



Science and Technology Committee

Corrected oral evidence: Delivering a UK science and technology strategy

Tuesday 26 April 2022

11.20 am

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Members present: Baroness Brown of Cambridge (Chair); Baroness Blackwood of North Oxford; Viscount Hanworth; Lord Holmes of Richmond; Lord Krebs; Baroness Manningham-Buller; Lord Mitchell; Lord Rees of Ludlow; Baroness Rock; Baroness Walmsley; Baroness Warwick of Undercliffe; Lord Winston.

Evidence Session No. 15

Heard in Public

Questions 122 – 131

Witnesses

Dr Beth Mortimer, Royal Society University Research Fellow; Professor Sir Richard Friend, Former Cavendish Professor of Physics, University of Cambridge.

USE OF THE TRANSCRIPT

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

Examination of witnesses

Dr Beth Mortimer and Professor Sir Richard Friend.

The Chair: Good morning to our second panel of witnesses. Thank you very much for joining us today. Before we start on the questions, I would like to remind you that the session is being broadcast on the internet. You will receive a transcript of today's session in a few days' time for you to check and send in minor corrections. If there is anything you feel you would have liked to have said or you would like to expand on, we would be very pleased to receive additional evidence from you in writing after this meeting. If that is all clear, we will start with the first question. As you start answering the question, if you could introduce yourself with your name and the institution you come from, that would be very helpful.

Q122 **Baroness Warwick of Undercliffe:** Hello and thank you very much for coming and for your time in helping us. I echo the Chair's point that we really are trying to dig underneath some of the rather complacent comments we have heard so far. You will know, because it is very clear, that the Government have an ambition for the UK to become a science and technology superpower by 2030. What role should universities and academics play in that ambition and what role should the Government have in setting the strategic directions for science? Beth, why do you not start us off on this? It is a big question but, on the other hand, you are the one making it work.

Dr Beth Mortimer: I am employed by the University of Oxford and I am funded by the Royal Society on a University Research Fellowship. I am going to answer based on my experience. If you want a broader range of opinions, I know that the Royal Society would be happy to facilitate getting a broader range of opinions from other research fellows. I want to start off with the context that, since finishing my PhD, I have been self-employed and on short-term contracts for around eight years, including taking maternity leave during that period as well.

You asked about what the role of universities and academics might be in making the UK a superpower. It is through universities that this ambition can be met, because there are so many things about a university that allow this ambition to be met. First, there is curiosity-driven research. That is why I do the research that I do, because I have questions that are driven by my curiosity. I am a biologist, so it tends to be questions around why animals and natural systems are the way that they are.

Secondly, there is the openness to collaborate across interdisciplinary boundaries. Again, this is something that I do a lot in my research. I collaborate with earth sciences, engineers, physicists and mathematicians, as well as being a biologist myself.

Both of these aspects, being curiosity-driven and these collaborations, lead to stronger outputs, in terms of having breakthroughs or advances that you would not necessarily expect. This can help us to achieve the aim of the UK being a superpower. I notice, talking to other colleagues,

that the UK has a very strong reputation in this and is able to attract international talent as well to come and do research over here.

The point that I would make is that, although this is all well and good, the short-term funding in particular can be a barrier to achieving this. It is difficult to get on to the ladder of being able to be eligible to apply for these grants, never mind actually getting these grants and then getting the publications that you need. Even at my stage in my career, I spend most of my time currently writing grants, because that is what I need to go on to the next stage and achieve that job security. I am not actually currently spending that much time doing science myself at the moment, even at this stage in my career. So there would be benefits for me and other academics like me of having longer-term strategies and funding options, including opening up ways to collaborate. The Government could have a role here, in terms of facilitating this longer term view.

Professor Sir Richard Friend: I am in the department of physics at the University of Cambridge. Science and technology is something delivered by people. This is primarily a question about talent and the UK being an attractive destination or retainer of local and international talent. That is what has worked in the past. Being good is not sufficient. We need to be best and first if we are going to ensure that UK science and technology gets in early enough to generate benefit to society, including economic benefit.

