



HOUSE OF LORDS

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The Select Committee on Science and Technology

Inquiry on

THE DOWLING REVIEW

Evidence Session No. 1

Heard in Public

Questions 1 - 11

TUESDAY 7 JULY 2015

10.40 am

Witnesses: Professor Dame Ann Dowling and Dr Hayaatun Sillem

USE OF THE TRANSCRIPT

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

Members present

Earl of Selborne (Chairman)
 Lord Cameron of Dillington
 Lord Fox
 Lord Hennessy of Nympsfield
 Lord Hunt of Chesterton
 Lord Kakkar
 Lord Maxton
 Duke of Montrose
 Baroness Morgan of Huyton
 Baroness Neville-Jones
 Lord Peston
 Viscount Ridley
 Lord Vallance of Tummel

Examination of Witnesses

Professor Dame Ann Dowling DBE, FRS, FREng, President, Royal Academy of Engineering, and Dr Hayaatun Sillem, Director of Programmes and Fellowship, Royal Academy of Engineering

Q1 The Chairman: Welcome, Dame Ann. I did warn you that we would need binoculars to see each other. I am very sorry for that. I thought I would show great initiative and alter the seating, but I was told that that would upset the broadcasting cameras and you would be out of focus or something. I am sorry about that. I hope you can hear me. I am usually quite loud. I would just ask if you would not mind remembering in turn that some of us are challenged in various respects. The acoustics are not brilliant in this room. I should also just warn you that at 11.30 am the Division Bells will ring and there will be a minute's silence throughout the Palace of Westminster to commemorate the terrorist attack a decade ago. I will suspend the sitting for a minute until the Division Bell rings for the second time. I particularly welcome you, Dame Ann, and your colleague, Dr Hayaatun Sillem, who has joined you. I was very privileged to attend the launch of your review last week. Before we go into the questions and discussion of your report, is there anything you would like to say by way of an opening statement?

Professor Dame Ann Dowling: Perhaps I may make a couple of brief comments. I would just like to say how pleased I was to be asked to undertake this review by the former Minister for Universities, Science and Cities, Greg Clark. I was pleased for two main reasons. The first is that I have long believed that strengthening and scaling up business-university research collaboration in this country could offer real benefits for our ability to innovate and compete on a global scale, which is just so important for innovation, productivity and growth. The second is more personal. Collaboration has always been a strong part of my own research career. Some of my most rewarding and successful research areas have arisen from discussions with business about what would make a big difference to them, and I have seen that lead to really interesting research activity. I have experienced from first-hand that

interaction with industry can enrich a research career, and it is one that I would like to see more academics make the most of. On the down side, we were asked to report on a fairly short timeframe of five months. Thanks to excellent support from the secretariat, we managed to do that.

Q2 The Chairman: Thank you very much. You note in the beginning of the report that there have been many reviews over the last decade or so—Lambert, Witty and others—into business-university collaborations. What have you uncovered in your review that is different—indeed, was a further review really needed?

Professor Dame Ann Dowling: That is a good question, because it is a well-travelled landscape. On the other hand, the environment in which the review has been done has changed, and timing is really important. There have been changes in the innovation support landscape since the previous reviews. For example, we have Innovate UK; the Catapults have been funded; we have a modern industrial strategy; and we have the LEPs with a remit for innovation. The landscape that is supporting innovation has evolved. We are in a period of continuing and probably increased pressure on public finances and a real wish to address a productivity gap. We looked very carefully at the previous reviews and in our report we list and group the recommendations. Where we felt something had not been acted on and was still pertinent, we adopted that. In addition the letter asking me to undertake the review placed a somewhat different emphasis from the previous studies. Our review is on long-term strategic research collaboration between business and universities, and that is a distinctive element. We undertook, as you would expect, an extensive consultation, and I was surprised by the large extent of the response to our consultation. We had about 212 written responses to the request for evidence and when we ran workshops they were extremely well attended, with people even turning up who had not been signed up. For the academics, we scheduled a morning workshop; at lunchtime they did not want to go, because they had so enjoyed sharing experiences across different disciplines about how they interacted with industry. There was a huge response to what we were doing and, again, that showed that there was a need for such a review. I did not mention it earlier, but another element that has changed the landscape has been the Research Excellence Framework, which in 2014 for the first time assessed the impact of the research—or research that had had impact—as part of it. That has really raised, at least in the academic base, the profile of working with business and making sure academic results get picked up by users.

Lord Hennessy of Nympsfield: I declare my fellowship of the British Academy and I am a professor of contemporary history at Queen Mary University of London. Dame Ann, which sentence above all in your report—which I welcome—do you hope will cling to the Velcro of memory?

Professor Dame Ann Dowling: We think all our recommendations are important; otherwise we would not have made them.

Lord Hennessy of Nympsfield: It is a sentence. It is an old journalist's question. You cannot expect much to cling to the Velcro of memory; the trick is always to get the one bit you want to be the piece that adheres.

Professor Dame Ann Dowling: The one sentence is: we have an excellent research base in the UK and more use can be made of it by business in order to improve economic growth and productivity.

