HOUSE OF COMMONS

Science and Technology Committee

Oral evidence: Managing intellectual property and technology transfer, HC 755

Tuesday 22 November 2016

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Watch the meeting

Members present: Stephen Metcalfe (Chair); Victoria Borwick; Chris Green; Dr Tania Mathias; Graham Stringer

Questions 111 - 198

Witnesses

I: Dr Will West, Executive Chairman, CellCentric and Member, BioIndustry Association Board, Felicity Burch, Head of Innovation and Digital, CBI, and Richard North, Head of IP Protection Licensing and Control, Rolls-Royce.

II: Anne Glover, Co-founder and Chief Executive, Amadeus Capital Partners Ltd, Chris Mairs CBE FREng, Venture Partner, Entrepreneur First, and Mike Conroy, Executive Director, Corporate and Commercial Banking, British Bankers' Association.

Written evidence from witnesses:

– BioIndustry Association

Examination of witnesses

Dr Will West, Felicity Burch and Richard North.

Q111 **Chair:** Good afternoon and welcome. Thank you for joining us. For the record, would you please introduce yourselves, state who you are and where you are from?

Felicity Burch: Hello. I am Felicity Burch, head of innovation and digital at the CBI.

Dr West: I am Will West. I lead a biotech company called CellCentric and I am on the board of the BioIndustry Association.

Richard North: I am Richard North. I am head of IP at Rolls-Royce.

Q112 **Chair:** Thank you very much indeed. As I am sure you are aware, the landscape around this inquiry changes quite rapidly, and the Prime Minister helped us along the way yesterday by announcing the industrial strategy challenge fund. In your individual view, how do you think that would be best used to help commercialise our research and make the UK the best place to do it rather than overseas?

Felicity Burch: Certainly business was very pleased with the Prime Minister's announcement yesterday. It represented quite a substantial commitment to research and innovation, and we look forward to seeing some of the details. The industrial strategy challenge fund is a really good example of a way that we can embed science and innovation in industrial strategy, and that seems like exactly the right approach. As to how yesterday's announcement is delivered, it looks as if it will be through UKRI, and they will deliver some of that investment through the research councils and Innovate UK. Once again, I think that is the right approach. What we need now, though, is to have as much evidence as possible about the sectors that we choose to support, and that will involve a fair degree of engagement between business, universities and Government, and other players in the science and innovation space, to make sure that we are investing in the sectors that really can drive future growth, and that the UK has the biggest potential to lead the world.

Dr West: I support those comments. The fact that the biotechnology industry was highlighted is great. We can make a real difference. I agree that some of the channels that already exist are working very effectively. The Biomedical Catalyst, for example, as part of Innovate UK, which will be within UKRI, is a very effective mechanism. Things like R and D tax credits made a big difference to SME companies doing R and D.

Richard North: We, too, support any new investments in science and technology, but we are looking forward to seeing the detail when it comes out. In terms of the spread of how it is spent, or how it contributes to commercialisation, our perspective is to get the mix right, between academia, SMEs and large industrials such as ourselves. It is not an individual sport—it is a team sport; we cannot commercialise without the

other two participants. The role of Government in putting that into the right environment, a helpful industrial environment, is really important as well.

Q113 **Chair:** Do you think the Government should consult, or ask how best to target it to what the right balance of the ends of those various spectrums should be, to make sure we are using it to commercialise what has previously been commercialised offshore?

Richard North: As I said, you have to look at it strategically sector by sector, from the origins of science and technology through to how that makes its way into products and services that customers want to buy. There is a wide range of factors that come into play—industrial investment and Government investment and support. The way we can use investment in infrastructure to benefit more than one sector is particularly important. We can see that the catapult we are involved in, the High Value Manufacturing Catapult, is able to leverage investment into more than one sector, and crowd in funding from industry and build an environment where SMEs can flourish.

Felicity Burch: If I could build on that, having Government working closely with business on how it prioritises that money will be pretty fundamental to the process working well. I expect you have seen that, as well as the Committee, the CBI is also calling for the Government to target 3% of GDP to be spent on R and D. Yesterday's announcements are a step in the right direction towards that, and they will lift the level of total expenditure, but it is something that has to be a partnership between business and Government, and certainly Government expenditure alone will not do that. The signs from the suggestions that we have so far for the industrial challenge strategy fund suggest that it will be a partnership between Government and business, and will pull in that money jointly. From the CBI's perspective, we would see the first allocation of that money go through Innovate UK, which is underfunded relative to the rest of the science and innovation landscape. From overseeing some of the transition from grants to loans that was announced previously, I know it would be very welcome. Supercharging their ability to run programmes and fund what business does would be a really positive move.

Q114 **Chair:** Did you want to add anything, Dr West?

Dr West: No.

Q115 **Chair:** Going back to the scope of this inquiry, which is around the transfer of technology, what motivates a business to collaborate with a university? What is the starting point?

Dr West: Mainly, it is to access expertise and infrastructure, frankly. Industry put a lot of money into universities through sponsored research and consultancy, and in fact that is how most of the money goes from industry into universities. There is an additional element, which of course is accessing innovation and licensing IP, but in the context of industry's

interaction with universities it is more around sponsored research, gaining expertise to really drive something in a particular field.

Q116 **Chair:** Is there anything that would dissuade you from doing that, from working with a university?

Dr West: I think we shall go on to talk about some of the issues around licensing IP specifically. Industry goes where the expertise is, which is another thing that was flagged up ahead of this meeting. We go to Newcastle because there are fantastic bacteriologists and fantastic people doing prostate cancer up there; we go to Manchester because the Manchester Cancer Research Centre is fantastic. You go where the expertise is.

Felicity Burch: Thinking about that from an SME perspective, one challenge that might perhaps not dissuade SMEs from working with universities but might stop them working with universities as much as they would want—it was an issue raised in the Dowling review—is the ability to find the right partner. It can be an issue for larger companies as well. Often universities have many specific experts within their walls, and organisations such as the technology transfer offices can help, but even they do not always know the exact specialisms that their academics are working on, so that is a challenge for businesses looking to engage with universities. It is not necessarily anything that the universities are doing wrong—the fact is that we have a lot of specialists in this country—but it can be a key issue when it comes to having a successful collaboration.

Richard North: Rolls-Royce has, possibly more than any company, put its heart and soul into working with universities. We created our concept of the university technology centre more than 25 years ago, and most of those centres are in the UK—about two thirds. Many of them have been running since the start, so they are very long-term commitments by both sides, and we see advantages in the access to expertise and infrastructure, and in the diversity they can bring to helping us solve our problems. They can bring partnerships and avenues to funding that we might not otherwise get access to. They are a great source of talent, and we recruit actively from the universities we work with. Going back to the issue about this being a team sport, we need to share the risk of research. The type of research we do in our universities is pre-competitive; it is early TRL. There is not a specific outlet for it in a product or a service, so it is a risk investment and we need to spread that with other partners and with universities.

Q117 **Chair:** This is a question to all three of you. Are there any particular gaps in the innovation policy that the Government are pursuing that, if addressed, would enable more ideas to be pulled through to help improve commercialisation?

Felicity Burch: The biggest gap is the one I have already raised, which is the scale of funding for Innovate UK. A number of its schemes make a difference in supporting business and university collaboration—things like

collaborative R and D and KTPs—but the scale of the funding is very small. The success rates have been falling quite steadily over time because of the fact that there are a lot of good business bids going into Innovate UK and they cannot fund all of them. Having more money would make a difference there and free up some of those collaborations.

Richard North: From our perspective, we have such strong links with the universities that we know what their strength is and how we need to develop long-term capability such that a natural transfer of technology occurs. At the other end of the spectrum, in terms of the things that we do not know about in other university departments and in universities we do not deal with, and maybe the technologies that are coming along that we are going to need, it is less clear how we get that transferred into our company and our network. We do not have links to the technology transfer offices. We go direct to the research offices, so we can see that there is a disconnect between our business and the efforts by universities and other bodies to push technology out.

Q118 **Chair:** On that particular point, are you, therefore, saying that you do not know what you do not know?

Richard North: Yes.

Q119 **Chair:** It is how you can find out what you should know even if you do not then need to know it.

