



HOUSE OF LORDS

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The Select Committee on Science and Technology

Inquiry on

THE FUTURE OF INNOVATE UK

Evidence Session No. 1

Heard in Public

Questions 1 - 8

TUESDAY 7 JUNE 2016

10.45 am

Witnesses: David Eyton and Dr Virginia Acha

USE OF THE TRANSCRIPT

This is a corrected transcript of evidence taken in public and webcast on
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Members present

Earl of Selborne (Chairman)
 Lord Borwick
 Lord Broers (co-opted)
 Lord Cameron of Dillington
 Lord Fox
 Lord Hennessy of Nympsfield
 Lord Hunt of Chesterton
 Lord Mair
 Lord Maxton
 Baroness Neville-Jones
 Lord Oxburgh
 Viscount Ridley
 Lord Vallance of Tummel
 Baroness Young of Old Scone

Examination of Witnesses

David Eyton, Group Head of Technology, BP, and **Dr Virginia Acha**, Executive Director of Research, Medical & Innovation, Association of the British Pharmaceutical Industry (ABPI)

Q1 The Chairman: Welcome, David Eyton and Virginia Acha. I apologise for the fact that you can hardly see us. I can see you out there somewhere, and I am sure we will manage. The room is of a slightly longer configuration than we are used to. This is the first session in a very short inquiry that we propose to undertake on the future of Innovate UK. Would you first like to introduce yourselves for the record? If you would also like to make an introductory statement, please feel free to do so.

David Eyton: I am David Eyton. I am BP's head of technology. It is probably also relevant that I am a director of the UK Energy Technologies Institute, which has a number of associations with this conversation.

If you will allow me, I will make a few remarks, which I have prepared and will read out. BP is domiciled in the UK, and the UK innovation ecosystem underpins our global success. More than 40% of our global research and development investment occurs in the UK, with three major research centres: one Pangbourne, one in Hull and one in Sunbury. We also have strategic relationships with four universities in particular—Cambridge, Oxford, Manchester and Imperial—and we made significant investments in the BP Institute for Multiphase Flow at Cambridge in 2001 and the International Centre for Advanced Materials into 2012, with its hub in Manchester. We also have a growing corporate venturing activity in the United Kingdom, and we have invested an amount totalling about £25 million in nine start-up companies. Therefore, we care deeply about innovation in the UK and about Innovate UK itself as a subset of that.

Large companies such as BP have well-developed global innovation ecosystems, of which universities and venturing are an integral part, alongside our own internal capabilities.

Consequently, we have the capability to develop and deploy innovative products and services to support our own businesses.

However, small to medium-sized enterprises, on which BP also depends, do not have similar resources available to navigate the university and funding landscape. We see our UK role as primarily to support the success of innovative UK SMEs in developing and selling their products and services in global markets.

BP has not been a direct beneficiary of IUK's support, but we have supported a number of SMEs in their bids for IUK funding, and we would ultimately be the first customer of their successful development. It is therefore primarily in this capacity that I make my comments here, as a venture capitalist.

The Chairman: Thank you very much. Dr Virginia Acha.

Dr Virginia Acha: First, I thank the Committee for giving me the chance to present evidence today. I represent the Association of the British Pharmaceutical Industry. We have more than 53 full members, who represent global biopharmaceutical companies from around the world. As a sector we remain the largest investor in R&D in the UK. That is no accident; it relates largely to the deep legacy of research and academic strength in the life sciences that the UK represents.

As David has described, the world is very much aware of the potential of the UK as a source of innovation, and in life sciences we represent the third largest cluster globally, behind only Boston and San Francisco. I would personally like to see us challenge for the top spot, but if we are to do that we need investments across the board that support the scaffolding around life sciences, not just the big companies and the academics, so that critically the translational work that happens through SMEs really comes to fruition in the UK.

Innovate UK has had a strong role in delivering that translation from science to innovation, which is why it remains so incredibly important to us. We are very supportive of the White Paper published on success in the knowledge economy. There are many aspects to UKRI that we support and would be happy to see continue: the Haldane principles, for example, and dual funding for science. However, how Innovate UK fits within that wider strategy is of keen interest to my membership for the same reasons that David described: we do not necessarily have direct funding coming to all our members, and although we have some small company members, for the most part it is about the life science ecosystem, which we are desperately keen to make sure continues to grow. Thank you for the chance to offer comments and evidence today.

Q2 The Chairman: Thank you very much. Before I ask the first question, which is of a general nature, I must declare my interests, which are that I am a fellow of the Royal Society, I chair the Foundation for Science and Technology and I am an honorary fellow of the Institution of Engineering and Technology.

My question is very general and to both of you. In what way do your organisations interact with Innovate UK? Do you think these interactions are successful? How important do you think Innovate UK has been in contributing to supporting innovation in the United Kingdom?

