



HOUSE OF LORDS

Select Committee on Science and Technology

Corrected oral evidence: Life Sciences and the Industrial Strategy

Tuesday 10 October 2017

12.05 pm

[Watch the meeting](#)

Members present: Lord Patel (The Chairman); Lord Borwick; Lord Fox; Lord Griffiths of Fforestfach; Lord Hunt of Chesterton; Lord Kakkar; Lord Mair; Baroness Neville-Jones; Lord Vallance of Tummel.

Evidence Session No. 3

Heard in Public

Questions 15 - 21

Witness

Professor Philip Nelson, Chair, Research Councils UK (RCUK).

USE OF THE TRANSCRIPT

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

Examination of Witness

Professor Philip Nelson.

Q15 **The Chairman:** Professor Nelson, can I welcome you? Thank you very much indeed; you are a busy man and we appreciate very much you coming today to give us some advice. I saw you at the back listening to the previous sessions. You are the key person, and your organisation the key organisation, to take this strategy forward and implement it, complex though it might be. You are the one who is going to deliver it. How are you going to do that? Introduce yourself and make a statement, if you wish.

Professor Philip Nelson: I am chair of Research Councils UK, so I chair the strategic partnership of all seven research councils, but of course we will be moving, by 1 April next year, to UK Research Innovation—UKRI—and it will be that organisation that will deliver on this strategy. I correct that to start with. Having said that, I have been listening with great interest to the first two sessions this morning, and a lot of good sense has been talked by my colleagues.

The Chairman: Can you hold on one minute? We need to move you slightly. You are an important man; the camera and the world must look at you.

Professor Philip Nelson: Having corrected the issue around Research Councils UK and UK Research Innovation, which we are very much looking forward to being part of, it will be that organisation delivering on this strategy. Obviously, we are very keen to contribute to that across the research councils. You already heard this morning plenty of evidence that the research councils have worked together in the past extremely effectively in addressing some of the sorts of issues that have been raised in the life sciences strategy. The point has already been made, I think, that it is, perhaps, a narrow view of life sciences and perhaps I should point that out again. In the research councils the environmental sciences, animal and plant health, and so on and so forth, are part of the life sciences spectrum. Having said that, the strategy itself has much to commend it, as has already been pointed out by my colleagues. We are very keen to do our utmost to deliver against the objectives of the strategy. I am very happy to answer any further questions you might have in that general area.

The Chairman: What do you think is required to implement it?

Professor Philip Nelson: Again, I have heard the discussion this morning that strategies are fine but delivering them is the really important part. If I could make a broad comment, I feel very confident that we can deliver the aspects of the strategy that involve research, development and the interaction between academia and industry particularly, through UKRI. Obviously, the points have been made that there are many other aspects of the strategy which involve regulation, access to the NHS, the availability of patient capital, and so on and so forth, which are outwith UK Research and Innovation, and it will be

challenging, as you have already registered, to ensure that government can bring about the sorts of changes required to deliver on the entire strategy, if I can put it that way.

Lord Vallance of Tummel: I cannot see how UKRI could conceivably be responsible for the strategy if you look at some of the recommendations, such as, "Create four UK companies valued at >£20 billion market cap in the next ten years".

Professor Philip Nelson: I think I was trying to agree with that. I feel confident that we could deliver those elements, if I can repeat it, which involve commissioning the right research, addressing the right research issues and making sure that the outcomes of that research are picked up and taken up by industry. I feel confident we can do that. When it comes to the other aspects of enabling industry to scale and grow, which I think is one of the main points of the strategy—that one of the drawbacks of our current environment is that we suffer from an inability to scale companies—that is not within our remit, so I completely accept that.

Lord Vallance of Tummel: There are a number of main recommendations which are right outside UKRI's responsibility, I just wanted to stress.

Professor Philip Nelson: Exactly.

- Q16 **Lord Fox:** The central role of the NHS in this strategy is clear. The fact that it is both a participant and a customer in what is going on, also hinted at and sometimes more broadly stated, is very awkward in terms of how researchers interface into that relationship. How will UKRI and, in your experience, how has your own organisation managed that relationship and what can be done to make that relationship more fruitful and more positive than, frankly, it seems to be at the moment?