Richard North: Yes. There is that part of it. I also spoke about how we need to engage SMEs in the chain of academia, SMEs and large-scale business. We see the efforts to push technology from universities and we understand the reasons for that, but when we are working with SMEs our issue is how we grow an SME and how technology can play a part in that. It is really important when we are looking to find exploitation of technology that we understand that side of the equation and work from that point, rather than from the point of pushing the technology out.

Q120 **Chair:** Dr West, do you want to add anything to that?

Dr West: Technology transfer is a very complicated thing. It is a team game, to reiterate what has already been said. Some of the early funding to prove concepts is very important to highlight. The other thing is that no single invention, or very few single inventions, is a box-ready product or service. They require an awful lot of other stuff to happen around them. That is why it is a team game. It is slightly different for large industry interacting with universities. That side of knowledge exchange and commercialisation happens relatively efficiently in the biotech pharma sector. For spin-outs and small SMEs, which are much more fragmented, there are some challenges that need addressing.

Q121 **Chris Green:** Dame Ann Dowling's report concluded that the UK's innovation funding landscape is rather too complex. Do you agree with that finding, or, for a diverse range of needs, do we need a diverse range of funding mechanisms?

Felicity Burch: You are hitting the nail on the head. Innovation is really complicated, and to a certain extent—I think Ann Dowling has said this before—the mechanisms that we use to support it will be complicated as well. But business falls into two categories: the businesses that have engaged a lot with innovation support and are used to it, and probably would prefer that it did not change that much because they know their way around, and every time it changes there is a new system to get used to, versus the businesses that have not accessed the support before and do not know where to start. The recommendations in Ann Dowling's report about hiding the wiring but keeping the diversity of support underneath it would meet the needs of both sets of business groups.

Q122 **Chris Green:** For businesses that are entirely new, it is a mechanism to introduce them to the system, but organisations that are already there know their way around and only have to look at what they need, as opposed to looking at the whole. Dr West, do you want to add anything?

Dr West: I am not worried about investing, because there are a lot of different types of innovation that need different types of money. Angel funding, with EIS-type support, has been absolutely terrific and has escalated in our sector; VCs are reasonably well placed, although, with the latest EIB and the Brexit thing, that might be something to be addressed. Corporate venture has been very interesting; corporate companies putting together investment funds to come in alongside more traditional financial VCs have been an interesting addition in the pharma biotech sector. The translational funds could do with a boost, things like the Biomedical Catalyst and what Innovate UK are doing, but in terms of having a healthy breadth of different types of funding, that is good.

Q123 **Chris Green:** What type of finance do you think entrepreneurs are most comfortable with? Which type is most attractive to entrepreneurs and spin-out companies?

Dr West: It depends on the opportunity. In one of my businesses, I am developing a cancer drug for the most aggressive form of prostate cancer. That requires tens of millions of pounds, so I am not going to get that from just one or two angel investors. Other people I know spin out new ideas that are much more technology based and need only a few hundred k. Having an angel investor for that type of thing makes a lot of sense. It depends on the opportunity.

Q124 **Chris Green:** How closely aligned are the finance markets to what innovators need? If businesses are not inclined, or find it difficult, to invest in research and development, which because of its nature takes a long time and is very money intensive, it might also, for similar reasons, be challenging for investors to come in from outside to put in money. Is that a problem?

Dr West: I do not think so. The mature VCs, certainly in the UK, are very aligned to what Innovate UK has been doing. Innovate UK, when it funds, normally requires match funding or a significant proportion of money put

in by someone else. Actually, VCs see it as a good way of de-risking early stage R and D. In the main, in the pharma biotech sector, they are pretty comfortable with it.

Felicity Burch: For many companies, receiving a grant from Innovate UK can be a really important way to get a seal of approval to get access to further finance down the line. Slightly separately but still on your question, when we look at businesses past the very early stage, access to finance is not the biggest issue that they raise around innovation. It comes back more to access to expertise and access to collaborative partners. It is about funding, but it is also about the funding that helps get access to expertise and access to collaboration, and funding that enables innovation.

Q125 **Chris Green:** Mr North, does Rolls-Royce have the resource it needs to support collaboration with universities, or is collaboration contingent on accessing funding from external sources? Earlier, you mentioned sharing the risk. I was wondering if that rather meant you need external funding from other organisations to enable Rolls-Royce to collaborate fully.

Richard North: On the first question, if I go back to the state, we see the complexity as a second-order effect for us. I worry slightly about SMEs and how they make sense of it, but for us it is second order. We really value three things: predictability, long-term accessibility and the speed with which finance can be applied to problems. We find that sometimes speed is not as fast as it needs to be. In our sector, the ATI, for aerospace, has been a really good mechanism to focus the core of the research we wish to do. In terms of sharing the risk, we are primarily looking at how we can work with Government, but also important is how we exercise the supply chain and get them engaged more in pulling through technology. That is where we see the catapult being a very good example of how it works well, where we can see investment coming in following the involvement of the large players and the academics.

Q126 **Chris Green:** If Rolls-Royce did not have that external support, the collaborations perhaps would not happen.

Richard North: That is a really interesting question. We have several conflicting requirements as a company. We obviously have to give a return to our shareholders, and there are competing avenues for investment, whether it is building factories, designing new products or doing advanced research on technologies that may be needed in the future. We have that internal competition, but there are also our competitors and how they can access funding in the regimes in which they operate or that we could access.

Q127 **Chris Green:** When you say regimes, is that across the world?

Richard North: Globally, yes. We need to be able to operate financially on an equivalent basis to the best of our competitors. There is an element of having to find where the money is and accessing it to be on a level playing field. It affects us in terms of competition, but it also affects

the UK, because the UK needs to attract the large players to drive research through to commercialisation, and if the environment is more attractive elsewhere it is not a difficult decision. We have to go where the environment will help our shareholders.

Q128 **Chris Green:** This is my final point. There can be a bit of competition between what scientists within a company can do in their approach to things and their collaborators in universities—the sense of a "not invented here" kind of culture within companies. Are there any examples in Rolls-Royce? Can you give a general idea of whether that is a real concern for you, that you are aware of perhaps in Rolls-Royce and more widely?

Richard North: For Rolls-Royce, it is absolutely not so. In the long-term view that we have pursued through the university technology centres that we have created, they are effectively our in-house labs, and we have worked hand in glove with them over many years. The level of trust is extremely high. It is an extension. We are to some extent an extension of them as much as they are an extension of us.

Q129 **Chris Green:** It is particular to the way Rolls-Royce is set up. Are you aware more broadly that this is the case, or would you not like to comment on it?

Richard North: I don't think I can comment on that particularly.

Q130 **Chris Green:** Would anyone else on the panel like to comment?

Felicity Burch: It is not something I have ever heard from companies. My colleagues here have laid out that businesses work with universities to access their expertise and their knowledge, so it would go against the grain of why you were working with the university in the first place. Actually, businesses continue to work with universities; it is not just once but several times repeatedly. We see that even at the smaller end.

Q131 **Chris Green:** Wouldn't there be concern, though, that if the university was developing a product or something, rather than the company doing it, perhaps the intellectual property side of things would not be as secure?

Felicity Burch: There can be a concern, definitely, around the security of intellectual property. A lot of our larger members would have agreements in place with universities and non-disclosure agreements with them, so there is a reasonable degree of trust. Trust is a fundamental issue when it comes to collaborative relationships, and it can be a challenge to build.

Dr West: I totally endorse that. I have not personally seen "not invented here." It requires clear structures and a clear understanding of what each other wants, both around IP and around publication rights and things like that. It is about understanding what the other person wants out of the relationship, and making sure they are aligned with what you want out of

it. I have not seen that as a problem and I have not seen the not invented here thing.

Q132 **Victoria Borwick:** Taking forward the IP bit of the conversation that we were just leading on to, the valuation of IP assets by universities and the allocation of equity during the formation of spin-outs inevitably can be contentious. You have just talked about trust. Can you give us a business perspective? We have spoken previously to universities, but we would like to know from your point of view where the problem is.