If we look at what the universities have done, what the causality is I am not sure, around the larger research universities, there is a huge amount of activity, which I would call research, that happens in the private sector too. There seems to be a happy co-existence between the two and that, I consider, underpins a huge amount of what the UK would want to have well in place in future.

We will have to work harder to make the UK an attractive destination. Bluntly, since the financial crash in 2009, particularly the less fashionable or yet to be fashionable areas of research have not had a wonderful time. We have kept going, but we have not been prospering and that, I hope, will get addressed. On what role the Government should have, it is good that the Government see the need for a large science and technology base. Size matters.

Baroness Warwick of Undercliffe: Can I take this a little further? I was very struck by your points about the way in which that science is built, effectively from curiosity, blue-skies research and so on. One of the constants in comment about science strategy is the balance between applied research and blue-skies research. It was quite interesting listening to Professor Dame Ottoline Leyser of UKRI in our earlier session. She said that actually the balance between blue skies and applied in terms of UKRI funding has not changed. Clearly, that is not the perception in universities, although she went on to point out that what was funded within that changed, in terms of priorities and so on. I wondered, from your perspectives, whether they actually have this balance right. She and others have been at pains to say, at that strategic level, that although it is difficult and there is never enough money, they

think they have that balance right.

Professor Sir Richard Friend: I do not like the way that the question is framed. We have at least one physicist on the committee, so I am going to say that the problem is that “applied” and “blue skies” are not the “eigenfunctions of the Hamiltonian”. They are not the answers to the right question. There are two sorts of research. There is interesting research and there is dull research and whether you happen to label it blue skies or applied, in general, is unhelpful.

The general comment I would make is that there has to be ambition. Ambition is quite easy to set for blue-skies work, because the international going rate is easy to know and to test against. We know when we are doing well and when we have activities in the UK that attract the brightest and best from around the world. When we get to research that is more applicable, it becomes harder to be so clear about what the goal is. When the goals are set, where we know what success is, and where there is a really big challenge, which may have a large engineering component to it, there is absolute excellence.

I am somewhat concerned that there is a middle ground where work is deemed to be useful because it is, in principle, applicable, but the connection through to what a real outcome would be is not clear enough. That connection between what we do in the universities and where we get the pull from the commercial world needs a lot of effort.

Baroness Warwick of Undercliffe: In relation to UKRI funding, are there mechanisms there to reflect that or respond to it, or is there something there that needs to change?

Professor Sir Richard Friend: I was a member of the EPSRC Council until about four years ago. My anecdotal view is that research councils, when they are short of money, promise to deliver things earlier and come up with grand schemes that apparently will accelerate what the UK does. The pitches that get made tend to be those that are more likely to get a bit of extra funding. Along the way, we drift from being as open to the unexpected as we once were.

Baroness Warwick of Undercliffe: Beth, what is your perspective on this?

Dr Beth Mortimer: Interpreting blues-skies research as perhaps more fundamental research that does not necessarily have an obvious application immediately, if I look at UKRI and which grants I might want to apply for, I fall somewhere between NERC—the Natural Environment Research Council—EPSRC, which is engineering and physical sciences, and BBSRC, the biological one. I know we will come to this later. I would look at their priority areas and I know from their website that I am more likely to have grant success if I fall into their priority areas. Those tend to be shaped by particular problems. For example, in BBSRC, it might be related to animal welfare or food security.

For more fundamental research that does not necessarily fall into those particular problems, I would not apply to UKRI for that. I have been lucky to get funding from the Royal Society, and I feel that that has been

excellent longer term support for me at this stage in my career, where I can look at more the blue-skies questions, rather than applied. I take this into consideration when choosing which grants to apply for.

