



HOUSE OF LORDS

Revised transcript of evidence taken before
The Select Committee on Science and Technology

Inquiry on

EU MEMBERSHIP AND UK SCIENCE FOLLOW-UP

Evidence Session No. 2

Heard in Public

Questions 11 - 19

TUESDAY 19 JULY 2016

11.50 am

Witnesses: Sharon Witherspoon, Professor Philip Nelson and Ron Mobed

USE OF THE TRANSCRIPT

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

Members present

Earl of Selborne (Chairman)
 Lord Cameron of Dillington
 Lord Hennessy of Nympsfield
 Lord Hunt of Chesterton
 Lord Mair
 Lord Maxton
 Baroness Morgan of Huyton
 Baroness Neville-Jones
 Viscount Ridley
 Lord Vallance of Tummel
 Baroness Young of Old Scone

Examination of Witnesses

Sharon Witherspoon, Policy Chief, Academy of Social Sciences (AcSS); **Professor Philip Nelson**, Chair, Research Councils UK (RCUK), Chief Executive, the Engineering and Physical Sciences Research Council (EPSRC); and **Ron Mobed**, Chief Executive Officer, Elsevier

Q11 The Chairman: Could I welcome our three witnesses for the second session this morning? Thank you for joining us. As always, we are being broadcast, so I am going to ask you if you would like to introduce yourselves for the record. If you would like to make any introductory statement at this stage, feel free to do so.

Professor Philip Nelson: Good morning. As an introductory statement it is clear that Brexit has put a precious national asset at risk. Undeniably, there are some opportunities, too, but at the moment the focus has to be on managing the very severe risks that we face to UK science.

Sharon Witherspoon: I am Sharon Witherspoon. I am here for the Academy of Social Sciences, which is a national academy of academics, learned societies and practitioners—it goes beyond the university sector—in the social sciences. On this issue, as with many, we have worked alongside other bodies and certainly we are prepared to talk about the relationship with the Higher Education and Research Bill and to lay out the implications, both positive and negative as we see them, of the referendum result. I believe the Committee has seen the professional briefing paper that we used to draw together the facts as we define them currently. The day after the referendum result we published one of two prepared briefing papers on the different models, and it might be worth talking about that.

Ron Mobed: Thank you for inviting us to present to the Committee. I will break with the other members and take the opportunity to make an opening statement.

I am the chief executive officer of Elsevier and, as such, I am not representing a research body itself but one of the largest providers of research information to the research community. As background, Elsevier is a business. We are headquartered in Amsterdam, but we are part of RELX Group, which is headquartered in London, and is one of the 20 largest publically quoted companies in the UK. About 10 million researchers access our data every

month. That gives us an enormous perspective on the world's research and some ability to put the UK's research into context.

You have heard already about the UK's strength in research. The UK has about 1% of the world's population; 3% of the world's R&D expenditure; 4% of the world's researchers; and 16% of the world's most highly cited articles. That gives some kind of perspective about the current reach of UK research.

We have been asked to talk about funding and collaboration. You have heard already from others earlier this morning about the link between research volumes and quality and how that correlates with funding and economic benefit. One of the observations I would like to offer you is that as we look around the world in developed countries, particularly in the post-financial crisis period, many of these developed and developing countries examined their research spending as a source of reduction, and almost all of them took the step to continue with research funding or even to increase it because of its correlation with economic growth.

The second topic that you have asked us to talk about is collaboration. There has been a lot of talk about that and we have done a lot of research around collaboration and mobility in the UK and elsewhere. The UK has extremely high international collaboration rates. There are about 250,000 researchers in the UK at the moment. About two-thirds of them in the last five years have worked outside the UK. Forty-six per cent of UK researchers published articles with non-UK researchers. That gives you a sense of both the mobility and international collaboration that the UK currently enjoys.