Dr Virginia Acha: One of the key measures by which we have been engaging with Innovate UK is the catapults. We have a number of engagements with the catapult centres, which are a mechanism by which Innovate UK almost primes the market on how to interpret and

translate that new technology. If you have the opportunity to see the future for life sciences in cell therapies, for example, the Cell and Gene Therapy Catapult is a way to bring together the earlier-stage science with the earlier stages of business to generate opportunities for change. As the ABPI, we engage directly with that catapult, and likewise with high-value manufacturing, because, again, manufacturing remains a growing technology for our sector. We also engage through the new Precision Medicine Catapult. You cannot pick up a newspaper today without more discussion about how precision and targeted therapies can work. The question is how the UK can play a role in that development. The catapults are there to try to bring those opportunities together to empower translation and impact to innovation.

We also have a lot of engagement with the knowledge transfer networks—the KTNs. They have been remarkably helpful in building community around technology and new areas of study. We have a knowledge transfer network on a number of issues relating to life sciences. I work with the KTN on all its work but specifically on medicines development. We have a medicines manufacturing innovation partnership, which includes members of the Government, the KTN, Innovate UK and a number of companies, to try to advance manufacturing once again for the UK. We have lost a lot of investment in manufacturing in recent years, and we are working with the KTN to see how to reverse that. As a first measure, the KTN put together a landscape that provides an online tool for people to identify where all the current manufacturing work is undertaken in the UK, so that people can find partners and build a community quickly. The KTN has been very effective.

Finally, there is the Biomedical Catalyst. Although we do not directly benefit, those grants have been absolutely material in developing the spin-outs and new start companies that have very much become a feature of the life sciences community in the UK. You may have heard about Discover, a company that is developing one of the few antibiotics in the pipeline. It is working on its MRSA project and other projects at the moment. It was an early beneficiary of Innovate UK investment, in particular through the biomedical catalyst. We have a list of companies that have directly benefited from the Biomedical Catalyst, without which our life-sciences cluster would be ever the poorer in the UK.

Through those three measures—the catapults, the KTM and the Biomedical Catalyst—the life sciences sector and my members in particular have received a lot of benefit from Innovate UK. They do that work well, but I will not kid you: it takes years to develop these opportunities to really have an impact. It is now all coming to fruition and, as always seems to be the case, we are starting to make changes to an organisation when it is finding its feet in the innovation environment. That is why we are worried.

David Eyton: In 2014, BP spent about £7.7 billion in the UK with 4,000 companies, from the very large to the quite small. I cannot tell you how many of those were beneficiaries of IUK's work, but I have no doubt that Rolls-Royce down to the smallest companies—the whole supply chain on which we depend—were. Many of them have benefited from that.

In terms of our own more direct relationship, we have supported 18 successful bids to IUK, or its antecedents, over the last 10 years, and we currently have two live bids: one with Silicon Microgravity and one with Magma—the former for developing methods for making measurements underground and the other for making composite jumpers for subsea developments.

The other area is through the UK Energy Technologies Institute, of which BP was a founding member, as was the TSB, and a funder of its programmes. We created a programme called Smart Systems and Heat, which has now been transferred into the Energy Systems Catapult with our strong support.

The UK Energy Technologies Institute's other function has been the strategic analysis of the UK energy landscape, and a reasonably strong signal is now being sent that the intention is to shift that function into the Energy Systems Catapult as well, as the ETI reaches the end of its 10-year period. The ETI is an important case in point here; it was set up to plug a gap in the UK's innovation system to fund large demonstrations of energy technologies that are needed for the transition to a low-carbon economy. Now that the ETI is winding down after a 10-year period, that is the sort of thing that IUK needs to do in the future, and transferring some of the capability from the ETI into the Energy Systems Catapult is an important component of that.

Q3 Lord Vallance of Tummel: Could you say a bit more about the value-added of Innovate UK and the balance between financing, which is very clear, and the other services that it provides? If there was much less financing, would it stand on its own two feet because of the other services that it provides?

Dr Virginia Acha: That is an excellent question and one that Innovate UK colleagues have constantly challenged: without the funding, to what extent would they add anything new to what has already been delivered? From our side, ABPI members do not often benefit directly from that funding—we tend to benefit more from the other side: the building of networks and the building of communities—so without question Innovate UK is valuable, and we can see that value continuing regardless of the funding. However, I take very much on board the point that the companies that directly benefit from the funding—the Discovers and the spin-outs—are in a very different place and would find it very difficult to get some of the risk capital needed to take on some of the very challenging investments that they have to take on in pursuing technologies that a conventional loan or conventional VC might not be willing to pursue. That risk capital is a very important and value-added contribution that would not be easily replaced were Innovate UK not to pursue this. That is why we are also looking for more detail on how Innovate UK will be able to provide finance and whether that will be on a grant basis, a loan basis or whatever.

