



HOUSE OF LORDS

Science and Technology Committee

Corrected oral evidence: Financing and Scaling UK Science and Technology: Innovation, investment, industry

Tuesday 22 April 2025

11.30 am

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Members present: Lord Mair (The Chair); Lord Borwick; Lord Drayson; Lord Lucas; Baroness Neuberger; Baroness Neville-Jones; Baroness Northover; Lord Ranger of Northwood; Viscount Stansgate; Lord Stern of Brentford; Baroness Walmsley; Baroness Willis of Summertown.

Evidence Session No. 5

Heard in Public

Questions 41 – 50

Witness

I: Professor Sir John Bell, President, Ellison Institute of Technology.

USE OF THE TRANSCRIPT

1. This is an uncorrected transcript of evidence taken in public and webcast on www.parliamentlive.tv.

Examination of witness

Professor Sir John Bell.

Q41 **The Chair:** Welcome to the second of the evidence sessions today, and we are very pleased to have Sir John Bell with us. We have had a lot of interesting discussions with Sir Paul Nurse, Sir John, which you will have heard some of. I would like to start by saying that what we are trying to address are the perennial problems of the scaling and financing of UK science and technology. You have spoken a lot about this in the past, and a few years ago I was a member of a Select Committee to which you spoke about this very topic. We would like to know what your current perspective is, particularly, of course, around the life sciences. Do you think things are improving, or do we still have the same problems that we were talking about a few years ago?

Sir John Bell: If I take a long perspective on this and look back to when I started working very actively with government—I was named life sciences champion in about 2010 or 2011, so I have been at this a while—over that timeframe things have improved. It has not been a linear trajectory; it has been better and then it has been a bit worse, but overall we are in a better position.

The science base is much better supported in the UK than it was in 2011: government has done a terrific job of stepping up and providing funding at a very high level for the science base. We have also been able to engage industry better than we did then, because there was no industrial strategy at all. It was not until we created the industrial strategy with Greg Clark that we started to properly engage with industry.

If you look at life sciences in particular, we perhaps became the poster child of a country that actually understood how to interact with industry. Indeed, we have had visitations and attempts to copy our life sciences strategy by Japan, Canada, Sweden; there were about half a dozen countries that said, "Hey, those guys have got it right; off you go". Some things we have done have been very good, but it is worth reflecting that we are in a bad place at the moment in life sciences. The industry has never been so negative about the UK. The major pharmaceutical companies have said to me, in one form or another, that they are out and are not coming back. They are not investing in capital infrastructure or building the kind of discovery sites that they did in 2017 and 2018, so we are in a bit of a bad patch. It is soluble, but these things have their ups and downs.

Lord Borwick: Is this mainly an issue of a lack of capital in the UK, is it bad skills among the investors in picking out a good investment, or is it bad asking by the investees? Do they not know how to pitch to financial services?

Sir John Bell: We are missing an ecosystem that works, and it involves all those components. But the biggest single problem is the lack of scaling capital. The explanation for that is very simple: the decision to

put defined benefit pension schemes on the balance sheet of companies meant that they had little choice but to put those in safe, secure investments, which meant gilts. So, where pension schemes used to account for 60% of the holdings of public companies in the London Stock Exchange, they now account for 2%. That amount of money adds up to trillions of pounds, which is now all sitting in gilts.

That is terrific for a Government who want to have somebody buy their debt, but the truth is it is a terrible outcome for scaling capital. In the absence of a substantial chunk of scaling capital, guess what? There are not people around who know how to invest it because there is no money. I have had the experience of bringing in some outstanding investors from the US in the venture capital space. They come here with great enthusiasm, and then they say, "Well, this is terrific, but there's no money". So that is a serious problem.

Because we have never really had any, or very few—in fact you can name them on a couple of fingers of one hand, to be honest—companies that have scaled to be productive companies that pay tax, make products and sell them globally, you do not have entrepreneurs who know how to scale companies. We have never scaled them, so it is not surprising that those people do not exist. We are missing all those bits, but we have a lot of talented people—science is great—so there is no reason we could not get to a different place. But we will not get there without capital and we do not have capital. I have been quoted as saying, "You can't do capitalism without capital", and that is what we are trying to do at the moment.

Lord Borwick: Are you saying that we do not have the capital because the Government are competing against science?

Sir John Bell: The Government could sell their gilts to somebody else. The real problem is that the pension industry has slid across to being deeply conservative, and for understandable reasons. Given the fact that the pension schemes are appearing on people's balance sheets, they have gone for the ultimate conservative approach, which is, essentially, gilts. Then, when they finally give up, they sell their pension schemes to the insurance industry, which is even worse and sticks the money back into gilts. So the situation is not good.