However, to understand short-term linkages in the topic under discussion, these longer-term connections between research funding and output need to be looked at. You have heard the anecdotes. We hear them, too, but we would also like to support the idea that some of them are short-term responses to short-term uncertainty which may have long-term consequences. We heard right at the end a very good example of that. As we go into this, we would like to give you more examples. To understand what these short-term activities are, we need to supplement the data that we currently hold with the data that was talked about earlier this morning and, as a convening house or as a participant in other research and data-gathering activities in the UK, Elsevier stands ready to participate.

Q12 The Chairman: Thank you for that. I am going to start with a very general question which may get us into the discussion. I think you were sitting in on the earlier session and you will have heard the thoughts on the Higher Education and Research Bill which will receive its Second Reading today in the Commons—and, of course, we are starting the negotiations on Brexit. Do you think that the two will run alongside each other harmoniously or do you think we should stall on the Higher Education and Research Bill?

Professor Philip Nelson: I think it is very important and I agree with the previous witnesses that we should press ahead with UKRI. We have been on this direction of travel for some time in the research councils and have been intimately involved with government in shaping that future. They have listened to us very carefully. We are heading towards a solution that can be made to work very successfully. It has the elements that will preserve the good things that research councils deliver at the moment while enabling the vision that Paul Nurse so clearly articulated of a stronger voice for science. Now more than ever we need that strong voice. So I am quite clear in my mind that we should be pressing ahead with that.

I echo the comments made earlier about the appointment of Sir John Kingman as our interim chair. He has already engaged with us very positively at the Research Councils, so that is definitely a step in the right direction. We also welcome the reappointment of Jo Johnson as Science Minister. The words “listening” and “thoughtful” were used earlier, and I would absolutely echo that sentiment. He has engaged very positively with us through this whole reform agenda. Finally, having Greg Clark, who has real experience as the Science Minister, as the new Secretary of State, is also a very helpful appointment. So we firmly believe that it would be mistake not to press ahead with the recommendations.

Sharon Witherspoon: The Academy of Social Sciences also welcomes the strategic viewpoint that the formation of UKRI would add and the explicit recognition of the importance of interdisciplinary research, because many of the challenges facing us—behaviour change in response to global warming, health-related behaviour change and so on—involve science and social science. I speak as someone who was a statistical social scientist. We need more of those skills.

I would point out that the Higher Education and Research Bill has three parts: two about teaching, one about research. It will be important, particularly in the light of higher education being split departmentally, that those are still considered in tandem and still have detailed parliamentary scrutiny. We have not yet put in a submission on the teaching excellence framework because it is not only the technical issues of the metrics but how you use the metrics to ensure a proper regulatory framework, particularly in plans for new providers, while not assuming that the world is simpler than it is in a multidimensional model that does not give added value.

We have produced a briefing paper which I believe many of you have on the part 3 research aspects of the Bill. Again, we welcome the strategic steer, but I think it is important to say that we have a number of detailed points which we had before the referendum decision that are strengthened by that. The current model brings a strong strategic voice but without the same duties to consult the wider research community. By that I mean to make sure you are taking a wide range of views rather than a small number of views about UK social science. We say that not just as social scientists but because we believe that it is true of all the sciences.

We have proposed a number of ways in which we hope that there will be consideration of the need for consultation and of the remit for public-benefit science. All of this takes place against not just the referendum decision but the real uncertainties about what that will mean for resources in the face of 150 years’ experience of underinvestment comparatively by the United Kingdom in science. It would be much easier to assuage fears about what this would mean if it was very clear soon that those budgetary difficulties are understood.

Q13 Baroness Morgan of Huyton: You were present for the previous session when we talked about this and you heard the anecdotes. Can you bring to our attention today any assessment that you have made yet or that you are proposing to make about the immediate impacts of the UK vote on UK science and, regarding this session, any impacts on business investment in R&D?

Professor Philip Nelson: The anecdotes are real, if I can put it that way.

Baroness Morgan of Huyton: Sure.