Q3 Lord Hunt of Chesterton: I declare an interest; I am emeritus professor and I have a company and work with many companies. I share entirely your point that the questions that arise in industry and the company world produce all sorts of interesting scientific questions. My question to you, with a hint about it, is: which part of the review's findings gives you the most cause for concern? I notice the last sentence of the second paragraph of the executive summary refers to how these collaborations "can happen at scale". In my 40 years of being at Cambridge, I have seen large numbers of companies grow and then collapse. Usually they have been taken over. There has often been a deliberate process of being taken over by American companies, and then the companies have been suppressed. The owners of these companies live in palaces in Malta and various places around the Mediterranean. It has really been a problem. Your report comments that we do not have enough of these very large companies owned in the UK; we have a lot of foreign-owned companies and, having helped them with their research, the results may then go back to Japan, America and so on. This issue of the scale and how you have a strategy for industrial-academic involvement when so many of the big companies are foreign-owned seems to me a question worth addressing. I wondered whether you had discussed that.

Professor Dame Ann Dowling: Yes. There are a number of points to that question. Perhaps I will take the second first: the internationalisation. Every big company is international these days, whether its base is in the UK or overseas, and in terms of where research is done we are in a global competition. Just because a company is headquartered in the UK, we should not assume that all its R&D will be done in the UK or all the value captured in the UK. Our UK-domiciled companies look globally when it comes to where is the best place to carry out research and innovation. There is no doubt about that. The UK has a positive thing, which is the quality and strength of its research base; on the other hand, it is found to be expensive by businesses to do research in the UK. We found it very hard to get publishable data about how companies assess the cost of doing R&D in the UK, but we received assessments of the costs from a number of companies on a confidential basis. If you take the raw costs of doing R&D, the fact that we charge full economic costs on our university research in this country means that companies view us as expensive. On the other hand, companies that know their way around the system can get some co-funding from government. On page 25 of the report, we have a diagram of what the co-funding system is like for companies in the UK. They need to be really expert to find their way around that co-funding system. Those that know their routes can get government support so that the industry does not have to pay 100% of these rather higher costs. So, we are in a global competition, whether it is a UK or an overseas company, and the Government have a role in co-funding with industry to make sure that our R&D costs are competitive with other countries'.

Your point was about companies that are based, or at least headquartered, overseas doing R&D in the UK. There is no doubt we attract overseas investment in our research base. Quite often that is followed by those overseas companies setting up their own R&D activity in the UK, bringing high-quality jobs to the UK, so one should not view that as a problem as long as it is followed by real investment in the UK. One thinks perhaps of Tata, which is in overseas ownership but, through JLR, makes a huge investment in the UK, both in the science base and in manufacturing. We have to acknowledge that we are part of a global model for innovation and use the strengths we have as an attractor to bring wealth and jobs into the UK.

You also asked about scale-up. There are a number of elements there. Our review was about long-term strategic research collaborations between businesses and universities, rather than how university spin-outs should grow in the UK. That is an area that others have reported on previously, but we do see, for example, the support being provided by the Catapults as a way in which some of those later-stage or higher-TRL activities are being fostered in the UK. In terms of growing small companies, we have a number of very innovative companies and we have made specific recommendations about how those SMEs can be supported in accessing the research base. The advice to SMEs is often quite confusing in the UK and, again, we have recommended that there be a clearer route in for SMEs seeking advice on innovation.

Q4 Lord Peston: Just as background, I am a great one for making lists and one that I made in preparation for this meeting was just a list of some of the products that have been most usefully developed in recent years. Unless I have missed it somewhere, you do not in your report mention any specific example of university-industry collaboration. To take some examples, if you asked me what has been the best invention in my lifetime, I would say the Post-it note—a marvellous invention. Another—Peter mentioned it—is Velcro. The third and fourth are the mobile phone and the iPad. As far as I know, none of those was developed via the route of this report, but what intrigues me as a general question is that you do not mention any examples at all, unless somehow I have missed them or they are in some appendix that did not get published.

Professor Dame Ann Dowling: That is probably fair. Lots of others have listed case studies. What we did was an analysis of the case studies submitted to the REF, and all those case studies are available on a public website. We had the companies that appeared in that analysed by Technopolis as part of this review. As one looks at those, a number of really excellent examples come up. That has been one of the really positive bits of the assessment of impact in the REF; it has led to a public database of—I cannot remember the exact number—

Dr Sillem: Nearly 7,000.

Professor Dame Ann Dowling: Seven thousand case studies in which research results from universities have had impact on users.

Lord Peston: And it mentions specific products.

Professor Dame Ann Dowling: Yes.

Lord Peston: Good. I can look at that.

Professor Dame Ann Dowling: Sometimes the company has been removed if they felt it was commercially sensitive, but in many cases they want to promote the product and, yes, specific products are mentioned.

Lord Hunt of Chesterton: I assume a product includes a service, not just a gizmo.

Lord Peston: Yes.

Professor Dame Ann Dowling: Yes, and sometimes it has had an impact on policy.

Dr Sillem: A number of the other reviews that are listed at the start of this report have produced case studies on this very topic. There have been several recent publications. In the interests of time and adding value to what was already there, we focused on the analysis.

We did mention one example in box 6, the Structural Genomics Consortium, which is uncovering quite a lot of valuable new information about the 3D structures of proteins that have very significant implications for the development of new drugs and so forth, but we made a decision, in the interests of the rather short period that we had to conduct the study, that we could best add value by focusing on broader analysis.

