



Select Committee on Science and Technology

Corrected oral evidence: Contribution of innovation Catapults to delivering the R&D road map

Tuesday 15 December 2020

11 am

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Members present: Lord Patel (The Chair); Lord Borwick; Lord Browne of Ladyton; Baroness Hilton of Eggardon; Lord Hollick; Lord Kakkar; Lord Mair; Viscount Ridley; Baroness Sheehan; Baroness Walmsley; Baroness Young of Old Scone.

Evidence Session No. 4

Virtual Proceeding

Questions 33 - 37

Witnesses

Stuart Martin, CEO, Satellite Applications Catapult; Andrew Jamieson, CEO, Offshore Renewable Energy Catapult and Chair of Catapults Network; Philip New, CEO, Energy Systems Catapult.

USE OF THE TRANSCRIPT

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

Examination of witnesses

Stuart Martin, Andrew Jamieson and Philip New.

The Chair: I welcome the next set of witnesses. Can I ask you, when you speak for the first time, to introduce yourselves so that we get you on the record? We are on a broadcast, so you are being listened to by millions of people.

Q33 **Lord Borwick:** What are your favourite emerging developments in science and technology that you think hold most promise in their ability to be commercialised?

Stuart Martin: Good morning, everybody. I am the chief executive of the Satellite Applications Catapult. The big thing that is happening in the satellite industry at the moment is the emergence of satellite constellations. I think this is going to become a really important technology for the 21st century. It started with earth observation imaging satellites, which are now able to take pictures of activities on the earth down at the 30-centimetre level, or even less than that now.

That is driving a lot of our knowledge around what is happening to the climate. It is informing sectors as diverse as agriculture, financial services, mining and fishing. Pretty much every sector you can imagine is now using satellite imagery to understand how its industry is working and how it can get a competitive advantage in the future.

The other area where this is now having an impact is in satellite communication. The OneWeb investment over recent months has gained a lot of attention. That is going to be a really transformative, truly ubiquitous communication technology which will unlock some of the potential from autonomous vehicles, autonomous shipping, driverless cars and drones, where there is a need for very high-reliability, secure communications wherever they are operating. It is really only satellites, things such as OneWeb, that can do that. All these technologies are going to be pretty fundamental to how we evolve in the 21st century.

Andrew Jamieson: Good morning. I run the Offshore Renewable Energy Catapult. We are one of the asset-heavy Catapults, so we work very closely with big industry all the way through to small industry and across the academic space to drive innovation in the offshore renewable energy space. It is primarily offshore wind but with some wave and tidal aspects as well.

To the question on where we see prospects for new growth and innovation in offshore renewables, I suppose I could answer it by saying we have been very successful as an industry in helping to drive down costs. There is a lot more to do on making sure that we have turbines that remain fit for purpose and are for ever on the cost-reduction journey. There is a lot more to be done with the technologies therein.

For us, it is next-generation turbines. Offshore wind turbines are now bigger than the diameter of the London Eye. They have some seven times the power output of your average onshore wind turbine, so they

are much bigger machines, and are getting larger still. That all takes big investment. In the UK, recognising that we are an island and we have net zero challenges and opportunities to deliver, that also means going from the shallow-water projects we are developing today as a nation into deeper water. For me, that means floating wind projects. That would take the science and technologies of what we use in the oil and gas world, for example, with turbines sitting on the sea surface and tethered to the ground rather than fixed foundations embedded into the seabed.

Very importantly, as we build huge fleets of offshore wind turbines, they need to be serviced in a sustainable way. How can we bring in more sustainable transport for servicing those vessels? How can we also use autonomous and digital solutions for servicing all that? That is a big challenge: getting the industry more towards the collaboration aspect of things rather than the heavily competitive position we have today, which has been terrific for pulling prices down. One of the challenges for us all in the UK is building the supply chain and that means an awful lot more towards collaboration. Those are the three things I would suggest are exciting for us.

Philip New: Good morning. I am the chief executive of the Energy Systems Catapult. I also chair the Government's Electric Vehicle Energy Taskforce. The Energy Systems Catapult is a younger version of the Connected Places Catapult, in that we are an asset-light, services-driven organisation. Our mission is to do what we can to maximise UK economic benefit from the transition of the energy system to a net zero outcome.