It is worth remembering that the pension industry and the people who have pensions in this country get a terrific tax benefit for doing so. I do not see much feedback from that to the wider British society. That is a problem because if you are going to offer all these benefits, you would hope that the money would be used to build capacity in the economy in the UK, make jobs for the next generation and grow scaling companies. There is a virtuous circle here, if you could get it to fly. It is not that complicated, to be honest, and some countries have done it: the Dutch, the Canadians and the Australians have done it, and the Americans do it at scale. So, it is not as if there are no precedents out there—there are lots; it is just that we seem to be stuck in this space where we cannot spring loose some of this resource.

Q42 Lord Ranger of Northwood: Thank you, Sir John: you have immediately come to the crux of the challenge of how we get these company scale-ups to happen, and highlighted that it has not been happening. One thing we look at is where this has been succeeding internationally, and our committee is interested in what is happening in other parts of the world, which you have highlighted. The US has been very good at scaling but also at coming here and taking our companies over there to scale. So, apart from the capital issue, what can we do here in terms of not just learning but potentially also helping those UK companies to stay? They are being picked off.

Sir John Bell: They are, yes. You are describing exactly what has happened. The universities are actually quite good at spinning out small companies, and the UK numbers from the big institutions are actually as good as the American numbers. But what we do not do is build them into real companies, which is exactly the point you are making.

You get into this difficult problem that the absence of the substantial funds that would sit in the public markets means that companies actually have quite a hard time going back and doing rights issues to raise money from their substantial shareholders, because actually, the truth is that these big shareholders, pension funds and the like, do not exist. As a result, in order to give return to investors there has been more of a tendency to shift towards giving dividends, rather than doing growth, and they cannot do growth because they cannot raise the scaling capital to do it.

Our dividend rates are twice what they are in America, which is fine except that is not producing growth; it is giving investors a bit more money back to keep them incentivised. As a result we are basically haemorrhaging the possibilities of growth of companies, just as a function of the fact that we are either buying back shares—which is, to be honest, a completely ridiculous activity—or paying dividends. So, if you look at it from any kind of a distance, that is the fundamental problem we have.

I have been chipping away at this for about six or seven years, and I promise you I know more about pensions than I ever wanted to know. Let us be clear: most people do not understand their own pensions anyway. We have come up with ideas about things we might do but there has been no flex. Just to be crystal clear, anybody who thinks this is going to be fixed by Mansion House needs their head examined, and the evidence is there: nothing has happened. A firm handshake is not going to get you to where we need to be; it needs to be something else.

The Chair: Baroness Walmsley, you were going to ask about pensions; would you still like to?

Q43 Baroness Walmsley: Yes, indeed. Sir John, you have said a lot about the importance of getting pension schemes involved with science and technology companies, and precedents in other countries where they do it a lot better. What can you suggest we do here to make pension schemes perhaps a little less conservative and put more of their money

into science and technology?

In addition to that, can I ask you about procurement? Another big lever for government in scaling up is public procurement, and you would think we had a really big advantage here through the NHS, for example. Is this true in practice, and if not, what could be done to improve the situation on procurement as well?

Sir John Bell: Those are both really important questions. There are a couple of really good examples of how countries have shifted their pension schemes by consolidating them. The success of pension schemes is really driven by a couple of factors. One is scale: the bigger your scale the more you can diversify your asset allocation, and as a result you will put money into venture capital and private equity and a variety of other investment vehicles. But it is also crucial that it has a long-term horizon, and by definition pensions are a long-term horizon because you do it over a lifetime. You can then actually manage your investment strategy in such a way that you should be able to generate recurrent returns of something in the order of 10% a year. I know that because the big pension funds that do this—the Canadians and the Australians—generate those returns reliably. Interestingly, so do the university endowments. The university endowments in the UK generate those kinds of returns regularly. It is not complicated to generate returns that would make people's pensions a lot better, but you have to consolidate pensions and take a long-term horizon, rather than chopping and changing all the time.

The Canadian pension scheme, which started about 35 years ago when they brought it all together with 19 billion Canadian dollars, is now approaching a trillion Canadian dollars. These things can actually generate huge growth over time. Canada routinely invests in venture capital but also in companies, directly or indirectly, and it is a massive source of capital growth and scaling capital in the country. The same applies to the big Australian scheme; I cannot remember the name but anyway, it has consolidated a lot of its pensions. The Dutch also put all their pensions together into a big single scheme. This has worked before but it is simply not happening in the UK, partly because the incumbents in the system at the moment do not want to change because they are ticking along with a rather nice income and it is all fine. But the truth is, you are not going to fix this problem without somebody doing something rather more dramatic.

Baroness Walmsley: What can government do to encourage this consolidation and dilute the risk you have talked about?

Sir John Bell: The Government are in a very powerful position because they can set the criteria by which pension funds operate. They could say, "Sorry guys, if you're not of a certain scale then your tax rate's going to go up, or you're going to get less tax benefits". Or, as the Dutch ultimately did, they could squeeze their pension funds into a single big fund, using the tools of government to do that; the Dutch have ended up in a very good position. The Canadians did it by starting small but giving

it such benefits that it grew rapidly, and everybody wanted to be in. So, there are lots of examples of how this works.

