HOUSE OF LORDS

Select Committee on Science and Technology

Corrected oral evidence: Life Sciences and the Industrial Strategy

Tuesday 24 October 2017

12 pm

Watch the meeting

Members present: Lord Patel (The Chairman); Lord Fox; Lord Griffiths of Fforestfach; Lord Hunt of Chesterton; Lord Kakkar; Baroness Neville-Jones; Lord Oxburgh; Lord Renfrew of Kaimsthorn; Lord Vallance of Tummel; Baroness Young of Old Scone

Evidence Session No. 9 Heard in Public Questions 54 - 59

Witnesses

Professor Sir Robert Lechler, President, Academy of Medical Sciences; Professor Joyce Tait, Director of the Innogen Institute at the University of Edinburgh, Royal Society of Edinburgh; Professor Mark Tooley, President of the Institute of Physics and Engineering in Medicine, Fellow of Royal Academy of Engineering.

Examination of witnesses

Professor Sir Robert Lechler, Professor Joyce Tait, Professor Mark Tooley.

Q54 **The Chairman:** Good morning. Thank you for coming to help us today. We are being broadcast on the web, so please be careful; if you have a private conversation it might get picked up—unless you are saying nice things about us. Would you introduce yourselves, starting from my left? If you want to make any comments before we start the question session, please do so.

Professor Mark Tooley: I am a fellow of the Royal Academy of Engineering and president of the Institute of Physics and Engineering in Medicine. Life sciences is a very wide area, and I am very pleased that biomedical engineering and medical devices are included, because it is very important for the NHS and wider healthcare.

The Chairman: We were pleased to have your written submission.

Professor Sir Robert Lechler: I am here as president of the Academy of Medical Sciences.

Briefly, the academy very broadly welcomes the strategy, because it is important and timely—important because it aims to build on a real area of strength in the UK. The UK is really good at life sciences. If you look at academic performance and highly cited papers, a single NHS healthcare system and the pharma, medtech, biotech and digitech industries are all real assets. If we deliver this strategy, we will sustain, and even enhance, our international competitiveness.

I would highlight very briefly four areas in the strategy that I would particularly endorse. The first is the importance of maintaining a balance of research funding from discovery science to applied science. I see a risk that discovery science may be disadvantaged if we are not careful in the current climate. The second is the role of the NHS as a research partner. If we do not make that work, the life sciences strategy will not work. The third is clusters. This is absolutely the right way for the UK to organise itself intelligently to be most competitive, and those clusters should even differentiate themselves a little from each other. The fourth is talent. If we do not retain and recruit top talent, we will simply fall behind, and there are some headwinds that we are facing right now.

The Chairman: We might come to those headwinds in a minute.

Professor Joyce Tait: I am a professor in Edinburgh University and a director of the Innogen Institute there, and I am here representing the Royal Society of Edinburgh. I am also on the Synthetic Biology Leadership Council, and I chair its governance subgroup.

By way of introduction, I agree with everything that Sir Robert has said, although I would add that I regret the way the rest of the bioeconomy is being largely ignored in the industrial strategy and other papers coming out of it. The area covered by Sir John Bell's report is perhaps up to about 20% of the bioeconomy. The rest is in areas such as food and drink

and large-scale chemical manufacture, which is ripe for a disruptive innovation challenge coming from fermentation approaches to manufacturing small molecule and large molecule chemicals. There are enormous opportunities in other areas of the bioeconomy, and I would like to see the balance redressed a bit so that they are considered on an equal basis.

The Chairman: Can you tell us a bit more about the Innogen Institute?

Professor Joyce Tait: The Innogen Institute was set up in 2002 with funding from the Economic and Social Research Council. We have had £7 million in funding from them over 12 years and we brought in another £14 million in matching funding. It focused mainly on interactions between regulation and innovation. Our conclusions have been that you can spend a great deal of money supporting science and its translation through to innovative products, but if you do not have the regulatory principles and a regulatory system in place that is compatible with the regulatory needs of the new biotechnologies, which are often very different from those of chemicals, you will get much less national benefit from your investment in the science. We need a parallel initiative that brings to the fore the interaction between innovation and how it is regulated; making the regulatory systems more proportionate and adaptive to the needs of new technologies.

Q55 **The Chairman:** One of the key recommendations, which, Sir Robert, you slightly touched on, is the idea of creating the health advanced research programme, HARP. What will its success depend on?