In terms of the technologies that excite us, everything happening around the generation and storage of energy is moving at pace and moving globally in a very promising direction. All these technologies are crashing down cost curves and opening up new opportunities. The challenge we see in delivering net zero is more about how that is harnessed and put into practice in people's homes, on the roads and in our cities. How do they join up? The key technology that we are interested in is the deep digitalisation of the energy system and the potential that holds for opening up new markets and business models as we think about how best to decarbonise our homes, how best to decarbonise how we move and how best to decarbonise industry, at lowest cost and without investing in lots of copper.

Lord Borwick: Mr Martin, you mentioned the direct broadcast from space to the consumer. Examples are Starlink, SpaceX and OneWeb. Will that completely overcome the need for broadband cable to go to the Outer Hebrides or the enormous number of not-spots that are affecting consumers so severely at the moment?

Stuart Martin: It will not completely overcome the need. It is a balance of economics. Where it is economic to do so, the wired solutions are still going to be required. However, satellite communication does mean that there is an affordable, economic option for everyone on the British Isles to get access to high-speed broadband, so there is no reason for anybody to be excluded. The same goes for anywhere on the oceans and anywhere humans operate on the surface of the earth. That is what is

going to unlock some of this potential from truly autonomous systems that we are now starting to see.

Q34 **Lord Mair:** What should be Innovate UK's main priority to ensure your Catapult can have the greatest impact on the 2.4% target in the R&D road map?

Philip New: We are now five years old, so we are not in the first wave but in the second wave of Catapults. We are starting to see that we are pulling together the assets, capabilities, toolsets, data, insights and relationships that are of value to industry. What we really look to Innovate UK to support us with now is in pulling those together to create the test and demonstration environments, utilising these tools, that could be seen as an analogue to the test and demonstration environments that have been so effective in underpinning the success of the more mature asset-based Catapults. You heard from Mr Elsy earlier about the remarkable things that high-value manufacturing has done.

In particular, how can we build what at the moment are effectively research artefacts into propositions that can better connect the physics of place with people and the users of energy, innovation and broader markets? It is about joining those up to create an environment that companies feel compelled to invest and participate in, so they can access some form of competitive advantage. My experience from my time in industry is that I would invest my research budget only if I could see a way in which it would differentially advantage me against my competition. I need to have something to buy into. Those test and demonstration environments we have been talking about are a great example of that happening.

You then need CR&D to support smaller companies and others to participate in them as well. Larger companies, which are going to be the big drivers of growing to 2.4%, need something to buy into that is unique and gives them advantage.

Lord Mair: Specifically, what is the best mechanism for Innovate UK to support the funding of those test and demonstration facilities that you were referring to?

Philip New: It needs to have more flexibility in how it allocates its money. In this particular instance, it would be access to capital grants between the normal core grant funding periods. If a good opportunity emerges within that five-year window, it is not simply money that is allocated through the normal mechanisms. It has an opportunity to, at its discretion, invest in supporting a Catapult to build such an environment.

Andrew Jamieson: It is a very interesting question. I think all of us in the Catapults fully accept that we need to be measured and held to account on the value we are creating with the money we are using from Innovate UK. If we go back some years, when the austerity budgets were kicking in very hard across all departments, Innovate UK suffered from that badly. The level of budget has largely not recovered. We understand certain reasons as to why, but it is also important to understand that it has also established quite a culture of—perversely, in the world of

innovation—being highly risk averse and making sure that there is no failure in whatever programmes go on. That is part of the culture now that we are all having to deal with and challenge.

In my sector, every project that goes forward in offshore wind is in the billions of pounds of investment. Doing anything in the research world for these large projects naturally says it is in the millions of pounds to make any kind of difference. That is where, as a nation, we come unstuck. The applied research programmes need to match the scale of the industry solutions that are required. Innovate UK, through no fault of its own, has been held back on that a lot. That has an overall flow-through for the entire programme across all the Catapults.

I would agree with Philip: I would like to see a lot more applied research through real demonstration projects. These will be, naturally, in the millions of pounds. That is something we all need to address. As we have mentioned, we are an asset-based Catapult. Those assets take millions of pounds to invest in. If this nation is to compete around the world and attract and grow manufacturing in these shores, we need to make significant investments. There are no two ways about it. We need the checks and balances of making sure we are doing the right thing. We also need to move forward with a bit more aplomb than we have been able to do historically.

Lord Mair: In your written evidence, you told us there is a market failure in your sector and you talked about the need to gain greater traction in the marketplace. What should be the role of Innovate UK, and indeed the Government, in addressing this market failure, taking the point you make in your evidence?