Lord Peston: We were supposed to declare an interest. I used to be an academic, until I realised everything I was doing was a complete waste of time. Could I ask another question, which is, again, a sort of background question? When I was an academic, one of the areas I knew about was pharmaceuticals. I can remember—I always moan about this on occasions like this—I was the external examiner on a PhD in the pharmaceutical sector where a particular company had provided the research student with a lot of data, but when I said, “I cannot judge this thesis without seeing all the data”, I was told that they had signed an agreement that none of that data would ever be made available to anybody. Has this emerged as an issue in your area of work here? In other words, is there a lot of research that comes into your rubric, so to speak, that is kept secret? Just to add a point, one always thinks of a university as a free area, where people just talk, share their views, et cetera, but once you get involved with business you are in a different area altogether, are you not?

Professor Dame Ann Dowling: The particular aspects we were looking at were research collaborations, and in a research collaboration the academics expect to be able to publish. There may be some contract research that is done not by the university acting in its charitable way but through a limited company where one might have confidentiality, but we were talking about building long-term trusting relationships between the industry and the academics, with a real understanding that the academics do need to publish their results. You cannot publish results without making the data on which the conclusions are available transparent.

Lord Peston: My last main question, which you may have answered when Lord Hennessy asked you a question but I was not quite clear whether you did, is: is this the last report we are going to get in this area? I think you did ask that, Peter.

Lord Hennessy of Nympsfield: Sort of.

Lord Peston: There are three possibilities: “yes”, “no” and “don’t know”.

Professor Dame Ann Dowling: One can never predict the future. Previous reports have had an impact and we are doing much better in business-university collaborations. We find that some companies are really doing this very well. Our report has recommendations that could help the others get engaged. If they do, this particular aspect will move on, but no doubt there will be something better that can be done in the future—so, a “maybe”.

Q5 Baroness Neville-Jones: Dame Ann, thank you very much for a very cogent and easily consumed report. It is written extremely clearly. Just before I ask you about what you said about complexity, can I briefly follow up on the question you were just asked about intellectual property, or at least research and intellectual property? Do you see a conflict between the way in which research grants tend to be awarded, which includes the track record of a university in the quality, volume and relevance of its publications, and, on the other hand, when it comes to collaboration with a business, the generation of intellectual property, which you need to protect and you will not necessarily advertise to the world? Is there a problem here? If there is, how do we go about solving it?

Professor Dame Ann Dowling: I do not think there is a problem between the universities' wish to publish and proper protection of IP, provided time is taken to patent and so on. We saw more of a conflict in how the technology transfer offices in some universities operate, with them being tasked by the university to bring returns in the short term, sometimes on a year-by-year basis, assessing whether they have brought in enough money to fund their own operating costs, for example, or to bring immediate profit to the university. That can be damaging to getting those results used in the longer term, perhaps because the university is trying to take too high a proportional share of a spin-out company, which prevents venture capital wanting to invest in that company.

Baroness Neville-Jones: So, the universities themselves can fall prey to short-termism when they are meant to be promoting something long term.

Professor Dame Ann Dowling: Yes. Rather than taking a long-term view and using their technology transfer offices as a way of driving collaboration and partnerships that will grow the whole activity in the long term, trying to cash in short-term on some of their results.

Baroness Neville-Jones: That is an important message and relates to the whole university culture.

Professor Dame Ann Dowling: Yes, so we have a number of recommendations around sharing best practice amongst technology transfer offices, and the research councils and Innovate UK showing more leadership in encouraging projects they are funding to use some of the model contracts. There are a number of ways in which we think that could all work better, to the long-term benefits.

Baroness Neville-Jones: You remind me that I ought to declare an interest as a member of the Engineering and Physical Sciences Research Council. The question I wanted to ask you was about your very loud and clear message that comes across about complexity of the landscape. You do indeed say we ought to consolidate some of the areas where organisations are pursuing similar or the same activity. Can I press you a bit on this? Do you think it is a question of getting the existing landscape—which is, undoubtedly, full of institutions and has grown like Topsy—linked up and working better, or do you think it is a question of institutional simplification?

Professor Dame Ann Dowling: Before we get to institutional simplification, the current institutions we have could simplify. For example, Innovate UK is doing some great work but it has far too many schemes. So, it is not primarily about institutional simplification but about simplifying the schemes that they have.

Baroness Neville-Jones: That sounds more like focus to me.

Professor Dame Ann Dowling: We have one table that shows how the research councils deal differently with CASE awards for PhD students, which are collaborative awards partly funded by industry. The processes are different across the six research councils. An industry is likely to be dealing with more than one research council, so all this extra complication is not helping that interface with industry. Without changing the structures, there can be simplification within what different organisations offer. When you look at all those tasks with supporting SMEs, there is just such a distribution of organisations with that remit and SMEs are the ones with least time to start to hunt around for where the best support will come. We do think that end should be simplified.

Baroness Neville-Jones: You think streamlining is in order there, do you?

Professor Dame Ann Dowling: Yes.

The Chairman: But if one of the overarching recommendations is indeed to reduce complexity—and I read that loud and clear—another theme throughout your review is that there is a pressing need for greater support for businesses and academics seeking to identify potential partners for collaboration. You refer to this under recommendation 10. You identify the National Centre for Universities and Business as an organisation that appears on the face of it to be well positioned to be a conduit for this support. I entirely agree that more support is needed, but what we really need is a champion out there with a high profile who can help the interested parties—the SMEs and the universities. Much as I respect the NCUB, it does not really have a high profile; I suspect quite a lot of people have never heard of it. If there is to be a champion—if there is to be a central organisation—are the NCUB the right people? If so, what has to be done to change them?