Professor Philip Nelson: I think the main route, as Sir John Savill pointed out this morning, is that the co-ordination of research across the research councils and the NHS and NIHR has been through the OSCHR body—the Office for Strategic Coordination of Health Research. I think that has worked well. Clearly, there are still issues in terms of uptake of technology into the NHS and enabling that to happen fast. The accelerated access review undertaken made some recommendations on that. I think that was fairly recently published, about a year ago. The extent to which that is being acted on and has been implemented, I am, frankly, not sure of yet, but I think it made some very sensible recommendations about, for example, identifying key, game-changing technologies that should be accelerated through the whole system. That sounded very sensible. It was limiting that number so that there was a clear focus on making sure that the really big developments could be taken up quickly. Actions like that are clearly necessary.

Lord Fox: What role would UKRI play in those actions?

Professor Philip Nelson: We would certainly be lobbying for it very strongly because if we are seen as the champions of innovation, in the

sense that we want to see it adopted quickly and effectively, we would be—

Lord Fox: Who would you be lobbying?

Professor Philip Nelson: I should imagine NHS England, to start with. That will be one port of call. I have heard the discussion this morning about co-ordination across government, and I see that as a thorny issue that we need to resolve if this is going to be delivered. If we had a very clear view of how our research and innovation could be taken up more quickly and we could very rapidly get hold of senior people in the organisation to change things, that would be a very important part of delivering, quite frankly.

Q17 **Lord Hunt of Chesterton:** We heard from the previous panel the concerns about Europe. Are you thinking about this strategy, as it were, in terms of alternatives? One is that the UK leaves in a more or less complete way and the other is that we, perhaps, stay in Europe. The consequences will be profound. That seems to be the general feeling. I wondered whether you are thinking hard, as one person was this morning, about developing more links with China, Japan and so on. Is that how you are approaching this issue?

Professor Philip Nelson: Absolutely. We are acutely aware of the consequences of an unsatisfactory exit from the European Union, if I can put it that way. We certainly welcome the Government's statement on continued collaboration in science and innovation across Europe. We are very keen that we end up in such a position that we can collaborate with Europe. I have appeared in front of this Committee before on that very subject. Issues such as the supply of talent are a critical part of that. Ensuring that our own ecosystem continues to thrive, as it has been so dependent on people coming from the European Union to work here—some really talented people contributing—is a huge issue and worry for us.

There is the funding. As you have probably heard me say before, it is getting on for £1 billion a year in sheer funding we get from the European Union across the whole research base in the UK. That is a massive potential issue for us. The people and the funding are the two crucial things. There are many other subsidiary issues around collaboration, and so on and so forth, which are equally important. To answer your question whether we are worried about it, we certainly are. Are we doing anything about it? Obviously, in the research councils, we are thinking carefully about what our response would be if the worst came to the worst. We are thinking about that. We are also being very proactive in working with other nations. We already have offices in China, India and the United States as well as Brussels, so we have excellent overseas offices representing the research councils there which have built good relationships with the funding agencies there, and they have been going for roughly 10 years. That places us very well to expand those sorts of relationships.

We are finding more and more interest from other countries, such as Canada, for example, and indeed European countries that are concerned that they want to retain a relationship with us, and we have dialogue with those—Germany, France, and so on and so forth. We have certainly been very proactive in trying to make sure that our international links are strengthened wherever possible. I would want to make the point that to scale up those activities to the scale we currently have with the European Union could not be done overnight; it will take time to do that. I am not saying it is not possible in the long run, but if we did come out without an agreement on research and innovation it will take time to scale up the level of activity we currently enjoy with the European Union, and that would be no light undertaking.

Lord Hunt of Chesterton: This is future gazing. Does it also involve discussions with international business and industry, and so on?