Andrew Jamieson: For context, the industry we serve in offshore renewables is largely two camps. It is a lot more than that, but it is largely two. You have the development community, which tends to be the utility and energy companies that develop the projects. They put a lot of money at risk through the planning processes, winning the contracts for difference that give them the right to generate the electricity, winning planning permission and so on. There is a lot of value at risk. Then you have the supply chain, which sells its goods and services to the developers to build the projects.

Our policy mechanisms in the UK to decarbonise and create more renewables are highly incentivised towards the development community. The development community is very competitive and that has played a large part in the tremendous result we have in cost competitiveness and offshore renewables. Some 10 years ago, it was maybe £150 a unit of electricity. Now we are offering up £40 or less for electricity, so it has been a staggering cost reduction. Every electricity user in the UK has gained from that. There has been less focus on how we grow a supply chain to provide more of those goods and services to the development community from the UK and how we do more in the research world that would inspire more players in a supply chain to come into this market to keep on delivering.

Government is beginning to address some of those aspects of life at the moment, but an awful lot more needs to be done. I would like to see very strong, strategic alignment between government, UKRI, Innovate UK and indeed the Catapults. These are all critical things for net zero in the future. We have done extremely well in terms of capacity thus far for offshore renewables, but we frankly need to put in about 10 times more than we have today. We need new thinking and new appetite for doing that. I feel that we can do that only through a better balance between competition and collaboration on some of the key issues on the way forwards.

Lord Mair: Mr Martin, what should Innovate UK's main priority be for your Catapult?

Stuart Martin: The challenge is figuring out why business does not invest more in research and development than it currently does. We know our businesses are hungry for new ideas from the amount of money they spend on market research. We know it because of the amount of effort they put into user surveys, constantly looking for new ideas and things they can put out into their products and services to give them a competitive advantage. They are not reaching back into the research base for those ideas. We need to understand why.

We also have one of the most sophisticated investment environments anywhere in the world. We know that, if there was a return to be had from that kind of activity, the investments would be forthcoming. That points to something missing in our innovation ecosystem that prevents such investments. There is a challenge. We have one of the world-leading science bases. Fantastic science goes on in this country. We create fantastic knowledge from our scientific institutions, but we are not very good at turning that knowledge into the ideas that businesses crave in order to turn those into products and services that they can use to differentiate themselves in their marketplace.

We do not do enough in that translation space between knowledge and ideas that industry can then take advantage of. We are still thinking about this as a problem of de-risking investment at the close-to-market side. That is important, and we should not stop doing that, but we are not doing enough in the space that comes before that, which is about transferring knowledge from the research base into ideas that industry can then exploit.

Q35 **Lord Kakkar:** I would like to build on that and explore a little further the R&D ecosystem attending the Catapults and, indeed, the role that Innovate UK plays. We have heard that Innovate UK should be funding more transformative and riskier collaborative R&D. Do you think it is funding the right types of collaborative R&D for your Catapults and sectors?

Stuart Martin: I was one of the Catapults that said that. Maybe I will build a little on my previous comments. We need to make it easier for industry to do the research it is not currently doing. Part of the problem is that we are looking for short-term gratification from the public spend.

We are looking to the leverage on the funding we get, or the funding we give to industry, to show we are immediately getting a return on our investment.

In the translation of ideas from the research base out into the business space, we need to do more at an earlier stage to create that ferment of ideas that the industry can reach back into. If we have more activity going on in that area, there will be a better return for industry when it starts reaching back and trying to see what it can take advantage of. That is the point I was trying to get to: that higher-risk activity that industry is not yet ready to invest in, but which will create the outputs that it can then invest in. That is where we have the gap at the moment.

Lord Kakkar: Do you think that rightly sits in the territory of Innovate UK?

Stuart Martin: It is in nobody's territory at the moment and that is the problem. At the moment, we have the science base and what the research councils fund. Then we have the gap I am talking about. Then we have the business space, the R&D space, that Innovate UK funds. Somebody needs to fill that gap in the middle. We need everybody being in that gap in the middle so we can have a free flow of knowledge and ideas across that whole space. Somehow, we need to encourage that kind of activity.

Andrew Jamieson: I agree very much with the evidence Stuart has just provided you. I will try not to repeat that. The Catapults were established based on models that exist worldwide. How do other countries do innovation and drive it harder into industry? One of the main benchmarks was the German programme called Fraunhofer. I deal very closely with our equivalent in Fraunhofer and I see the equivalent of a Catapult with a much stronger academic base sitting below it.