I will give you an excellent quote that makes the point. Ingenza was a spin-out from the University of Edinburgh. It works on bioprocessing engineering, an extremely useful part of our ecosystem, and is a really exciting company that helps to make biopharmaceuticals a reality in so many companies. It has grown quite a bit. It has partnerships with GSK and continues to go from strength to strength, but, as the managing director said, it is Innovate UK's ability to connect business and the research community that makes it "the envy of western Europe". It is about much more than the money; the community and the scaffolding into the life-sciences cluster is equally valuable. So I think it would find it difficult to separate the two. For larger companies we might find it useful to have that direct connection without the finance, but the way the pull-through works is what really makes a difference for Innovate UK conditions today.

David Eyton: I agree totally with Virginia. If you are a start-up company, you are generally six months away from bankruptcy, and financing is critical, so the grants that IUK has been putting into these companies are company-makers, and financing is likely to be the most

critical thing at that stage. However, as you mature as a company, your products and services quite often become much more sophisticated—you do not have a single product but a combination of many products—and the knowledge networks that Virginia mentioned become increasingly critical. It is therefore a spectrum of things, depending on your scale and where you are in the life cycle of your product. I cannot comment on the balance. I do not know.

Lord Hennessy of Nympsfield: I declare four interests that may touch on the research councils: I am a fellow of the British Academy, of the Royal Historical Society and of the Academy of Social Sciences, and I am a professor of contemporary history at Queen Mary University of London. From the Department of Scientific and Industrial Research through to MINTEC, we have never felt at ease with our relationship between the state and the private sector in particular on all this. This has been a problem throughout my conscious lifetime. From your very deep experience in your different ways, could you both give a thumbnail sketch if you can, a little audit, of what the British state does well and does not do well on the innovation front?

Dr Virginia Acha: I think you know the history as well as I do on this. We always say that something is invented in the UK and exploited elsewhere. To some extent the life sciences have had this history; some of the most important inventions in our field have come from the UK. The question is: can we translate it into innovation and commercial outcomes here in the UK?

Since the Cooksey report some years ago, the biggest change that we have made in the life sciences in the last five to 10 years is to make translation a desirable outcome. That has been phenomenally important and I cannot underscore enough how much that has already changed and why today we are seeing a resurgence in life-science spin-outs and SMEs and in life sciences for biotech or bioprocessing, or whatever it might be, including new therapies, gene therapies. Without a doubt this is making translation desirable and achievable. It is critical, and it is why Innovate UK has played an important role in it: because you will not be able to translate if you do not know who you need to connect with. That building of community and providing the risk capital to ensure that you get to the early stages of being able to follow-on fund has been why we have seen an upsurge in life sciences. My colleagues at the BioIndustry Association have made that analysis with Ernst & Young in showing the remarkable improvement in the life-sciences SME cohort in the UK. That is entirely down to doing translation.

On the question of what we do badly, we still keep a distance between academics and those working on innovation matters; they are still not easily brought together. There are some challenges in the way we establish evaluations for academic careers, which again is part and parcel of the same Bill. If we think about it we should do so holistically, and there is still more work to be done in that regard.

David Eyton: I must declare that I was on Professor Dame Ann Dowling's review steering group, and I co-chaired the study by the Council for Industry and Higher Education as it was—it is now the National Centre for Universities & Businesses—into the relationship between business and universities, so I have been around this a fair bit. UK science is of an extraordinarily high quality. The evidence for that is the quality of the output for the money spent, which is second to none in the world. That is my belief and understanding based on the evidence that I have seen.

However, the shape of businesses and supply chains in the UK is really quite different from what you see in some of our major competitor countries, such as Germany and America. The vast majority of research and development done in the UK is either state-funded or done by very big companies. Our competitor countries have the equivalent of Germany's Mittelstand—middle and smaller-sized companies; hence the shape of the supply chains in the UK, that feed the bigger companies here, looks quite different from what you see in some of our major competitor countries. I think that concern about whether or not you have a working supply chain, and hence jobs and wealth in the UK linked to the bigger businesses that are here, is a function of historic policy and industrial strategy, or the lack of it, in the UK. That is a “but”, if you like.

Another concern identified by the Dowling review was the complexity of the innovation landscape. If you are a company that does not have huge resources and want to figure out with whom to connect, how to connect or even how to get funded, it is a particularly complex landscape. IUK has stepped up to try to help and to be something of a one-stop shop in that space: you can come to them and they can make sure that you get connected to the right people. That is an important function. We somehow need to take all that complexity away, so that whether you are considering a spin-out from a university, a small company or a big company, you do not have to understand the system yourself to figure out where to plug in; you just need to connect with somebody who can point you in the right direction.

Lastly, I do not think that venture capital is as vibrant here as it is in America, for example. It is more difficult, I would assert—I cannot bring much evidence to bear—to get funded here. America has a different system whereby, because it is vibrant, the finance put in by arms of government in America can fit in with the large funding for science that already exists. Large venture capital and private equity are available, so a lot more of the money that the government puts in other than by grants is in the form of loans or convertible loans, because it fits the ecosystem as a whole.