Professor Dame Ann Dowling: I am afraid I am not in the right position to answer that. The NCUB is developing an online brokerage tool as we speak, so this is being done and it has support from Innovate UK, the research councils and HEFCE, so there is a bit of steam around this online tool. It is not completed yet, so I cannot comment on it, but what we are saying is that an online tool will never be sufficient. We have listed things that we think would be very useful to go into such a tool. It is aiming to show the landscape of where research is going on in universities, and information will feed in from the research councils, which have information on who they are funding. One thing we are saying is that it would be good to know where industry is putting its money as well—this is something that Witty commented on in his report—because there would be nothing like that information to help encourage the rest. In particular, we hope that if a UK company sees one of its competitors investing, it will be encouraged to get involved itself. So, we make recommendations on the type of things that should be in an online tool, but online will never be enough to really help SMEs; they need a person they can phone up to seek advice from, not only on how to navigate the landscape to find partners but on how to navigate the landscape to find funding.

The Chairman: If an organisation needs to complement its online activities with this presence, whose job do you think it is to organise such an organisation?

Professor Dame Ann Dowling: We thought Innovate UK was the right body to put those people in place. It is already engaged with industry. Its remit is this industry-led side of research and innovation, so it has a good knowledge of the landscape and we think that would be the best place to embed those people.

Lord Hunt of Chesterton: Thirty years ago, or whatever it was, we set up a European network, ERCOFTAC, which is online; it teaches people who arrive. Surely in different areas of technology you need these online European networks that will particularly have the data, the expertise and the special interest groups. You are not going to do it for the universities as a whole. If I may say so, the officials, both in the UK and in Brussels, have not been madly helpful for these unofficial but very pervasive networks.

Professor Dame Ann Dowling: For those who do not know, ERCOFTAC is a group that is interested in modelling of fluids, particularly turbulence. It is fine if you know that is your problem, but if a company is trying to find a route in it does not necessarily know what the problem is. What it might know is, “We are trying to take our product up to higher temperatures than before; where do we go to find some information about materials that

operate at a higher temperature?” or something like that. It needs an interface to turn that problem into terms that can easily be searched through an academic database. There are lots of online ways and when it is a big company or a company that has been very engaged in research and knows what it is looking for, it can find its way round existing databases very easily. The information is out there in the public domain. What we are talking about is how a company gets help before the problem has been formulated into knowing which bit of the technology and science base will be appropriate for it. That is a much earlier-stage question.

Lord Hunt of Chesterton: In Germany, the Fraunhofers are where small industry go, are they not?

Professor Dame Ann Dowling: Some of the Catapults provide exactly that support in the UK. The advanced manufacturing Catapult—if that is where the questions are—gives very clear guidance into that.

Baroness Neville-Jones: Really active industry federations can be extremely helpful to their members in this sort of area. They need to get organised, though.

Lord Maxton: I remember when I was down the other end of the corridor on a committee asking a Microsoft representative what his view was, and he said the next new idea will come from an 18-year-old, working in his bedroom, who is not even at university—before he goes to university. To some extent, what that youngster requires is financial support. Did you talk to the banks at all? Were they involved in any of this discussion? The banks are part and parcel of the financial backing, presumably.

Dr Sillem: That is probably beyond the scope of what we were asked to look at within the review. We definitely recognise that as being an important issue and the Royal Academy of Engineering has an Enterprise Hub that supports early-stage entrepreneurs. We are very interested in issues like access to finance, so we connect early-stage entrepreneurs with people who have deep personal expertise and experience in founding and growing businesses and with their networks, but really that goes slightly beyond the remit of this particular review.

Lord Maxton: I think it is an important element; that is all.

Professor Dame Ann Dowling: It is an important element, but not so much on the university-business research collaborations. I would say that Microsoft has established R&D centres in the UK that are large buildings that have the groups and engage with the academic base.

Q6 Baroness Morgan of Huyton: Thank you very much, Dame Ann; it is a report that rings really true, I think, to most of us here. I should declare an interest: I am a member of the council of King’s College London. In reply to Lord Hennessy, page 25 is the answer, because that is writ large across the whole piece; whether it is funding or whether it is structures, there is lots of complexity. Is there, though, a danger that when we talk about simplification we become rather clunky and we say, “It is okay, because in this region the LEP is going to do it”, and if they are not good enough, that means things do not move? There is a bit of a dilemma between simplifying and stripping out the task force and the structures and all the rest of it and saying, “This is the perfect model around the country”. Who then takes the action if that bit of the structure does not work.

Professor Dame Ann Dowling: That is a fair point. If we turn to the LEPs in particular, they vary so much across the country, and in big cities there may well be an LEP very much

engaged with its local universities that is really able to drive an innovation strategy, but in other areas they will struggle. We are not going to get uniformity of quality of engagement and ability to have a science and innovation strategy across all 39 LEPs. Neither is it going to make sense for LEPs to compete with one another in the same areas, particularly as much of the funding to be accessed might be from Europe rather than within the UK. We think that they will need support in what a structure of a science and innovation strategy should look like and the ability to have some co-ordination so that not every area is going after the same technology or setting up centres in exactly the same areas. We think Innovate UK will have a role to play in that co-ordination.