I have been quite clear in my business that we need to have strong relationships with the research community, because there is no point in my business trying to replicate what strengths exist within the research community. We have a tremendous opportunity in the UK, under the UKRI model, which brings the research councils together more closely with Innovate UK, to achieve that as a successful model for all of us. There is more to be done in addressing the barriers that exist about why research does what research does, why we are doing what we do and how you bring those things more closely together. Frankly, it needs quite a lot of deep alignment across many of the vectors that are driving behaviours across our whole research landscape.

There are a lot of applied research centres in the UK that quite often go underutilised. We have a very big ecosystem, but it is quite often siloed. It is an obvious thing to say, but a hard thing to do. We need stronger strategic alignment across that to get the best routing of innovative ideas from research pulling all the way through into industry.

Lord Kakkar: What role do the funding sources play in achieving that strategic alignment? Who is best positioned to deliver that for you?

Andrew Jamieson: The current funding system ought to be serving rather well, particularly if, under a UKRI model, we have the research councils sitting alongside Innovate UK. Marrying the ambitions of both aspects of the research councils and Innovate UK more strongly than we have been able to do historically would be a good thing. As I said earlier, Innovate UK has been somewhat hamstrung by not recovering from the austerity Budgets some years ago. It remains in a place of pretty good knowledge across the technology challenges.

I have no suggestion that the funding needs to be sitting elsewhere, but we need to see stronger links across the research community and across other departments of Whitehall, for example. There are innovation budgets sitting in BEIS, for example. Of course, we have things going on at regional levels. As a nation, we could get a greater sum of the parts.

Philip New: I will answer this by talking to an example of what I think has worked really well and an example of something I think has worked less well. What has worked really well is another example of the Industrial Strategy Challenge Fund in action. In our case, it is the “prospering from the energy revolution” challenge. Here, Innovate UK utilised its funding to engage local authorities, innovators, companies and a wide range of actors. It has an academic consortium heavily engaged and involved as well.

Now we are at the point of starting to see that having real impact in enabling local authorities to better understand what needs to happen to unleash subnational scale innovation and decarbonisation. It is starting to make a real difference. That is a great example of focused and inclusive funding that has had some benefits that I do not think any of us anticipated at the beginning.

What have worked less well are examples where competitive funding, when laid out in a very standardised and narrow way, has resulted in very little impact being made on the systemic barriers that are getting in the way of investment being unlocked. I have been sitting with industry leaders in my sector and their reaction against these things has almost been visceral. They bend themselves out of shape to participate in these programmes, they do the work and then, at the end of it, the waters close over the activity, they have to dismantle everything, and nothing has changed. They are fed up with that. Things that have a lasting impact and create some traction on the systemic barriers seem to be working quite well. Things that are simply putting money out there to do tech tests and pilots without a broader goal are less successful.

I would like to mention another example of some good vision by Innovate UK. It recognised that the net zero challenge is a significant and all-embracing challenge for the country, so it has incentivised and funded the Catapults to start to collaborate on better outcomes and make a stronger contribution to delivering net zero. As the network matures, we are starting to figure out how, by working together, we can see synergies across the network that are otherwise inaccessible if we are left to operate as individual entities.

Lord Kakkar: Is there evidence that, inadvertently, the approach to R&D

funding that Innovate UK has adopted, with the restrictions and rules attending this, has forced good businesses to do R&D elsewhere, outside of the United Kingdom, when they could have engaged here if the mechanisms had been clear and more facilitating?

The Chair: Answer very briefly please.

Stuart Martin: There is some evidence of that. The one example I am particularly thinking of is on the Industrial Strategy Challenge Fund. There were some very specific rules brought in for that programme about the intensity of funding and the amount of leverage expected from the private sector. By the measures we set ourselves for that fund, it has been extremely successful, and we have some good programmes under way. There were some other programmes that were slightly more ambitious, slightly further away from the market than what has ended up being funded, but they never got as far as submitting a proposal because they could not meet the criteria for the core. I know that, as a consequence of that, some of those companies have gone elsewhere to get the funding they were seeking.

Q36 **Lord Hollick:** I would like to look at the funding model and its efficiency through the lens of demand. How many projects do you fund each year? More importantly, how many promising projects do not receive funding? How do you prioritise? What changes would you make to the funding model and the rules surrounding it in order to target more opportunities and make a greater contribution to the 2.4% target?