Professor Philip Nelson: Absolutely. If you look at the people we work with across the research councils, very often they are multinational businesses, very often they will have significant UK parts to their enterprise, and we enjoy working with them. They very often have a forward-looking view of research and development and so they invest actively in their own research and development. We are always pleased to work collaboratively with them and co-invest in our universities. We have some splendid examples of very effective co-investment. I do not want to paint an unduly rosy picture, but I think we are absolutely on the right path when it comes to industry-academia collaboration.

One point I would like to make, because some of my university colleagues have already made it, is that there is a perception that we underperform in innovation. If we look at the data—and I go back to the 2013 report that came out, which is a little old now—and the performance indicators per pound spent, which is the important factor, and you look at patents filed, licences granted and spinouts formed, we came first, second and third in the world per pound spent. This is the crucial thing.

The Chairman: But not in innovations.

Professor Philip Nelson: No, these are indicators, I agree, but I think there is a point we should put across that there is a matter of scale. The fact is that 1.7% of GDP is spent on R&D. Sir John Bell's report points out that the upper quartile would be 2.6%. It is gratifying that the Government is increasing its expenditure on R&D, so we are on an upward path, and that is excellent recognition of the strength of our science, but I think there is a perception that we have not been proactive in promoting innovation, and that is not a fair perception. We have been very proactive, especially in the research councils, and Innovate, in trying to move things on quickly from the research base into industrial uptake and innovation. If you look at the data, it tends to suggest that we are not doing so badly, but there is a scale issue. The magnitude of the entire endeavour is not as big as it is in the United States or in Germany. Sir John Bell's report shows that clearly. If you look at the data in his report,

it is the scale of the activity that is perhaps too small here. I wanted to register that as a point, having heard the earlier discussions.

Q18 Lord Mair: I have two questions. One is about data hubs and digital innovation, which are mentioned in Sir John's report quite extensively. The other is about manufacturing and the engineering that goes with the whole biotechnology potential. First of all, your own research council is EPSRC, data scientists. How much input do you think they had into Sir John's report?

Professor Philip Nelson: There is, for example, the Farr Institute, which we have co-invested in with MRC, which is about health data. There is Health Data Research UK, which is following that up. I know that Andrew Morris, who looks after that, was consulted around that whole issue. I think data science is a big field in its own right. It is a very important field. We are keen to make sure we contribute to this. Again, UKRI offers a great opportunity to get still better join-up—because we have been joined up, I must emphasise. Engineering and physical sciences research and medical research, as has already been pointed out by colleagues, are a critical feature of being able to take future opportunities. There is no question but that we want to assist and make sure that our computer sciences get deeply involved, as many of them already are, in health data research.

Lord Mair: Does the Turing institute have a role here?

Professor Philip Nelson: Absolutely. I think it already has a strategy around the health area, if I can call it that. It is attracting a huge amount of attention, especially from the private sector. The leverage that government money is getting from the private sector through the Turing institute is quite impressive. I know it is early days in the life of that institute, but it is off to a flying start and has great potential to exploit world-leading expertise in things such as machine learning and data science. There is no question but that we will be doing our best to help that.

Lord Mair: And manufacturing?

Professor Philip Nelson: For example, my own council, EPSRC, launched two very relevant manufacturing hubs. These are investments of tens of millions—one at Strathclyde in manufacturing and one at UCL—which are both around medicines manufacturing. That involves the whole process of getting a drug that is deliverable and manufactured accurately and well, and all the technicalities involved in that, the chemistry, and so on and so forth, and the processing. We are absolutely committed to trying to help on that too. We are making good progress and lots more needs to be done, but I go back to the issues of scale, if I can put it that way.

Lord Mair: Do you think the two communities, the data science community and, if you like, the manufacturing community, had a major role in the preparation of and input to this report?

Professor Philip Nelson: The honest answer is I do not know quite who Sir John Bell consulted. I have seen the list of companies that were involved and I know, for example, that the MRC was actively involved in that. I would expect, by some means or another, they will have had an input on the construction of the report. The report itself wisely acknowledges the importance of data science and the physical sciences to the whole strategy, so I think it is captured.

Lord Mair: Thank you.