Professor Philip Nelson: There are multiple anecdotes. They are being collected by Universities UK. We have been engaged at the Research Councils with Universities UK, the Russell Group and the other representational groups across higher education. We have a meeting fixed fairly soon to bring us together still further. We have had conference calls about this issue. The data I have seen—turning anecdotes into data—is fairly compelling. Large numbers of these events are being recorded. However, as Lord Stern rightly articulated, it is too soon to tell whether this is significant when put into the scale of the activity. Remember, we have 1,366 ERC grants in this country at the moment, to give you an idea of the scale of activity. The stories we are getting in are in the tens, not in the hundreds or thousands.

Baroness Morgan of Huyton: Are the stories you are getting about staff, students or research funding?

Professor Philip Nelson: There is a range of things. For example, people declining offers of employment: that is certainly happening. The sorts of stories coming through are of people being asked to stand down from co-ordinating collaborative bids and being edged out from collaborative bids. The extent to which this is a knee-jerk reaction to the referendum is hard to tell. We have to let things settle and start looking at definitive data on quite what is happening out there in the bids that are going into Horizon 2020. The Prime Minister and the Science Minister were very clear that nothing has changed as of now—but clearly, in the minds of many, it has, so that is the risk we have to manage.

Sharon Witherspoon: It may be helpful to think about a distinction between anecdote, alleged facts, facts and statistics. Your Lordships know the general situation and that there are real grounds for concern. I view anecdotes as what is reported in the papers. Alleged facts are when you have an individual case and the allegation is that it is because of the referendum decision. Universities may then look at facts and say, “Looking at this, we think that is right”. Statistics are the aggregation of those facts. Facts will be easier to establish with collaborations on EU projects that are either already funded or well under way in their development. Writing the research bid takes several months, up to a year, maybe more. It is when researchers can say with confidence that they have been asked not to join a partnership or not to host or that they have been edged out. In the case of one of the larger social science infrastructures—the European Social Survey, which is an EU ERIC infrastructure project—there have already been discussions about what would happen to a project that has not only been funded but is the basis for a large-scale statistical social science collaboration across Europe.

In the case of potential new collaborations, where the lead time can be months or years, and assessment is another year or 18 months later, collaborators are looking to a future that may put them outside the Brexit timetable. In those cases, it is also harder to establish the facts about an individual case, such as who would have been asked. It is hard to use a counterfactual to establish that there has been any contravention of legal duty or any discrimination. So while I welcome—and while the Academy welcomes—the efforts that the Minister for Universities and Science has made about clear statements and working with the EU Commissioners about the legal situation, my colleague Ashley Lenihan and I have referred to this type of problem as “planning blight”. It will be very hard to establish facts on individual cases. That is why we need statistics about outcomes, and we need them in a very timely fashion.

Up-to-date monitoring of applications going in, success rates, the proportion of cases where UK institutions are hosts and so on should be in place now. Our view is that it needs to be done in an official way through BEIS perhaps and collaboration with Universities UK, and I am sure organisations such as Elsevier, so that we are getting monthly or quarterly figures. I hate to use this trope but it is still the case that the owl of Minerva will fly out after dusk. You will find out what is going on afterwards, but at least it can be kept in public debate. This is one of many areas—and, again, I hope to get a chance to talk about it—where it is absolutely important that those figures are fed into the Brexit negotiations on a continuing basis with a strong voice.

Q14 Baroness Neville-Jones: I apologise for not being here at the earlier session. I need to declare my membership of the Engineering and Physical Sciences Research Council, Foundation for Science and Technology and the Quantum Technology Strategic Advisory Board.

I wanted to ask a follow-up question to yours, Chairman. I quite understand the thesis that you need to wait until you have some hard facts, but the trouble is that by the time those facts have hardened, so has behaviour. An interception of this behaviour is needed. This is not a research project; it is real life. I hope the notices have gone out to the universities telling them actively to input to various bodies. Secondly, is there any thought, presumably via the Government and the Brexit Ministry, about having early discussions with the European Commission on a code of conduct in the transitional period? I know that these things are difficult, but it seems to me that is where we need to be going extremely soon. Do any of the witnesses have a comment on this?