Baroness Morgan of Huyton: You talk about the interface, but it seems a lot of your recommendations are about industry and academia understanding each other, in a way. Are you happy that the REF is driving collaboration not just for its own sake but which delivers real value? I know what you are going to say. You are going to say that impact is a big step forward, which I am sure it is, to an extent. Do you think we are in a position where the way we measure impact is really working, or are we in danger of producing another set of boxes that everybody ticks and therefore they get their impact stars? There is always a danger when we approach things in this way that it is another form to fill in and people get clever at filling the forms in, bluntly.

Professor Dame Ann Dowling: One advantage of the REF is it is a way of influencing behaviour in universities. It is a powerful tool, and that means it needs to be handled with care. Certainly, asking universities to come up with these case studies of how the research has had impact on users is making universities think through what their strategy is about how they engage with users. That side of it is positive, but there are negative parts as well. Mobility is all-important to people in universities and people in industry understanding one another and where they are coming from. It is really clear that we have far less mobility between industry and universities than other countries. In Germany, you would find the senior academic leaders had all spent time in industry; you hardly get that in the UK. Quite often the REF is quoted as an issue that prevents people from industry moving into academia and the other way—mobility for academics to spend some time in industry—so we are recommending that efforts are made to really promote mobility through the REF.

Dr Sillem: 70-odd academics from across all disciplines attended the academic workshop and we were struck by the passion with which they spoke about why they wanted to collaborate with industry. It was not about the REF; it was because they felt that it was a way to see their research have real impact on the world and to access problems that related to people's everyday lives. It is easy to get cynical about why academics are pursuing this path, but a subset of academics feels quite deeply motivated to collaborate.

Baroness Morgan of Huyton: What bit of structure would you change to make that happen more? Is it more Daresburys? What is it that enables people to get together and create value?

Professor Dame Ann Dowling: Encouraging mobility. We thought, "Get them young", so encouraging mobility amongst PhD students in appropriate subject areas to spend some time in industry.

Lord Hunt of Chesterton: Do you not think they should spend time in industry instead of on a gap year? Everybody used to; you were not allowed to do an engineering degree unless

you had spent a year on a building site or in a factory. Would that not be necessary; otherwise they are spinning around?

Professor Dame Ann Dowling: We were thinking more about being involved in industry in the sense of being involved with R&D in industry rather than necessarily on the shop floor.

Lord Hunt of Chesterton: You learn a lot on a big building site.

Lord Maxton: In Germany, that mobility often includes government service as well—in other words, the civil service. Do you think that should be the case too?

Professor Dame Ann Dowling: We were particularly asked to look at business-university research collaboration, so for us mobility meant between those two bodies, but I think mobility in general, actually.

Q7 Lord Vallance of Tummel: I had better declare an interest, oddly enough, as the chairman of the board of governors of the Royal Conservatoire of Scotland, which does a bit of collaborative research. I was also on the boards of three of the companies in your figures 5 and 6, Siemens, BT and the Mobil part of ExxonMobil, but that was in the past. I look at things from a very managerial point of view, I am afraid. Just looking again at this figure of the complexity, managerially you would look at that and you would say it needs root-and-branch change right across the board. To be fair, you have recommended that there should be simplification by government or, if not, that you “hide the wiring”—that is the metaphor that you use. I wonder about the willingness of government to do a root-and-branch look at this. I do not know this landscape; it is not something I am aware of, but it feels a bit like the tax code. Everybody knows it needs to be simplified big time; nobody is really willing to take it on, because there will be winners and losers, and the losers make a big deal of noise and the winners just take away the winnings and are quiet. Is this a parallel thing? If you had the chance to take a fresh piece of paper and design it from new, do you not think you could get something that is a lot better? Would the Government have the guts to take it on?

Professor Dame Ann Dowling: One of the problems with this—as you have indicated—is that it is very difficult for Government to take a system-level view about whether this is working. You cannot follow the interactions in the system because it is just so complex. On the other hand, we have a system that is delivering quite well at the moment. We should not get too negative on this. For those who work their way around this, it is delivering very well indeed; it is just hard for newcomers to come into the game because it is a big activation barrier to get started. Innovate UK and the research councils are at the core and it would set things back tremendously to throw all that up in the air. The CEO of Innovate UK has already responded to our review, saying that she agrees completely and wants to simplify it. I think it is about working with those two organisations to make sure that they simplify. The research councils need to work together rather than differently. The subjects are different, but the schemes do not have to be different. There are areas where one would not throw everything up in the air but could consolidate and simplify. Some of the rest it would not hurt to take another look at.

Lord Vallance of Tummel: There are big bucks in HEFCE and the SFC and so on—even bigger bucks. What about them? They come at it from a completely different angle.

Professor Dame Ann Dowling: They are somewhat less complicated, really. We have the regions in HEFCE, but—

Dr Sillem: There is a trade-off. One of the most consistent calls that we get from business is for stability, so simplification is important, but if you rip it up and start all over again you introduce a whole set of new problems.

Lord Peston: I have a very brief question arising from the complexity issue. I was intrigued by your recommendation 12 about VAT, which we all know is a mess as a tax; we would have been infinitely better off if we had introduced a consumer expenditure tax at the time we went for VAT. I do not understand. Have you been in touch with the Chancellor about this? It is ludicrous that there is VAT on shared facilities. Have you said to the Chancellor, “I am looking forward to the Budget”—exactly as I am speaking now—“and I expect to hear that that has now been abolished”?