Professor Sir Robert Lechler: I have a comment and a question about HARP. What remains to be clarified is whether HARP is just folded into the industrial strategy challenge fund and will be part of that funding stream or whether there is a pot of money yet to be identified that will fund life sciences-type challenges. I simply do not know the answer to that. An important question is whether this will all get funded under UKRI or not, and so on. The risk with HARP is that you could create initiatives that are too big to fail. If you put huge sums of money into a very small number of challenges, there is a risk that they are too big to fail. Of course, that is not the point. If we are going to take on challenges, we need to have a risk appetite that allows things to fail. That is the nature of a challenge.

Many of us have discussed a lot the analogy with DARPA in the United States, which I am sure you are all familiar with. One of the very obvious features of DARPA is that it has an enormous risk appetite. Most things that you take on fail. That is the definition of a challenge, in a sense. Of course, I would welcome an additional infusion of resource into taking on some important challenges, which are often called moon shots. The scale of funding needs to be carefully thought about so that you avoid the risk that they are too big to fail. We need to think about how they are structured. Most of us in my world think too incrementally. That is how we are trained to think and how the next grant application works. This is about thinking outside the box a little. Who is going to do that thinking? How are we going to identify the challenges and how are we going to

resource them in a way that allows us to be adequately accepting of failure?

Professor Mark Tooley: Part of the money involved in this is to train biomedical engineers who can be equipped with innovation and entrepreneurial skills. That is key to this initiative, and I think engineering skills should be key to this brief.

The Chairman: That might apply equally to Scotland, because HARP is Great Britain-wide.

Professor Joyce Tait: Yes, indeed. The Scottish health service is probably quite well placed to take part in such an initiative. Being smaller overall it has an advantage in that it is easier for it to co-ordinate and develop integrated approaches to make these things happen. It has embarked on that path already, helping to make the Scottish health system more innovative than it has been in the past, but I would not say things are by any means well entrenched in that process. HARP is fine, and it is true that it focuses a lot on fundamental research as the starting point, but it does not give enough attention to the possible constraints further downstream and smoothing the flow particularly of disruptive innovations. Some of the disruptive innovations will need serious help getting through to a marketplace, even in a willing health service, and we need more focus on that.

Lord Hunt of Chesterton: Do you think that the EU grant-giving process allows you fail? My impression from doing grants for both sides is that you have this extraordinary push to do something really big and innovative from our friends in Brussels, but you do not see quite the same from Swindon. Would you like to comment?

Professor Sir Robert Lechler: That is an interesting point. You are probably right, although again, as you will know well, having participated in many European consortia, there may be quite a grand plan, but when the money gets divvied up each participating site tends to revert to type and be concerned about deliverability and so on, as we usually are. I am not sure if, in my participation in EU funding, I have seen a much greater risk appetite than I have in conventional UK funding, although I would agree with you that the scale of resource perhaps would accommodate it. If you have seven sites, two could fail without damage being done to the overall project. I think that is true.

Q56 **Lord Fox:** Coming back to the point you just made about the potential difficulties of implementation through the health system, what could be changed now to augment the plans to ease that process and improve it?

Professor Joyce Tait: It has occurred to me from reading quite a few papers in preparation for this event that it could do with a higher-level group looking outside the industrial strategy and the health system at how that path could be smoothed. It would be different for different technologies.

Lord Fox: Is that an implementation team as such or is it still a theoretical exercise?

Professor Joyce Tait: It would need to be a highly-focused implementation team.

Lord Fox: What sticks and carrots would you give them in order to make it happen?

Professor Joyce Tait: There is some really interesting work being done in the John Innes Centre on the development of viral vaccines using synthetic biology. That has the capacity to develop vaccines extremely rapidly and very much more cheaply. That could be a big part of the antimicrobial resistance strategy. Better vaccines could take the place of antimicrobials in some cases.

Lord Fox: Absolutely.

Professor Joyce Tait: You could have a policy in place that would create carrots for the health service to take up these new technologies on a technology-by-technology basis. There are a lot of policy incentives you could put in place to say that if the health service can develop an approach that will in the long run save money, the Government will put carrots in place to help them to do so. At the moment there is no incentive in the way the health service is funded.

Lord Fox: So it is all carrots and no sticks.

Professor Joyce Tait: Not entirely. You still need the sticks to keep drugs safe and things such as that, but carrots in terms of drawing innovation through to a future marketplace is an extremely powerful policy mechanism.

The Chairman: Sir Robert, do you have a comment about the NHS?