Q4 Lord Fox: I declare an interest in that I have shares in Smiths Group, which is a technology company. I am employed by and have shares in GKN, which has relationships with catapults and at least one KTM, but I have no oversight or knowledge of those.

My question is about the effectiveness and the barriers to entry around Innovate UK. You will be talking as a third-party advocate for your various connected companies and relationship companies. Do you see any challenges or barriers to working with Innovate UK, and have those barriers and challenges improved over its relatively short life? I think you said that it was just getting good, so what has it done to improve that?

Looking forward to the delivery plan for next year, it contains the word “simplification” several times. Do you have any comments on that?

Dr Virginia Acha: Again, over the period since it was the Technology Strategy Board and then became Innovate UK, there has been a lot of work within its teams to understand the environment in which it is operating. The truth is that when we think about the life sciences sector, can we write down a list of everybody in the sector today? No, it is changing. Part of its challenge is how it keeps abreast of who needs to be part of the conversation and how it makes connections outward. I have seen that at ABPI and previously, when I worked for member companies Amgen and Pfizer. In both cases, it was becoming much more proactive

and engaging to understand the needs of industry and to try to anticipate where the flow was going.

An example is its work on regenerative medicine and how you develop the new technologies of cell and gene therapies. That was born in a conversation that I sat in on six or seven years ago, where again by speaking to industry and being able to see the lay of the land it was able to coalesce work. It has become much more adept at that over time. Saying that, there are questions about the future and the five-point plan; the points about simplification are very well made. That goes to the point that David has already made: that we are never faced with an environment in which it is easy to identify where to go and how to pick things up. In fact, the larger companies may have an easier time doing that because they have staff who can invest the time and effort. That is a burden particularly for SMEs or new start companies. I very much welcome Innovate UK's intention to make it as simple, easy and straightforward as possible for individuals to access its benefits. You can never stop that process; it is a continuous effort.

David Eyton: The delivery plan is clear and sensible. It gets to the big issue, which is complexity. We are still concerned that a lot of effort is put into the reporting and administration associated with grants to small companies. Our advice to any company that we work with is: do not bother asking for less than £250,000, because you will spend a fair amount of money putting in the bid and administering it on an ongoing basis. We need to watch out for the reporting burden, and giving people feedback on applications, whether they are successful or unsuccessful. Those are minor things in comparison with the important points that Virginia has made.

Lord Vallance of Tummel: I have a quick point that relates to my first question. I think what we are hearing is that, in part at least, Innovate UK is there to address a market failure in the venture capital market of the UK. Is that right?

Dr Virginia Acha: In the early-stage, high-risk area, yes.

David Eyton: There is a lack of risk capital in the UK for earlier-stage companies; I agree with that.

Dr Virginia Acha: That is why there is the Biomedical Catalyst.

David Eyton: It is a vehicle that can address that.

Lord Broers: You have said that you think that the delivery plan is clear, and I certainly agree; I think it is excellent. However, would you comment on whether Innovate UK is trying to do too much? It covers an immense spectrum, from biomedicine all the way to space and energy. It is across the board and trying to do this with £500 million. Is that not too much and the money too little?

David Eyton: This activity is one that I think the UK is seeking to grow and build: to be more successful in generating jobs and wealth in the UK through translation in the UK associated with a world-class science base. That is the objective, as far as I can see, and it is the bit that needs the most effort. We have a well-established science machine that is running smoothly and is very mature—it dates back for ever. This activity is the one that we really need to grow, so my personal view, if I am allowed to express one, is that this needs significant effort in the UK and should be a significant component of the differential time spent by the governing body of UKRI—because the rest of it is running quite well and this is the hard bit, in my view.

The question whether this is the right amount of money to spend is quite difficult to answer, because companies are also spending huge amounts of money in this space. You are trying to ensure that where companies are not active or there is a failure in the market, state funding is put in; but vastly more than this is already spent by companies in this area and you are trying to multiply that activity. In my view, you could spend more money here wisely.

Q5 Lord Mair: I start by declaring an interest: I am a fellow of the Royal Academy of Engineering and a fellow of the Royal Society. At Cambridge, in our engineering department, I lead the Centre for Smart Infrastructure and Construction, which is an innovation and knowledge centre funded jointly by the EPSRC and Innovate UK. There have also been other grants from Innovate UK to my department.

My question relates to the Government's plans, which we have heard about, to integrate Innovate UK into UKRI. I want to ask you specifically about the business-facing focus of Innovate UK. The Government have said in their White Paper that they envisage improved collaboration between the research base and the commercialisation of discoveries in the business community. What do you think about the integration of Innovate UK into UKRI? Will it achieve the benefits that the Government are looking for, or do you see problems with it?