Just to be crystal clear, when I talk about pensions people sometimes think I am saying, "Can we have more money for the biotech sector?" Okay, we might get a bit more money for the biotech sector, but I am talking about something much more important for the country generally: we need money for infrastructure, for growing other kinds of companies and to basically grow our economic capacity across the whole piece. All those parts of the country are starving economically because they do not have access to scaling capital—forget the biotech industry, write it off; it is still a massive problem.

The Chair: And what about Baroness Walmsley's second point about procurement and the NHS?

Sir John Bell: Oh God; okay. So the NHS is pretty much bulletproof to innovation, as far as I can make out. I can see Paul Drayson, who worked with me for many years when he was First Minister responsible for the Office for Life Sciences. This is a really hard lift. It is not that the NHS is underfunded; the NHS is at about the right level of funding compared to most other healthcare systems in the OECD. But it is the way the money is used: the idea that it could fix some of its problems using innovation has not yet really struck home, and that is a really big problem. If you look at its use of IT and digital, it has been unbelievably slow. There are 40 hospitals in this country that still write everything on a little piece of paper; you could not make it up. It uses almost no AI. There are massive barriers to getting anything adopted in the NHS because it has created a whole set of artificial barriers that prevent it happening.

I have a lot of time for the current Secretary of State and those supporting him. They could fix it, but they also have a big problem, in that the incumbents in any system will not want it to change. The biggest obstacles in the NHS to this are, first, the civil servants, who do not want it to change, and, secondly, the doctors, who also do not want it to change. And it is the doctors who are the biggest obstacle to getting this done. I am sorry guys: I know I am one, but just so everybody knows, I am not a member of the BMA.

Lord Drayson: John, you said you have been an adviser to government since 2011, so through several Prime Ministers. One of the frustrations felt within British society is that we are good at diagnosing what the problems are—you mentioned the problems relating to pensions and to the loss of clinical trials—but these problems have been known for years; why do they not get fixed?

Sir John Bell: It is a really important question because you are right: we identify these problems, and nothing happens. Let me give you an example. The clinical trial thing actually goes back to when you were in government, Paul, back to Sally Davies, when it was recognised that the UK share of clinical trials had been falling steadily. Despite the fact that we have a single-payer healthcare system, industry was not coming here

to do commercial clinical trials. That received an uplift in funding to help support it, but most of that money went to academic rather than commercial clinical trials. So it did not actually have the desired result of making the UK the place to come for commercial clinical trials. It then grumbled along for many years, and after Covid it was much worse.

After we had demonstrated during Covid that we could do clinical trials much better than any other country on the planet, we decided, "Oh my goodness: we forgot about that. Why don't we institute a programme which would bring many more commercial clinical trials to the UK?" We had Lord O'Shaughnessy, one of your number, come and do a great report. I have to say it was really excellent: he went around, collected all the data, and said, "Okay, here's what you have to do", and there were four or five steps. That was three and a half years ago, and nothing has happened. The numbers are as bad as they ever were, in fact they are worse. And as you say, Paul, nobody seems to be willing to pick this up and say, "Actually, we are going to make this work. Who's responsible? Who's accountable? Where's the money going to come from?" In this case it would not require any money, just a willingness of the system to operate. But frankly, that has not happened.

Clinical trials are but one example. Access to digital information is another one that we have been talking about for 25 years—about how the UK should be the place to come and get digital information, to help discovery and development of life sciences products. There was an announcement two weeks ago, which is the first progress, but it was only an announcement, and nothing has yet happened. I remain sceptical about whether we are going to make that work either. So, there is a problem about delivering: we are really good at working out what the problem is, but we are really bad at delivery.

Q44 **Baroness Northover:** I want to take you back to 2011 and particularly the industrial strategy that led to the Catapults, which were supposed to be focusing on areas where the United Kingdom had particular strengths and could build on that. I wondered how you would judge the Catapults in terms of their success? Secondly, of the life science start-ups and SMEs that you have encountered, how successful have they been in getting government funding, and where have they been unsuccessful? But I want to start with the Catapults.

Sir John Bell: The Catapults were a good idea. As you know, they were originally modelled on the Fraunhofer centres in Germany, the idea being that they could actually help with that "valley of death" of helping companies get products across, so that they become commercial products. In the life sciences there have been some good successes. The Cell and Gene Therapy Catapult has been a real success and has helped a number of companies get to that point, so that has been quite good. But there have not been a lot of successes in the life sciences, though my understanding is that there have been other Catapults that have worked well. It is not that they are a bad idea, but they are very expensive. The real question is, is that the way you want to spend your money? If you

summed them all up, I am not sure that would be where you would want to place your bets.