Professor Philip Nelson: I know that our Science Minister has been in contact with Commissioner Moedas on this very issue and he has issued a helpful statement—but, again, the difficulty here is indeed about new consortia being formed. As someone in the press put it, “If you’re not invited to the party you don’t know there’s a party on”. That encapsulates the idea. It is really hard to say what is happening out there. In terms of taking action now, certainly in Research Councils we look at the applications coming our way. There may well be a shift to research council applications in the light of the Brexit event. We are expecting the number of folks who apply to us to go up. We can capture that data very quickly and we will be doing that on a regular basis. So we can get some lead indicators from that point of view, but it is very hard to tell from the European Union end of things quite what is going on. We have a very effective office in Brussels—the UK Research Office—which is well staffed and provides a great service to our community. It has already been gathering an awful lot of concerns and facts and feeding those into BIS. So far they have put three sets of questions into BIS. That sort of activity is being undertaken. We are taking all the steps we can at the moment.

At government level I have already discussed with the Minister the need for a very clear message making it crystal clear to people applying for Horizon 2020 grants now that they will be honoured in full in the future. The former Prime Minister made a statement in the House of Commons to the effect that all Horizon 2020 bids will be honoured, but it needs to be made clear that if you are applying for an ERC grant, which may last five years, that will be honoured in the future. Making statements such as that would be enormously helpful to researchers on the ground when they are considering where they should apply for research funding. So there are things that could be done to alleviate that situation.

Sharon Witherspoon: I certainly did not mean to imply that this would only be a research project. Getting statistics on a monthly basis would be very helpful in practical deliberations. It is also important that universities are in touch with the Minister for Universities and Science to ensure that specific cases—and I think we know of some specific cases of well-advanced research grants—are taken up swiftly. A lot of the planning blight will happen on the basis of those specific cases. There are many other things—and I am sure we will get to them in other questions—that I think government and others can do to protect not only EU collaborations and make use of what advantages there are.

I would also point out that even in the social sciences there are a number of existing plans for joint collaborations on framework programmes: for instance, programmes on the dynamics of income inequality, extended working life and health, welfare models and demographic change and a joint programme on sustainable cities and health, all being led by the ESRC. Again, it is very important that those continue during the period that those collaborations are in place.

Baroness Neville-Jones: I want to make two comments on what we have heard. On the whole I have to say that the two answers rather increase my level of anxiety if anything. The problem with statements from current or previous Ministers is that they are not entirely in control of the situation, so when they say grants will be honoured, what does that mean? It may mean—it could mean—that the UK will make up the difference. I would like to hear that but I have not.

The second thing I would like to say is what Professor Nelson said about not knowing what is going on is very important. That is why collection of evidence in this country will not in itself be enough. This is why I think we need to talk to the Commission. We need some rules laid down by it about future behaviour, with our agreement. I press the point that talking to the Commission in detail about a code of behaviour is going to be very important.

Ron Mobed: Could I answer this question and the previous one? It goes to the migration from anecdote to data that was covered earlier on. One of the things that we have a very strong perspective on is not only what happens in the longer cycle from research funding to research output into economic growth but some of the shorter-term activities both in the UK and the EU. We have a number of areas in which we can move a little from anecdotal evidence to data in the shorter term because it is these shorter-term decisions when uncertainty is high that may have longer-term impacts. For example, a few years ago we convened eight universities in the UK to look at what would be an adequate set of credible research metrics to evaluate research quality and output over time. We called it Snowball Metrics. It was a programme that ran for about two years and ended up getting quite a high degree of alignment not only for the original eight but then expanded to others. That same mechanism could be used to look at ways in which we could systematically understand decisions being made on individual researchers' mobility or willingness to move. We could look at edited communications. We have something like 700,000 editors working with Elsevier today, of whom about 2% are based in the UK. Those networks operate on a daily basis. They are not long-cycle. We talk to our editors all the time. Those signals can be very immediate, high-frequency signals. They may not be precise at the beginning but over volumes they will become more and more precise.