The Chairman: You mentioned the importance of data scientists and the Farr Institute and Andrew Morris, both of whom I am familiar with; after all, it started in a university I know well. Going back to that, in your role as UKRI, if the Turing institute has a big role to play, why do we not have an institute of data science that covers all science and not just the Farr Institute which covers life science?

Professor Philip Nelson: That is a very fair question. There are dangers in oversimplifying things. You probably need to grapple with the particular problems of particular sectoral areas. The sorts of problems one might get in dealing with data in the healthcare area may well be different from the sorts of problems you get in dealing with data in the aerospace industry, for example. You would use different techniques and will have different sets of challenges. We have a shortage of data scientists, and there is no question but that we need to upskill in data sciences. The real value will come when you get that basic training in data science and the techniques involved in that, and then you interface those people with the specific problems of the sector. I do not think just having data scientists is the answer. We need to make sure the data scientists are deeply embedded in the environments which are trying to solve the particular problems of a given sector, if I can put it that way. The Turing institute, for example, has its different sectoral areas that it is trying to tackle, and while there will undoubtedly be some common approaches and common data science themes you will probably find that the specific approach you need is different from one sector to another.

Lord Fox: Sticking with data, but coming back to this interface between the researchers and the NHS, everybody is agreed that there is this fabulous potential resource of NHS data, but it is obviously not an NHS priority to unlock that data because it does not seem to have happened. There are lots of other things going on. How would you incentivise that unlocking process to get access to that rich source?

Professor Philip Nelson: As I understand it, there have been attempts to unlock it, but I think it is a difficult area because of the reasons of privacy, trust, data security, and so on and so forth, that you have with personal data. The issue there is not so much the will but the practicalities. It is all about consent to use data and opting in and opting out, and these sorts of issues. It is easy to get bogged down in that; that is my understanding. Again, I have not been close to this, I will be honest, but second hand I believe there have been attempts to do this in the past. There are a lot of basic social science issues that need to be addressed. I have read it as a social contract, if you like: people will

accept that their data is useful for the population at large and, therefore, are willing to release it. They can see the value and the benefit of it. There is a lot to be done around convincing the population at large that this is a good thing to happen rather than them being desperately worried that there will be some aspect of the data that comes back to haunt them. I do not know. It is that sort of issue, I believe.

Lord Fox: I agree with all that, but who is going to do it? The NHS is doing a bunch of other things. This has been clearly filed under “too difficult”. How do you break the logjam?

Professor Philip Nelson: Again, I am not close to this. I am not speaking with a great deal of authority on this one. We need to work out a strategy with the NHS to be able to unlock the value of the data. I know that the Farr Institute and some of the initiatives we have been funding through there have been very focused on some of the issues I have just raised. If you look at the Farr Institute outputs, they do indeed—

The Chairman: Can you define the Farr Institute, please, for the record?

Professor Philip Nelson: I am sorry. It was an initiative, I believe, started at about four universities—I cannot remember exactly the start date but it was several years back—where I think the potential for NHS data was clearly recognised and, therefore, the processes involved in trying to unlock it were initiated. The Farr Institute has been doing some of the research that has been going on to try to better enable that unlocking process, if you like, and my understanding is that Health Data Research UK is the follow-on to that.

Lord Fox: That is a subset of the big data, is it not? It is not the whole.

Professor Philip Nelson: It is not all the big data. Big data is a massive thing in its own right. As I mentioned, having a clear view of the problems associated with certain sectoral issues around data is where we need to have a real attempt at solving some of this.

The Chairman: Lord Hunt, you might think your question on animal science, et cetera, has already been dealt with. Do you have a supplementary?

Q19 **Lord Hunt of Chesterton:** My only other question was how the strategy that is being adopted compares with those in other countries, in the way that some other countries have a sort of national health service and there are researchers in Sweden and Germany, and so on. Are we converging with some of these other successful countries, or are we diverging? What is your general view?