Baroness Warwick of Undercliffe: That requires quite a lot of finesse in understanding the system. Do you think that is easy to get? Were you aware, for example, of the new National Science and Technology Council and the Office for Science and Technology Strategy? Are academics aware of these things and how they might affect them?

Dr Beth Mortimer: I personally was not aware of these before seeing them in the questions that you sent over, so no, not from my point of view.

Q123 **Viscount Hanworth:** I should like to begin by asking a question of Richard Friend. At present, there is low morale among academics and there is a fear that the mainstream of scientific invention in this country could run dry. I would like to ask you for your perception on this matter. How attractive is an academic career at present and how does it compare with the past, when you joined and when I joined in the late 60s?

Professor Sir Richard Friend: The key question for career structure is that it is presented fairly broadly. Certainly in Cambridge—I do not want to be too parochial about this—the experience for a young researcher involves the university, but most will have very direct contact with the world of start-up companies and high tech. The sense of there being a whole set of very interesting careers is part of what is on offer and, in my view, should be on offer.

In that context, I would not say that you start a PhD or a Master's in order to become an academic; it is to get a training that will give you real opportunities to make use of the science that you know, and that is broader. I got my position a long time ago, at the time when the then Prime Minister, Margaret Thatcher, had chopped the budgets for universities and life was very tough indeed. I remember that it got significantly better. Lord Sainsbury did a wonderful job at setting a steady trajectory, where both volume and quality went up. Now, the universities have fixed budgets and rising costs and it is not such an attractive option to stay in the university system.

Viscount Hanworth: Beth Mortimer, I am distressed to hear of the insecurity of your position and of how much time you are spending in grant applications and in various other strategies, I suppose, to defend your position. Can you envisage a circumstance that would be much more conducive to good research and fulfilment?

Dr Beth Mortimer: The shorter term funding cycles are the basis of a lot of these job security issues. Talking to other early career academics, job security is really at the basis of any low morale within that group of academics. It is different for those that have job security. Morale there is still pretty low, and, from what I can work out, it seems to be that they do not feel that they have time to think. There are so many calls on an academic's time nowadays, so it is not just doing the research and applying for grants, but you also may have teaching responsibilities. I

have caring responsibilities as well. Now we might be expected to be entrepreneurs too—so, as an early career person, how would I get started in collaborating with industry? I do not necessarily have that training or know-how for how to add that on to all the other things that I am doing as well.

In terms of what the Government can do, it is understanding that every bit of academic activity is driven by the REF, in terms of how departments get money out of their academics that are there. We spend our time on whether it helps with getting publications, helps with getting grants or can lead to some kind of impact statement. If you want to understand how to create incentives for academics or how to change what academics are doing, it is all understanding how the REF influences that, and it absolutely governs what we do, because that is how we get a job. We convince the department that we are going to contribute to the REF.

Viscount Hanworth: There is more to the audit culture than the REF. There is the REF, the TEF and the KEF. I do not know whether I need to spell out those acronyms to others. I would like to turn to the matter of postgraduate education. There are numerous master's students in our universities. A very large proportion of them are overseas students, and the courses could not be sustained in their absence. Is this not a danger, Richard Friend?

Professor Sir Richard Friend: The UK universities have always been very international. On average, that has brought huge benefit to us. We are lucky to get some of the brightest and most energetic young researchers from around the world. They push standards up. In my view, we do not want them for the money. We want them because they are bright. Thankfully, these days I do not have to worry about the economics of how the universities run—but I hope that that question is framed more in terms of attracting talent rather than balancing the books.

Viscount Hanworth: I was wanting to imply that there was some danger that the overseas students might not come.

Professor Sir Richard Friend: I do not think that the model that there will be a steady stream of students, particularly from Asia, who want to pay, just because of the name of many great UK universities, will be sustainable. University quality in Asia is going up very quickly. The amount of investment in universities in China is huge. One has these strange conversations with Chinese postdocs who are going to set up groups and they have larger budgets than it has taken me a long time to put together. Standards are rising quickly, so that phenomenon may evolve. The key is that we continue to attract the best talent.