Professor Sir Robert Lechler: Yes, of course I do. I am not sure if this is slightly deviating from your question, but those of us who function in the NHS in one way or another are very conscious of the strictures under which it is operating and the pressures that are felt at the coalface and therefore work all the way up to NHS trust boards. They spend a huge amount of time worrying about staying afloat, keeping NHS Improvement at bay and meeting their target referral-to-treatment times and all that. That is the reality, and if we want the NHS to be a research partner we need to think very seriously about how we are going to address that. I would observe that, thanks to the NIHR to a large extent, we now have an infrastructure in the major academic medical centres in the UK that is possibly unparalleled for experimental medicines. The clinical research facilities and everything else in my own patch are absolutely outstanding. They could not be better. There is nothing else I would ask for.

However, the problem is that my NHS colleagues simply do not have the time to think about or devote to research. You may accuse me of being self-serving here, and I apologise for that, but I genuinely believe this. There is talk in here about academic health science centres—I happen to lead one—and it goes back to my point about clusters. In my view, a modest amount of resource allocated to the DH-designated academic health science centres would allow us to buy time for NHS consultants who are really motivated to engage in research. It would not take a great

deal of resource, but it would make an enormous difference, and it would partly address the challenges in the NHS that people's job plans are so dominated by their clinical commitments that they simply do not have the head space to engage.

The Chairman: We have heard a lot of comments from different witnesses that it will be the academic health science centres which will drive both adoption of innovations in the health service and make the health service innovative. Do they have the resources to do that?

Professor Sir Robert Lechler: No, I do not think they have the resources to do that, but I believe they genuinely have the opportunity to do that. The amount of latent energy in the academic health sciences centre that I run—Lord Kakkar, of course, is chairing one of the others—is enormous, and the amount of untapped talent in the NHS consultant community is huge. A lot of the consultants that we appoint at Guy's & St Thomas', King's College Hospital and so on have PhDs; they have had research training. It simply goes to waste, because they get straight into a clinical job and their life is dominated by their clinical commitments, and if they had a bit of research time in the past, that tends to disappear in the next annual job-planning cycle. There is real potential there. As I say, it would not be very expensive and, by my calculation for King's Health Partners, if we had £4 million a year that would allow 10% of the consultant staff to be 20% research active.

Professor Mark Tooley: I very much agree with Sir Robert that clinicians need space to innovate. Each hospital needs an innovation champion. Certainly in Bath we had an innovation panel where we gave medics time to have ideas. That is essential, and that link with the academic health science networks is crucial. There is not enough money to support people having space in busy hospitals, wherever you are in the country. Innovation champions could be biomedical engineers as well working with the medics, and you would have great results there.

The Chairman: We need more engineers.

Professor Mark Tooley: We need many more engineers.

Q57 **Lord Renfrew of Kaimsthorn:** I would like to ask you a little further about the implementation of the life sciences strategy. What sort of structure do you think might be the best way of implementing it, and, in particular, who might be responsible for the implementation in a more general sense? The report was not very specific about that. Do you have some thoughts on that?

Professor Sir Robert Lechler: There are probably more than two, but there are two options that occur to me. The first is that, assuming we are going to implement the strategy—

The Chairman: You are not certain.

Professor Sir Robert Lechler: I am not certain, no. There is not very much that I am certain of these days. Let us assume that we are going to adopt and implement it. Whoever is going to be responsible needs to straddle BEIS and the Department of Health. That seems fundamentally

important. If it just sits in one government department or another we will miss half the point. That is the first thing I would say. If that is the case, it could be some kind of Office for Life Sciences beefed-up structure, perhaps with a Minister in charge but with these dual accountabilities to the head of BEIS and someone in DH.

An alternative—and I do not know whether this has come up in any previous discussions—is the OSCHR, the Office for Strategic Coordination of Health Research. It was set up initially to manage the interface between the Medical Research Council and the NIHR, but it has broadened its remit now and it very much sits across Business, Energy and Industrial Strategy and the Department of Health. You could reinforce OSCHR in some way and make that a body that would oversee the implementation. Those seem to me to be two options.

Lord Fox: Did we ever reveal who the OSCHR reported to? I asked that of a previous witness and no one was able to give me the answer.

Professor Sir Robert Lechler: It sits in the Treasury. It is a very good question and I do not have a clear answer.

The Chairman: Is it not that it has more of a co-ordinating role of the different research funders?