We also conduct in-product polls on our platforms—I mentioned the 10 million researchers interacting with the platforms—to ask individual researchers to see if they are willing to give

us data in volume about what they are seeing today. This could be in the UK or from EU researchers talking about their experience or non-UK researchers wondering about whether to come into the UK or where to source funding. We have already created a site on one of our platforms which is open for a two-week window to solicit from researchers their own experience over the last few weeks around any post-Brexit consequence that they have been facing. So we have a range. I do not want to take too much time, but I want to point out there are high-frequency, immediate signals that could be gathered which, when accumulated in volume, could give quite useful pointers to immediate activity which, when combined with the already established longer-term metrics that the world of research everywhere relies upon, could be very helpful.

Q15 Lord Vallance of Tummel: I would like to push a little further the question Baroness Neville-Jones asked you. Let us suppose that the anecdotes are indeed facts. We have a pretty good hunch as to what the problems will be. The issue is what the Government are going to do about it. Do the Government have an action plan and have you been able to influence an action plan? On the assumption these anecdotes are right, what do you want them to do?

Professor Philip Nelson: There are multiple dimensions to this. The first real issue for us is the people. It is about making sure that we can keep that very beneficial free flow of people into the UK research base. That is absolutely critical. We have already discussed that. We benefit enormously from having that cohort of EU staff in UK universities, as has already been articulated. There are 43,000 of them there at the moment. This is a crucially important population of staff, all making great contributions to our science base. The point was made earlier that the distribution of those staff may well be more concentrated into more research-intensive institutions. For example, in the Crick Institute in London, 34% of its group leaders and 56% of its post-doctoral researchers are non-UK EU nationals. We have a real issue in ensuring the continuity of employment of those people and reassuring them that they have a future here. That is number one.

Number two, the funding, as has already been articulated, is clearly very important. It amounts—and again I am in accord with Lord Stern on this—to getting on for £1 billion a year. That is a big chunk of money when you think about a system that is run on a knife-edge regarding financial sustainability. Lord Stern articulated it beautifully: 0.5% of GDP is what we spend and it is half of what other developed nations—our competitors—spend. That reduction in funding is critically important to the whole risk picture. Mitigating that risk by some means is clearly going to be very important. It speaks for itself. Those are the two main issues: the people and the funding.

Lord Vallance of Tummel: Can I push slightly further on the people issue? Are you really saying that what you want is free movement of people across Europe in the research operation?

Professor Philip Nelson: As I said, we have benefited hugely from that as a policy. I can see that this is all tied up with much bigger politics, and that is one of the real problems here. We would absolutely recognise how well this has worked for us in the UK research base. It has been enormously beneficial.

Lord Vallance of Tummel: But if you do not ask, you do not get.

Professor Philip Nelson: We have to somehow enable the very easy movement of people through that research base in Europe.

Sharon Witherspoon: I would like to first welcome protocols for good practice. However, it is urgent that over the next days some cases are assembled that can be taken up very actively with the Commissioner and examined and dealt with. There are some large cases pending.

Secondly, we have talked about research funding and one point that perhaps did not come through in Lord Stern's excellent evidence is in the case of social sciences it has not just been the flat funding from research councils; it has been a real decline in government direct spend on social science. There has been a very hard evaluation of science, understandably, partly as a result of the fiscal crisis and the fact that research budgets are quick and easy to cut. So EU funding played a large role there.

Statements about funding will be important and it would be nice to see statements in principle that it is a high priority for this Government, recognising the role of research, for public benefit and for economic growth, to consider what would happen with the loss of the EU budget and the money we put into the EU research funding, bearing in mind that we are a net beneficiary. We get more money out than we put in. So there is a set of issues there about funding.

