during my 18 months, which is that there is the engineering and then there is people's behaviour in how they use engineering as well. We need both. But DECC—energy and climate change—is all engineering, as is Transport. A huge amount of work goes on in Government on infrastructure, and engineers play an important part in that.

Q330 Graham Stringer: This Committee has been concerned about the appointment of departmental scientific advisers, and we have also been concerned about the tick-box approach to scientific advisers in Departments where somebody takes it on as part of their role. They tick the box and say, "Oh, yes, we're doing a day a week in this job." Are you concerned about that kind of approach to departmental scientific advisers?

Sir Mark Walport: I won't say that I don't recognise it at all, but it is an exaggeration of the situation as a whole. Most Government Departments have very serious chief scientific adviser input, and that is the majority. There are some Departments where, probably, both you and I would like more scientific input. While my role is to encourage, ultimately I am not accountable and I can't force Departments to have a chief scientist, but it is a constant discussion. I believe that, on the whole, we are making good progress. Are there a couple of Departments where there is more to do? Yes. There are Departments where we are moving forward.

Q331 Graham Stringer: Can I move on to communicating science and communicating climate science? In the report we did on communicating climate science, where we tried to get to a definition on which everybody could agree on what climate change was, I thought the Government's response was particularly slippery. I would be grateful if you could expand on it a bit. Having accepted that Professors Rapley and Slingo's definitions were there, the response says: "In this case 'climate change' means not just the physical manifestation but also steps taken in the UK and internationally to reduce" greenhouse gas emissions "and other human impacts of the climate." Why do we need a process as opposed to just a straightforward scientific definition?

Sir Mark Walport: With respect, there are two slightly different issues. The question is how effectively the Government communicate on climate and the potential policy decisions, and whether individuals agree with the content of that communication. They are two slightly different things. On the communication side, I have, literally, just come this morning from the launch of the global 2050 calculator. One of the things that the Government, through DECC, have done, which has been of global importance in the communication of climate change, is to develop the 2050 calculator, which was originally

developed for the UK alone. There are now 22 2050 calculators in countries such as China and India, which has had a huge impact.

Today, the Secretary of State and the Climate Minister both attended the launch of the 2050 global calculator, which is one of the most powerful communication tools that I can think of in relation to climate. The communication by Government is of a whole range of things. My job is to look at the science itself. The Government's job is to communicate the things that the Government want to communicate. This is a subject that is taken very seriously and many people think that our communication of climate science was exemplary. If you look at the question—I have it here—which is from the “Public Attitudes to Science” review from 2014, there was a specific question: “How informed do people feel about climate change?”; 78% felt informed and 99%, at least, had heard of the topic, which was the top. Vaccination came next, renewable energy next, animals in research is a little way down, and nuclear power. If you look at it in terms of public communication it is effective, but it is not the role of Government alone to communicate in this area. It is the role of the community as a whole. There is active communication. People will disagree about the individual content of what is said.

Q332 Graham Stringer: There is a lot in that answer. The calculator, about which I had a presentation, is very impressive indeed. My point was that, if you decide on a definition of climate change that everybody can agree on, that is usually a good starting base for communicating something clearly and precisely. Why, then, do you need to say next to that that it needs to be accompanied by something which is likely to confuse it? In the Government's response it says: “However, we believe that this definition needs to be accompanied by a broader statement to cover how the term is commonly used. Climate scientists in DECC are considering the issue and will come up with a suitable formulation...”. I am commenting on what you are saying. I don't quite understand why that extra is necessary, and has that extra accompanying statement been produced yet?

Sir Mark Walport: We have discussed in the past the semantics of individual words, but, if you look at any dictionary definition, you will mostly find three or four related ways of expressing it. There is no single biblical legislative definition, and all of these things need to be framed. That is all that that is intended to do.

Q333 Graham Stringer: Where would members of the public who wanted to learn more about contentious areas of science, such as climate change, GM foods and mitochondrial donation, go to look for the information that the Government produce?

Sir Mark Walport: Again, there is a great deal of research in this area. The research of Nick Pidgeon in Cardiff particularly looks at the public information in relation to climate. As to the more generic question of where people get their scientific information from, that was tackled in the “Public Attitudes to Science” survey. The hierarchy was TV news programmes, other TV programmes, print newspapers, although it depended a bit on your age. Younger people have different sources. If you are 16 to 24, 21% of them will use social networks as opposed to 6% of the people in this room. I should say generically. It's an age. I can't be as specific. The short answer is that it is well understood where people

get their information from. They get it from a variety of different sources. Personally, I have taken a very active role. As you know, I have done a national tour of open lectures around climate and weather.

Q334 Graham Stringer: Often the learned societies are more trusted than Government in these areas. Have you worked particularly with them to get them to communicate the more difficult controversial areas of science since you have been in post?

Sir Mark Walport: I have worked closely with the national academies. Indeed, the Royal Society has worked with the National Academy of Science in the United States to produce a very clear document on climate. So there are many examples where, yes, we do work with national academies.

Q335 Graham Stringer: Are there any other areas in these difficult areas?

Sir Mark Walport: The Academy of Medical Science is working on mitochondrial disease, for example, so, yes.

Q336 Graham Stringer: Finally, how important do you consider the role of Sciencewise is, and in your view should it continue?

Sir Mark Walport: The public funding of science engagement is important and, therefore, the programme that Sciencewise does is important.

Q337 Graham Stringer: So you think it should continue.

Sir Mark Walport: I have not personally done a detailed review. All science funding needs to be scrutinised all the time, so I would need some notice of that question, but on the broad principle of whether the Government as part of their funding should be funding public engagement work, the answer to that is yes.

Q338 Chair: Instead of that notice of the question—

Sir Mark Walport: That is not a question I would be able to answer in a very short time, either.

Q339 Chair: We have covered a huge amount of ground in the last hour or so, so we are extremely grateful for your time once again. Please pass our thanks on to your colleagues, the departmental chief scientists, for the input they have made over this Parliament as well. Thank you for your attendance this morning.

Sir Mark Walport: May I take the opportunity to thank you, Chair, and the Committee for your work on science, engineering and technology, and indeed the social sciences, if I may say so, because your scrutiny is important? Your inputs are helpful. We do take notice of them. Thank you and my congratulations to you.

Chair: Thank you.