Viscount Hanworth: There are dangers that we should be wary of. Also, there is a dearth of native doctoral students in many areas. Hitherto, we have been able to recruit our young academics from abroad and we have had a genius for turning them into Brits. It seems to me that this is no longer the case and that they return much more readily to where they came from. Is this not a rising problem?

Professor Sir Richard Friend: I do not know what the figures about that are. Where we present really interesting opportunities—in Cambridge the high-tech sector does that—a lot of very bright students who have come from outside the UK do stick.

Q124 **Baroness Rock:** We heard in the last session from Lord Browne that what is missing is this integration and connection of business, academia and industry. Dr Mortimer, you have just raised it yourself: where does one start in collaboration and how does one collaborate more with industry? From your perspective, are you seeing more of a push in this area, in terms of more of an enthusiasm for collaboration with industry? What more could be done to enable those sorts of career moves? Perhaps, Sir Richard, I could ask you whether you have any examples of successful collaborations.

Dr Beth Mortimer: On how barriers could be removed for being able to collaborate, because there are so many constraints and I might not necessarily know how to go about starting it, I wonder whether there could be more approaches for industry reaching out to academics. I know some universities might have some kind of university-based facilitator who might look at research profiles or who people could go and talk to. They might be able to give you information about what industries are out there and what types of problems they have. We could then say, "We potentially have a solution to that". I do not necessarily know what industrial problems there are that I might be able to contribute to solving.

Also, really important there would be meeting people and networking. Any collaboration that I have done with industry has been with people who I already know. I have not set up anything where it has required me doing any kind of cold-emailing or anything like that.

Funding is the third thing that I would mention. If I want to collaborate with industry, it tends to be start-up companies that do not tend to have the budgets to facilitate some kind of joint studentship or get a project going. There could be more funding options for helping collaboration with start-up companies specifically.

Lastly, there need to be ways to free up time of academics. It cannot be at the expense of other core activities that we are hired to do, so we need initiatives that give incentives to the university that allow you to free up your time.

I am aware of an increasing number of initiatives in these four areas, but more could be done and perhaps with a focus on early career researchers as well, and making sure it is not just for people who are already funded by UKRI. I know that I have missed out on opportunities before where I would have liked to have done these types of programmes or training but have not been eligible because I did not have UKRI funding, because I have been funded so far by charities, for example.

Baroness Rock: That is extremely helpful. Thank you for some of those ideas as well.

Professor Sir Richard Friend: Collaboration with industry, at its most trivial, is contract work. Industry knows what the problem is. It subcontracts the work out. Some of that happens in the universities and there is a role for that. When it goes really well, the company discovers that the problem it wanted solved was a different one and that they have discovered that there are some really smart ideas that they did not know about. They end up discovering that there is a depth to the university they are working with and things get much more creative. That is the ambition.

It is straightforward to make a dictat from the top that we need to work better together. We really have to work out what the mechanisms are that get that engagement. I have been involved in setting up what we call the Maxwell Centre, a UKRI “partner infrastructure funded” building, which is part academic—there are five departments in the building—and part industry. We have tried very hard to set up the building as a melting pot where people from companies large and small will end up having random conversations with people around the coffee machine with people within the university. That is not a model that works during a pandemic very well, but it works, and we have quite a few examples. We are on the West Cambridge sites, which is physical-sciences based. We have had quite a number of life sciences activities that have gravitated to us, where the numeracy skills are, and these have been flourishing in the building.

Baroness Rock: That sounds like a very interesting model. You are really saying creativity and flexibility and, from Dr Mortimer, an understanding of what is out there, and not just start-ups but looking at scale-ups as well.