Dr West: First, most of the finance that goes from industry into universities is through sponsored research and not from licensing IP. Accessing IP particularly affects, and what you are alluding to affects, SMEs and spin-out companies. It goes back to something that was mentioned at the beginning of the session, which is that this is a team thing. The thing that comes out of the university is not box-ready the majority of the time, so we all have to sit on the same side of the table and ask how we make it work. There are some structural issues, because technology transfer offices have certain metrics by which they are judged. They also have obligations to their funders. Researchers do not spend university money per se; they normally spend money from charities or research council funding. TTOs have an obligation to those people, so in a way they are partly constrained in what they can do.

Lastly, one of the biggest worries for them, which I completely understand, is that they do not want the blockbuster going out of the door inappropriately, so there is a little bit of tension. There are some things that could change to breathe some air into the system. There are some obvious inventions that require protection and to be developed in the right way, but there are other models being used across the UK system that work quite effectively for the little bits of IP that are not a product but just need to create economic activity by being out there.

Q133 **Victoria Borwick:** You touched on sponsorship and that sort of thing, but some academics report that universities have a strategic interest in pursuing one avenue for commercialisation over another, obviously in order to maximise their revenue. Have any of you found that to be the case?

Dr West: You highlight something that exists in the UK, in that technology transfer happens in a variety of different ways. The model that Imperial and UCL have is very different from what is done at Cambridge University, and it is very different from what is done in Edinburgh or in the Knowledge group up in Norwich. There are often different motivations for trying to get technology out. It depends who you are talking to, because different technology transfer offices are measured, and measure themselves, in different ways.

Q134 **Victoria Borwick:** What about the time taken to agree negotiations? That is often cited to us as a barrier to collaboration. Do you have a view on what is at the root of that, what causes that, or not really?

Felicity Burch: The time taken is an issue sometimes, but it is not solely an issue with the IP agreements in business-university collaborations. A number of people who have already given evidence to the Committee have described it as a contact sport, and it really is. I would go back to seeing whether businesses are coming back to universities and engaging with them again, and how those relationships are working over the long term. From a business perspective, if the university is approaching the negotiations understanding that it is a win-win, that the business is adding value to the IP as well, and it comes with good legal knowledge and has an open negotiation with the business, it can lead to an effective outcome. It is tricky, it can take time, but most businesses accept that as part of the negotiation.

Q135 **Victoria Borwick:** That is helpful. My final question is about whether you have examples of good practice that we could perhaps examine or instance when it comes to IP negotiations between universities and businesses.

Dr West: There are a couple of things that one could highlight that might be used more generically. Again, you have tension between what the technology transfer offices themselves want out of the deal and what their funders want, whether it is a research council or whoever. One thing that Cambridge do very well, for instance, is to remove the exclusivity of negotiating for the IP from themselves. If you are an academic there, you do not have to go through the technology transfer office. That means that the technology transfer office has to add value in order to get something that is generally a win-win. That is a really positive thing to do. Cambridge is unusual in its overall ecosystem and set-up, but other people could adopt similar types of thing.

The other thing that institutes such as Glasgow or King's College here in London have adopted is a sort of easy-access-type IP. IP obviously is not a product or a given service straightaway, so it is a very simple form for saying, "Have it, go with it, do what you can with it, but if you don't do anything with it, we get it back." Adopting things like that seems eminently sensible. Part of the barrier is that we have to get alignment across the research councils, because they adopt slightly different policies on how intellectual property is exploited. One advantage of UKRI coming into play is that that can be harmonised. Trying to get more buy-in from research councils to let out the smaller non-blockbuster bits of IP should be looked at.

Q136 **Victoria Borwick:** Are there any other specific examples that you want to give us?

Felicity Burch: No. I very much echo what Dr West said. Flexibility on the part of universities, as well as on the part of business, is what leads to the best outcome.

Q137 **Victoria Borwick:** Mr North, do you want to add anything?

Richard North: Flexibility, I think. As I mentioned, we do not have any direct relationships with the TTOs, so we have looked at the evidence provided to the Committee. Observations on that are that there seem to be fairly rigid structures, fairly specific routes by which universities seek to exploit the IP. We would rather have a more open approach—to have the IP applied and see where it goes—rather than trying to tie up the commercial aspects in advance. That is certainly a headwind, if not a barrier, to effectively getting the IP out of the lab and into further development. A key point is that university research often ends at maybe TRL 3 or 4. There are many more stages of investment and development to be done to take it further into a real product, and, as I alluded to, the pressures on the resources to do that are great within companies and even greater within SMEs. We need to make the transition from universities to businesses as smooth and unencumbered as we can. If it does not work, it goes back in the pool, but we should try to be flexible.

Q138 **Graham Stringer:** Going back to what we were saying previously, you said that different research councils had different policies, or at least I think that is what you said. Can you expand on that and say how different from each other?

Dr West: The BBSRC, for instance, which funds quite a lot of basic bioscience and research in our space, has a different IP policy from the MRC.

Q139 **Graham Stringer:** It will be a help when they are amalgamated.

Dr West: Perhaps you know more than me. I didn't know they were being amalgamated, but they will be within UKRI.

Q140 **Graham Stringer:** Maybe I don't know more than you. Thanks. Innovate UK is changing the way that it supports businesses financially, shifting from grants to loans. What will be the impact of that? Presumably, it will make it more difficult for businesses down the line to sell themselves on, or they will be less attractive to investors. Are there any other ways that it will disadvantage or advantage them?

Dr West: As an industry, I do not think we are closed-minded to the concept. Some of the very early-stage translational work will be difficult to do without funding it through grants, but certainly loans could have a role in some of the later-stage translational stuff. You asked about the mechanics of it and whether it will affect other business development activity. I think those are solvable. For instance, if you had loans that were subordinate to equity, it should not make it difficult for other investors to come in later. There are ways it could be made to work if we consult together to try to come up with the best solution. We are not closed-minded to it.

Felicity Burch: Looking at industry more broadly, we have some concerns about the shift from grants to loans, and that is why it is one of our autumn statement recommendations that the Government should reduce the scale of the transition within Innovate UK. The sense we get is

that already their ability to fund some of the longer-term programmes that they run, because they have to commit money several years in advance, has had to be scaled back, and success rates on a number of their schemes are falling because the level of funding available is lower. It is already starting to have an impact on the amount of innovation that Innovate UK can fund. There are some places where loans could be of value—I think Dr West outlined those—perhaps for very early-stage companies. When we look at the challenges associated with innovation, it is very risky, it requires resources and it requires access to facilities. Funding is part of that and enables a lot of the other aspects. There is a real risk if we do not see some movement on that. My sense is that some of the new funding coming through UKRI for the industrial strategy challenge fund will go to Innovate UK, so the overall picture might look quite different when we have some of the details.

Richard North: On behalf of our company, loans versus grants would be a big retrograde step. I have spoken about the economics of how we fund activities inside the company and how we look at the opportunities to fund them across our global footprint. A loan will be a liability on the balance sheet and it would be like any other form of company investment: whether the loan is from the Government or from a bank, it is capital that we have to pay back. It fundamentally changes the approach to investing in what are essentially high-risk, early-stage technologies. We would look at that equation versus the equation available in other places where there is a grant-based scheme, and the decision would be simple. Finally, wherever we are on that equation, SMEs will struggle even more to find the finance to fund their own growth—their factories and their people. To put on additional liabilities for research is a big impediment.

Q141 **Graham Stringer:** It is a bad idea in your estimate. R and D tax credits and the patent box are there to help companies innovate and support research. Is there any way in which those two schemes can be improved?

Felicity Burch: To start on a positive, we recently surveyed our members for their views of the UK innovation landscape and the tax treatment of R and D, looking at the R and D tax credit in and of itself and looking at the patent box as well. They are some of the aspects of the innovation landscape most likely to be viewed as world class by our members, because they are grabbing international attention. Interestingly enough, companies that are owned by foreign parents or have foreign arms are just as positive as UK-based ones.