Professor Sir Robert Lechler: It does, you are quite right. As I am sure you are aware, John Bell chairs the OSCHR at the moment, although I believe he is talking of stepping down next year. In my early conversations with John, he said, "This is a time-limited entity. It won't be needed, because everything will be humming along so nicely". It has become quite a significant function and plays a very important co-ordinating role. If it were to take on this remit it would need to be in some way reinforced, and it would need an accountability to somebody.

The Chairman: Does the timescale for implementing the strategy have to be longer term? The document talks about 10 years or longer. Do you think in that situation government departments are the right places to drive it?

Professor Joyce Tait: I would say that the timescale is somewhat optimistic as it is elucidated in the report. I also think that the sums of money that are attached to that timescale are highly optimistic. We have been operating on this research-push model for a very long time in the UK and it has not yet delivered the innovation it could have delivered if we had been more focused on the translation aspects. There is something in the Bell report about translation, but it is not spelled out very clearly, and the kinds of efforts that would need to be undertaken to improve that translation are not spelled out either. That is where a body such as the OSCHR could have an important role to play in putting a strategy together for translation. It should be very sector specific. The translational needs of one sector, even within the broad area of health, are very different from sector to sector. Some areas are highly regulated, and regulation will be the main factor. Other areas such as data are not so highly regulated, but the public response might be the most important factor to take into account, and it needs a body that is capable of dealing

with all those different aspects, because just relying on the research push is clearly not going to deliver what we need.

The Chairman: We are going through legislation related to data now, both European and UK, in the House of Lords.

Professor Mark Tooley: I agree that the translation path is very difficult. Certainly the Royal Academy of Engineering put a lot of effort into their Enterprise Hub[1]. We are trying to get devices into the NHS especially, but it is very difficult. We need training and skills on the regulation needed to get into the health sector. The regulation on data will not be trivial. Security is a huge problem, or could be, especially when we get more and more digital. There is huge cause for disruption there.

Q58 **Baroness Neville-Jones:** The next question rather follows from what has been said. I wanted to pursue the issue of translation with you a bit further. We have had a lot of evidence in previous sessions on the subject of the inability historically to make the most of our science by turning it into innovation and then bringing it to commercialisation. You have already begun to touch on this, in a sense. What further thoughts do you have for the Committee? In relation to the last exchange we had, do you think that UKRI, in its new guise, has a role to play in getting the Bell strategy off the ground and implementing it, quite apart from the whole issue of how effective Innovate UK can be now as one of the research bodies?

Professor Joyce Tait: I have thought about it and talked to several people about it. The innovation voice in UKRI is certainly in danger of being drowned out by the much larger number of research-related bodies.

Baroness Neville-Jones: I share that worry.

Professor Joyce Tait: There is a serious concern about that. It could have a major role, and I think that the people involved are capable of delivering in that area, but it remains to be seen whether the voice will be heard over the clamour of the other parties involved.

Professor Sir Robert Lechler: I absolutely agree that UKRI could play an important role, not least because, of course, one of the drivers for creating it was to bring disciplines to work more closely together. With my engineering colleague on my right, making real progress with life sciences is going to require conventional biomedical life sciences stuff and, of course, engineering, data science and social science. Social science is going to be very important in terms of public acceptance and all that sort of stuff. UKRI is certainly important.

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[1] The Royal Academy of Engineering's Enterprise Hub, founded in 2013, is a national resource for the UK's most promising engineering entrepreneurs. The Hub makes awards to exemplars of excellence in engineering innovation who will be the founders and leaders of tomorrow's high-tech companies. Enterprise Fellowships support outstanding entrepreneurial engineers, studying or working at a UK university, to prove the utility of an innovation by spinning out a business based on that innovation.

On the general issue of translation, sometimes we do not celebrate the change that has happened over the last decade or more. I remember not so long ago that we were all bemoaning the decline of biotech in the UK. That has absolutely turned around and now we are spawning small biotech industries and spinout companies like there is no tomorrow, and it is going really well. What we are very bad at, as you well know, is growing those into big companies.

Baroness Neville-Jones: Scaling up.

Professor Sir Robert Lechler: That takes us into the patient capital area. The patient capital review seemed to me—I am no expert by any means—to be making some very sensible proposals as to how we can do that. There are some examples. Immunocore is one that I happen to know quite well. It is becoming a bit of a poster child for how you can grow something without it getting swallowed by an American giant too early. I would say—and I come back to my point about the infrastructure for early-phase trials and getting discovery into patients—that we have a really outstanding infrastructure, so I think we are poised to do it, but implementing the strategy would help us to move forward.