Professor Sir Richard Friend: One of the challenges we have with companies that no longer have the corporate R&D lab—that is not the case in life sciences, but in the other 90% of the economy it is now the case that they have jettisoned that—is that the point of contact is harder to find. We have to delve further and be more patient to get those connections.

Q125 **Lord Rees of Ludlow:** I would like to follow up on the issue of incentive for careers and encouraging careers that link academia and industry. I wonder whether you could say a bit more about this. In particular, if someone works in academia, there are some rather narrow criteria, which has been mentioned already. Once they leave, it is hard for them to get back, and this is a loss to both sides. I wonder whether you can suggest a way in particular that universities could make their employment structures more flexible, so as to encourage these more diverse and interesting careers.

Dr Beth Mortimer: The good news is that universities are definitely doing more now for those who are on short-term contracts. The Concordat to Support the Career Development of Researchers has just been signed by a number of universities. They are all thinking very hard about how they can support diverse careers. Part of that is supporting those that are early on in their career in looking at outside academic

options—so how you could look at other options as well as that. There is a lot of focus on mentorship and transparency in what an academic career is like. The universities are going to be doing more on this in the next few years, given that they have signed up to this initiative.

Otherwise, with career breaks, for example, I have taken maternity leave as part of my Royal Society University Research Fellowship. That was an example of how it worked really well. The Royal Society paid for my maternity leave period in line with my employment contract, so not only did I not lose any of the grant money but I also gained the money back, due to taking maternity leave. This is not the case with all UKRI funding. For example, if I currently have a UKRI grant, if I took maternity leave during this grant, I would not get any additional money. The grant would actually continue. The PI would be absent and for the whole of that period the grant would continue. It is not really flexible at the moment for those types of parental leave. A lot more could be done to help support that example of a career break.

Lord Rees of Ludlow: To follow up, you mentioned already two rather negative issues. One is the insecurity and difficulty with grants and the constraints imposed by the REF, which focuses people on narrow refereed publications in a small number of journals and all that. You also said that, if people get a permanent job, the way these jobs are structured involves so much administration, et cetera, that they do not really have enough time for research—so this seems to be bad news all round.

Dr Beth Mortimer: The good news is that we all want to be in academic jobs. We all want to do our job because we love that curiosity-driven aspect. That is why I stay doing what I am doing. It is not all bad news, because we all, honestly, love doing research.

Professor Sir Richard Friend: We live in an age where everything gets measured, and the things that are easiest to measure are the things that carry too much weight. These harder-to-measure qualities that emerge through people having more varied careers run the risk of being sidelined. Engineering does better than science. There is rather more movement in and out of the engineering community, but it is a big challenge for the most ambitious universities to work out how to avoid looking at the h-index and concentrate instead on the larger opportunities.

Lord Rees of Ludlow: Is this something that the universities are to blame for, in that they could change the criteria that they use for employment and promotion?

Professor Sir Richard Friend: The universities are independent bodies. They really ought to be able to deal with that; it ought to be part of the culture of a university. We are much better than many universities in Asia in taking a longer-term view on that, so it is not all bad.

Q126 **Lord Winston:** Many of my questions have already been asked, but one of the key questions is whether you think that the research councils, particularly the UKRI in this case, could help you more when you are applying for grants. May I suggest an example? Richard, you and I

crossed paths at EPSRC years ago. To my mind, there was a very big difference between EPSRC and MRC, which was the research council I was mainly applying for myself. It was very difficult to get information about what the research council would be likely to fund and a bit more likely with EPSRC. I found that it was rather more helpful. Do you have that problem, Beth? Of course, you are on a Royal Society fellowship, which is a very valued and privileged position, but you must have colleagues who are not, who are also applying for grants.