Professor Dame Ann Dowling: We are not the first people to point out this inconsistency. As soon as more than 5% of a building that, because it was built for university research, did not have VAT on it is used for collaborative research with industry, the whole building is subject to VAT. It is known to be an issue. It has been challenging. It is tied up with an EU regulation.

Dr Sillem: The Treasury is well aware of it and I think there is an appetite to look again. We are told it originates from EU legislation, but at the very least there could be much clearer guidance to the community as to how to best navigate this obstacle.

Lord Peston: We do not expect your report to lead to the abolition of VAT in general; that is another matter.

Professor Dame Ann Dowling: This is a very specific one that—

The Chairman: One should be realistic in these matters.

Lord Hennessy of Nympsfield: Dame Ann, I may have misheard you, but in reply to Lord Vallance I think you said you cannot expect the Government to take a systems view of this. If that is true, that is—

Professor Dame Ann Dowling: No; I meant one would hope the Government would take a system view, but it is very hard when the system looks like that [*indicates figure 10 on p25 of the Dowling Review report*].

Lord Hennessy of Nympsfield: I detected more than a note of scepticism in your voice there. That really is something that will cling to the Velcro of my memory. You are almost giving them an alibi for not taking this seriously, because the diagram is so overwhelmingly awful.

Professor Dame Ann Dowling: Really, we would say: how can the Government take a system view of support for research and innovation when this is the landscape?

Lord Hennessy of Nympsfield: What is the answer?

Professor Dame Ann Dowling: Simplify. Remove complexity.

Lord Hennessy of Nympsfield: How do you get the Government to face up to this? If you do not, somebody else will come back and revisit your terrain in a few years’ time and say exactly the same thing.

Professor Dame Ann Dowling: It is always easier to start things than it is to stop things. Part of this complex landscape is because new things have been started that overlap with existing things and it has just got more complex.

Viscount Ridley: Just to follow up on that point and on Lord Vallance's question, if this was a map of the private sector, the way it would simplify would be by mergers. You say it is difficult to stop things and I quite agree, but how about merging them? It seems to me that that is something that you could have pressed for in how to achieve simplification: mergers of these public bodies.

Professor Dame Ann Dowling: What we are saying is: "Look at the remit". We have things that have the same remit being done by different organisations. As I said earlier, the number of bodies tasked with supporting SMEs is large, both regionally and nationally. There is simplification that can be done. It is looking at duplication. Sometimes we even have things that have the same name but do different things.

Baroness Neville-Jones: This is a small point within what you were talking about. You said "get them young" in terms of collaboration between business and universities. Do you think it is too early to have an assessment of—or do you have an assessment of—the success and the value of the centres for doctoral training?

Professor Dame Ann Dowling: Before the centres for doctoral training there were the EngD programmes, on which students spent some time in industry, and indeed there have been some medical collaborations where students spend time in industry. There has been positive feedback on those, and the centres for doctoral training provide another way in which behaviour can be influenced.

Baroness Neville-Jones: Can that scheme usefully be increased?

Professor Dame Ann Dowling: CDTs do not necessarily lead to time in industry. Industry has been more involved in setting up the training aspects of those centres for doctoral training.

Baroness Neville-Jones: What I hear is that people then do go into industry as a result of the closer collaboration.

The Chairman: I am going to suspend the sitting for a moment. We are about to start the one-minute silence to mark the 10th anniversary of 7/7, so if we could have one minute's silence.

One minute's silence was observed for the 10th anniversary of the 7 July bombings.

The Chairman: Thank you.

Baroness Neville-Jones: I had finished, Chairman.

The Chairman: We move on now to Lord Cameron. We said we would release you, Dame Ann, by about 11.40 am and we are running slightly behind the curve on this, so I will invite Lord Cameron to ask the next question and I hope we can go a little faster now.

Q8 Lord Cameron of Dillington: I was going to say that I agree with the Chairman about the complications of this landscape. You need somebody whom naïve Mr Royce can ring up to find his Mr Rolls. I know academics who would not have the faintest idea how to guide themselves through this landscape. If Innovate UK is the right answer, somehow that has to be well publicised. My question was going to be about attitudes. Last year there was a MORI poll—if you believe polls nowadays—that indicated that the public trust scientists less if they

are collaborating with industry. You yourself also said there could be conflicts of interest if academics did collaborate with industry. As we all want them to collaborate with industry and we all want to try to foster the relationships, how do you think we are to overcome this possibly irreconcilable opinion?

Professor Dame Ann Dowling: It seems to be more of a problem for some disciplines than for others. It is perhaps when it is particularly health-related that the public begin to get concerned. It is important that we address it because we are going to face a time when research funding from industry becomes more important and a bigger part of the patch. Universities have very clear guidelines on how they handle the fact that the research will be independent of the industry that funded it. One thing that we are saying is that they should be clear in publicising their code of conduct for such collaborations so that the public can have confidence, and it should be very clearly stated what role the industry has had. Ideally, it will have been a funding, an involvement and an interest in the research but not control over the output or publication of the results. So, there should be good codes of conduct and universities should robustly promote the way they deal with those industry collaborations.