Professor Mark Tooley: Patients and the public are not mentioned in the strategy. If we get them more involved in the design and implementation of the devices or whatever we are installing, it will be much easier to implement. Certainly the SMEs, as Sir Robert said, are very important, but they find it very hard to get into the NHS, and training and help with that would also be appreciated.

Professor Sir Robert Lechler: There is one point I want to make at some point in the conversation about the porosity of the boundaries between academe, the NHS and industry. I do not know whether this is the moment to make it or later.

The Chairman: Go ahead.

Professor Sir Robert Lechler: It is vital, and it comes back to the cluster model. If we are really going to make clusters work and extract the maximum value from the assets we have, we need much more freedom of movement between these sectors. Historically, it has not been like that. We all know academics who have gone off to "the dark side". That is still the language that is used when they go into industry, and they tend not to be seen again. It is one-way traffic. The NHS does not really understand industry; industry does not understand the NHS. The number of times I have heard an academic go off to spend some time in a major pharma company saying, "My gosh, they have good science. I never realised", and of course they should realise because it has great science. Things we can do to increase mobility at all levels of career paths would be very welcome, and it is referred to in the strategy.

One thing I am particularly enthusiastic about which the academy is doing is shaping up a novel leadership programme that I hope will bring people to lead clusters. These will be cohorts from academe, industry and the NHS; a mixture of all three sectors. The programme is designed to give you full immersion in the two sectors that you do not come from.

You will be able to do a project in the other sector. You emerge with a real understanding and those people—I wish I had had the chance to do that when I was 45 years old—will be vital to delivering some of this strategy in the future.

Lord Kakkar: To pick up on that point, do you think that there needs to be a more fundamental review of how one assesses academic, or indeed clinical, promotion in the elements that might be delivered through academics or clinicians taking a clear approach towards collaboration with industry early, rather than a focus on pure academic routes of support for their research?

Professor Mark Tooley: The earlier the better, to get the groups involved. I totally agree with Sir Robert that we have to make it so porous that each sector understands the other and people are working with different groups early on. That is essential.

Professor Sir Robert Lechler: The rewards system needs to recognise that. The REF's emphasis on impact helps, but I still think that many people at a relatively early stage in their career are very nervous—they are obsessed with the next Cell paper, the next grant or whatever it may be—and we need to make sure that our promotions systems recognise the value of real connectively with industry.

The other thing is that there are not enough people from industry coming to spend time in the NHS and/or academe. It really is mobility in both directions.

Lord Kakkar: To pick up on that point, you mentioned the REF. Do you think there has been adequate consideration of how the REF might be modified to support this industrial strategy?

Professor Joyce Tait: I am on the REF interdisciplinary panel. We are currently looking at how you would develop criteria for evaluating interdisciplinary research in universities, and that is an important key in developing impact. It is very rare that you get impact from a narrowly focused research programme. You need better approaches to evaluating interdisciplinarity in connection with impact in the university system, and through the REF is a great way to do it. The way it operates at the moment there is still strong encouragement for each individual to do mainly fundamental academic research with a bit of impact tacked on to it. It would be better placed if we could allow the REF to evaluate the research of some academics purely on an impact basis, not necessarily on their contribution to highly-rated refereed journals. It would have a big impact on the amount of interdisciplinary research innovative outcomes coming out of universities if we could tackle that one.

The Chairman: Is there not a suggestion that we develop a KEF—a knowledge efficiency framework—alongside the REF and the TEF?

Professor Sir Robert Lechler: Yes, absolutely.

Professor Joyce Tait: Yes, that would be one way to do it.

The Chairman: The second bit, coming back to your answer, Sir Robert, is that we do not have a culture in academia, let alone in the NHS, of

allowing those who are developing any kind of research that may go to innovation to step out and develop that innovation and then be allowed to come back.

Professor Sir Robert Lechler: We absolutely need that. I completely agree with all this. I would go back to one of the earlier points I made: I still worry that the pendulum is going to swing too far towards the applied science end. Again, in all this it is great that we have additional funding. It is very, very welcome government funding. But we have to sustain discovery science—and I do not think you disagree, Joyce—otherwise the pipeline will dry up.

Professor Mark Tooley: It is all important, the continuum from basic science to translation in the NHS.

Lord Fox: This is probably a very silly thing to say, but it seems to me that as long as the main driver of people's success in academe is papers, you will never get that rotating door working, so we have to devise a different rewards system before that door can ever work.