Stuart Martin: This is a really interesting question. I am a supporter of the three-thirds funding model. It is a good way of ensuring that we have a strong range of activities close to the universities, low levels of technology development, through to what the businesses require—exactly trying to fill this gap I have been talking about. One of the consequences of that funding model is that two-thirds of what we do is competitive and dictated by what the market drives us towards. That can make it quite difficult for us to be strategic and do some of the stuff we think is going to be of greater value in the longer term. We tend to be more reactive and responsive to the shorter-term demands.

In response to the specific questions about percentages, I could not give you numbers directly. We can perhaps come back to you with some more information on that.¹ There is an issue about how much we can be strategic in the directions we are trying to follow.

Andrew Jamieson: We support between 150 and 230 SMEs a year, so in total, since the Catapult was formed, just under 1,000 SMEs have been supported. Direct support towards those companies with product development is around 200, so it is quite a number of SMEs, but it is engineering. Success in getting to the end of the line and making a huge

¹ In the last financial year (FY19/20) the Satellite Applications Catapult submitted 64 competitive proposals, of which 39 were successful. This then left 25 projects unfunded, of which 15 were collaborative R&D projects which would have involved SMEs. This includes one project in the health sector that had been awarded, but ultimately did not proceed due to the outbreak of the Covid-19 pandemic.

difference takes a long time to come. Meanwhile, I am also dealing with the big manufacturers and developers, as I mentioned. Their activities are creating multibillion pound benefits economically for the UK. It is quite hard to understand what success looks like in a company such as mine, when you are dealing with the smallest and the biggest. They are all valid and should be supported because we need a healthy mix.

As a nation, we constantly have a search about what success looks like. For example, SMEs can come in. I am dealing with a client just now that has a very novel disruptive technology for turbines. It is seeking support from across the public sector landscape. The biggest question that is constantly put to it by public sector funders is not so much about the chances of its turbine technology becoming a success as: "When are you going to build a factory? When are you going to build jobs so we can support economically the endeavours you are trying to do?" Yes, we need to see what the chances of economic gain are going to be as a result of all that, but these companies have technologies to be taken through very big stages and very heavy investments to properly be proved and become an alternative to what exists in the market today. That is no easy thing to do.

Asking innovators not just to focus on the science and technologies of the products but to think about longer-term manufacturing routes makes it quite a stretch for any SME to come in and make a large difference in our world. We need to consider what we are looking for in how we bring technologies through.

Lord Hollick: Do you think you have the skills to take that kind of longer-term, strategic view?

Andrew Jamieson: Certainly, on the technology aspect of things, yes. That is our experience of dealing with the markets, the market players and the wind turbine technologies that sit therein. When it comes to manufacturing, I would look to my colleagues in the High Value Manufacturing Catapult to talk about manufacturing efficiencies. It then leads into the wider landscape about where the geographic best place to be placing a factory is and what other economic activities and support mechanisms business might need. That is not necessarily in the direct remit of the Catapults, so it becomes quite a stretch for us to do that successfully.

Philip New: The thirds model, in principle, is fundamental to Catapults being able to be Catapults. If we were entirely nationally funded or overweight in terms of national funding, the temptation would be to retreat down the ladder of TRLs and become much closer to academia. If we were not given the support of the grant funding we get, we would have no choice but to compete as a commercial consulting house or similar and simply chase the money. The tension that is a result of the thirds model in principle is a helpful and important frame for enabling and forcing the Catapults to behave in the way they were designed and intended to do. How that plays out in detail will clearly depend on the context, maturity and business model of an individual Catapult. It does

not pay to be too dogmatic in chasing down the KPIs around it, but the principle of the blended approach is key.

To your question about how then we prioritise and how we approach industry, we are explicitly forbidden from being grant-giving or funding organisations. The support we provide has to be in kind. The way we do it is by having a very clear view of the critical challenges and opportunities that we see the sector facing in its transition to net zero and using that as the primary lens through which we then determine the themes against which we put out calls to innovators to apply to work in partnership with us and ultimately be introduced to the network of investors, VCs and strategics. We try to matchmake the most promising technologies with the money. In a sense, we have a curatorial and matchmaking role, trying to take the most important challenges and connect the most promising innovations with the investment community.

Lord Hollick: Are you satisfied that you are not leaving promising projects to one side because of lack of funding or the restrictions of the rules under which you operate?