In terms of improvements for the R and D tax credit, there are a couple that our members would point to: ensuring that development is properly included in the definitions, as well as research to make sure that the sort of mid-stage TRLs that we have talked about can happen here in the UK; and supercharging small companies' R and D tax credits, to make them even more of a boost to companies' cash flow. We have talked about enabling companies to access that money on a quarterly rather than an

annual basis so that it can give them cash back a little more quickly. We are quite encouraged by the Prime Minister's announcement yesterday that there will be a review of the R and D tax credit. One of the things that it will be important to look at as we see the corporation tax rate coming down—at least, the Prime Minister has suggested that that is the profile—will be the impact that has on the competitiveness of large companies' tax rates. Obviously, as the corporation tax rate comes down, it reduces the impact of the R and D tax credit.

Q142 **Graham Stringer:** Have any of you had experience of the British Business Bank or the business growth fund during the commercialisation process, and, if you have, what sort of experience has it been—good or bad?

Dr West: I used to sit on the BBSRC and we tried to have some interaction, but it was less than forthcoming—like me.

Q143 **Graham Stringer:** Anybody else?

Richard North: We haven't had any.

Felicity Burch: We haven't had any feedback from members.

Q144 **Graham Stringer:** We can move on then. When people are looking at industrial policy and why we perhaps do not do as well as the States or some other countries, Silicon Valley is often used as an example—clusters of businesses—yet we have information that there are more technology companies within the golden triangle than there are in Silicon Valley. What are we doing wrong? Why are we not getting the same benefits as they get in Silicon Valley? I do not like the word, but is it connectivity? Is it the quality? What is it?

Felicity Burch: One of the things to point out is that it is not just about what we are getting wrong but that we have started getting some of this right. The scale of the investment that we have had in the business commercialisation stages of research and innovation has only recently begun to grow. There is a lot of Government policy that is really positive; the business-university collaboration, things like the higher education and innovation fund, the inclusion of impact in the research excellence framework, the creation of the TSB—then becoming Innovate UK—and the establishment of the catapult centres, which has already been discussed. There is a lot of policy now going into that space. We would still like the scale of that to continue to increase, but there have been a lot of improvements in the UK landscape and I think business recognises that.

Dr West: But it depends how you measure things. In the early 2000s, universities were motivated financially to spin new companies out, so we had a lot of new spin-out companies. Again, it comes down to the quality of companies, and, as Felicity says, whether or not they can genuinely grow. We have an ecosystem in the UK that can definitely be turbocharged to keep helping businesses, and what really fired me up

from yesterday is that that is the Government's view as well. We have something; we have the foundations to fuel a real change in technology and biotechnology.

Richard North: I would like to go back to the HVM Catapult, which we really focus on. Where we have a strategy and a clear direction, it can be really successful, and we are seeing growth. It has taken some time, but the Sheffield and Rotherham Advanced Manufacturing Centre is now pulling in investment. We have just built a factory in the vicinity to take advantage of what is going on there. SMEs are coming in. We have seen the same thing occur in the south-west around Bristol with composites, where we are working with universities, the National Composite Centre and British Aerospace and Airbus. We think there is another potential centre in the midlands where we can work with automotive in particular on digital design capability, and get cross-sectoral benefit through common themes, bringing together SMEs, large companies and universities. There is lots of opportunity, and a bit of design and strategy will go a long way.

Q145 **Graham Stringer:** This is asking part of the question in a slightly different way. How important is hard infrastructure, such as roads and trains between centres of excellence, and proximity to London? Again, going back to the same evidence, it seems to indicate that there is good communication between Cambridge and London and Oxford and London but less between Oxford and Cambridge, rather surprisingly. Would reinstating the brain train between Oxford and Cambridge help, or is it irrelevant?

Dr West: Definitely.

Q146 **Graham Stringer:** It would help.

Dr West: Yes, totally. Making stuff happen involves people, and people need to get together, so infrastructure is very important.

Felicity Burch: One of the most important parts of infrastructure that cannot be forgotten is digital infrastructure. We have seen the Government make some announcements about that today. Digital infrastructure is a key enabler for collaboration. The number of companies that I have talked to that now do international collaborations on science innovation over Skype is pretty high. As to how we can make sure we are enabling universities and businesses to transfer high volumes of data, I suspect the applications will only increase over time, so we need to make sure that we have the digital infrastructure in place that enables those collaborations.

Q147 **Graham Stringer:** There was a lot of squealing when the regional development agencies were abolished and replaced partially by LEPs. How successful have the LEPs been? Are they less successful than RDAs or are they better? How successful have they been in helping innovation and research?

Felicity Burch: It is difficult to talk about the role of the LEPs in this space in the same way as the RDAs, because when the RDAs were abolished most of the innovation funding then went through the TSB, which I think, from a business perspective, most companies welcomed. To go back to an earlier point, it simplified the position overall and made it a little easier to have one place to access support. The key role for the LEPs is making sure that they can signpost businesses to the support that is available and to what the universities around them can do as well.

Q148 **Chair:** Before I go back to Chris Green, Mr North, can I clarify? You said that moving from grants to loans was a retrograde step, and obviously I can see how it would be. Are you saying that the kind of risky research that grants allow you to do would not be undertaken at all, or would it be undertaken elsewhere?

Richard North: There are other places where it can be undertaken. It would only make business sense to do it where grants were available, as well as the skills, resources and infrastructure and so on, but all those things exist in other places.

Q149 **Chair:** How much damage do you think it would do to the innovation landscape in the UK if that were the case?

Richard North: One piece of data is that we are obviously a channel for a large amount of grant funding to flow into aerospace research. About 70% of that flows directly to SMEs and to universities, and it is spent directly in the economy. It has an immediate impact on the economy and brings through the crowd funding, the crowd investment, that we spoke about, but the payback for a company is maybe 10 or even 20 years in the future, if the research is applicable. If we move out, it has a multiplier effect on the supply chain and the academics. Ultimately, it will flow down through the supply chain and have a big impact.

Q150 **Chair:** Do both of you share the same concerns?

Felicity Burch: Yes. The concerns about the shift from grants to loans are very much reflected in our membership, but it seems that some of the funding that was announced yesterday will go into Innovate UK, so I would not want to criticise the Government too much on that at this stage.

Q151 **Chris Green:** What difference have catapults made to the UK innovation landscape, and are they successful at bridging the gulf between academia and industry?

Felicity Burch: We hosted a round table with our members on this a couple of months ago and the overwhelming message that our members wanted us to get across was how much they value the catapult centres. There are a couple of things that were quite critical in that. The first is that they capture international attention; policy makers and companies from overseas come to look at the catapult centres to see what we have done. Some people are interested in copying us now, but it is also about

whether they want to invest and engage in the catapult and collaborate with companies in the catapult here, so it encourages some foreign direct investment into the UK and making the UK a stickier place, for want of a better word.

You asked about bridging the gap between businesses and academia. Yes, they are achieving that. I really liked one story I heard from a company that I talked to. An SME company was pretty nervous about engaging with catapults; they had not engaged with academia beforehand and their concerns were very much around things like timescales and different approaches to research. They got involved in a project with quite a small catapult centre and found the process smooth and helpful; it has helped move their business forward and they are getting more engaged with the catapult centre now. We see those stories in a number of places. That is not to say that they are perfect. There are some challenges around the catapult centres, but the thing that really struck me is that businesses felt that they should be a key part of our innovation landscape. They talked about the fact that we do not question whether universities are going to be here in 50 or 100 years' time, and they would like to get to that place with catapult centres too, so it was an overwhelmingly positive message.

Dr West: In certain industries we have seen a decrease in the amount of industrial translational R and D that has been taking place, and the catapults have come in at just the right time to make sure that we retain and build skills here in the UK. The catapults have to be focused—that is really key—and we have to make sure that they are not competitive with activity that is being done effectively elsewhere. As they have currently been structured, they are definitely additive, and the skills piece is particularly noteworthy.

Richard North: We are really supportive. I have already spoken a lot about the catapult. Particularly on manufacturing, as I mentioned, we think a next step would be to take that model and look at the digital space and how we get into the digital capabilities in design and modelling of the products and services we want to develop—designing in a digital sense. Linking that to manufacturing through Industry 4.0 is the next phase, and we would like to see that develop.

Q152 **Chris Green:** Will the money the Chancellor announced in October—£120 million for technology transfer—be most effectively spent on more catapults or more money going into the catapult system?