One of the big issues—and I will come to staffing in a second—is the collaborations, infrastructures and partnerships that again were spoken about in the last session. It is clear that Brexit negotiations will be very complex. I understood the discussions about Norway versus Switzerland as compared to Tunisia, Israel, Georgia and Bosnia-Herzegovina. There is a problem in that there is no existing template for retaining access to collaborations, partnerships and infrastructures that involves not only a funding contribution but a link to freedom of movement. In our briefing paper we go through the differences between the Norwegian model, where it is a member of the European Economic Area, and the Swiss model, where it is currently having negotiations because of a decision taken in 2014 to limit freedom of movement. The other models are all bilaterally negotiated, some for very specific aspects of EU funding such as capability funding or very particular programmes. Each of those other partners not only represents a far smaller amount of research money given by the EU but comes with very clear limits to what they can take part in.

I have seen discussions about an EEA-minus option and there will be a question about whether that is going to continue to be the case. If it is, those questions of international collaborations elsewhere, or what negotiations may need to be made separately for the UK, need urgent attention. They cannot wait and be an afterthought in the Brexit negotiations.

One of our recommendations—I have seen it elsewhere—is that there should be very strong and early input of a voice in the EU Brexit negotiations on these issues. The Minister of Universities and Science or the Secretary of State for Exiting the European Union could become part of those deliberations. It will not be enough to add them on later.

Finally on staffing, it is clear that this is a major issue. Again, from the social science point of view, which shares features and statistics very similar to those of other sciences, there are particular issues, for instance with quantitative social sciences and with survey methodology, where EU staff have played a disproportionately important role. I would say whatever other discussions are going on around general freedom of movement, one of the opportunities, or certainly one of the requirements as a result of the referendum, is that there are very clear

discussions between what will now be DfE, BEIS and the Home Office about what the visa regime for skilled university and science staff should be.

Ron Mobed: Can I offer an example from the world of business, and also an observation? First, the observation. In countries that have gone through much more severe disruption in the world of research funding than we are facing today in the UK, we have observed a few things where Governments and research universities have tried to navigate through uncertainty, which is where we are today. One of the things that we have observed is the consistency of message from government and from the institutions, even in the face of some uncertainty, around what is not changing: the commitment to research, the commitment to excellence, or whatever those messages, agreed and aligned, might be. That repetition and alignment of message seems to play a great part in reassuring individuals as they are trying to make their own personal decisions.

Secondly, there is the ability to eliminate extremes. During these periods of uncertainty, one of the things that tends to happen is to go to the extreme. To the extent that the messages can be brought closer towards the centre, it also tends to have a reassuring effect.

On a business example, Elsevier employs about 1,100 people here in the UK. One year ago we opened the largest of our research and development centres, which is a software development and technology centre for building research platforms here in London, in Finsbury Square. We have 200 software developers, computer scientists and data scientists working in that location. Sixty per cent of them come from non-UK EU countries. I was there last Friday talking to them, and they had already had a series of messages to try to create some kind of reassurance without overpromising. What we found when we went there on Friday was that having that consistency of message, even though there remained some uncertainty and anxiety, and the fact there was some principle or idea being put forward—a recognition of the uncertainty that was being created, not just from a business standpoint but from an individual standpoint—seemed to be helpful. It is early days. People will make their own individual decisions. They may not tell us about them until after they are made but certainly we are finding that communication, even in uncertainty, is extremely important.

Q16 Lord Maxton: First, may I say I have no interests to declare except to say that I voted remain in the referendum. By the way, I voted the other way in 1975. One of the big issues in the referendum was immigration: the free flow of people from Europe. One of the problems science has always had in this country, or so I have been told, is that we are very good at research and creating ideas but we are not very good at producing the technicians and the people who can then put them into practice. To what extent does Brexit mean that the flow of people from Europe to do the technical jobs lower down the scale from the scientists doing the research is going to be affected? Is a problem that we are going to have? In Scotland there has been a major cutback by the Government in further education colleges, and therefore a cutback in the flow of those particular people. Are they going to be coming from Europe or not?