Baroness Northover: Can you give examples of where start-ups have tried but been unsuccessful in obtaining government funding?

Sir John Bell: Most start-ups would argue that they get a good deal from government, particularly at the early stages, and there are a lot of schemes available. If you ask most successful companies to go back and recall what they received early on, they will say, "Oh, we got this and this". There will be half a dozen schemes that have given them some money, and there is, of course, the R&D tax credits, which underpin an awful lot of our research and development in small and mid-sized companies.

Some schemes are great, but they do not get you to scale the companies with products, which you really need. You need money from the commercial sector—private money—to do that. Government cannot be expected to prop these things up for ever, and that is something that they need to think about.

Where the R&D tax credit is successful it is really helpful, but I am just not sure about it. Somebody said to me that there are 55,000 companies that get R&D tax credits. If you asked me how many companies in the biotech sector would make good use of R&D tax credits, I would say maybe 500, so I have no idea how you get to 55,000. That is a lot of taxpayer money because, of course, they are getting a third of all their expenditure straight back at them. I keep wondering, "Well, hang on a minute, that is billions and billions and billions; maybe there is a better way to think of how that money is spent".

Q45 **Baroness Willis of Summertown:** My question is both following on from the previous question but really the one before, about SMEs. We can see where the problems are in funding from the Government, but what would "good" look like in terms of government funding to really get SMEs over this valley of death, and to really get these things to pick up and fly?

Sir John Bell: First, there are an awful lot of things that we could do to make these things happen that are not money. I do not want to be critical about government, because it does support these companies financially. But there are a whole load of things that would make the UK a much more attractive place, both to do discovery science but also to do the kind of science that companies do. One, of course, is the regulatory environment, which we control. We have been talking for ages about how the regulator in medicines and health care, the MHRA, could get faster and more efficient but also more innovative about how it does its regulation. It could be a pioneer, because now that we are out of the EMA, it has quite a lot of freedom to operate. Obviously, it has to retain the safety, which nobody disputes is the most important thing. But the real question is, what is the best way of determining whether you have a

signal of efficacy for any of these products, and what do you need to do to become licensed in that space?

There are a lot of really good ideas kicking around about how that might work. It had looked very much like the FDA was going to lead on a lot of those things, but that is now unlikely: the FDA is struggling badly. But the MHRA could really step in to make it easier. Then, there is this whole issue of whether you can get the health service to think a little more creatively about access to the health service for some products. I do not think the health service should be there to prop up small companies; that is not its job, but it needs to have a slightly more open mind about how some innovations could actually save it money, improve the outcomes for patients, and those sorts of things.

If you just consider the drugs, at the moment the UK is massively behind the rest of the OECD on the percentage of its health care budget spent on drugs, at about 9%. The average in the OECD is 15%, with many countries at 16%, 17% and 18%. So I do not know how we got there but anyway, it reveals that there is a real obstacle to those sorts of things.

The Chair: Baroness Northover, did you want to ask about the big pharmaceutical companies?

Baroness Northover: You have just mentioned that we are not going to hang on to the big pharmaceutical companies, so the question is, can we, and how do we do it?

Sir John Bell: For the reasons I have just described, at the moment the commercial environment for these companies in the UK is terrible. When they launch a drug in the UK they are being asked to provide the lowest prices in the OECD by some margin. Then, the way the system works, they have been asked to pay a rebate on whatever they sell of a further 25%. This is the famous VPAG structure. They are really cross about that, for very good reasons. We tried to negotiate this to a better place four years ago, and it has now drifted back up to a 25% rebate on top of the lowest prices.

As you know, the CEOs had a round table here about three weeks ago, and I spoke at the dinner at the end of the event. I know most of the CEOs, and they all said to me, "That's it for us: we're out. We're not doing this any more". You saw the AstraZeneca problems. Those are not entirely related to the Speke event; it is the wider general commercial environment for these companies. Glaxo is the same: it is looking for other opportunities elsewhere. Just to be crystal clear, if we lose our big pharma companies, the life sciences here is done.

Baroness Northover: You are putting it down largely to the prices to the NHS, but are they facing any other challenges?

Sir John Bell: Yes, lots of promises but no delivery. Clinical trials that are going to be great—"Hello? Where are the clinical trials?" Digital is going to be great. "Can we get access to data?" "No, you can't get access

to data". So they are just a bit fed up because we tell a good story, but we are not so good at delivering. That is entirely the result of those in government departments not holding people to account for not achieving stuff; they just do not do it. There needs to be accountability in the system, which frankly, I do not see.

Q46 Baroness Neville-Jones: The Government are going to produce an industrial strategy quite shortly, we hope, which on the face of it is going to be broader in scope than things we have had previously, such as the Life Sciences Strategy that you were involved in. Could you say what you would like to see that strategy cover in order to deal with the shortcomings of the existing situation, or to invent new ways of making this perhaps more of a national mission? I do not know where you see the starting point of using an industrial strategy which is a beneficial political instrument for the research and transition world.