Dr Virginia Acha: I certainly have questions that I would like answered in the next few months, because the uncertainty about exactly what is proposed is a challenge for both Innovate UK and companies working with it. At the moment, the White Paper's detail on how that integration should take place is scant. We understand that Innovate UK will have some autonomy to make decisions, but what will that mean in practice? If they are to encourage integration, is that in decision-making, priorities or just back-room support? That is where we would like to see quite a lot more detail explained. I would be concerned if Innovate UK were brought under the same decision-making approach that a research council would be brought under, because they are making very different decisions. The problems are different and they need to be addressed as such.

Likewise, I would not want them, at the very moment when we are trying to encourage such integration for better translation, to have to fight among themselves as to who gets what part of the pot of money. There needs to be a lot more direction on how budgets for Innovate UK will continue, because it will be a challenging environment if you are trying to collaborate with the very research council that directly benefits from you having less in your budget.

David Eyton: The combination effectively works fine in a company. As the head of technology in BP, I have all our R&D and all our venturing activity. I do not see a conflict in that at all. They are two different ways of accessing innovation: doing it ourselves or investing in someone else who does. It works fine in the context of a company, but that is because we have a very clear strategy. I am very clear about what is needed of my function inside BP. The question one has to ask is: how clear is the strategic context for UKRI that would guide its decisions and choices? That is a critical issue for its governing body.

We were surprised that the Nurse review made this recommendation, because it was not self-evidently something that was consulted on in the first place. We provided input; we did not comment on that issue whatsoever. The challenge, as I have already said, will be one of

emphasis. Effectively, IUK is the start-up in the context of that behemoth. It is 10% of it; the other 90% is very stable. It is comparatively new and needs to really motor. Will it get the management attention and focus, which requires the quite different skills for governing innovation ecosystems from governing science? That is also the question for that body: the balance of skills on the governing body.

The Chairman: Lord Broers, would you like to declare an interest?

Lord Broers: Yes, I am sorry. I am a fellow of the Royal Society and I was president and am a fellow of the Royal Academy of Engineering. I also chaired the steering board of the transport KTN that led to the transport catapult.

I do not want to put any words into any mouths, but do you not think that, across the board, trying to get results out of research into industry and products is not done well in universities: that it must have intermediate organisations, hence catapults or the BP institute? I declare that I was vice-chancellor when that institute was set up in Cambridge. I have never seen it work otherwise. Therefore, is it not a bad thing for the funding that enables those things to be joined up with the research funding? Does that not spoil both halves? Does it not spoil the environment that researchers need to discover and work in completely new areas and, on the other hand, the relentless drive that one needs to make new technology useful?

Dr Virginia Acha: That is why there needs to be very clear separation between that and the way in which the research councils undertake their decisions, strategic planning and budgeting. That must be separate and distinct from whatever Innovate UK will pursue. Again, to address David's point, the fact that they are under UKRI means that it matters very much how the governing body treats those separate entities. We will look to see how that is elaborated, but I fully agree with your point and just make the additional one that Innovate UK also helps spin-outs from companies that do not come from the university sector. As you know, many of our companies, including some of my former companies, have changed how they are structured here in the UK. There have been a number of spin-outs from the very companies that have likewise benefited and been midwived through their emergence into the cluster through Innovate UK support. That is another good reason why it has a wider focus than just the university sector.

Q6 Viscount Ridley: I declare an interest as a fellow of the Academy of Medical Sciences and honorary president of the International Centre for Life in Newcastle, and it is wearing my Geordie hat that I want to ask you a question. We are well aware in the north-east of England, as in other regions of the UK, that you have to shout twice as loud to be noticed as you do in the golden triangle of London, Cambridge and Oxford—chip on shoulder over.

In a previous inquiry, the Committee heard from the Royal Academy of Engineering that Innovate UK's support for business is very London-centric, tends to be just a website that people can go to, and really needs to spill out into the regions a bit more. Do you think that Innovate UK's regional presence will be improved on integration into UKRI, or might it get worse?

Dr Virginia Acha: The integration itself will not necessarily change that one way or the other; the question is how the Innovate UK team perceives that opportunity. That is not so marked for the life sciences. With the Precision Medicine Catapult, for example, if anything people are now complaining because it is geographically distributed, so I guess they cannot win. The

question is really what makes sense for what they are trying to achieve. I fully agree that we have a tendency to focus on very geographically-centred behaviour. I am sure the same is true for BP as it is for my members: they will look for that research and the translational opportunities that it provides wherever it is happening. Whatever happens with Innovate UK and whatever its context, it has to address the question that you raise. Will the new structure make it easier or worse for it? That depends on the extent to which its independence is protected and to what extent it will be expected to do things differently as opposed to today.