The Chairman: Hence the development of a KEF.

Lord Vallance of Tummel: You touched on data earlier, and we have heard from a lot of witnesses that there is a great wealth of resource in NHS data if you can get at it, but there are hurdles; there is the privacy hurdle and the balkanisation of platforms and systems across the NHS. Is this really worth going for, and how would you set about doing it?

Professor Mark Tooley: It is worth going for, but there is the complexity of different systems talking to each other, so the standards have to be there to enable this to happen. There is complexity in having the security, so the regulation is important. The end result could be dramatic. It is worth going for, but it is not without its challenges.

Professor Sir Robert Lechler: It is absolutely vital, and if we do not correct this one we will certainly waste an opportunity. How often have we observed that the NHS is an opportunity because it is a single system and all that? On a more positive note, what has become very, very clear in recent years is that while there used to be a bit of an obsession with aligning our IT systems, it is completely unnecessary. Interoperability now allows systems to talk to each other and we are engaged with all sorts of other organisations, sharing data through these interoperability mechanisms. That is absolutely soluble, and the five major biomedical research centres, which we used to call comprehensive BRCs—we call them something else now—are all now sharing patient data and research data in disease-themed areas, and it is going really well. All this absolutely can be done, and HDR UK [Health Data Research UK] is a very welcome additional slug of resource that we hope will extend this.

On the point that came out earlier about public trust, or the regulators' belief in the public trust—Joyce may take a slightly different view from me—it is important that the public's voice is clearly heard. The academy, under the umbrella of Understanding Patient Data, which is a conversation that is under way now, is going to conduct a public dialogue about the use of patient data. I think the message that we will hear in

general is that the public are very happy for their data to be used if it is advancing healthcare, but the people regulating the use of data need to hear that. I hope we will get a co-ordinated voice that will make this easier to deliver.

Professor Joyce Tait: I agree. I would add something about regulation. We have to be extremely careful that the regulation for this technology does not stop innovation. There is also an opportunity in some cases to use technology rather than regulation. The blockchain software that underlies bitcoin is being looked at very carefully by the people who want to share medical data in complete confidence and without a breakdown of security. In the development of fintech, which is one of the new technologies based on this blockchain software, they set up what they called a regulatory sandpit and brought the small companies that might be frozen out by a draconian regulatory system into the discussion about how it was going to be regulated. That is a good approach when you are trying to regulate a new industry and where you could unwittingly put in place regulatory systems that will block off whole areas of innovation if you are not careful.

Lord Vallance of Tummel: The point about blockchain is interesting, and I am interested in what you said about interoperability. But that is between platforms. Is the data collected in a uniform way across them?

Professor Sir Robert Lechler: That is absolutely spot on. Again, people often overlook that. The biggest issue is agreeing common data-entry standards, coding and all this stuff. It is a cultural thing among the people accumulating or acquiring the data. That is what we have discovered again within our own academic health sciences centre. Would that we had just a single system and a single electronic health record. That would be wonderful, but you can overcome the problems of not having that. You are absolutely right that the issue is getting commonality in the way the data is acquired.

Lord Vallance of Tummel: Who would be responsible for that?

Professor Sir Robert Lechler: It is easier to see local solutions. You could imagine an academic health science network, for example, with quite a reasonable geography. Our AHSN is five million people. With that sort of geography you could agree common standards. It is going to take a lot of energy and a lot of foot leather being worn out going round and persuading people, but I can imagine that if there is a will, there is a way. You would need to dedicate some human resource to making it happen, but it is possible in those local geographies. Doing it at a national scale is where we have always fallen over in the past and we need to pick them off, and people have slightly different views about how big the population needs to be to make this really valuable, but AHSN-type geographies are probably realistic.

Professor Joyce Tait: This is the kind of thing the British Standards Institution does quite well. It might be the body to take forward something like that.

The Chairman: We talk about the NHS, and the report mentions the

NHS. It says that we need to use the data from the whole of the NHS, which is not really necessary, is it, because we heard earlier the witness from Birmingham say that academic health science centre data is completely digitised. If you have big trusts that are completely digitised to collect the data, surely it is not necessary for the rest of the NHS to be involved in the innovative part of it, is it?

Professor Sir Robert Lechler: I think I agree with you. It depends a little on the question that you are posing and whether you are dealing with rare patient populations and so on. You need populations somewhere between 5 million and 10 million if you really want to maximise the opportunity. That means it is more than a single trust, that is for sure. You need a constellation. That is why I mentioned AHSNs.