Sir John Bell: It is interesting, because the country that uses industrial strategy most effectively—just to be clear, I am not talking about today, I am talking about previous to January—is America. America is unbelievably effective at this, and it is quite willing to put money towards industry to help with R&D. If you look at the success of things like DARPA and ARPA-H, that is direct government funding which actually goes to industry to solve big problems. Industry then has an immediate procurement vehicle because it can sell the products: in the case of DARPA, to the Department of Defense, but also in terms of BARDA to the healthcare systems. It is a really effective cycle. The NIH gave out huge amounts of money to support clinical trials in small companies. All they needed to do was make a good application, which would be peer-reviewed and if it was good they would get those trials funded. There were multiple ways of making that work, and there are really good examples out there of countries that have actually made this fly. I have now lost my train of thought on what questions you actually asked.

Baroness Neville-Jones: Given the analysis of our existing situation, where should we best put our effort in trying to use an industrial strategy to good effect?

Sir John Bell: I am now going to be a bit self-centred about this, but the life sciences strategy document we put together for Greg Clark in 2016-17 laid out a set of projects. To be clear, we did it with industry. We did not say, "Oh, I have a good idea; industry will like this". Industry created that document, and then the Government, to their credit, put significant amounts of money—about £600 million—into that programme, and we received about £3.6 billion of inward investment.

We had new discovery sites for UCB, Merck and Novo, and AstraZeneca built out its big campus in Cambridge. It was a really good time, and all we needed to do was show that we were willing to dance and do some stuff with industry to make it easier for them to do. Obviously, we had done UK Biobank, and that initiative launched Our Future Health, which is now one of the most successful vehicles for interaction with industry.

We did a lot of work on trying to pull together certain digital data sets, digital pathology and radiology. There were a lot of really successful things in that programme. It was not all singing, all dancing; it was very life sciences focused, and industry was very excited about doing stuff in the UK, which was great.

We then ran into Covid, and all that. In fairness, we showed we could do some things pretty well during Covid, and Covid worked for us partly because we had a life sciences strategy. I had on my phone the phone numbers of every CEO of every major pharma company. So when we ran into trouble and we needed X, Y, and Z, I would just ring them up and say, "Could you help us?" People say, "Why did the UK do so well?" It is because we had this great relationship with industry, and strategically it was a really important step for us.

What has happened since Covid is that we have kind of lost the plot. John Simons and I wrote another uplift to the life sciences strategy, identifying a series of areas that we thought we could lean into with industry again. There were areas which we think are the biggest burdens on the NHS—obesity, Alzheimer's disease, infections and vaccines, cancer immunotherapy, prevention—a set of seven or eight major areas. As far as I can make out, nothing has happened in any of them since we launched that report. Again, there is not a pot of money that gets used for industrial strategy; you have to go and beg, borrow and steal from the existing funding agencies, and if they do not want to do it, they do not do it. So having a separate function with a separate budget and a separate set of focused areas is probably the only way to do that.

Baroness Neville-Jones: Do the conditions exist now, if not to replicate to at least take some elements and recreate something as fertile as the scene you have just described?

Sir John Bell: Yes, I think they do but it is crucial for the money to be allocated and then for there to be people accountable for delivering against a set of objectives. That, again, gets back to this issue of accountability, which does not really exist at the moment. In fairness, we have been trying but we have been spinning our wheels for the last three years. You could make it better because the structures are there to do so; you just have to have somebody either in Treasury or—

Baroness Neville-Jones: Is this a leadership issue or something else?

Sir John Bell: It is a leadership issue.

Viscount Stansgate: Speaking of leadership, the Prime Minister himself recently announced some measures that he expects to be in the industrial strategy when it arrives to support life sciences, including measures to reduce the time taken for clinical trials and new health data research services. In view of some of the comments you made a moment or two ago, do you welcome these? Do you think they go far enough, or do you not have confidence that they will actually happen?

Sir John Bell: I welcome them: they are terrific ideas but they are the same ideas that we have been touting for the last 10 years. The real question is, are they actually going to deliver on these promises or not? That is the central issue.

Q47 **Baroness Neuberger:** Thank you, Sir John. I want to declare an interest, particularly given what you have said about the NHS, as Chair of University College London Hospitals NHS Trust and Whittington Health NHS Trust; we can talk about innovation in the NHS another time.

I want to take you to pandemic preparedness and vaccines; you have already mentioned Speke. As a committee we have been very concerned with the UK's pandemic preparedness and particularly vaccine manufacturing. We wrote a letter last year urging government to support the sector, particularly by procuring domestically produced vaccines to address outbreaks around the world. Since then we have seen the Speke investment withdrawn and a cut to ODA budgets: another impact. Do you think the Government are doing enough to secure the UK's domestic vaccines industry, and what should they do to support it?