Viscount Ridley: I have a follow-up question that is really a footnote to Lord Broers' last question. There is the philosophy that ideas start in academia and go in one direction into commerce, which has been called the linear model. We now know that that is wrong; things go in both directions. I wonder whether that might become a problem in the UKRI structure: UKRI owning Innovate UK, as it were.

Dr Virginia Acha: From my perspective, it might be an issue if it is focused on doing something different from what it might otherwise be doing. That might send a signal to the industry—and we will be careful to explore this—that there is a question as to whether they are still open to engaging directly with industry as a first measure. In the example that I gave about regenerative medicine, the prompts came equally from academia and industry, and the Innovate UK team brought them together. That must be sustained and it must have the independence to do that. You are quite right that it is not a linear model: we think of it and then you sort something out with it.

We almost need a mechanism to bring people together at the very early stages of the science. It will matter very much if they can do this in a way that tells industry that they are not just a technology transfer organisation for all of UK higher education but remain Innovate UK as a separate entity to develop the right cluster structures.

Lord Hunt of Chesterton: I declare an interest: I am also a fellow of the Royal Society, and I set up an SME that has had some dealings with Innovate UK. I have a question that follows up what Lord Ridley said. We had evidence from Rolls-Royce that the UK was in fact not doing as well as it should in working on European-wide industrial projects. The organisations that it had, the regional development agencies, were dismantled and followed by Local Enterprise Partnerships (LEPs). What do you feel about regional support structures across Europe? In the 1980s, I helped to set up a European network in industrial fluid mechanics with lots of big companies, but it has been pushing water uphill all the time to get the Brits to participate. All the regions of Europe are working on these sorts of projects, but do you feel that the attitude and approach of Innovate UK could in some way enable Britain to benefit more from the regional networks all across Europe?

Dr Virginia Acha: I have seen that happen with KTNs, which will occasionally be part of the conversations that they have. Knowledge transfer networks are about how to engage with whatever is being pursued under Horizon 2020 or via other European-level approaches. In my own setting, life sciences, we have the innovative medicines initiative, which is the largest public-private partnership for R&D in the life sciences between the pharma industry, the EFPIA members and the European Commission. It is worth €5 billion and lasts until 2020. We will shortly release some material showing our analysis, and it is pretty plain that the UK actually does extremely well out of IMI. I suspect that the KTNs are encouraging that in the

ways catapults used to, but that is something to be pursued. That is in my field. I am not sure if it is the same in David's.

David Eyton: There are two big buckets in Brussels: one is Horizon 2020, the other is the structural funds. I was not a big fan of the Framework Programme. The evolution of Horizon 2020 is much more oriented towards excellence, you might say. It is less political, with everybody needing to get a piece of it. That seems to me to be a jolly good evolution of that system. However, there is the potential for the UK to be more effective in the way in which the structural funds, which by the way are supposed to be oriented towards innovation in the various regions into which they go, are used in order to support innovation in those regions, and the role that IUK could have in that respect.

The catapults have been somewhat geographically dispersed. It feels to me as though IUK has made quite an effort to ensure that it does not always put things in the so-called golden triangle. Certainly the Energy Systems Catapult, with which I am most familiar, has been set up and is going to be based in Birmingham, I believe, while the Offshore Renewable Energy Catapult is similarly not in the golden triangle. I am familiar with that one; it is testing out wind turbines. There seems to be a fair amount of geographical diversity in the location of the catapults.

The Chairman: So there are no chips on shoulders about catapults.

Lord Maxton: I will take Lord Ridley's question and put it the other way around. I come from Scotland. Scotland has the Scottish Parliament, which has control over the universities, planning and a large amount of company investment. How does that affect Innovate UK and your companies that are involved? Does it affect you at all?

Dr Virginia Acha: It has not been a challenge with respect to the catapults that are in our space. In fact, I think that the lead of the Precision Medicine Catapult based in Glasgow has already been motoring quite a lot of work, so she is a formidable lead for that work. That has worked very well between Innovate UK and Scottish Enterprise. For us, it is a fairly seamless process.

Lord Maxton: So Scotland does better than the north-east of England.

Dr Virginia Acha: In the Precision Medicine Catapult, it did. It was very successful.

David Eyton: I would just advocate that the National Centre for Universities & Business has just written a quite comprehensive report on growing value in Scotland and what needs to be done with the innovation system there to make it more even more effective. I am not going to try to paraphrase that report, but you might want to look at it if you want to look specifically at Scotland.

Lord Fox: You did not bite on Lord Hunt's question about LEPs, so I will push the question again. Do you think they have a role? If they do, can you give me any example of an LEP that is actually playing that role?

David Eyton: The Dowling review commented on LEPs and obtained quite a lot of input. I have no experience of dealing with LEPs so I cannot really answer your question. It is certainly suggested that some are really quite successful. I vaguely recall one in the Cardiff area, which was pointed out as being really quite effective in creating connections between universities and businesses there. But it seems pretty hit and miss to me, and there are many of them.