The Chairman: By the way, there is no mention of a blockchain type of software being used for either data collection or data monitoring in the Data Protection Bill, so that is not going to happen.

Professor Joyce Tait: IBM has a big programme looking at exactly that.

Baroness Young of Old Scone: I want to dwell for a minute on the issue of patient angst. My understanding of the problem that triggered it was that patients were getting shirty because their data was being sold for non-health purposes to commercial organisations without anybody having really thought through the implications of that. That caused this huge reaction, but, in fact, as people quite rightly have said, when you talk to patients about whether they are happy for their data to be used and shared for research purposes, they have no problems with that. If we are looking at an integrated system where we could have small and medium-sized enterprises involved in multidisciplinary, multi-institution co-operation right from discovery through to uptake, do we need to start getting the best ambassadors we have, i.e. the folk who are faced with patients on a day-to-day basis, to start being indoctrinated with the philosophy that they ought to be doing the selling job in a subtle, ongoing and comprehensive way about the importance of data collection and data use?

Professor Mark Tooley: And the quality of the data that is collected is very important. Data that is corrupted or contaminated is not useful. I agree with you that we need appropriate staff working on the front line to be trained in this method.

Professor Sir Robert Lechler: We have failed as a community to tell the story in a compelling way. That is why public understanding of science is so important. I do not think we are energetic or active enough about telling the story about how valuable all this is to patient care and population health. It is a failure on our part. We were talking about this before we came in. We need to be much more energetic about it.

Baroness Young of Old Scone: Is anything happening on that at the moment?

The Chairman: Are you doing anything?

Professor Sir Robert Lechler: We are. The academy is engaging on this topic, but it will be the job of academic health science centres, for example, to have a really co-ordinated communications strategy that is better and more professional than anything that we currently do.

Lord Vallance of Tummel: Let us suppose we get over the hurdles of privacy and so on and that the data is available. Do you think that data should be made available free and across the world, or should it be commercialised? Should it be a source of revenue for the NHS?

Professor Joyce Tait: Where surveys have been done asking people whether they would be happy for it to be commercialised, the answer that has come back has in general been yes, provided there is a benefit to the NHS. If money comes back into the NHS from that commercialisation, people are generally happy about the commercial use of their data. They would still want to see controls and privacy and so on. Nevertheless, I do not think that is necessarily a blocking aspect for the use of these this data in these circumstances.

Professor Mark Tooley: There is a cost in collecting good quality data as well, so yes.

Professor Sir Robert Lechler: I do not know of anybody who has properly worked out a costing model, but it should not be beyond the wit of man or woman to do so.

Lord Vallance of Tummel: We need to get the principle right first.

Q59 **Lord Griffiths of Fforestfach:** I have a question regarding Brexit. In a way, you have touched on some aspects in answers to previous questions. There are two issues. You may say, "What is Brexit?", but let us assume that, whatever else happens, we leave the European Union. In more specific terms than we normally use, particularly regarding skills and regulation, what would you like to see in a post-Brexit world?

Professor Mark Tooley: Keeping the regulation as planned to be implemented in 2020 is very important. We are too small a country to go that alone.

Lord Griffiths of Fforestfach: Does that mean that you see opportunities for deregulation?

Professor Mark Tooley: No, the regulation of us within the European device market is very important, so we have to continue that.

Lord Griffiths of Fforestfach: In evidence that we received from the Shelford Group, it said, particularly in relation to the European clinical trials directive, that it was out of date more than inappropriate; that it was inappropriate because it was out of date. What would you say to that?

Professor Mark Tooley: I am talking about MRHA-type device regulation[2]. That is being revamped now and is going to come in too late, after Brexit in fact. I think we should implement some of that.

[2] The European Union Medical Devices Regulation (Regulation (EU) 2017/745) entered

Professor Joyce Tait: From my perspective, we have to make sure that we do not lose European markets because we do not comply with their regulatory requirements. I hope there will be opportunities to adapt that European medical device regulation in ways that will be more sympathetic to small companies developing diagnostic tools. At the moment there are lot of small companies already going out of business because they do not think they can meet the regulatory requirements of that European regulation. A lot of the European regulation is fit for purpose but very bureaucratic, and if we can find less bureaucratic ways of meeting the regulatory requirements we could save a lot of the extra cost for these companies. There are ways in which we can look at of making our regulatory approaches more adaptive to the European regulatory requirements that would enable innovation to take place more readily.