Dr West: Some of the money could potentially go that way. There are other things where it could also be useful. Channels already exist through Innovate UK for helping to do translational stuff, including proof-of-concept-type work that is jointly funded between industry and Government. That seems to make a lot of sense, and we can make that money go further. The one thing we have not raised until this point, and which is also really important, is encouraging more networking of knowledge within the technology transfer profession and community, and

trying to use some of that money to get people to work more effectively, so that, if there is a particular skill in Glasgow that can be used with some technology in Bristol, we try to help make that happen.

Felicity Burch: Absolutely, we would like to see more money going to the catapult centres. The commitments over time to grow their core funding have been really valuable, but the catapult centres derive a fair amount of their funding from Horizon 2020, through the competitive element of their funding, so we have some concerns about long-term access to some of that. Anything that can help support those centres, especially to help the existing centres to build rather than creating too many new ones, would be very welcome to business. It is also important to remember—this builds on what Dr West said—that science and innovation is an ecosystem, and it is not just about putting all the funding in one space. It is about making sure all the areas are covered off.

Q153 **Chris Green:** You mentioned that the catapults are not perfect and there are perhaps a few problems. Is one of those problems that perhaps catapults can be a little narrow? Engagement with a university, where you have a broader remit, can be handy sometimes, so we do not want to focus too much on the catapults.

Dr West: But focus is good. Particularly around the skills bit, you want focus. You do not want them necessarily to be competing with blue-skies research. One of the other areas where the catapults can play a role is through IP exploitation, aggregating IP and helping industry reach into universities and other technology transfer organisations such as catapults. You heard from the lady from NCUB, I think, about the konfer platform. Very few people in industry know about those types of things, yet they could be fuelled and really effective; industry needs to be better at reaching into higher education institutes.

Felicity Burch: The feedback we have had from members is not that the focus is a problem. Some of the concerns are more about whether there is a bit of duplication between some of the existing catapult centres and some of the existing private sector provision through existing RTOs, for example, and whether the catapults are competing in that space. Making sure that the catapults are focused on areas of market need, and potentially lining up with the new challenge fund, is quite important.

Q154 **Chair:** Thank you very much. I have a very final quick question. You mentioned konfer. Who should be responsible for informing businesses about that? Do I, therefore, look to your right?

Dr West: Funnily enough, after your last session, I phoned the chief exec and said, "This sounds really good. We don't know anything about it." He is picking up on that and they have a roll-out programme starting next year, but that is something that the Bioindustry Association and other industry associations, hopefully, can help with.

Felicity Burch: The CBI very much recognises that as well and it is something we will be looking to do more of with our members.

Chair: Fantastic. Thank you very much indeed for your evidence this afternoon. I hope you will read our report with interest when it eventually comes out. We will move straight on to our next panel. Thank you very much.

Examination of witnesses

Anne Glover, Chris Mairs CBE and Mike Conroy.

Q155 **Chair:** Welcome. For the record, could I ask you, please, to state who you are and where you are from?

Chris Mairs: I am Chris Mairs. I am a venture partner at Entrepreneur First, which is an organisation that takes about 200 aspiring technology entrepreneurs each year and helps them to build start-up businesses, some of them spin-outs and some of them not.

Anne Glover: I am Anne Glover. I am a co-founder and chief executive of Amadeus Capital Partners. We are a technology venture group in the UK, about 20 years old with about $1 billion under management. I am a member of the Council for Science and Technology, which advises the Prime Minister on science policy, and—full disclosure—I am a non-executive of the Future Cities Catapult.

Mike Conroy: My name is Mike Conroy. I am an executive director of commercial and corporate banking at the BBA. Thank you very much for inviting me to give evidence.

Q156 **Chair:** Welcome. I am going to start with the same question that I asked the first panel. Following the announcement yesterday from the Prime Minister about funding for an industrial strategy challenge fund, how do you think that would be most effectively targeted to make sure that commercialisation happens here in the UK and does not go abroad? Who would like to start?

Chris Mairs: There was a lot of discussion in the previous session about Innovate UK and the importance of making sure that Innovate UK is properly funded, and that is absolutely true. The start-ups that I have been working with over the last year have really felt the reduction in Innovate UK funding as an issue, so I think that is important. The other thing from the perspective of very small businesses is that it has to be simple to access the funds. Even Innovate UK, which is generally regarded as having a fairly straightforward process, is a large burden for a start-up that is literally only three months old, so the simpler the access to the funding, the better from the point of view of very early-stage businesses.

Anne Glover: It needs to be managed by intermediaries who have a clear mandate and rules. Whether the intermediaries are existing public

sector bodies, or even private sector bodies, they can still be constrained by rules on how much is invested locally versus distributed beyond, so that is relevant. It is not as much of a constraint as you would imagine.

Mike Conroy: I echo Chris's point about accessibility. If I could give you an example, there was a housing fund that was run from HSA some time ago, which unfortunately ended up with only two customers borrowing from quite a sizeable fund. When you looked at the reasons for that, a lot of it was around complexity and difficulty in accessing the scheme, which has now been relaunched, but the message there, especially for SMEs, is to make it, first, visible and, secondly, accessible.

Q157 **Chair:** Anne Glover, you appeared before this Committee in 2012, I think it was; I remember the session. At the time you said there was no ladder of financing in place. Do you think things have changed in the intervening four years, and, if so, what would you describe as the most significant changes?

Anne Glover: The positive one is that we have two more steps upwards. The negative one is that there is an even greater chasm at the top. The ladder is still needed, and we absolutely have more support. Fundamentally, the EIS scheme, the presence of crowd funding and the growth of the patient capital vehicles have all added to the existing venture ecosystem, and are all supporting the early stages of company formation. However, unfortunately the tendency is still that those companies get sold, and are not grown further to become a part of the future ecosystem of science and technology where they can become acquirers of small businesses and keep company-based research, as opposed to publicly funded research, here in the UK. I will give you one statistic, if that is helpful. In the first half of 2016, the UK had the second largest number of tech exits in the world after the US—greater than India in number and quantity of companies.

Q158 **Chair:** Can you clarify that and explain exactly what it means?

Anne Glover: It means that 135 companies were sold successfully.

Q159 **Chair:** To foreign investors.

Anne Glover: To others, not all foreign—just anybody, often foreign. It was No. 2, which we are very proud of. There was not a single company above $350 million and, on a global basis, 14% of exits are above $350 million, so we do not have the large ones. We did with ARM, but this is recent exits.

Q160 **Chair:** When you say exit, do you mean the founders exiting the business?

Anne Glover: No, the whole company is sold.

Q161 **Chair:** Sorry. Maybe it's me, but could you explain exactly what you mean by the word exiting?

Anne Glover: The whole company is sold to another entity—100%.

Q162 **Chair:** Thank you. You said that the chasm at the top of the ladder is growing. What would you use to bridge that? What should we be doing?

Anne Glover: We have to find a way to get our capital markets interested in technology companies again. There is capital in the UK. It is just not very interested in technology, at the top end in the large asset managers.

Q163 **Chair:** Is there a reason why?

Anne Glover: It is a chicken and egg problem. There are not many that exist. ARM was one of the few. When there is not much analyst coverage, or bankers or lawyers that support and follow them, investors do not find it easy to follow the SMEs underneath, so it is difficult for people to break through. I know it is surprising to be talking about this large end when I work in the venture industry, but, actually, that is what the ladder is needed for. The reason the US venture industry works is that there are Googles and Facebooks, as well as small-ticket exits that are very successful. You need both and we have one; we have fantastic young companies, but we do not have the other yet.

Q164 **Chair:** No. I think you told us back in 2012 that ARM would not have received funding.

Anne Glover: Not in 2012, correct.

Q165 **Chair:** That's right. That is what you said, and it was subsequently sold for £24 billion.

Anne Glover: Yes.

Q166 **Chair:** Is that us selling the family silver? The investment was received both as a good and bad thing. What would be your view?

Anne Glover: It is a very difficult one to call, because I firmly believe that a stronger defence should have been put up against keeping it in the public domain, but that is not my responsibility; that is the responsibility of the board. It is not the responsibility of Government either. I would love to have seen it defend itself in the way that AstraZeneca defended itself against the Pfizer bid, but it did not.