Dr Virginia Acha: I would add only that any time you have multiples of anything, you make it harder for industry to engage. Ideally, when my members look at the UK, they are looking at it as a whole, and when they make decisions on partnerships they are looking specifically at individuals: particular strengths in a particular science, or companies that they are going to work with. The intervention of the LEP is probably less prominent in their expectations.

Q7 Lord Cameron of Dillington: I declare my interests: I am a Lawes trustee at Rothamsted Research, I chaired the strategic advisory board of the Government's Global Food Security programme, which is a UKRI body, and I chair the advisory board of the Centre for Ecology & Hydrology.

My question is about the proposed change in the method of financing of Innovate UK, from grants to loans. I am not quite sure what form these loans will take or whether they are going to differentiate between SMEs and larger companies. What are your views on this, particularly with regard to SMEs?

David Eyton: I think the target is to spend £165 million a year on new kinds of financing that are not grants by 2020. My sense is that, as a consequence, IUK is now reducing its organisation. It was a grant-giving organisation, and we wait to see how it imagines it is going to put in money in some other way from 2020. If I were an SME, I would probably prefer a grant because there are no strings attached and it is the easiest way to have money coming in. I think IUK will struggle to pay the salaries and build a true venture capital group, if you want to call it that. If the money is to go in some other way, that probably means that it is likely to be in the form of loans or something like that.

The UK's Energy Technologies Institute is quite a good case in point. If you are operating by yourself, a grant may be fine. If you are working in partnership with other companies, companies do not want to give money away; they want to do so on a basis that is at least somewhat more commercial. So in the context of the ETI, at least at that point in time, the EPSRC and the TSB, which were on its board, struggled somewhat with the fact that the other companies on the board of the company wished to put in money in the form of equity or loans, as well as funding development programmes. That is a more effective mixture of funding going into this activity; and, frankly, if it is successful, you get something back for it. If IUK is working with companies and within consortia and wants to invest on the same basis, it will have to consider doing that.

I will make one plug, if I may. One of the most effective forms of venture capital is actually corporate venture capital. We put money into companies, because if that technology or capability is successful, we want to use it. So we are an absolutely natural customer for that company and a very capable supporter of it. As far as I am aware, there is no incentive at all for companies to do that in the UK. In fact, there are some mild disincentives, because if you want to have more than 20% of the company, it gets treated as an affiliate and a whole bunch of new reporting requirements come in, imposed by the big company that is investing in it. That is a hell of a burden on small companies. So as well as, obviously, thinking about how IUK puts financing in, if it were going to put equity in I would say, "Do it alongside another company, because they know what they are doing and they are very naturally a customer". Actually, the UK could do more to incentivise corporate venture capital as well, or at least make it easier in the UK. It is a very symbiotic and virtuous relationship.

Lord Borwick: I want to hear more about the loans that are being discussed. If the theme is making life simple, I cannot imagine anything that would make life more complicated than adding loans instead of grants. Is there any suggestion of the priority Innovate UK might want to have over other loans, what sort of interest rates it would charge, how on earth a small company would structure it against its other shareholders, and how on earth it would service such a loan?

Dr Virginia Acha: You are raising all the questions that people have been asking since the loan facilities were first described. It matters very much how all that will be resolved and whether they would be any advantage at all to the companies pursuing them. These are exactly the questions that we hope that this Committee will be able to push in connection with questions about the Bill. This needs to be thought through very carefully, because choosing a different way of doing it could lead to a loan facility that is never used, which we have seen before in other circumstances. To go to the point that David made earlier, it matters. They need a mix, and if they are to have a loan facility it needs to be geared to the risk and the potential for the sector at the time.

David Eyton: The case for it that I can think of is: why should the UK taxpayer not benefit from providing money to a company if it is successful? The company will not mind because it is then successful, so I would have thought that that was one of the cases for it. The key question is the level of risk that IUK is prepared to take. If it is set up like the Green Investment Bank, which invests on much the same basis as any other bank and takes very little risk, that is completely against the whole purpose of this thing here, which is trying to take some risk and to provide money to things that are not a guaranteed success. The question comes down to things like interest rates. The US Government has been prepared to take a \$1 billion hit on a company that did not work out and the loan was just written off. If you are prepared to do that, fine; at least you are really taking risk. The issue becomes one of the right balance between grant-giving, equity and loans. There are not many ways of putting money into a company. Is it appropriate for IUK? That is the issue that you are pushing on, and I think it is a very valid issue to push on.

Lord Borwick: I should first have declared my interest as chairman of an advisory group on autonomous vehicles in Greenwich. The danger of this is even worse than has been suggested: it could stop other people investing, because the Government have priority over them. That danger could be very real, could it not?

Dr Virginia Acha: Exactly.