Lord Fox: You have mentioned Catapults on a number of occasions and I think you hinted that you found them variable. You might like to confirm that. There is nothing wrong with variability, because you do not get excellence without one being better than another, but looking across the nine, what do you think characterises the good ones and how can that be propagated? Are they successfully drawing in new people or is it a re-formation of the same people in a different institution and a different way of doing the same thing with the same companies? Are you getting in new companies, SMEs et cetera? The final point is: when do we know when we have enough? Have we got enough? How many is enough? What measures perhaps should we apply to make that calculation? I should have declared an interest: I am an employee of GKN.

Professor Dame Ann Dowling: What determines the good ones? Long-term sustained investment. These are not things that you switch on overnight and expect to see producing immediately. The German Fraunhofers have had investment over 60 years. The advanced manufacturing Catapult is based on investments that the Engineering and Physical Sciences Research Council has made over decades. They came together from existing innovative manufacturing centres and they are performing extremely well. We have to recognise that that is built on 20-plus years of investment. They are indeed bringing in new parties and they have ways of bringing in SMEs as well as other new medium-size or Tier 1 suppliers. They can be very productive. From the ones that, as it were, almost started from scratch, one cannot expect very much in a couple of years. Those that we have talked to and heard about have been very careful in selecting areas in which they can make a difference, and it is often around how you deal with the scale-up issues. Critical mass is important if Catapults are to do something distinctive. When addressing integration areas or scale-up for digital—how you do things with appropriate security at scale—or future cities, where you are looking at how you integrate across the cityscape, scale is a really important element, so it is vital to invest enough in making sure that they have critical mass, rather than just bringing in new ones for the sake of it. We are saying: if money is tight, make sure that we support the ones that we have rather than rush off and develop new ones, and expansion should happen only as additional money becomes available rather than starving those that are doing well. Although they are doing well, it is still important that their funding is one-third from industry, one-third from grants of various sorts—including government—and one-third from

a block grant, which enables them to build the seed corn for their future. To expect them all to be funded by industry would kill off the next stage of innovation that it is important that they produce. There are Catapults that are going well, and that has led to lots of regions wanting a Catapult, so there has been pressure to have more. We really think that, although it is a good thing to have more, it should happen only when more money is available. We have seen the Digital Catapult and others be quite canny in the way they have set up centres that are offshoots so that they can still get the critical mass but maybe expand the geographic footprint if there is particular expertise or enthusiasm in an area that they want to link into.

The Chairman: I hope, if your timetable allows, we can continue for about another 10 minutes or so.

Q9 Lord Kakkar: I should declare an interest as chairman of University College London Partners Academic Health Science Partnership and professor of surgery at UCL. Dame Ann, you recommend that the NHS should be considered “a key part of innovation frameworks within the UK”. What do you consider the principal barriers and challenges that prevent this currently, and how do you think these should be overcome?

Professor Dame Ann Dowling: The NHS came up time and again as a body that should be a key partner in these university-user collaborations, where it was not working as smoothly as one might hope at the moment. The challenges are because of the size and complexity of the NHS, which make it hard to spot opportunities for collaboration, or even to spread good practice about collaboration; difficulties in integrating innovation within the incentive framework for NHS staff, where there is insufficient recognition for innovators and senior staff often lack skills to promote innovation; and the NHS not being particularly helpful in providing access to data or evidence. The National Institute for Health Research was seen to have positive effects there, but still there were concerns that we were not getting out of the NHS as much as we might in terms of encouraging research excellence and partnership. John Bell was a member of my review group and is undertaking a review around innovative medicines and medical technology, which is looking at the NHS in much more detail than we did. For us, it was very much flagged as a concern. It could be such a huge opportunity and we are not making the most of it.

Lord Kakkar: Did you receive any evidence that the academic health science networks that have been established across the NHS in England were starting to break down some of those barriers? That is clearly their purpose.

Dr Sillem: There was a sense that the direction of travel is right and that is one of the reasons, but there is still a great deal of potential that is unfulfilled at present.

The Duke of Montrose: You say that there are many useful component parts in the British field. In particular, you mention the research base. Would you like to mention any of the others that you see and anything that you particularly think should be co-operating better?

Professor Dame Ann Dowling: The strength of the research base has certainly been one. In addition, we have many innovative companies that are doing very well. The industrial strategy has brought benefits in getting collaboration within sectors between the primes and Tier 1 companies, but it has also helped to have a long-term vision, which, being shared across the sectors, brought in universities—although we think more could have been done

there—and SMEs. So, collaboration within sectors around a long-term vision and the role that innovation, science and technology can play in that has also been a strength.

The Chairman: Lord Maxton, you mentioned you would like to ask a question about Scottish issues.

Lord Maxton: Yes. This is marginally political. Scottish universities are not under the control of the UK Government; they are under the control of the Scottish Government. The research councils, however, are under the UK and fund research at Scottish universities. Did you look at this? Did it make any difference to the conclusions you came to?

Professor Dame Ann Dowling: We looked at Scotland in particular and we were very impressed with the way Scottish Enterprise and the universities and companies in Scotland were really working together. Hayaatun has probably found the relevant section in the report.

Dr Sillem: There is the Scotland Can Do initiative; there is the Universities Scotland five-point plan to enhance business-university engagement; and then there are some interesting innovations around the use of model contracts. There is a whole set of activities. There is also the Interface system that supports SMEs looking to engage with the research base. Overall, it seemed an impressive story that we were hearing.