Dr Beth Mortimer: Nowadays, it is clear on the UKRI website what the priority areas are in general. It is even very explicit that, say for BBSRC, you are welcome to apply from any area of biology, but you are much more likely to get funded if you fit within the priority areas. It might as well say, "Don't bother applying if you have any blue-skies biology research", frankly, but at least that is clear, so then I can make decisions on how I use my time. Is it worth me putting together a 40-page grant to BBSRC on blue-skies biological research, or do I look to other funding bodies that perhaps are a lot more flexible and open in what they fund? An interesting difference, for example, is between BBSRC and NERC, the Natural Environment Research Council. I found that that was on their website and my interaction with them was a lot more open to what they call discovery science.

Lord Winston: The website is all very well, but can you make a direct telephone call?

Dr Beth Mortimer: I would be put off doing a telephone call. If you do, they are almost like, "Why are you ringing me?" and it is very hard to get an answer. Even if you send them an email, it could be a couple of weeks. From my experience, I felt discouraged in reaching out directly. They do occasionally come to universities and talk to us, but it is unclear whether that is a high-policy meeting or is for the people who are actually applying. Perhaps more could be done to help improve that dialogue.

Lord Winston: Richard, what about interdisciplinary research? How easy is that with EPSRC?

Professor Sir Richard Friend: I listened to the advice of the Chair at the start to be controversial, so here goes. The problem is not that there is not a grand objective for interdisciplinary work to get funded. The problem arises when a grant proposal comes in and it is not refereed very well, because not enough effort is made to find the right referees. The funding panel then looks at something that they do not appreciate and they have lots of mainstream projects that have very good referees' reports, so that is where the funding goes.

The controversial bit is that the European Research Council does a better job. All of us who have had experience of it will have the view that it has done something rather remarkable, which is to raise refereeing standards. The success rates are still low, but the feedback is impressive. There is the sheer quantity of quality referees' reports that we get back when explaining why we have not been funded, most of the time.

Lord Winston: Does that apply to peer review as well?

Professor Sir Richard Friend: This is a peer review problem. If you want to be able to fund the stuff that is not mainstream, you need very high-quality information about those proposals, and that has not had enough attention. The ERC is an example of where the going rate has got better.

Lord Winston: Beth, are you prepared to put your foot in the water at this point?

Dr Beth Mortimer: Remind me what the question was originally.

Lord Winston: It is more about whether you feel that you get justified reviews from what you have applied for, or your colleagues do.

Dr Beth Mortimer: Because of my research, I find it hard even finding a conference to go to that is relevant to what I do, never mind also picking some named peer reviewers that would be appropriate. It is because what I do does not fit into these normal scientific silos; it is a little bit of engineering, a little bit of materials science and a little bit of biology. The opinion is that you roll the dice whenever you apply and there is a lot of frustration from perhaps some referee scores that might not be entirely accurate that directly affect what you have—but that is part of the game. It is essentially that you apply for three grants and hope to get one. It is a huge amount of time that goes into preparing all of that. That would be an excellent success rate.

Lord Winston: Dame Ottoline has just told us that they are funding 20% of UKRI proposals, but she also points out that they have a lot of good proposals that they do not fund. Do you know whether proposals that fail ever get followed up by the research council as a marker of whether it is funding the right stuff?

Professor Sir Richard Friend: We choose not to track this stuff. We have abandoned quite a few of the measures we used to have in place. There used to be international reviews by subject in the EPSRC. They got abandoned a while ago, so I do not think we are as systematic at benchmarking what we fund, let alone what we do not.

Lord Krebs: With your interdisciplinary work, Beth, are there obstacles to applying for a project that cuts across two research councils, for example NERC and EPSRC, because of the bureaucratic processes of grant submission and assessment?

Dr Beth Mortimer: You are welcome to apply to the UKRI for a project that might fit across research councils or across panels, but, again, the knowledge on the ground would be that this reduces your chances. Because you have to go through multiple panels of review, you are less likely to get your research through, because it is under those increasing levels of scrutiny.