Sir John Bell: This is a very timely question because the vaccine issue in America is going to get incredibly tough. The FDA is going to pull the shutters down; I know Novavax has been put on indefinite hold for its protein-based Covid vaccine, and you are not allowed to say the word RNA in any applications for funding. This is going to be really grim.

It is interesting because if you look at the predicted mortality—there has been beautiful work done by the IHME in Seattle, Chris Murray's shop—for the likeliest causes of premature death over the next century, pandemics and infections are right up at the top of the list. Just to be crystal clear, climate change is going to kill almost no one, but pandemics are going to kill a ton of people.

We could do a lot more. We have the MHRA in position to actually help with the regulatory approval of these vaccines, and we could enable companies to develop new vaccine platforms. At the end of the pandemic there was a belief that it was now all solved with RNA vaccines. RNA was a great achievement at that time, and I am not taking anything away from those guys; it was terrific, but they are not very durable and they do not really do quite what we thought they did. So there will have to be a diversity of vaccine platforms—that has not gone away—and we do not have the capacity to manufacture much of that in the UK. So we are not in a good place domestically, but the world is in an even worse place and there seems to be a real obligation, in many ways, given that this should, historically, have been one of our strengths. GSK is the world's biggest vaccine manufacturer and company, and AstraZeneca has a great programme with a new vaccine platform; we should be encouraging them to build their capacity and to date that has not happened. This is a serious problem, which, incidentally, was one of the seven missions in our life sciences strategy that has largely been shelved.

Baroness Neuberger: Okay; let us create a programme. So what

should the UK Government do? They are coming up with an industrial strategy; what should they do in precisely this area, particularly given what you have said about the Trump Administration, which, if you like, could put the UK, which has been a leader—you are saying it is not so much a leader now, but it has been—in a prime position? What should Government do right now about vaccines?

Sir John Bell: I would put a chunk of money on the table that would include matching investments for companies that wanted to build a manufacturing capacity in this country. There should be somebody responsible for helping the MHRA get into a better position for regulatory approval. For example, we pioneered the whole concept of challenge studies in this country, which is a really wonderful way of assessing the efficacy of new vaccines and immunological interventions against a wide range of infections. The MHRA should be prepared to accept a set of challenge studies as a way to get an initial approval for vaccines, so that you can then roll them out and test them further, once the safety has been established. At the moment it takes 10 years to make a vaccine.

Baroness Neuberger: Which is absurd.

Sir John Bell: You could do this a lot faster. But in order to make it work you need to have a vaccine person, give them a ton of money and say, "Off you go and make this a big industry in the UK. But make it an industry, and make sure that you do not end up spending a lot of money on stuff that is never successful, commercially or otherwise". We have a tendency to spend too much money on things that do not have impact at the heart. Paul is right that we need a fundamental discovery piece, but we also need to be able to put money into things that are going to be commercially sustainable over time.

Q48 **Baroness Willis of Summertown:** This leads very clearly into the next question, and it would be remiss of us not to ask you about the Ellison Institute. Obviously, I have to declare a conflict because I am based in Oxford, and I am seeing it from various angles.

The government response to Paul Nurse's review highlighted a step change in the way philanthropic funding built on the UK's research strengths in R&D. Do you see the Ellison Institute as being an example of that, or is it a kind of third model? We are all interested to hear about the relationship of philanthropy versus business in the Ellison Institute.

Sir John Bell: First, it is a great credit to the UK that Larry, who is the third or fourth richest guy on the planet, decided to make his legacy to the planet in the UK, largely because of the strength of the science base here. But he is also a very creative and thoughtful guy, and he tried really hard to work out the best way to get outcomes and have impact. The Ellison Institute was set up to solve some big global problems in healthcare, food security, green energy and climate change, and global governance. You guys are the global governance bit; we have not got round to fixing that yet, but we will get there in the end.

The other domains are really pivotal and important, and Larry was very keen to develop a research and engineering capability to address those issues. But, having gone through it, there was a general view that if you really want impact, universities are not a great place to get it because the alignment of incentives is actually not directed at getting impact. It is: did you get your last grant? Did you publish in *Nature*? How many graduate students do you have? It is good—I am not saying it is not—and I have spent my whole life in university, but it is not going to get you those outcomes that you want.

When you look at the charity support, charities have the same sort of problem, which is that they will often make their way to a solution but they do not create sustainable solutions. So, what we decided to do at Ellison was to say, "We're going to make it a company, a commercial entity, and we're going to identify the problems we're going to solve and go at them in a commercial way, with the view that if you do not make something people want to buy to solve those problems, you do not have a sustainable solution". So we are trying to create sustainable, commercially viable solutions to all those big problems.