Professor Dame Ann Dowling: We held a workshop in Scotland. All the workshops were very well attended, but in some regions it was almost as if we were bringing groups together whereas in Scotland it was very clear that the companies, Scottish Enterprise and the universities were very engaged with one another, to their mutual benefit. We were impressed.

Lord Maxton: I dare not ask the next question, but I will. What if Scotland became independent?

The Chairman: I know you belong to two national academies, Dame Ann, but would it be fair to say that the national academy in Scotland is a very good example of bringing business and academia together in the Royal Society of Edinburgh? It sets an example, does it not?

Professor Dame Ann Dowling: Yes.

Q10 Lord Hunt of Chesterton: One of the important elements of the British science scene is—or was—government laboratories. The Met Office is still a very prominent one. In other countries, you have more of a triangular relationship involving industry, the government labs and the universities. The point about government labs is that people have a career there; they spend all their lives there and they have the data. They are very knowledgeable. At universities, people come and go. That is what concerns me about Catapults; are they coming-and-going institutions or are they going to be the new government labs? All science and technology requires this tremendous storage of data, but the career structure of people in Catapults is not at all clear to me. They are not government civil servants; they do not have the job security of universities. Somebody said, “They are all going to be go-go scientists”. Most scientists are not go-go; they want a lifetime doing something. I would be interested in your view on this aspect of the architecture, which we have not discussed.

Professor Dame Ann Dowling: Yes. Our remit was business-university research collaborations. We saw the public labs playing an important role as hubs in often working

with SMEs and being able to provide a link to universities. I am not sure I can comment on the career structure in Catapults. The advanced manufacturing Catapult has strong interactions with universities and you see people there who have made a very successful career in the Catapult, and it is quite clear that they are playing a very valuable role. I cannot comment on people's job prospects, but what they are doing is so valuable that that position and those activities need to continue. The newer ones are finding their feet. They are doing all the right things, but it is impossible to say what their long-term career structure will be.

The Chairman: Lastly, we would like to take advantage of your presence here on a slightly unrelated subject.

Q11 Baroness Neville-Jones: Gender imbalance in engineering might be close to your heart; I do not know. It is the case, is it not, that the UK fares rather badly, even by international comparisons—Germany has 15% female engineers, Sweden 25% and Latvia 30%. I do not know whether the base is exactly the same, because these days what qualifies as engineering is almost as varied, it seems to me, as what qualifies as a doctor. What would you like to see happen to increase the number of women who are in this very important profession for the future of the country?

Professor Dame Ann Dowling: There is no doubt that we are completely out of line with other countries in the number of professional women engineers that we have. It is 7% in the UK; look at other countries that are very similar to us in Europe, where the number will be 20%. Lots of good initiatives are going on and they are making changes, but very slowly.

Baroness Neville-Jones: Can we join them up in some way?

Professor Dame Ann Dowling: Absolutely. The Royal Academy of Engineering has put our efforts with schools together with EngineeringUK and tried to do everything through Tomorrow's Engineers, and the engineering institutions are following that as well.

Baroness Neville-Jones: Are you getting into schools?

Professor Dame Ann Dowling: Yes, there is lots of good stuff going on in schools. One of the issues, as I am sure you know, is that girls are not taking A-level physics. That is a big drop-off.

Baroness Neville-Jones: It has gone down, has it?

Professor Dame Ann Dowling: No, sorry; girls do extremely well at GCSE and then the number of young women taking physics combined with maths, which is needed to qualify for most engineering courses, is where the decrease in numbers goes. That is a really important element, so we need to do things in schools that get girls enthused. If we were to do really radical things, we would keep a broad curriculum going in the sixth form. If we compare ourselves with elsewhere in Europe, there is the fact that we let anyone give up something like physics at age 16. But given where we are, universities can do more by having foundation years or routes in for those who do not have A-level physics. We know that that can be important.

Baroness Neville-Jones: What about careers advice?

Professor Dame Ann Dowling: Yes, careers advice is still lacking. Even—a really frightening statistic—20% of the STEM teachers canvassed in a recent survey said they would actively discourage their pupils from being engineers.

Baroness Neville-Jones: That is terrible.

Professor Dame Ann Dowling: So, we need really good advice on careers in schools. We also have to do some work with the employers. The academy is working with its diversity leadership group on making sure that employers have the right kind of employment practices and flexibility that all youngsters expect these days from good employers. We are sharing good practice around that, but what would really make a difference is the general population being aware of what engineering is these days. If you Google “engineer” images, every single one has a hard hat. We are not getting across that these are careers where you use your brain and not your hands, and that engineering spreads from saving lives—the bioengineering applications where you maybe design new devices, but also ways in which to deliver medicines around the body—right through to IT. That message does not get across. People think it is dirty and greasy.

The Chairman: Dame Ann, this is clearly an issue that the Select Committee takes an interest in. It seems remarkably hard to achieve the culture change you are referring to. If you think in future the Select Committee has a role to play in joining up some of the organisations and helping to change public perception, do please let us know. Meanwhile, coming back to the Dowling review, may I congratulate you and your colleagues on having stimulated an interesting discussion? I see you have really laid down a challenge to such organisations as Innovate UK and research councils. When we see them—as we certainly will see them—we will have the opportunity to invite them to respond to some of these challenges, and I hope we can keep going some of the momentum that you have so successfully started. Thank you, Dame Ann, and thank you, Dr Sillem, for your great help today.

Professor Dame Ann Dowling: Thank you very much for the opportunity.