Professor Philip Nelson: The honest answer is I am not sure of the details of other countries. You see other countries implementing very top-down driven national strategies. If you look at the expansion of research and development in China, which is accelerating incredibly fast, and if you look at the rate of growth, I think probably they will be more instrumental and more top-down and clear about delivering certain things in their strategy. Singapore has been quite effective in doing similar sorts

of activities around a life sciences strategy. Let us pick some key areas and work hard at those. They are quite top-down. The real challenge here is to get the blend between strategic intervention, the top-down driven, and enabling the creativity we have in our higher education system to blossom. That is a key issue for UK Research and Innovation. We need to get the balance right between the strategic view and a bottom-up view. The opportunity for UK Research and Innovation is to be strategic at a larger scale by bringing the councils together, roughly speaking. If I look at cross-council initiatives that have been going on—very successfully, I have to say—over the last five to 10 years, we have been co-investing in scales of tens of millions and what is starting to happen now are investments in scales of a hundred million. We are seeing a scale-up in the strategy, through the Industrial Strategy Challenge Fund, frankly. That is the main vehicle, as Sir John Savill was articulating earlier. That is what is currently happening in terms of being strategic.

To come back to your question, which I probably have not answered terribly well, we are being more strategic than we have ever been before, and I would like to think that we do not lose that balance between the top-down strategy and the bottom-up. You heard my university colleagues talking about the importance of having a close dialogue with industry, but scientists can often see a pathway through things that industry has not spotted, and I think it is important that we continue to enable, allow and encourage that to happen.

Q20 **Baroness Neville-Jones:** I think we have rather exhausted, perhaps, the wisdom of our witnesses on accountability. I would like to ask Professor Nelson a different question. Part of EPSRC's strategy is "Healthy Nation", which is, as I analyse it, at any rate, very much focused on health and wellbeing—ie prevention. In the light of this strategy, which has a different focus and is much more, as we have been discussing, to do with disease and how you cure, do you see the funding and what the council in future will sponsor changing as a result of this strategy, or remaining as it is, and why?

Professor Philip Nelson: I think it goes back to my earlier remark about the balance between the strategic element of our R&D funding and the curiosity-led, blue-skies element—call it what you will—bottom-up element of the funding. I think keeping those in balance is going to be important. Frankly, we are not quite sure where that is heading yet within UKRI. I think the new strategic interventions are to be welcomed. It very much depends on how that strategy evolves because, remember, this is an industrial strategy; it is not just life sciences. There are a number of other sectors in which we will be bringing forward reports and recommendations in the near future. Quite how that shapes what we will do as UK Research and Innovation will stem from that. I want to see how that whole strategy evolves before I commit to doing one thing or another. I would still expect EPSRC to be hugely active in promoting its "Healthy Nation" objective, if I can put it that way.

Baroness Neville-Jones: It seems to me that blue skies can occur in either of the definitions of life sciences. I do not think that is the key

question. Given that this strategy has now appeared and, presumably, will have UKRI backing, do you see it then potentially taking precedence over some of the existing funding priorities of individual research councils?

Professor Philip Nelson: The current situation is that the Industrial Strategy Challenge Fund is in addition to the current baseline research funding.

Baroness Neville-Jones: Do you think it will all come out of that?

Professor Philip Nelson: I am not answering your question terribly effectively.

Baroness Neville-Jones: No.

Professor Philip Nelson: I think we are in a situation where I would want to see—to repeat myself—how the industrial strategy as a whole evolves, because we are still waiting for a number of sector reports. We are waiting for wave 2 of the Industrial Strategy Challenge Fund to be announced. We know there are about 11 areas being looked at. That is public domain knowledge, and we know what the areas are. They are under consideration. Advice will go to Ministers fairly soon regarding those and Ministers will be responding to that advice. We will then see quite what the Government's priorities are coming out of that consultation. That will deal with wave 2, if you like, of the Industrial Strategy Challenge Fund. Speaking as a research council chief executive, rather than in my RCUK role, I would want to take a look at where we have got to with that, because we are seeing extra money coming through the system for important strategic interventions. Quite how we respond as a research council, I think, will depend on that. That is my answer: wait and see, unfortunately. It could change. We need to take a look at quite what the balance of funding turns out to be across our portfolio. We need to look at that in the light of the new initiatives and decide where to go from there, frankly.