Philip New: We can always do more. One big debate in my Catapult right now, as we think about our business plan for the coming year, is whether we can afford to do more than one such call in the coming year. In a typical call, we will work with perhaps six SMEs very closely. The lack of bandwidth has a consequence in how we prioritise and ration what we can do and the impact we can have.

Q37 **Baroness Hilton of Eggardon:** The Government have an agenda of levelling up the country. To what extent are you satisfied with the geographic spread of your initiatives? To what extent can you encourage investment in deprived areas of the country?

Philip New: We find ourselves working across the country predominantly in two forms. First, it depends where the small companies that we work with are located. Critically and increasingly, we are building relationships with local authorities, as we try to bring our tools and capabilities to bear to help them think through what they need to do to support building more robust local infrastructure, driven by the decarbonisation challenge. In our particular case, we focus quite a lot on the questions and challenges of social equity in the transition, and making sure that the fuel-poor and the vulnerable are able to benefit as much as the relatively wealthy Tesla owners in the transition from where we are to where we need to be. That is a very high-priority issue for many of the councils and local authorities we work with.

That is the way we interact. We do local area energy planning with them. We are developing toolkits to support them in how they work through. Included in those toolkits are mechanisms and advice they can use to help them be stronger at attracting the investment they need in order to supplement such money as they have available in their own control. That is the predominant way in which we play in. As ever, similar to my last answer, we are very proud of what we are doing. There are Innovate UK and BEIS projects and programmes that are supporting and helping us

with this. There is more that can be done, and we are very concerned about the urgency of action, particularly given the timelines and ambitions that have been announced around the rate and pace of decarbonisation that we have to see in this country.

Andrew Jamieson: The Offshore Renewable Energy Catapult is geographically blessed by good happenstance on the levelling-up agenda. I am sitting in my office in Glasgow. Our main centre of operations is in Blyth in Northumberland, which has been an area of economic deprivation for many years. We have the biggest assets in the world for the innovation, testing and validation of offshore wind turbines. We are currently putting a 12-megawatt turbine owned by GE renewables through its paces. We have just certified the 107-metre blade that goes with that through its subsidiary, LM. Getting through that process is a project that has then released billions of pounds into the Dogger Bank investment.

There is fantastic economic value flowing through Catapults in various aspects of the geographic territory. We are also in Grimsby. We set up an office there to help industry further operations and maintenance, trying to break people out of siloes and coming together on how to create the supply chain that would better that. We have a turbine and an office in Fife. We are also looking at where we are going to put our floating wind centre of excellence, which is likely to be on one of the coasts. We are in Wales and Cornwall because these areas also have very high marine and offshore wind growth ambitions.

It needs not just a Catapult to be there but a very strong and willing match with the local authorities and universities. Despite many years of economic deprivation, can we now make them places where businesses want to collocate around that? Those are other stretches and challenges towards the Catapults, which we are rising to. We are very pleased to be part of that journey. I am saying that success in that is not simply down to the Catapults being there; it is a very collaborative effort required across many stakeholders. I firmly believe that Catapults can play a huge role in the levelling-up agenda.

Stuart Martin: I can emphasise that further. When Catapults were starting out, around 2012 and 2013, they were about accreting businesses and creating clusters around a single location. That was certainly our mission in Harwell in south Oxfordshire. Very early on, when we were engaging with the broader industry, it was clear that it wanted us to play more of a national role. It wanted us to spread out and make sure that other parts of the country could have access to what was going on at Harwell and have something tailored to their own specific needs. We decided to create a network of centres of excellence around the country.

We had to fight the system a little bit to do that at the time, because it was still very focused on clustering as the Catapult objective. None the less, we set up a network of centres of excellence, three of them initially. We now have six. We have found that, wherever we have gone in the country, there is expertise, knowledge and local specialisms that we can

enhance, add to and build on, to give them the power of satellite applications. Every location we have operated at has been successful. We have a very strong presence now in Leicester and in the north-east around Durham. We have a great team up in Glasgow, working with Strathclyde University, and elsewhere around the country. We are now working with other locations in north Wales and Southampton. We continue to see that there is always something there that you can build on and take advantage of, and where a Catapult can make a difference.

The Chair: Can I thank all three of you most sincerely? Thank you for coming today to help us with this session. It has been brilliant, and the timekeeping again has been fantastic, so thank you very much indeed.