Q167 **Chair:** I have one final question. I started off by asking how the £2 billion might be used to support commercialisation. The Chancellor announced £120 million, back in October, for technology transfer. What advice would you give him about how that should be best used? It goes to all three of you.

Chris Mairs: We are probably going to talk a little more about technology transfer later, but, again, it comes down to simplicity. I cannot stress enough the difference between the speed at which the academic sector works and the speed at which very early-stage start-ups work. If you cannot do stuff fast enough as a start-up, you die. It is that

simple. We have talked a lot about technology transfer taking somewhere between six months and 18 months, and in the lifetime of a start-up that is probably the difference between life and death. We have to make it simpler. There are multiple things we can do to remove friction. We have to make it fast. I am sorry to make this sound slightly contrived, but I was thinking about an acronym for FAST—fairness, alignment, simplicity and transparency. If we can improve those things, the whole process becomes much faster and more efficient for start-ups.

To go back to your question about how the Government can use that £120 million, there are some things that can be done to realign the incentives that TTOs currently operate under, which is not a criticism of the TTOs; they are measured by certain things and therefore naturally those things dictate their behaviour. We could put more money into relaxing some of the constraints on TTOs, because, after all, UK universities received only £50 million last year in their share of the money from exits of spin-outs, or licences from spin-outs, so it is a pretty small amount of money in the total amount of budgets for universities. Something could be done there to simplify that process.

Mike Conroy: I would find it very hard to disagree with anything Chris said.

Anne Glover: It is important that it is more flexible money than perhaps exists already in the market, so in that sense it must not be tied to particular universities. It must not be absorbed by existing structures. It could be used to catalyse them—in other words, maybe to act as a co-invest vehicle, or to attract great teams to the UK that would not otherwise come. It does not necessarily have to be just a UK academic. It could be to help somebody come here.

Q168 **Chris Green:** Mr Mairs, can you explain to us the role of an angel investor in commercialising ideas coming out of universities, and how angel investors fit into the funding ecosystem?

Chris Mairs: This very much comes back to Anne's funding ladder, and angel investors are right on the first rung of the ladder. This is the point where fairly modest amounts of money, typically somewhere between £150,000 and £1 million, are invested in a business, and that will come out of the pockets of individuals. Very often, angels have been entrepreneurs themselves, and that means they bring two pieces of value to the business: one is their cash and the second is their expertise, and that is an incredibly valuable part of the mix. A small group of angels put money into the business and get it to the next stage. They do not expect the business to become profitable but they expect it to reach certain key metrics that will then allow institutional investors to take the business on and take it forward.

Q169 **Chris Green:** It is very much early stage, and even though profits may not have been made when they hand it on to people, I suppose the equity holding they have is what they hope will be developed and where

the returns will come later on.

Chris Mairs: Yes. There is absolutely an expectation that they buy a share of the company now, and at some time in the future that share will be worth a lot more. They do it very consciously understanding that probably eight in 10 of the businesses they fund will go bust and give them a zero return, but the other two, hopefully, will return 10x or 20x on their investment.

Q170 **Chris Green:** How do angel investors identify potential academic partners? It must be an interesting process.

Chris Mairs: Not very often do they actually identify academic partners. If you look at the number of technology businesses that angels invest in, a surprisingly small number of them come directly out of university spin-outs. A lot of them use expertise that the founders gained doing their PhDs, or possibly their postdocs, but they do not very often come through a relationship with a TTO.

Q171 **Chris Green:** Angel investors perhaps have a background in the area—they would already be familiar with it—which enables them to invest.

Chris Mairs: And there is a network. They have a network of other angel investors, other entrepreneurs and venture capitalists. It is a relatively small community.

Q172 **Chris Green:** Can I take that to Anne Glover?

Anne Glover: The angel community has professionalised in its own way in the last, probably, 15 years, and a number of angel clubs exist. The clubs exist to attract deal flow, so that is why the deal flow comes to the club. Usually a member in it who has the expertise needs to put their hand up and say, "I will lead this deal," and then other people follow. There are different economic models, but that is, in general, how they function.

Mike Conroy: My sense with angels—it reflects what you have heard from Chris and Anne—is that many are not investing purely for a strong economic return; many do it because they have an interest in the technology and in the business sector. While indeed many would exit along the lines that we have heard—the business would get past the seed stage and through venture to the place where the business is commercialised—in some cases, because of that natural interest in the business, some may stay for a longer term and work collaboratively with the business in question. Certainly from my perspective, it seems that they make a very valuable contribution to overall investment.

Q173 **Chris Green:** Does the approach vary sector to sector or is it consistent across a range of sectors?

Chris Mairs: There are some sectors where angel investing is very difficult just because of the long life cycles and the amounts of money involved; drug discovery or something like that is very difficult and

hardware is quite difficult. Software is where angel investing really comes to the fore.

Q174 **Chris Green:** There has been a lot of emphasis on increasing the volume of seed capital and proof-of-concept funding available to entrepreneurs. Is that the right approach? Where are the equity gaps? Would anyone like to take that up?

Anne Glover: They are two different things. The proof-of-concept funding is always needed for people with a great idea and, to Chris's point, it needs to be readily available very quickly to be effective, because, basically, you need to get the new idea tested—fail fast is the jargon. The expectation is that there will be a lot of failure from it. More funding in that area is a welcome concept even within the university ecosystem. Seed funding is quite abundant. I don't think there is any gap. Because of the angel groups, the EIS schemes and the availability of incubators and accelerators that attract groups around them, there is a big change in the ecosystem, and a very positive one. I would not say that is where the problem is any more.

Mike Conroy: There are a couple of pieces of evidence worth bringing to the Committee's attention. You will be aware, of course, that the BEIS Select Committee recently published their report on access to finance, and they concluded that the funding gap was fast-growth businesses seeking venture capital of between £10 million and £25 million, which is very much in the space that Anne was talking to. The other is from the ScaleUp Institute, which is a relatively recent organisation that has been created; they also produced a report and very much came to the same conclusion. If I can quote from it, they said, "UK investors predominantly focus on early-stage investments and…there remains a funding gap for later-stage investments for scale-ups." Their data suggests that there is room for improvement in the funding ecosystem for scale-ups. Certainly those two pieces of evidence suggest that is where the problem currently lies.

Q175 **Victoria Borwick:** While we are talking about funding, what do you feel are the barriers to increasing the supply of bank loans to science and technology spin-outs with genuine growth potential?

Mike Conroy: The biggest challenge is where banks sit in the ecosystem. We heard in the previous session about some of the impacts of moving from grant-type funding to loans. Of course banks have to lend very responsibly, and obviously, these days, they have to lend prudentially. What you find is that banks need a lot of certainty around cash flow and ability to repay. They are playing mainly in the space where the business has customers and can be commercialised. It becomes a lot more challenging and, I would argue, probably inappropriate for conventional bank funding to be playing at the sort of seed venture and growth phases.

That said, we heard in the previous session about the business growth fund, which was, of course, set up by five major banks. When I say major banks, one was Standard Chartered, which obviously is a major bank but not perhaps one you would associate with the usual UK big five. They put £2.5 billion aside for growth finance, so it was very much that sort of patient long-term capital. To date, they have put £1 billion into the marketplace. What is encouraging about it, if you speak to their CEO and executives, is that it is a successful and profitable fund. This is not dead money that has been put out of the door. It is something that is making a real contribution to the landscape.

The other thing that goes a bit under the radar is that a lot of the banks do things in this space, but they are possibly not in the headlines. Barclays recently introduced a scheme to provide venture debt. Santander is playing in the space; Lloyds has a partnership with a company that is able to value intellectual property, and they send managers to the midlands to learn more about advanced manufacturing. There are interventions and collaborations, but perhaps a number of them are not headline catching.

Q176 **Victoria Borwick:** I have two slightly related questions. What difference have Government initiatives like the British Business Bank had on improving access to finance for SMEs?