Professor Philip Nelson: It is a good question. The extent to which we convert science into economic well-being has been transformed in this country in the last 20 years during my career. We have got an awful lot better at that. If you look at the spinouts generated per pound spent or the number of patent applications filed per pound spent, when we normalise it on that small denominator we end up being really high up the list. We are right at the top of the world in some of these measures as a consequence of some very sensible

interventions by Governments in the last 10, 15 or 20 years. So I would certainly challenge the idea that we no longer convert science into economic benefit. Again, as Lord Stern articulated very clearly, it is at the heart of modern economic growth; a knowledge-based economy is going to be essential for our well-being.

When it comes to skills, as time goes on the skills required become more and more sophisticated, and our system has been very effective at training graduates at masters and doctoral level to go out and work in very high-technology employment. That is a massive risk that we face through not being able to sustain that sort of supply if we are cutting off an awful lot of talent from coming here. I do not have any facts further down the list of levels of skill, but I take the point that technician skills are very important to these activities across the board, and we need to pay attention to that.

Q17 Viscount Ridley: Most of my question has been discussed fairly comprehensively in the last few minutes, but I would like to press one particular point a little further. Before we got into the argument about the referendum, one of the big concerns of universities was the lack of easy access to talent from around the world—the way that this Government had cracked down on migration in an attempt to control it and, because they could not control EU migration, they were controlling non-EU migration, and that was making it hard to get visas for professors, engineers and so on. As Sir James Dyson put it, “You can’t get a visa for a physicist from Taiwan because baristas from Bucharest can come in in such numbers”. At this moment is it not very obvious that we need to be pushing the Home Office very hard and to say, “Brexit is happening and at some point that is going to cause a diminution of non-skilled migration from the European Union. This is the moment to open up and make it much easier to get visas for skilled migrants from elsewhere in the world”—because, after all, 80% of STEM graduates in the world are not EU educated?

The Chairman: Mr Mobed, would you like to answer that as it is specific to your business?

Ron Mobed: As I mentioned, we have about 1,100 employees in the UK. We have 7,000 around the world and the group itself has 30,000 spread around the world, of which fewer than 5,000 are in the UK. So we are quite comfortable placing our activities where we can find business and where we can find the right types of people. In the last few years we have been able to expand our operations in London quite a bit, partly because of the local labour pool and partly because we have been able to find people to come in either from the EU or from outside the EU with visas. To the extent that that continues, we continue to be comfortable. To the extent that it becomes severely compromised, of course, any business makes exactly the same calculation every day of the week as to where to place its activities related to the business opportunity and the resources that are required to take advantage of that business opportunity.

Sharon Witherspoon: Irrespective of views about whether there is a direct trade-off, it is absolutely essential that the Home Office has discussions with both DfE and BEIS, putting forward the need to change the general view about visas. The Academy of Social Sciences has seen evidence about the number of hoops that people have to jump through, particularly in shortfall areas.

In addition to the well-known issues of international migration, this also goes to a long-standing debate about the quality of scientific, mathematic and technical education in the United Kingdom. Successive Governments have made various attempts, perhaps less

evidence driven on all sides than they should be. I cannot help but observe that it is a pipeline which starts in primary school. A lot of our attention right now is on the universities and higher education. It is important in maths education that you think about the pipeline through primary school and whether the qualification system in secondary school, which is still—and perhaps increasingly—narrowly focused on three A-level subjects, is the right way forward. I am sorry that Lord Hunt is not here to hear this. There are a number of ways in which, in the medium and longer term, this will pose challenges for what the UK should be doing for its own education of those skilled subjects.

Q18 Lord Mair: My question is for Professor Nelson. We have talked a lot about funding and people, but we have not spoken very much about facilities. There are some major EU research facilities that we host here in the UK. There are also a lot of EU research facilities to which our scientists and engineers have access. What do you think will happen in respect of those facilities?