Baroness Neville-Jones: It would be a miracle if each of these new strategies which are emerging resulted in extra money, would it not? I would like to think it, but do you believe it?

Professor Philip Nelson: We have an allocation on the Industrial Strategy Challenge Fund. There is still, roughly speaking, around £1 billion to allocate. Remember, this was the £4.7 billion uplift we had in the last Autumn Statement. There is still more money to be allocated, and so we are waiting for decisions on that. There are quite sizable chunks of funding likely to be coming through that system. We have to wait and see how that evolves. In EPSRC we would want to look at our strategy again in the light of that new information.

The Chairman: What is the £1 billion already allocated towards?

Professor Philip Nelson: There were three big initiatives. One was certainly in the health sciences area, the medicines manufacturing area. For example, I think there was extra funding going to the cell and gene therapy centre at Stevenage. There is funding set aside for a medicines

manufacturing centre, and a number of other initiatives under that heading. That was one tranche of the funding. Number two was around robotics and artificial intelligence for extreme and hazardous environments, especially in nuclear, for example, or undersea environments where, again, we have national priorities. The third example, if my memory serves me correctly, was the intervention around battery technology. It was the Faraday Challenge. Again, my own council has been very involved, certainly in two out of three, and we have been working hard to make sure we deliver the research components of those initiatives alongside Innovate UK. We will be co-working with them to make sure that we pull through research results into innovation in as efficient and effective way as we possibly can. That is what we are currently working on.

Q21 The Chairman: The last question I have is this: if you were making one recommendation that it was crucial we should make in our report, what would that be?

Professor Philip Nelson: You might expect me to say this. Maintain a commitment to basic science. We must not lose that real foundational strength of what we have in the UK. We have things to be done, we have things to fix, we have things to do better, but let us not lose that focus and ensure that we keep our science base as strong and internationally competitive as all the data suggests. Sir John Bell's report was very clear about this. It is a hugely effective and efficient system in turning taxpayers' money into first-class scientific output. Let us not lose that.

The Chairman: It does not translate to innovation.

Professor Philip Nelson: Again, I contest that assertion. We do remarkably well, given the funding that is available. I go back to my earlier statement that if you look at the "per pound spent" argument we do pretty well. I am not saying that life is a bed of roses when it comes to that—we must do better—but we are still not doing badly. We have made huge progress in the last 15 to 20 years in that whole space. You heard from my colleagues in universities about the sorts of initiatives that have been taken in universities to increase the focus on entrepreneurship and increase the focus on impacts. We have made huge strides in that area. The research excellence framework, which now requires reports on impact, has been helpfully incentivising that whole business of translation from research into innovation. Things are on a good path, while I completely accept more has to be done.

Lord Hunt of Chesterton: I hear what you say, but France and Germany have been putting considerably more money into expanding their basic research, and there are many areas of basic research where there is significantly less money available now in the UK in areas that I know quite well.

Professor Philip Nelson: Precisely my point.

Lord Hunt of Chesterton: Therefore, you see much stronger programmes on the continent. Of course, the only thing which kept us going was being part of these EU projects. If you took out EU projects

and you simply spoke as you spoke, that would lead to a reduction in our basic research.

Professor Philip Nelson: As I said, I think it is a huge risk to UK science and I think we must be cognisant of that. To be fair, the Government are understanding of that. I sit on Minister Jo Johnson's high-level forum for considering Brexit issues, and I think there is very good representation from across the whole R&D sector, especially higher education. The message gets well and truly transmitted around these risks, so I think the Government understand the issue. As I said before, he has made a welcome statement around that; he has done some useful things around underwriting Horizon 2020 bids and reassuring EU PhD students that research council funding will be available, and so on. We must not forget that that message is being heard.

The Chairman: Professor Nelson, thank you very much indeed for coming today.

Professor Philip Nelson: It has been a pleasure.

The Chairman: We appreciate it very much. I know how busy a man you are. We will have another opportunity, because we will be seeing Sir Mark Walport later on at some stage. Thank you today for coming.