Mike Conroy: My perception is a positive one. I would not claim to have done any in-depth analysis, but they have contributed about £2.5 billion to small businesses since inception, and probably, through their various funding schemes, provided another £3 billion to the marketplace. From a banking point of view, the enterprise finance guarantee is one of the more successful Government interventions; it still represents no more than, or probably supports no more than, about 2% or 3% of overall lending stock, but it is enabling businesses that do not have any form of tangible security to obtain finance where at least there are positive cash flows. They are also, I think, starting to demonstrate a good understanding of the marketplace. They produce annual reports, and one is due in February on SME finance markets. Off the back of that are various innovations such as their "Help to Grow" programme, which is aimed at providing support for mezzanine finance, and their ENABLE guarantee. To explain that, it addresses some of the capital allocation issues that some banks have. There is money going in, with angel funds and other VC funds. My feeling overall is that the bank seems to be making a positive contribution, but I welcome the views of others.

Chris Mairs: From an early-stage funding perspective, I think they are doing an excellent job. There is a set of very early-stage VC funds that have a significant chunk of money behind them coming from the BBB. In fact, BBB cornerstoned Entrepreneur First's latest fund, which we just raised, so I think they are an exceptionally good part of the early ecosystem.

Q177 **Victoria Borwick:** Excellent. I have a couple more questions on that.

How do the banks find the most successful SMEs to invest in? Do they have a good understanding of SMEs? How do banks access the type of information as to what they might go for?

Mike Conroy: Spotting businesses with growth potential is notoriously difficult. What tends to happen is that you can certainly see a company that has grown, but whether or not they are going to grow in the future can be very challenging. The simple answer to the question is a good dialogue with the customer. Again, if I may refer to the ScaleUp work, perhaps not unremarkably, having that dialogue with the business owner, the entrepreneur, and saying "What are your ambitions?" gives you a pretty good indicator of where the business is going to be. I have seen research to suggest that it can be a predictor of up to 80%. Part of the challenge that we have within the overall economy—again, we have heard this—in getting more businesses to scale up, is creating that ambition. I think the answer to your question is dialogue with customers to understand where they want to be in three, five or 10 years' time. Then you hope you will be able to work with them collaboratively to help them achieve those ambitions.

Q178 **Victoria Borwick:** To what extent has the SMEs' demand for funding and cash from banks been kept in check by the financial crisis?

Mike Conroy: It is a very interesting question. Certainly, we are seeing very weak demand for finance. A survey created more or less at the height of the crisis, in about 2011, called the SME Finance Monitor, has established a very strong dataset since 2011. It suggests that over 80% are—as described in the survey—happy non-seekers of finance; they are people who are not borrowing today but have not completely ruled it out.

Q179 **Victoria Borwick:** Is that because they think they will be turned down?

Mike Conroy: No. In terms of approval rates, in the monitor, the acceptance rates are 80% to 85%. I would treat that with a certain degree of health check because, obviously, that is what businesses report is the circumstance and there may be some that have made inquiries that are not quite captured by those figures, but approval rates are now pretty strong. The other thing that would be an interesting Government policy to keep an eye on is a piece of regulation that was introduced on 1 November that obliges nine banks to make referrals to Government-designated platforms—essentially, online credit brokers—if the business has made an unsuccessful application. That is slightly different from a decline.

Q180 **Victoria Borwick:** It is to encourage them to loan.

Mike Conroy: Yes. It is very much designed to address a policy problem, which is that many of the SMEs bank with the five major banks in the UK, and if they approach one of the major banks as their natural first port of call and that bank is not able to provide them with the finance they have requested, many just stop there. I think it is probably because they thought, "If my own bank won't provide the finance, would anyone else?"

It will be very interesting to see, and we have seen already, examples where something does not quite fit for a bank's risk appetite, but they have been able to obtain funding from other sources.

Q181 **Victoria Borwick:** Ms Glover, you wanted to come in.

Anne Glover: Yes, I want to make a comment about technology businesses. Some of those statistics may be true of general SMEs, but technology businesses, by and large, will not apply for loans. They just do not find that loans are available either fast enough or flexibly enough, so they only attempt to go for equity. In many ways, that is a shame, because technology-based businesses have the potential to be high-growth businesses. There are creative products that could be put forward by banks, whether invoice guarantees or other types of products that are not straightforward loans, that could help those companies, but it requires somebody in a bank to care about the technology sector as opposed to the SME layer—a vertical versus a horizontal view of the world, which is not how they are largely organised.

To your point about how people find the fast-growth companies, they have to go out and look for them. They have to attend networking events, and some do and some do not. They have to put in a business development function, because a lot of banks just assume that by sitting back people will come to them. Going back to your point, Chris, these guys are moving so fast that there is no chance they are going to do anything that is not calculably beneficial to them, and if they think there is a high probability of rejection they do not even try. There is a distinction to be made between the technology IP-based businesses and the general SME cadre.

Q182 **Victoria Borwick:** While we are talking about different sectors, can we touch briefly on the renewable energy sector? The Green Investment Bank takes equity stakes in the ventures it supports. Is there scope for other Government funding bodies, or, indeed, private banks, to do the same with start-ups? Do you have any correlations or not?

Anne Glover: To go back to the British Business Bank, which I also support—I have to confess that they funded us in some early-stage funds of ours—they have taken a view, which I tend to support, that they are trying to catalyse situations and not go direct. They are trying to support the ecosystem by supporting people who are already in it. The Angel CoFund supports angels, the Enterprise Capital Fund supports venture capitalists and the SME guarantee fund supports banks. I am more interested in the one-step-removed approach to how the Government use their money, because it then makes the market work better.

Q183 **Victoria Borwick:** Does anybody else want to talk about the Green Investment Bank just to help us understand it?

Chris Mairs: Can I pick up on what Anne said? I support absolutely the point about the lack of debt financing for technology businesses. It is pretty obvious why it happens: angel investors or early-stage VCs are

looking at a default rate of somewhere between 50% and 80% on their investment, whereas bankers are looking at 5% maybe, even if they are doing venture debt. I do not know what the numbers on venture debt are, but there is a huge risk gap between the two. There may be something the Government could do to underwrite some of that risk that would make some more money become more easily available.

Anne Glover: Export finance is very important for technology companies. It is difficult to access. They do not really know where to go for it at times. There are a lot of financial products targeted at specific needs that a technology company could benefit from, but they are difficult to find.

Q184 **Chair:** We talked about the banking landscape here in the UK. Quite rightly, there are assessments in place to make sure that people have the ability to pay back and so on. Are there other countries that do things slightly differently? I have often heard Germany referred to as a country where the banking system is slightly different and does more to support smaller tech businesses in the early stages. Do you have any knowledge of that?

Anne Glover: Not that I am familiar with. Hi-Tech Gründerfonds is an equity instrument. They might call it that, but they really are an equity player.

Q185 **Chris Green:** We have received evidence that venture capital is not well suited to commercialising products that have long development and regulatory timeframes. Is that a fair assessment, and in what kind of circumstances would venture capital funding prove valuable? Does anyone want to answer?

Anne Glover: It is a difficult area, I have to confess, and that is because of the 10-year-long partnerships where, basically, investors invest in the partnership expecting a return at least within 10 years, and often the development cycles can be longer than that. There have been some moves to go for even longer partnerships—maybe 13 or 15 years—but I think that the evergreen funds are the ones that have now been most successful at figuring out how to do seed to full exploitation, which are the listed vehicles. The patient capital category has slightly better positioning to support long long-term capital-intensive activities. Having said that, if you are able to get the ladder going, even a venture capitalist, at an early stage, can work through, with others coming in, eventually buying them out on that ladder successfully and profitably. That is what happens in the US.

Chris Mairs: That is exactly what I was going to say. There are private equity funds that do secondary investment where, essentially, they acquire the holding that the venture capitalist originally had. If you get that next step up the ladder working, it is perfectly viable for a VC to come in, hold the stock for eight to 10 years and then sell it on before the company goes to an IPO or an exit.

Q186 **Chris Green:** Specialist long-term funds such as the Woodford Patient Capital Trust have developed over the last couple of years or so. Can you explain why those types of funds have been able to emerge now rather than perhaps five years ago? Is there anything today that is different?

Anne Glover: It is like any market. The two that started Imperial Innovations and IP Group were experiments, and it is only the fact that they have been around for 10 years and reasonably successful that now other investors are willing to support similar types of fund.

Q187 **Chris Green:** It is a natural kind of evolution.

Anne Glover: Yes, but there are not many investors that will support those. There is a limited pool in the UK.