From a strategic point of view, I make the decision of whether I do the grant that I want to that is perhaps more ambitious, interdisciplinary and cuts across these boundaries, or whether I shape what I want to do so that it more carefully fits into the priority areas and goes through one panel specifically, because that increases my chance of success. From a

strategic point of view, you choose what gives you largest success, because of these incentives due to REF that mean we are under pressure to get these grants in.

- Q127 **Lord Krebs:** This one is primarily to you, Richard, although Beth may wish to comment. This is really about public sector research establishments—the national laboratories. I know that you have been quoted in the past as regretting the demise of some of the national research laboratories. I wondered what your view at the moment is about the balance between funding research in universities and in public sector laboratories, recognising that PSREs are a very heterogeneous category, so there may not be one answer.

Professor Sir Richard Friend: The university system is something we can be proud of. I mentioned earlier that, apart from life sciences, it is quite hard to reach from the universities into industry or the commercial world, because we do not have the halfway houses that, once upon a time, were corporate labs or national labs. They play a very important role. I am very conscious of that in the world of zero-carbon energy, where for example we do not have a national laboratory on solar cell research. We have only recently done something on batteries, but that only has a five-year lifetime. If one contrasts that with what is present in the USA or Germany, you can see that it hurts us. If you are in a university and you think you have a great new design for a solar cell, how do you reach out and find what industry would want? I know, because this is what my colleagues do, not necessarily in Cambridge, that they head off to Germany, to the Fraunhofer and the Helmholtz-Zentrum, which are very helpful—but that tends to draw away the links to what might have been the UK industry.

We have casually lost quite a lot of that national laboratory function when we privatised the utilities a long time ago, and we are paying quite a high price. Even though I do not work on batteries, quite a few of my PhD students ended up with jobs, a decade and a half ago, in German car companies, at least a decade before the UK industry realised this was going to be important. If we had had more of a national activity that was setting out the options and explaining where things might go, that would have had a significant impact on UK industry.

Lord Krebs: At the time they were set up, the story was that the catapults would do essentially what the Fraunhofer institutes in Germany do, but on a miniscule scale.

Professor Sir Richard Friend: “Miniscule scale” sums it up. They are short-term and relatively low-ambition in many cases.

Lord Krebs: Perhaps I could follow up with one more point to you, Richard. If the Government were to create something like the Fraunhofer or Helmholtz institutes, would you see that being by taking money away from the university sector or by additionality?

Professor Sir Richard Friend: At the moment, we are promised additionality, and it seems likely that the additional funding is headed to government departments and not directly to the university sector. If that

is done well and ambitiously, with the right timescales to build something consequential, that would be wonderful.

Q128 Baroness Manningham-Buller: This is the final question, but colleagues may want to chip in afterwards. I have two strands to it, starting with the international dimension of our work. Sir Richard, you have described—I think that we would all agree—the value of incoming students, the riches they have brought—not necessarily financial riches but broader riches—to universities. The Government talk about when to collaborate and when to compete. How do academics engage in international collaboration? To what extent are they affected, particularly now, by geopolitics?

Professor Sir Richard Friend: The first thing one has to say is that many of us have spent most of our working careers getting along extremely well with Europe. It has been very attractive to be able to fish in a pond about the same size as the USA to find the collaborations we want. If you are in a smaller research field, which I have always been, it has been necessary to find collaborations on that scale. Of course we can look more broadly, but it is extremely important that we do not allow those excellent relationships to lapse. We have to make that work.

On the compete versus collaborate front, for the most part, we are ambitious and are trying to find the collaborations that will get us there fastest. If that means telling our competitors what we are doing, that is fine. They can go and hire our PhD students when they graduate anyway.

Baroness Manningham-Buller: Can I move on to a supplementary? If you are looking at other countries, how do you think our research system compares? What are we better at, assuming we are? What are we less good at?

Professor Sir Richard Friend: The best of the UK system, which I actually think is world-best, is that we give a huge amount of freedom to younger researchers. They may not have job security but, in many cases, they have a lot more freedom to take projects where they want to than I have seen in other systems. That sense that the UK is a safe place to take a big risk is something we should not lose sight of.