Professor Philip Nelson: It is vital that access to those is sustained. There are two types of facility. There are those funded by the European Union. This Committee's excellent report on the subject highlighted five or so research infrastructures that we host here in the UK. It is going to be critical to sustain our involvement in those by some means. There are other facilities to which we subscribe and in which we take part. CERN is a classic example. It is not run by the European Union, but many of these get large amounts of funding from the European Union. I think this is absolutely critical. The UK earned about €273 million of investment into this country for research infrastructures in the UK in Framework 7, for example. So this is another very important consideration. Frankly, it is going to be difficult to disentangle all this from the bigger negotiations—which goes back to the point made earlier that it is absolutely critical that science has a seat at the negotiating table here. It really is very important that we are involved. Again, your own excellent report pointed to the fact that 18.3% of the money that comes back to the UK is for research and innovation. That is a big chunk of the money that was coming back our way from the European Union, and it is absolutely critical that we are represented in those negotiations through the forthcoming months.

Lord Mair: What do you mean by “seat at the table”?

Professor Philip Nelson: I think we need to see what the shape of the table is first, if I can put it that way. I am not sure how this is going to work. It is all very early days. Clearly we have a Minister in charge. Again, it was suggested that our Science Minister and indeed our Secretary of State are well qualified to participate in those sorts of discussions. They both have a good grasp of UK science and are great supporters of it. I would hope that something like that might be done to ensure that we have a strong voice at ministerial level.

Baroness Neville-Jones: There will have to be official-level negotiations on the detail, so I think it will be at all levels.

Q19 Baroness Young of Old Scone: The question I was going to ask has been answered in the previous discussions. Mr Mobed, you have done work in the past on the international comparative performance of the UK research base. How quickly does that body of information bring to the surface some of the lead indicators of what is really going on?

Ron Mobed: The traditional and most well-established metrics around research effectiveness tend to have a three to five-year time lag between the activity and the output.

Over the last five years, every second year BIS has commissioned a report on the UK's research competitiveness. That report has been compiled by Elsevier, and the reason Elsevier was chosen is because of the body of data that we have. These reports end up having something like 3 billion data points in them, which are then analysed using high-performance computing to extract the insights by department: for example, how strong is UCL's linguistics department compared to MIT's linguistics department? That can be aggregated at country level and compared with any country or institution in the world. But these have relatively long lags and the data can be supplemented by shorter-term data that give earlier signals as to what might be happening today. While these signals are gathered in a less systematic way today, the opportunity is to use existing networks, some of which I have described already, together with organisations such as the ones represented here, to create for the UK a set of short-term data points that have much more immediacy, which, when combined with the medium and longer-term data with which we are already relatively familiar, can give an insight as to what is happening today, what consequences we are seeing today, and can also help us understand a disturbance happening today and the impact it might have in three, five and seven years' time.

We can look at this data going back over time in other countries. We did a study a few years ago of a country that had decided to significantly reduce its emphasis on scientific research and the information around that. In the first year they saw no impact whatever. In the second year they saw a slight drop in output: the number of research papers being produced. In the third year they saw an enormous drop in the quality of those research papers. The reason it took so long was that the quality had already dropped but the visibility of the drop was only apparent two years on. In the situation we are talking about today—as Lord Stern said earlier—waiting for two years to see the impact means that we have lost two years. On top of that, long-term decisions have been made by individuals and institutions which then extend the period of consequence significantly beyond the two years.

The Chairman: Unless any of my colleagues have further questions to put to you, we have probably reached the end of this session. It has been a very helpful session and has complemented very well the earlier session. I know we all echo Professor Nelson's concern that science should take a seat at the Brexit negotiation table. We are all a bit puzzled as to what the shape of the table is, as he is, but nevertheless it is a critical part of the EU negotiations and we hope that the Government will put that to the front of their mind. We will do all we can to make sure that it remains there. We are going to start a summer recess but we will return to subjects allied to what we have been talking today in September, and indeed in October, and I am absolutely certain that we will wish to keep a close watch thereafter. Thank you to the three of you for your help this morning.