Q188 **Chris Green:** Are long-term patient capital funds accessible in all sectors or are they perhaps focused on commercialising specific technology such as biotech? Is it particular areas within the sector as well?

Anne Glover: It is focused more on IP-rich sectors.

Q189 **Graham Stringer:** The Government have said that we are going to have an industrial strategy. Within that industrial strategy, what would you recommend to improve business-university collaboration?

Anne Glover: Wow, that is a difficult question.

Graham Stringer: Here is your chance to influence the Prime Minister.

Anne Glover: It would be helpful if there was clarity about the areas that industrial strategy covers, in other words the areas of emphasis, which goes back to the discussion on catapults from the last panel. The fact that there are very focused choices of themes that the UK is strong in and can be competitive in, and which are globally relevant, has made a big difference to the business community's ability to engage. Defining the term "industrial strategy", which is incredibly broad, breaking it down into something that is better and more narrowly articulated as areas of emphasis would enable business to engage with universities in those areas.

Chris Mairs: That is true. I am struggling slightly to answer the question because it is such a broad phrase. I do not know what it means. Does it mean a strategy whereby we identify specific industries where we will become world leaders, or is it a strategy across all sectors? If it is a strategy that will identify biotech, artificial intelligence, machine learning and all the areas where UK universities are absolutely superb, and say that those are the ones where we ensure we are world leaders, we can devise programmes that optimise interaction with business. My personal view is that is probably what we should do. We cannot be masters of everything because we will just end up as a jack of all trades, so let's focus.

Mike Conroy: This is a personal view rather than the BBA's, but it is probably a question of chicken and egg. The answer is to establish your industrial strategy and then, having determined what are the key industries and what is your strategy to grow them in a global market, to look at the role of the universities in trying to facilitate the strategies.

Q190 **Graham Stringer:** This is a similar kind of question. We are perceived, as a country, to be poor at commercialising our research successes. If there was one policy, one thing that you would recommend to improve our performance, what would it be?

Chris Mairs: I would get a time machine and travel back to 1976 and start doing in 1976 what they did in Silicon Valley. We have to remember that we are a long way behind on that timeline, and we should not beat ourselves up too hard about the fact that our exploitation is not as good as Silicon Valley. We are 25 years behind the curve. I am reasonably optimistic that we have a very vibrant start-up scene in the UK at the moment. Anne makes the valid point that we have not achieved bridging the gap to make the $50 billion, $100 billion or $200 billion business, but that comes with having a community where people have done it before. I would try to encourage more really successful exited entrepreneurs, and maybe venture funds, to come to the UK.

Anne Glover: I would strive to keep more of our great successes domiciled here. The first steps of that have already happened in the sale processes of younger tech companies. Some entrepreneurs and some academics are now making it a condition that they will sell the company but that the company buying it must continue to invest in research in the UK. They have the excellence of work to be able to negotiate that, but we need to take it further and invest not just in research in the UK but in product development, marketing and leadership. It is about keeping the domicile of all the skills here if we can.

Q191 **Graham Stringer:** Mr Mairs, you made it very clear that for starter businesses speed was of vital importance, and the complexity during that period was referred to in the Dowling review. Is there any evidence that the complexity has been reduced recently in terms of the innovation landscape?

Chris Mairs: Not a huge amount. There is some best practice that is being shared, and people understand more about how to get things done quickly, which is certainly helping. I was speaking earlier today to an entrepreneur who exited a business fairly recently. It was a business that spun out of a university 15 years ago, and some of the challenges that he faced 15 years ago were very reminiscent of the conversations I had with entrepreneurs who were trying to spin out businesses, literally last year. There is not as much change as I would like to see in terms of simplifying the process.

Q192 **Graham Stringer:** We have talked about finance complexity. Does being in the golden triangle, or being close to London, help when a company

is—

Chris Mairs: Just to be clear, I was not really referring there to finance complexity. I think access to funding is relatively straightforward. For me, much of the complexity is around intellectual property and actually organising the transfer of intellectual property. Coming to your question on whether being in the golden triangle helps, for sure it does. This is where most of the money is, but train journeys to and from London from most places in the UK are relatively straightforward. You can do a lot by email and a lot by video conference. If people want funding, they very often have to come to London to get it, but that should not be a huge barrier.

Q193 **Graham Stringer:** You do not think setting up an innovatory business in Newcastle is a barrier compared with doing it in the centre of London.

Chris Mairs: I don't think finance is the issue. There are barriers around access to talent. While there are some very good software engineers in Newcastle, the density is not nearly as high as it is in London, Oxford and Cambridge.

Q194 **Graham Stringer:** This is a similar question. The British Business Bank has pointed out that 71% of total SME equity investment was in London and the south-east. Is there any way you can think of that the regional imbalance indicated by those figures can be addressed?

Mike Conroy: The British Business Bank have set up funds for the northern powerhouse and the midlands engine, so that is partly their response to that challenge. Obviously, it is very early days, so it will be interesting to see how that develops. They have also indicated that they would make changes to the way the Angel CoFund operates in order to facilitate that, but you are right: obviously, what they are reporting is a fact. Possibly part of the reason is that the pools in London and the south-east are deeper than in other parts of the country. I was speaking this morning to a young fintech entrepreneur from Scotland about his operations. He lives in Scotland and the business is based in Scotland, but they also have connections with Cambridge and, as you might expect, with London. I posed that very question. His response was two things: one was that he felt that the pool of expertise and range of finance was greater in London and, taking the point that was made, he was quite happy to get on a train and engage in London to do that; the other point he made—obviously this a survey of one—was that valuations in Scotland for the actual start-up business would be less than in London, so somehow or other the business seemed to attract a higher value in London than it would in other parts of the country. I do not know how widespread that is, but those were his comments.

Anne Glover: This is an area where the universities and the local authorities could play a significant role. Entrepreneurship is fostered in a local ecosystem, and if the mayors or the leaders of city councils in the regions could take on the same kind of experimental and innovative view

that the Government as a whole did around Tech City, in terms of providing support and space for incubation, and the universities themselves collaborated with that to get an ecosystem going—it is beginning to happen in Manchester—there is a lot that could be done at the local level. I do not think it is the finance; the sharing of skill, knowledge and experience is needed and you could easily see a focused group, like the games community that emerged in Dundee, because of that kind of clustering.

Q195 **Graham Stringer:** That brings me to my final question rather neatly. Spin-out companies often say that mentoring and advice is as important to them as finance, and sometimes more difficult to get. Do your organisations provide that advice, or where do spin-off companies go for that advice?

Chris Mairs: That is basically what we do at Entrepreneur First. I totally agree with that. Our business model is to spend six months intensively working with the start-up, mentoring them not so much on the technology, because that is what they already know about, but on how to build a business, how to go out and raise finance, how to create contracts, how to share data with businesses and so on. It is a very full-on process. For that we would expect to take equity in the business. We would take about 5% equity for that part of what we do. For a very intensive programme, that is very good value for the entrepreneur.

Q196 **Graham Stringer:** Anybody else?

Anne Glover: We certainly do it for our portfolio, but that is a very small number of companies. The ones who pitch to us get a fast piece of advice, but sometimes it is not always welcome.

Q197 **Chair:** Thank you very much. Before I draw this to a close, Anne Glover, you talked about keeping more companies domiciled here. Keeping them in the UK and not selling them off abroad is, I assume, what you meant.

Anne Glover: Yes.

Q198 **Chair:** What practically can be done to do that that would not then dampen entrepreneurism?

Anne Glover: It is all the infrastructure issues that really matter. I am sorry to bring it up, but it is immigrant visas so that you can bring talent here; it is great connectivity; it is the attractiveness of tax schemes for employees and for the actual entrepreneurs themselves, and it is the speed with which capital can be raised. It is all the things we need to stay an open economy and the most attractive place to do business. It is this contradiction. You cannot do it through protectionism. You have to do it by being better. I know it takes the immigration issue head on, but unless we can attract the best software guys to work here, there will always be a tendency to build the next-generation product somewhere else.

Chris Mairs: I absolutely agree.

Chair: Thank you very much indeed. Chris Mairs, Anne Glover and Mike Conroy, thank you very much for joining us this afternoon and for your evidence.