Let me give you a good example. We have just talked about pandemics. One of the things that all Governments in the world promised was a system for scanning for pathogens so that we would spot the new pathogens as they appeared. Guess what? Nobody did it. There is radio silence from everybody, despite massive promises. Larry and I thought that was actually a bit of a problem because not only do we have the pandemic risk, but we have all this antimicrobial resistance floating around and lots of people are now dying because the bugs do not respond to antibiotics. So, how are we going to fix that problem? If you back up from the comment I made about commercially sustainable solutions, what is really missing is a diagnostic test that can be used at the bedside to rapidly diagnose pathogens. That data would then go into a global cloud infrastructure, so you are tracking this on a global level. That data would be generated by the sequence of the pathogen, not the phenotype or whether it looked like this or that, but it would come straight from the sequence. As a result, you would actually have a system that would provide you with global surveillance, but you could sell the diagnostic tests in all western countries, and you could make money on the diagnostic test.

That is what we are doing: that is our pathogen programme and we are well down the road to making that happen. We are partnering with bioMérieux, a great French company that pretty much owns PCR in that space, and we think that will be a very successful company. It will produce a sustainable solution, solve a global problem and we will make some money on the way. This is completely different; there is only one other example on the planet that has ever done this before, and it is Bell Labs. As you will remember, Bell Labs was set up with unlimited funding by AT&T. It was enormously successful over a 50 or 60 year period, generating half a dozen Nobel Prize winners, but it also did semiconductors, all kinds of telecoms innovations and was an enormously

powerful engine, set up as a commercial vehicle to do commercial research. I am not sure whether it will work or not, but we have the backing and anticipate being about 5,000 people in the end, all on one big campus with several million square feet of space just outside Oxford. That is the vision; whether we are going to get there or not, let us wait and see.

Lord Drayson: John, could you just explain how you expect the Ellison Institute to lead to wealth creation and economic growth in the UK, given that it is a business and owned by Larry Ellison?

Sir John Bell: Larry has made a very substantial commitment to building these capabilities in the UK. The intention is to build multiple businesses that scale, produce and sell products, all out of a single campus in Oxford. The other thing which we think is one of the reasons why many of these institutions that hand out money do not do this is that basically, they give a bit of money to these guys and a bit of money to those guys. As you know, I advised the Gates Foundation for years and Gates has done terrific work; I do not want to undermine it in any way, but it has all been done on a charitable basis and it has no campus. It basically gives money to people and assumes they are going to complete the project. We will have people on the campus, building capacity and building companies on the campus.

Lord Drayson: So these companies that will come out of Ellison will be built in the UK?

Sir John Bell: They will be entirely built in the UK. As they become global, do not be surprised if they get a footprint in the US and somewhere else, but it is the intention to build them all here on the campus in Oxford.

Lord Drayson: Will they list in the UK?

Sir John Bell: In the current state of the listing arrangements, no, they will not, because we need capital. They will not be going on the LSE, I will tell you that for sure. But just to be clear, we are not great fans of public markets because we do not need them. These will be largely private companies.

Q49 **Lord Drayson:** The new Trump Administration have completely changed the global landscape for science and technology, particularly in life sciences. As you are uniquely placed to give some insights, and you have already touched on what is going on in the United States at the moment, it would be really interesting to hear your advice as to the actions the UK Government should take now.

Sir John Bell: I was hoping somebody would ask that question and if you had not asked, I would have given you my opinion anyway. Almost everyone I know who are leaders in the biomedical research space—in fact, I am talking a lot to MIT from the point of view of recruiting people from MIT to the Ellison Institute—are the best people in the best universities in America and they are all saying, “When can we move?” So

there is a massive opportunity. Do the thought experiment: you are an outstanding scientist, you are sitting in an American institution, and things are not looking good. You know for sure that they are going to be bad for four years, they are probably going to be bad for eight years, and it will take another four years to get the thing back on its feet again. If you are a great scientist in your late 40s or early 50s, there is no way you are going to sit it out. So where are you going to go? Do you really want to go to France or Germany? Not really.

Lord Drayson: That makes a lot of sense, but what about the wealth creation part? I can absolutely see that this is a fantastic opportunity to go and encourage the great and good talent to come to the UK, but how do we translate that into wealth to solve the economic problem we have?

Sir John Bell: This is a principle we are putting to work at Ellison, and Paul alluded to this, but the crucial bit of this is the people. If you get really good scientists who actually have an ambition to have impact, then that is the driver for all this, because in the end you will be successful, even if they have to raise the money in some other jurisdiction. Getting the right people in place is crucial, and that is why the migration of outstanding American scientists to the UK could prove to be quite powerful, if we go about it the right way. But people need to get used to the fact that it looks different in America. They get paid quite a lot more than we pay our scientists here, so we need to get used to that. I will not say they have a lot more freedom—they probably have the same amount of freedom to operate—but we need to get used to having funding agencies that are willing to not spread the money smoothly across everything but make choices and back individuals at a high level.