David Eyton: On the other hand, these companies are looking for financing. Obviously, the easiest thing for the company is a grant; we just give it away, obviously. Often a loan will be fine if the lender is prepared to take risk and the company is just trying to raise finance.

Dr Virginia Acha: Then it does not prejudice the next round of financing. That is key. That will only be the first stage, so it depends on the secondary approach. It is interesting, and may go to the point about risk that David mentioned, that your presentations today are from the two sectors with very high risk and very long timescales to fruition. We made it a priority to speak to the Committee, because we know that in our sectors this is the critical stage where such support is necessary for those small-stage, spin-out, SME companies to gain a foothold to continue. It may be less so in other sectors, but it is very true for ours.

David Eyton: To me, loans feel appropriate for later-stage activities, when you know what the proposition is. Fine, there is some risk, but at the very early stages loans seem less appropriate to me. You want more mature companies if you are going to start putting loans in.

Q8 Baroness Young of Old Scone: I declare an interest as chancellor of Cranfield University, which is involved in two catapults—and, we hope, three at some stage.

I turn to the international issue. David Eyton said that the structure of our business is quite different from that of other countries, so there may not be good international parallels and lessons that we could learn, but are there any examples from elsewhere where you think government innovation policy is particularly good, examples of good innovation agencies and what makes them particularly special?

Dr Virginia Acha: In the life sciences the environment has been a bit more patchy. We have structures in the UK that are not too dissimilar to what you might see in Boston; they are just fewer rather than categorically different. Saying that, as David said, venture capital is very different. Access to capital in the States is regularly recognised as a key reason why some of our best and brightest from the British cluster migrate and relocate in Boston, La Jolla or San Francisco.

In terms of interventions, a key feature in the global environment for life sciences has been a little less focused, other than via the direct funding that we have in the States through NIH and some of the strategic business investment projects. Direct public procurement and investment has been more of a feature, but it is quite different in life sciences than for energy or other fields. I do not know whether you have other international examples that are a better comparator.

David Eyton: I will answer a slightly different question first, which is: where would we choose to do technology demonstrations around the world in the energy sector? It is not necessarily because the Government are doing something; it is because of the ecosystem as a whole. If you want to do a demonstration project in the petrochemicals area, China is often a really good place because it can go incredibly fast and is extremely cheap. It is quite cost-effective to get something done quickly in China, but that is not because the Government are doing anything.

There are a lot of clever things in the design of the ARPA-E programme in America, because it looks at the whole value chain that would be needed to make an innovation successful and in effect tries to line the whole thing up and fund it as appropriate. When there has been some really class science or invention, they try to figure out how the whole thing can work and try to line up customers and engage and involve potential purchasers of the capability up front. I am not saying that IUK does not do that, but looking at what it really takes to take something from the point at which you engage right the way through to a successful business that you hope will have a presence in the country that is funding that activity seems to me quite a smart way of going about things. I should probably declare an interest: it is now run by the former chief scientist at BP, Professor Ellen Williams, and I did not declare my interest as a fellow of the Royal Academy of Engineering, for which my apologies. Anyway, I think ARPA-E is quite a good model. It is based on DARPA, which as everyone knows, is a huge machine for creating valuable capabilities that progressively find their way from the defence sector into the commercial sector.

Dr Virginia Acha: I will make a quick point, which is that this sounds very similar to proposals for the accelerated access review initiative that the Life Sciences Minister has been pursuing: a more holistic approach to evolving a life science technology through to use.

Baroness Young of Old Scone: I ask one last question. That is from your perspective as large multinational companies. Do you think that the examples you have given work for SMEs as well?

Dr Virginia Acha: The SBIR in the States works especially for SMEs: it is focused on helping early-stage companies. Again, the greater availability of existing market structures to support venture capital and small-scale industry in the US works very well in life sciences. The question is: to what extent do we have the same opportunities here in the UK and to what extent can Innovate UK deliver on that? Can they recreate NASDAQ? No, but they can encourage better communication between corporate venture capital, which David mentioned earlier, which is growing apace in life sciences in the UK, and the broader work that is being done in Innovate UK more generally to support technology development.

David Eyton: All I would say is that the companies that we have worked with are just focused on the next thing, which is getting funding to take them through the next stage of their product or service development. They do not have the capacity or ability to think about how you take that forward lots of steps beyond that; they are just focused on the next thing. ARPA-E, the programme I referenced, is quite a strategic programme, so there is a broader wraparound, and the companies that are being funded would sit in that somewhat larger programme, so things will be lined up by ARPA-E beyond the immediacy of that demonstration that could in turn be helpful, although it is not really the focus of those companies in the first instance.

The Chairman: We have run out of time on this session. We are most grateful to you both. This has helped us enormously to get this inquiry on innovation started. You will be sent a transcript, so please make any minor amendments of a factual nature. If there is anything further you want to add in the next week or so, please forward that to our clerk. Again, we are most grateful to you for your help this morning.