Baroness Manningham-Buller: On the other side, what are we less good at, in terms of other ways of funding in other countries?

Professor Sir Richard Friend: The general problem is that we have dropped our R&D spend. That is not in life sciences, but everywhere else it has dropped below the levels of our international competitors, and we have exited quite large sectors of the economy rather carelessly.

Baroness Manningham-Buller: Beth, if you did not have family commitments here, are there other research systems elsewhere in the world that you would find attractive to go and do your research in?

Dr Beth Mortimer: Yes. I have considered the USA in particular, not due to the amount of teaching they give you—it can be quite a large teaching load—but in terms of the amount of funding you get. Again, you have that large collaborative pool with the size of the USA. That would be the

one that would appeal to me the most—but, as you said, I have only worked and only considered working in the UK so far.

- Q129 **The Chair:** Could I follow up quickly on the geopolitical side? Richard, have you felt any pressure in terms of not potentially collaborating with China or taking Chinese research students in areas of technology that might be particularly valuable for the UK, for example?

Professor Sir Richard Friend: I am much more aware that that is something we have to consider quite carefully. We look very carefully to see where students from China in particular have come from and what their academic trajectory has been. It is something we have to live with.

- Q130 **Lord Rees of Ludlow:** I have the impression that the UK has become a less attractive destination for mobile talent. For instance, young people from, say, Singapore who want to come to the West would be less likely to put us as number one than they would have done in the past. I get the impression the universities find it harder to attract staff from overseas to their jobs. Is this your impression also?

Professor Sir Richard Friend: Sadly, I agree. The continuing noises around Brexit are picked up locally, but also by the bright students and perhaps faculty around the world. I pick this up—I am told about it pretty directly when I am travelling in Europe—and I hope we manage to put this behind us. But, at the moment, there is enough friction that it gives the impression that we are not quite as friendly a place to come to as we once were. I do not think that that is true, but we need to be careful when we have our internal debates that we must remember that there is an international audience as well.

- Q131 **Baroness Walmsley:** Sir Richard, you have had a major part of your career in Singapore and in the UK. The exam question is to compare and contrast research in Singapore and the UK. What are the big differences?

Professor Sir Richard Friend: I have had a long association with Singapore. I have never done a lot of research there. I have had some collaborations there. I have never been very good at managing more than one job. Singapore is very interesting, in that it made a determined effort to lift its universities to global standing, which, in the course of two decades, it has done spectacularly successfully. It suffers from many of the problems that we have talked about. International recruitment is a challenge that it has worked hard at and had some real successes in.

The big contrast is that Singapore has always been global. The UK is insular. We had a question earlier about the new assembly of strategic advice for the Government. It is quite insular; it is not that balanced across the whole economy. Singapore is small enough that it knows that it needs to get international advice and it does it systematically and rather effectively. We have quite a lot to learn in that regard. We are a substantial economy, but we have to take a lot of note of where things are happening elsewhere.

Baroness Walmsley: When you said that they have been quite

successful in overcoming the problem of recruitment, how have they done that? Have they thrown money at it, or has there been some other factor?

Professor Sir Richard Friend: There has been a very clear commitment to sustain the research budget. Their budgets went up when ours flatlined or, in real terms, went down after the financial crash. They benefited quite well from that. Small blips in the funding landscape can turn a whole cohort away from sticking around in the UK, so that sense of a long-term commitment has been attractive. They have done a good job at switching from five-year pulses of funding towards presenting their funding landscape as one for longer-term, more ambitious projects.

The Chair: Sir Richard and Dr Mortimer, thank you very much for talking to us today. We very much appreciate it and, as I said at the start, if there is anything else you would like to send on to us as additional evidence, we would be very happy to receive it. For now, that ends this session, so, formally, thank you and goodbye.