If you do that, the UK could come out of this looking really good, and if you coupled that with—I dream about this, but it will never happen—freeing up the pension money so there was actually adequate capital for these guys to scale, the UK could become a massively powerful economic driver. It does not really need to cost the Government very much money; they need to just turn some dials and get into a better place. We are then by far the most attractive place in the world for American scientists who want to move on and go somewhere else, and we should take advantage of that now.

At the same time, my personal view is that the global endeavour to solve big health problems will not be as successful if we do not have America back on the rails. So we have to do what we can to make sure that that all settles down and we get things back in a rhythm, but meanwhile it is pretty disrupted. In terms of industrial strategy, that might be the thing that actually makes a difference. I am worried about big reports, having done a few myself; short reports with a couple of things we are going to do might be better.

Lord Drayson: Finally, your solutions to the two problems that you highlighted: leadership and the failure to implement. What would you do to fix those?

Sir John Bell: The leadership thing is problematic because you have to have people who can lead from the front. In other words, they have to be doing science at a level where they get respected, or they have achieved something in the commercial sector where they actually have the respect to be able to lead. Identifying those leaders is not impossible; we have found a number that come to the Ellison Institute. For example, we have just recruited Jason Chin, the world's best synthetic biologist, to come to the Ellison Institute; we hope we will give him a really great environment to achieve things, and we have recruited others. So you can find these people, but you have to work hard, you have to reward them properly and set them up with the resources they need to succeed. I would rather do a limited number of those than try to spread the money out to a lot of different people; I would have real leadership positions.

The ability to deliver relies on accountability in the system, because the trouble is that when something does not work, everybody says, "Well, who is supposed to be doing that?" Nobody can ever give you an answer. There needs to be named accountability in the system. To be honest, government is not very good at doing that. It needs to feed all the way back to the Treasury, which says, "Okay, we are giving this department this amount of money to do life sciences industrial strategy. Who is accountable, and what is the list of things they are going to deliver?" They need to be held to account for that, and frankly, that does not happen.

The Chair: Lord Stern, for a final question.

Q50 **Lord Stern:** I should declare an interest as a professor at the LSE and chair of a couple of research institutes there. I want to ask a question that is fundamental to industrial strategy, which is, how do you assess where you think economic and social impacts might come, and how would you advise the Treasury, or the groups putting together an industrial strategy, to make those assessments?

But if I could just check one thing: you may want to correct what you said about climate change not killing people. I do not think you meant that.

Sir John Bell: I meant that, compared to other challenges to human health, I do not think that is correct.

Lord Stern: You should go back and talk to some your colleagues at Oxford. If you run this out 50, 60, 70 years, then the kinds of deaths that we could be talking about could be immense. I would advise you to reflect on that just a little.

Sir John Bell: Okay, let us wait and see; there will be some published work soon that will give us some information on that.

Lord Stern: Anyway, let us not push that. If we are thinking about industrial strategy, the most important thing is, how are you going to think about economic and social impact in that story because you need to have priorities?

Sir John Bell: You absolutely need to have priorities, and one important thing is you have to talk to industry to get ideas about where it thinks the world is going. For example, when we did our last version of the life sciences strategy, we said to industry and, indeed, to the NHS, "Where will the world be in 20 years?", so that we can get to that place early and lead in those domains. There were a couple of ideas which came up very readily, and one was that perhaps we should be thinking more about prevention and early detection of disease than historically we have ever done. Interestingly, industry was all over that. It said, "Look, we currently make drugs and devices for end-stage disease, but we know this is inevitably going to focus on how we improve health span and healthy life expectancy, which means we have to do more prevention and more early diagnosis". That is the way you can actually get a really good insight, because if anybody knows, it is the industry guys. They are thinking all the time, in their own space, about where the opportunities are going to be in the future.

Lord Stern: In the final part of that story, would you include not just the whole drug and diagnosis story, but things like public health, social care and so on?

Sir John Bell: Absolutely, and interestingly there is an overlap between public health and some of these ideas, because up to now public health has been largely behavioural. There are now ways to intervene in non-behavioural ways that can actually make public health much more effective at reducing the impact of disease. You need to bring that into the picture, because that is where we are likely to get to in 20 years' time.

But if you go outside the health domain there are obvious spaces where you can have a massive impact. For example, the development of electric vehicles is a really interesting example of how, 20 years ago, somebody said, "We're going to need electric vehicles". The electric vehicle thing has been pretty successful, but it did take a commercial model to make it successful. That did not come from universities; it took people saying, "How do we make electric vehicles, make them commercially viable, sell them, and then hopefully people will want to buy them and that will make it successful?"

Lord Stern: They recruited their engineers from universities, if you ask the Chinese—

Sir John Bell: No, there is no disputing that universities have a crucial role in the workforce, but in terms of delivering impact, that is not where it came from.

The Chair: Sir John, thank you very much indeed for coming to give evidence today. It has been extremely illuminating, and we are very grateful.

Sir John Bell: That is great; thanks very much.