I would add to that, regardless of Brexit, Europe is about to change. Europe has what is called an Innovation Council, which has been set up with the aim to make European regulatory systems more proportionate and adaptive to the needs of new technologies. It is quite possible that Europe will change its regulatory systems in some quite important ways when we are out of Europe, and if we are not well placed to keep up with that change we could lose out. Either way, whether we are in or out, and whatever the extent to which we are in or out, it is really important to make sure our regulations are fit for purpose. Some of them clearly are not and need to be adapted.

The Chairman: Would it not be important, whether we are in or out, that the regulatory system we set up fulfils the bureaucratic requirements of the EU legislation? Otherwise they will reject it, because presumably they will adjudicate the applications.

Professor Joyce Tait: But other countries with very different regulatory systems are still able to convince the European Union that their regulations meet the European requirements for safety, quality and efficacy. We could be inventive. We should not stop even considering such options because we think we could not do it. There are probably a lot of ways in which we could make differences if we put our minds to it.

Professor Sir Robert Lechler: If I come back to the way you framed your question, my Brexit speech, which I have given 100 times, is four Ps: people, partnerships, pounds and permissions—"permissions" being regulation, but it starts with a "p". People are the most important, to my mind. I can tell you as someone involved in recruiting talent to my university that it has definitely become more difficult since the vote. We need, as rapidly as the negotiations will allow, to give certainty to our current continental European academics and to those we are trying to recruit that they will absolutely be welcome, secure and safe and that it will not be more difficult. To my mind, that is by far the most important.

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into force in May 2017 but will only apply after a transitional period from spring 2020 after the UK has left the European Union.

On the regulations front, I agree with what has been said. There are two ways in which we should think about this. The first is that harmonisation with emergent European regulation makes sense in terms of markets and so on. That definitely applies to large-scale trials. There may be an agility dividend for early-phase trials, where the UK is so good at regulation. We are internationally regarded on mitochondrial DNA, the use of stem cells and such things, and we could position ourselves as the go-to place for those sorts of activities. If I am trying to find any silver lining in this whole process, perhaps this could be one.

Lord Fox: Are these things that the European Union has not yet regulated?

Professor Sir Robert Lechler: Yes.

Lord Griffiths of Fforestfach: If we think of the life sciences industrial strategy, we think of skills and people at the high end coming in, as you have, but the NHS today, universities and so on also include people at a much lower level of skill who turn out to be absolutely crucial to the operation of what we are doing. If you were now advising, let us say, the Prime Minister and you said, "Prime Minister, above all, we want to ensure that in whatever regulation of migration we have the following are essential", what would you say? You mentioned the top level, but do you have any comments on the lower level?

Professor Sir Robert Lechler: Absolutely. The social care system, which is already under extreme pressure, will fall over. I forget the exact figures, and forgive me for not having checked that before coming here, but there are a lot of people in the social care system doing jobs that British people do not want to do.

The Chairman: It is 37%.

Professor Sir Robert Lechler: Because of my primary responsibility, I am focusing on the top end, the highly skilled, but you are absolutely right. I would emphasise the social care system in particular, but to some extent the NHS requires skills at all levels.

The Chairman: Scotland has a different life sciences strategy and John Bell's strategy is UK wide. Are the two going to end up in conflict in Scotland?

Professor Joyce Tait: It is perfectly possible for the two to co-exist. Where I think the Scottish life sciences strategy is better is that it comes at things from a different basis. It comes from a sectoral approach. It talks initially about the bioeconomy and then looks at the sectors within that and where the enormous opportunities are within those sectors for Scotland. In a sense, the John Bell strategy is one part of that broader Scottish strategy. It is a useful way to look at things, because you have two emerging platform technologies—synthetic biology and gene editing—which are coming out of the life sciences, which are capable of having an enormous benefit across a much broader range of industry sectors than the healthcare one. Building on that foundational research coming up from academia, and from within companies, and getting the

benefits for the whole economy is a better strategy. The industrial strategy has the capacity to go in that direction.

I am going to wait with interest to see what is in the White Paper when it comes out. I know there was a White Paper in preparation just over a year ago that was going to include the bioeconomy as an integrating factor, but that was dropped. I do not know why. I hope it is going to be back in in the White Paper that is coming out, because it is a much more coherent and potentially profitable way for the UK as a whole to look at the opportunities that are coming out of the life sciences.

The Chairman: Thank you very much indeed. It has been a very helpful session and we appreciate it very much. Thank you very much indeed for coming.